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approval by the Office of Management and Budget for a period of three years.

**§ 25.221 Blanket Licensing provisions for Earth Stations on Vessels (ESVs) receiving in the 3700–4200 MHz (space-to-Earth) frequency band and transmitting in the 5925–6425 MHz (Earth-to-space) frequency band, operating with Geostationary Satellite Orbit (GSO) Satellites in the Fixed-Satellite Service.**

(a) The following ongoing requirements govern all ESV licensees and operations in the 3700–4200 MHz (space-to-Earth) and 5925–6425 MHz (Earth-to-space) bands transmitting to GSO satellites in the Fixed-Satellite Service. ESV licensees must comply with the requirements in paragraph (a)(1), (a)(2) or (a)(3) of this section and all of the requirements set forth in paragraphs (a)(4) through (a)(13) of this section. Paragraph (b) of this section identifies items that must be included in the application for ESV operations to dem-

onstrate that these ongoing requirements will be met.

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

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

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

26.3 – 10log(N) – 25logθ .....	dBW/4 kHz .....	for .....	1.5° ≤ θ ≤ 7°
5.3 – 10log(N) .....	dBW/4 kHz .....	for .....	7° < θ ≤ 9.2°
29.3 – 10log(N) – 25logθ .....	dBW/4 kHz .....	for .....	9.2° < θ ≤ 48°
– 12.7 – 10log(N) .....	dBW/4 kHz .....	for .....	48° < 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 an ESV network using frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques, N is equal to one. For ESV networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected number of co-frequency simultaneously transmit-

ting ESV earth stations in the same satellite receiving beam. For the purpose of this section, the peak EIRP of an individual sidelobe may not exceed the envelope defined above for θ between 1.5° and 7.0°. For θ greater than 7.0°, the envelope may 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 ESV shall not exceed the following values:

29.3 – 10log(N) – 25logθ .....	dBW/4 kHz .....	for .....	3.0° ≤ θ ≤ 48°
– 12.7 – 10log(N) .....	dBW/4 kHz .....	for .....	48° < θ ≤ 180°

Where θ and N are defined in paragraph (a)(1)(i)(A) of this section. 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)

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of this section. For the purpose of this section, the envelope may 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 inter-

preted 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 ESV shall not exceed the following values:

16.3 - 10log(N) - 25logθ .....	dBW/4 kHz .....	for .....	1.8° ≤ θ ≤ 7.0°
-4.7 - 10log(N) .....	dBW/4 kHz .....	for .....	7.0° < θ ≤ 9.2°

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 orbital location of the target satellite.

(D) For non-circular ESV antennas, the major axis of the antenna will 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) Except for ESV systems operating under paragraph (a)(3) of this section, each ESV transmitter must meet one of the following antenna pointing error requirements:

(A) Each ESV 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 ESV antenna, or

(B) Each ESV transmitter shall maintain the declared maximum antenna pointing error that may be greater than 0.2° provided that the ESV 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) Except for ESV systems operating under paragraph (a)(3) of this section, each ESV transmitter must meet one of the following cessation of emission requirements:

(A) For ESVs operating under paragraph (a)(1)(ii)(A) of this section, all emissions from the ESV 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 ESV antenna exceeds 0.5°, and transmission will not

resume until such angle is less than or equal to 0.2°, or

(B) For ESV transmitters operating under paragraph (a)(1)(ii)(B) of this section, all emissions from the ESV 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 ESV 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 an ESV that uses off-axis EIRP spectral-densities in excess of the levels in paragraph (a)(1)(i) or (a)(3)(i) of this section. An ESV or ESV system operating under this paragraph (a)(2) shall file certifications and provide a detailed demonstration(s) as described in paragraph (b)(2) of this section.

(i) The ESV 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 ESV operator shall accept the power-density levels that would accommodate that adjacent satellite.

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

target satellite operator. For ESVs using variable power systems, the individual ESV transmitter shall automatically cease or reduce emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP-density limits supplied to the target satellite operator; the individual transmitter must be self-monitoring and capable of shutting itself off; and if one or more ESV transmitters causes the aggregate off-axis EIRP-densities to exceed the off-axis EIRP-density limits supplied to the target satellite operator, then the transmitter or transmitters shall cease or reduce emissions within 100 milliseconds of receiving a command from the system's central control and monitoring station.

(3) The following requirements shall apply to an ESV system that uses variable power-density control of individual simultaneously transmitting co-frequency ESV earth stations in the same satellite receiving beam unless that ESV system operates pursuant to paragraph (a)(2) of this section. An ESV system operating under this paragraph (a)(3) shall provide a detailed demonstration as described in paragraph (b)(3) of this section.

(i) The effective aggregate EIRP-density from all terminals shall be at least 1 dB below the off-axis EIRP-density limits defined in paragraph (a)(1)(i) of this section, with the value of  $N = 1$ . 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 transmitter operating 1 dB below the off-axis EIRP-density limits defined in paragraph (a)(1)(i) of this section. An ESV system operating under this paragraph (a)(3) shall provide a detailed demonstration as described in paragraph (b)(3)(i) of this section.

(ii) The individual ESV transmitter shall automatically cease or reduce emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP-density limits specified in paragraph (a)(3)(i) of this section. The individual transmitter must be self-monitoring and capable of shutting itself off. If one or more ESV transmitters causes the aggregate off-axis EIRP-

densities to exceed the off-axis EIRP-density limits specified in paragraph (a)(3)(i) of this section, then the transmitter or transmitters shall cease or reduce emissions within 100 milliseconds of receiving a command from the system's central control and monitoring station.

(4) 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 ESVs, either directly or through the facilities of a U.S. Hub or a Hub located in another country with which the United States has a bilateral agreement that enables such cessation of emissions.

(5) For each ESV transmitter, a record of the ship 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 1 year. Records will be recorded at time intervals no greater than every 20 minutes while the ESV is transmitting. The ESV operator will make this data available upon request to a coordinator, fixed system operator, Fixed-Satellite system operator, or the Commission within 24 hours of the request.

(6) ESV operators communicating with vessels of foreign registry must maintain detailed information on each vessel's country of registry and a point of contact for the relevant administration responsible for licensing ESVs.

(7) ESV operators shall control all ESVs by a hub earth station located in the United States, except that an ESV on U.S.-registered vessels may operate under control of a hub earth station location outside the United States provided the ESV operator maintains a point of contact within the United States that will have the capability and authority to cause an ESV on a U.S.-registered vessel to cease transmitting if necessary.

(8) ESV operators transmitting in the 5925–6425 MHz (Earth-to-space) frequency band to GSO satellites in the Fixed-Satellite Service (FSS) shall not seek to coordinate, in any geographic location, more than 36 megahertz of uplink bandwidth on each of no more than two GSO FSS satellites.

(9) ESVs shall not operate in the 5925–6425 MHz (Earth-to-space) and 3700–4200 MHz (space-to-Earth) frequency bands on vessels smaller than 300 gross tons.

(10) ESVs, operating while docked, that complete coordination with terrestrial stations in the 3700–4200 MHz band in accordance with § 25.251, shall receive protection from such terrestrial stations in accordance with the coordination agreements, for 180 days, renewable for 180 days.

(11) ESVs in motion shall not claim protection from harmful interference from any authorized terrestrial stations or lawfully operating satellites to which frequencies are either already assigned, or may be assigned in the future in the 3700–4200 MHz (space-to-Earth) frequency band.

(12) ESVs operating within 200 km from the baseline of the United States, or within 200 km from a U.S.-licensed fixed service offshore installation, shall complete coordination with potentially affected U.S.-licensed fixed service operators prior to operation. The coordination method and the interference criteria objective shall be determined by the frequency coordinator. The details of the coordination shall be maintained and available at the frequency coordinator, and shall be filed with the Commission electronically via the International Bureau Filing System (<http://licensing.fcc.gov/myibfs/>) to be placed on public notice. The coordination notifications must be filed in the form of a statement referencing the relevant call signs and file numbers. Operation of each individual ESV may commence immediately after the public notice is released that identifies the notification sent to the Commission. Continuance of operation of that ESV for the duration of the coordination term shall be dependent upon successful completion of the normal public notice process. If, prior to the end of the 30-day comment period of the public notice, any objections are received from U.S.-licensed fixed service operators that have been excluded from coordination, the ESV licensee shall immediately cease operation of that particular station on frequencies used by the affected U.S.-licensed fixed service station until the coordination

dispute is resolved and the ESV licensee informs the Commission of the resolution.

(13) ESV operators must automatically cease transmission if the ESV operates in violation of the terms of its coordination agreement, including, but not limited to, conditions related to speed of the vessel or if the ESV travels outside the coordinated area, if within 200 km from the baseline of the United States, or within 200 km from a U.S.-licensed fixed service offshore installation. Transmissions may be controlled by the ESV network. The frequency coordinator may decide whether ESV operators should automatically cease transmissions if the vessel falls below a prescribed speed within a prescribed geographic area.

(b) Applications for ESV operation in the 5925–6425 MHz (Earth-to-space) band to GSO satellites in the Fixed-Satellite Service must include, in addition to the particulars of operation identified on Form 312, and associated Schedule B, the applicable technical demonstrations in paragraphs (b)(1) or (2) of this section and the documentation identified in paragraphs (b)(3) through (5) of this section.

(1) An ESV applicant proposing to implement a transmitter under paragraph (a)(1) of this section must 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 ESV applicant also must provide the value N described in paragraph (a)(1)(i)(A) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(A) of this section must provide the certifications identified in paragraph (b)(1)(iii) of this section. An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must provide the demonstrations identified in paragraph (b)(1)(iv) of this section.

(i) Any ESV applicant filing an application pursuant to paragraph (a)(1) of this section must 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. In each table, the EIRP level must be provided 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 position 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 position 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 position 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 certification, in Schedule B, that the ESV 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 (C) of this section will be met under the assumption that the antenna is pointed at the target satellite. If an antenna proposed for use by the applicant does not comply with the antenna performance standards in § 25.209(a) and (b), the applicant must provide, as an exhibit to its application, antenna gain test plots pursuant to § 25.132(b)(3).

(iii) An ESV applicant proposing to implement a transmitter under para-

graph (a)(1)(ii)(A) of this section, must 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 ESV 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 ESV antenna exceeds 0.5°.

(iv) An ESV applicant proposing to implement a transmitter under paragraph (a)(1)(ii)(B) of this section must:

(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 ESV 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 ESV 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 ESV antenna is less than or equal to the declared maximum antenna pointing error.

(2) An ESV 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) or (a)(3)(i) of this section shall provide the following certifications and demonstration(s) as exhibits to its earth station application:

(i) A statement from the target satellite operator certifying that the proposed operation of the ESV 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 ESV 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 ESV applicant in all future coordination agreements.

(iv) Except for variable power ESV applicants, a demonstration from the ESV operator that the ESV 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. Variable power ESV applicants shall provide a detailed showing that an individual ESV terminal is capable of automatically ceasing or reducing emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP spectral-densities supplied to the target satellite operator; that the individual transmitter is self-monitoring and capable of shutting itself off; and that one or more transmitters are capable of automatically ceasing or reducing emissions within 100 milliseconds of receiving the appropriate command from the system's central control and monitoring station if the aggregate off-axis EIRP spectral-densities of the transmitter or transmitters exceed the off-axis EIRP spectral-densities supplied to the target satellite operator.

(v) A certification from the ESV operator that the ESV system complies with the power limits in § 25.204(h).

(3) An ESV applicant proposing to implement an ESV system under paragraph (a)(3) of this section and using variable power-density control of individual simultaneously transmitting co-frequency ESV earth stations in the same satellite receiving beam shall provide the information in paragraphs (b)(3)(i) and (b)(3)(ii) of this section as exhibits to its earth station application. The International Bureau will place these showings on Public Notice along with the application.

(i) The ESV applicant shall provide a detailed showing of the measures it in-

tends 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 paragraph (a)(1)(i) 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 ESV transmitter operating at 1 dB below the limits defined in paragraph (a)(1)(i) of this section.

(ii) The ESV applicant shall provide a detailed showing that an individual ESV terminal is capable of automatically ceasing or reducing emissions within 100 milliseconds if the ESV transmitter exceeds the off-axis EIRP-density limit specified in paragraph (a)(3)(i) of this section and that the individual transmitter is self-monitoring and capable of shutting itself off. The ESV applicant shall also provide a detailed showing that one or more transmitters are capable of automatically ceasing or reducing emissions within 100 milliseconds of receiving the appropriate command from the system's central control and monitoring station if the aggregate off-axis EIRP spectral-densities of the transmitter or transmitters exceed the off-axis EIRP-density limits specified in paragraph (a)(3)(i) of this section.

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

(5) The point of contact information referred to in paragraph (a)(3) of this section and, if applicable, paragraph (a)(6) of this section, must be included in the application.

(6) ESVs that exceed the radiation guidelines of § 1.1310 of this chapter, Radiofrequency radiation exposure limits, must provide, with their environmental assessment, a plan for mitigation of radiation exposure to the extent required to meet those guidelines.

(7) Except for ESV systems operating pursuant to paragraph (a)(2) of this section, ESV systems authorized pursuant

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to this section shall be eligible for a license that lists ALSAT as an authorized point of communication.

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**§ 25.222 Blanket Licensing provisions for Earth Stations on Vessels (ESVs) receiving 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) bands and transmitting in the 14.0–14.5 GHz (Earth-to-space) band, operating with Geostationary Orbit (GSO) Satellites in the Fixed-Satellite Service.**

(a) The following ongoing requirements govern all ESV 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) bands transmitting to GSO satellites in the Fixed-Satellite Service. ESV licensees must comply with the requirements in paragraph (a)(1), (a)(2) or (a)(3) of this section and all of the requirements set forth in paragraphs (a)(4) through (a)(8) of this section. Paragraph (b) of this

section identifies items that must be included in the application for ESV operations to demonstrate that these ongoing requirements will be met.

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

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

(A) The off-axis EIRP spectral-density emitted from the ESV, in the plane of the 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 ESV networks using frequency division multiple access (FDMA) or time division multiple access (TDMA) techniques, N is equal to one. For ESV networks using multiple co-frequency transmitters that have the same EIRP, N is the maximum expected number of co-frequency simul-

taneously transmitting ESV earth stations in the same satellite receiving beam. For the purpose of this section, the peak EIRP of an individual sidelobe may not exceed the envelope defined above for θ between 1.5° and 7.0°. For θ greater than 7.0°, the envelope may 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 ESV shall not exceed the following values:

18–10log(N)–25logθ .....	dBW/4 kHz .....	for .....	3.0° ≤ θ ≤ 48°
–24–10log(N) .....	dBW/4 kHz .....	for .....	48° < θ ≤ 85°
–14–10log(N) .....	dBW/4 kHz .....	for .....	85° < θ ≤ 180°