

(2) If the proposed MVDDS antenna site does not meet the minimum spacing requirements on the date of original notification or on subsequent annual anniversary dates of non-operation as set forth in §101.129, then the MVDDS licensee shall not construct the proposed transmission facility unless all NGSO FSS licensees having active subscribers within the minimum separation distance agree to a shorter spacing. Nothing in this section shall preclude MVDDS and NGSO FSS licensees from agreeing to accept the siting of new MVDDS transmitting antennas that do not meet the minimum distance set forth in §101.129. Incumbent point-to-point licensees' (those not licensed as MVDDS) facilities are to be operated in the band 12,200–12,700 MHz following the procedures, technical standards, and requirements of §101.105 in order to protect stations providing Direct Broadcast Satellite Service.

(g) *Licensees operating in Basic Trading Areas authorized in the Local Multipoint Distribution Service.* (1) When the transmitting facilities in a Basic Trading Area (BTA) are to be operated in the bands 29,100–29,250 MHz and 31,000–31,300 MHz and the facilities are located within 20 kilometers of the boundaries of a BTA, each licensee must complete the frequency coordination process of paragraph (d)(2) of this section with respect to neighboring BTA licensees that may be affected by its operations prior to initiating service. In addition, all licensed transmitting facilities operating in the bands 31,000–31,075 MHz and 31,225–31,300 MHz and located within 20 kilometers of neighboring facilities must complete the frequency coordination process of paragraph (d)(2) of this section with respect to such authorized operations before initiating service.

(2) Response to notification should be made as quickly as possible, even if no technical problems are anticipated. Any response to notification indicating potential interference must specify the technical details and must be provided to the applicant, either electronically or in writing, within the 30-day notification period. Every reasonable effort should be made by all licensees to eliminate all problems and conflicts. If

no response to notification is received within 30 days, the licensee will be deemed to have made reasonable efforts to coordinate and commence operation without a response. The beginning of the 30-day period is determined pursuant to paragraph (d)(2)(v) of this section.

(h) *Special requirements for operations in the band 29,100–29,250 MHz.* (1)(i) Local Multipoint Distribution Service (LMDS) receive stations operating on frequencies in the 29,100–29,250 MHz band within a radius of 75 nautical miles of the geographic coordinates provided by a non-GSO-MSS licensee pursuant to §101.113(c)(2) or (c)(3)(i) (the “feeder link earth station complex protection zone”) shall accept any interference caused to them by such earth station complexes and shall not claim protection from such earth station complexes.

(ii) LMDS licensees operating on frequencies in the 29,100–29,250 MHz band outside a feeder link earth station complex protection zone shall cooperate fully and make reasonable efforts to resolve technical problems with the non-GSO MSS licensee to the extent that transmissions from the non-GSO MSS operator’s feeder link earth station complex interfere with an LMDS receive station.

(2) No more than 15 days after the release of a public notice announcing the commencement of LMDS auctions, feeder link earth station complexes to be licensed pursuant to §25.257 of this chapter shall be specified by a set of geographic coordinates in accordance with the following requirements: no feeder link earth station complex may be located in the top eight (8) metropolitan statistical areas (MSAs), ranked by population, as defined by the Office of Management and Budget as of June 1993, using estimated populations as of December 1992; two (2) complexes may be located in MSAs 9 through 25, one of which must be Phoenix, AZ (for a complex at Chandler, AZ); two (2) complexes may be located in MSAs 26 to 50; three (3) complexes may be located in MSAs 51 to 100, one of which must be Honolulu, Hawaii (for a complex at Waimea); and the three (3) remaining complexes must be located at least 75 nautical miles from the borders

of the 100 largest MSAs or in any MSA not included in the 100 largest MSAs. Any location allotted for one range of MSAs may be taken from an MSA below that range.

(3)(i) Any non-GSO MSS licensee may at any time specify sets of geographic coordinates for feeder link earth station complexes with each earth station contained therein to be located at least 75 nautical miles from the border of the 100 largest MSAs.

(ii) For purposes of paragraph (h)(3)(i) of this section, non-GSO MSS feeder link earth station complexes shall be entitled to accommodation only if the affected non-GSO MSS licensee preapplies to the Commission for a feeder link earth station complex or certifies to the Commission within sixty days of receiving a copy of an LMDS application that it intends to file an application for a feeder link earth station complex within six months of the date of receipt of the LMDS application.

(iii) If said non-GSO MSS licensee application is filed later than six months after certification of the Commission, the LMDS and non-GSO MSS entities shall still cooperate fully and make reasonable efforts to resolve technical problems, but the LMDS licensee shall not be obligated to re-engineer its proposal or make changes to its system.

(4) LMDS licensees or applicants proposing to operate hub stations on frequencies in the 29,100–29,250 MHz band at locations outside of the 100 largest MSAs or within a distance of 150 nautical miles from a set of geographic coordinates specified under paragraphs (h)(2) or (h)(3)(i) of this section shall serve copies of their applications on all non-GSO MSS applicants, permittees or licensees meeting the criteria specified in §25.257(a). Non-GSO MSS licensees or applicants shall serve copies of their feeder link earth station applications, after the LMDS auction, on any LMDS applicant or licensee within a distance of 150 nautical miles from the geographic coordinates that it specified under §101.113(c)(2) or (c)(3)(i). Any necessary coordination shall commence upon notification by the party receiving an application to the party who filed the application. The results of any such coordination shall be re-

ported to the Commission within sixty days. The non-GSO MSS earth station licensee shall also provide all such LMDS licensees with a copy of its channel plan.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23165, Apr. 29, 1997; 63 FR 6105, Feb. 6, 1998; 63 FR 9448, Feb. 25, 1998; 63 FR 14039, Mar. 24, 1998; 63 FR 68983, Dec. 14, 1998; 64 FR 45893, Aug. 23, 1999; 65 FR 38328, June 20, 2000; 67 FR 43037, June 26, 2002; 76 FR 59571, Sept. 27, 2011; 81 FR 79944, Nov. 14, 2016]

#### §101.105 Interference protection criteria.

(a) The interference protection criteria for fixed stations subject to this part are as follows:

(1) To long-haul analog systems, employing frequency modulated radio and frequency division multiplexing to provide multiple voice channels, the allowable interference level per exposure:

(i) Due to co-channel sideband-to-sideband interference must not exceed 5 pwpO (Picowatts of absolute noise power psophometrically weighted (pwpO), appearing in an equivalent voice band channel of 300–3400 Hz); or

(ii) Due to co-channel carrier-beat interference must not exceed 50 pwpO.

(2) To short-haul analog systems employing frequency modulated radio and frequency division multiplexing to provide multiple voice channels, the allowable interference level per exposure:

(i) Due to co-channel sideband-to-sideband interference must not exceed 25 pwpO except in the 952–960 MHz band interference into single link fixed relay and control stations must not exceed 250 pwpO per exposure; or

(ii) Due to co-channel carrier-beat interference must not exceed 50 pwpO except in the 952–960 MHz band interference into single link fixed relay and control stations must not exceed 1000 pwpO per exposure.

(3) FM-TV. In analog systems employing frequency modulated radio that is modulated by a standard, television (visual) signal, the allowable interference level per exposure may not exceed the levels which would apply to long-haul or short-haul FM-FDM systems, as outlined in paragraphs (b) (1) and (2) of this section, having a 600–1200 voice channel capacity.

(4) 12.2–12.7 GHz band. (i) To accommodate co-primary NGSO FSS earth stations in the 12.2–12.7 GHz band, the PFD of an MVDDS transmitting system must not exceed –135 dBW/m<sup>2</sup> in any 4 kHz band at a reference point at the surface of the earth at a distance greater than 3 kilometers from the MVDDS transmitting antenna.

(ii) To accommodate co-primary Direct Broadcast Satellite Service earth stations, an MVDDS transmitting system must not exceed the EPFD levels specified in paragraph (a)(4)(ii)(B) of this section at any DBS subscriber location in accordance with the procedures listed in §101.1440 of this part.

(A) Definition of equivalent power flux density: The equivalent power flux density (EPFD) is the power flux density produced at a direct broadcast service (DBS) receive earth station, taking into account shielding effects and the off-axis discrimination of the receiving antenna assumed to be pointing at the appropriate DBS satellite(s) from the transmitting antenna of a multichannel video distribution and data service (MVDDS) transmit station. The EPFD in dBW/m<sup>2</sup> in the reference bandwidth is calculated using the following formula:

$$EPFD = 10 * \log_{10} \left[ \frac{P_{out} * G_m(\theta_m, \phi_m) * G_e(\theta_e, \phi_e) * I}{G_{e,max} * 4 * \pi * d^2} \right]$$

Where:

P<sub>out</sub> = Total output power of the MVDDS transmitter (watts) into antenna

G<sub>m</sub> (θ<sub>m</sub>, φ<sub>m</sub>) = Gain of the MVDDS antenna in the direction of the DBS earth station

G<sub>e</sub> (θ<sub>e</sub>, φ<sub>e</sub>) = Gain of the earth station in the direction of the MVDDS antenna

I = Interference scaling factor for the earth station (1 dB for MVDDS transmitters employing the modulation discussed in Section 3.1.5 of the MITRE Report (*i.e.*, a QPSK modulated signal passed through a square-root raised cosine filter). For other modulation and filtering schemes, the interference scaling factor can be measured using the procedures described in Appendix A of the MITRE Report available at [http://www.fcc.gov/oet/info/mitrereport/mitrereport\\_4\\_01.pdf](http://www.fcc.gov/oet/info/mitrereport/mitrereport_4_01.pdf)).

G<sub>e,max</sub> = Maximum gain of the DBS earth station

d = the distance between the MVDDS transmitting antenna and the DBS earth station (meters)

(B) Regional equivalent power flux density levels:

(1) –168.4 dBW/m<sup>2</sup>/4kHz in the Eastern region consisting of the District of Columbia and the following states: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Ala-

bama, Mississippi, Louisiana, and Florida;

(2) –169.8 dBW/m<sup>2</sup>/4kHz in the Midwestern region consisting of the following states: Ohio, Michigan, Indiana, Wisconsin, Illinois, Minnesota, Iowa, Missouri, Arkansas, South Dakota, Nebraska, Kansas, Oklahoma, and Texas;

(3) –171.0 dBW/m<sup>2</sup>/4kHz in the Southwestern region consisting of the following states: Wyoming, Colorado, New Mexico, Utah, Arizona, Nevada, and California (south of 37° North Latitude);

(4) –172.1 dBW/m<sup>2</sup>/4kHz in the Northwestern region consisting of the following states: Washington, Oregon, California (north of 37° North Latitude), Idaho, Montana, North Dakota, Alaska, and Hawaii.

(iii) Except for public safety entities, harmful interference protection from MVDDS stations to incumbent point-to-point 12 GHz fixed stations is not required. Incumbent point-to-point private operational fixed 12 GHz stations, except for public safety entities, are required to protect MVDDS stations under the process described in §101.103(d) of this part.

(5) 71,000–76,000 MHz; 81,000–86,000 MHz. In these bands the following interference criteria shall apply:

(i) For receivers employing digital modulation: based upon manufacturer data and following TSB 10-F or other generally acceptable good engineering practice, for each potential case of interference a threshold-to-interference ratio (T/I) shall be determined that would cause 1.0 dB of degradation to the static threshold of the protected receiver. For the range of carrier power levels (C) between the clear-air (unfaded) value and the fully-faded static threshold value, in no case shall interference cause C/I to be less than the T/I so determined unless it can be shown that the availability of the affected receiver would still be acceptable despite the interference.

(ii) For receivers employing analog modulation: manufacturer data or industry criteria will specify a baseband signal-to-noise requirement (S/N) of the receiver that will result in acceptable signal quality for continuous operation. Following TSB 10-F or other generally acceptable good engineering practice, for each potential case of interference a C/I objective shall be calculated to ensure that this S/N will not be degraded by more than 1.0 dB. For the range of carrier power levels (C) between the clear-air (unfaded) value and the fully-faded threshold value, in no case shall interference cause the C/I to be less than the objective so determined unless it can be shown that the signal quality and availability of the affected receiver would still be acceptable despite the interference.

(6) 92,000–94,000 MHz; 94,100–95,000 MHz. In these bands prior links shall be protected to a threshold-to-interference ratio (T/I) level of 1.0 dB of degradation to the static threshold of the protected receiver. Any new link shall not decrease a previous link's desired-to-undesired (D/U) signal ratio below a minimum of 36 dB, unless the earlier link's licensee agrees to accept a lower D/U.

(7) All stations operating under this part must protect the radio quiet zones as required by §1.924 of this chapter. Stations authorized by competitive bidding are cautioned that they must receive the appropriate approvals directly from the relevant quiet zone entity prior to operating.

(b) In addition to the requirements of paragraph (a) of this section the adjacent channel interference protection criteria to be afforded, regardless of system length, or type of modulation, multiplexing, or frequency band, must be such that the interfering signal does not produce more than 1.0 dB degradation of the practical threshold of the protected receiver. The "practical threshold" of the protected receiver can be based upon the definition in TSB 10, referenced in paragraph (c) of this section, or upon alternative generally acceptable good engineering standards.

(c) *Applying the criteria.* (1) Guidelines for applying the interference protection criteria for fixed stations subject to this part are specified in the Telecommunications Industry Association's Telecommunications Systems Bulletin TSB 10, "Interference Criteria for Microwave Systems" (TSB 10). Other procedures that follow generally acceptable good engineering practices are also acceptable to the Commission.

(2) If TSB 10 guidelines cannot be used, the following interference protection criteria may be used by calculating the ratio in dB between the desired (carrier signal) and the undesired (interfering) signal (C/I ratio) appearing at the input to the receiver under investigation (victim receiver). Except as provided in §101.147 where the applicant's proposed facilities are of a type not included in paragraphs (a) and (b) of this section or where the development of the carrier-to-interference (C/I) ratio is not covered by generally acceptable procedures, or where the applicant does not wish to develop the carrier-to-interference ratio, the applicant must, in the absence of criteria or a developed C/I ratio, employ the following C/I protection ratios:

(i) *Co-Channel Interference.* Both side band and carrier-beat, applicable to all bands; the existing or previously authorized system must be afforded a carrier to interfering signal protection ratio of at least 90 dB, except in the 952–960 MHz band where it must be 75dB, and in the 71,000–76,000 MHz and 81,000–86,000 MHz bands where the criteria in paragraph (a)(5) of this section applies, and in the 92,000–94,000 MHz and 94,100–95,000 MHz bands, where the

criteria in paragraph (a)(6) of this section applies; or

(ii) *Adjacent Channel Interference*. Applicable to all bands; the existing or previously authorized system must be afforded a carrier to interfering signal protection ratio of at least 56 dB, except in the 71,000–76,000 MHz and 81,000–86,000 MHz bands where the criteria in paragraph (a)(5) of this section applies, and in the 92,000–94,000 MHz and 94,100–95,000 MHz bands, where the criteria in paragraph (a)(6) of this section applies.

(3) Applicants for frequencies listed in § 101.147(b)(1) through (4) must make the following showings that protection criteria have been met over the entire service area of existing systems. Such showings may be made by the applicant or may be satisfied by a statement from a frequency coordinator.

(i) For site-based multiple address stations in the 928–929/952–960 MHz and the 932–932.5/941–941.5 MHz bands, a statement that the proposed system complies with the following co-channel separations from all existing stations and pending applications:

Fixed-to-fixed—145 km;  
Fixed-to-mobile—113 km;  
Mobile-to-mobile—81 km

NOTE TO PARAGRAPH (c)(3)(i): Multiple address systems employing only remote stations will be treated as mobile for the purposes of determining the appropriate separation. For mobile operation, the mileage is measured from the reference point specified on the license application. For fixed operation on subfrequencies in accordance with § 101.147 the mileage also is measured from the reference point specified on the license application.

(ii) In cases where the geographic separation standard in paragraph (c)(3)(i) of this section is not followed, an engineering analysis must be submitted to show the coordination of the proposed assignment with existing systems located closer than those standards. The engineering analyses will include:

(A) Specification of the interference criteria and system parameters used in the interference study;

(B) Nominal service areas of each system included in the interference analysis;

(C) Modified service areas resulting from the proposed system. The propagation models used to establish the

service boundary limits must be specified and any special terrain features considered in computing the interference impact should be described; and

(D) A statement that all parties affected have agreed to the engineering analysis and will accept the calculated levels of interference.

(iii) MAS EA licensees shall provide protection in accordance with § 101.1333.

(4) Multiple address systems operating on subfrequencies in accordance with § 101.147 that propose to operate master stations at unspecified locations must define the operating area by a radius about a geographical coordinate and describe how interference to co-channel users will be controlled.

(5) Multiple address frequencies in the 956.25–956.45 MHz bands may be assigned for use by mobile master stations on a primary basis. Multiple address frequencies in the 941.0–941.5 MHz bands that are licensed on a site-by-site basis and the 952 MHz bands may be assigned for use by primary mobile master stations on a case-by-case basis if the 956.25–956.45 MHz frequencies are unavailable. Multiple address mobile (master and remote) operation is permitted on frequencies licensed by geographic area subject to the interference protection criteria set forth in § 101.1333, *i.e.*, adjacent channel site-based licensees and co-channel operations in adjacent EAs. Mobile operation in the 959.85–960 MHz band is not permitted.

(6) Each application for new or modified nodal station on channels numbered 4A, 4B, 7, 9, and 19/20 in the 10.6 GHz band must demonstrate that all existing co-channel stations are at least 56 kilometers from the proposed nodal station site. Applicants for these channels must certify that all licensees and applicants for stations on the adjacent channels within 56 kilometers of the proposed nodal station have been notified of the proposed station and do not object. Alternatively, or if one of the affected adjacent channel interests does object, the applicant may show that all affected adjacent channel parties are provided a C/I protection ratio of 0 dB. An applicant proposing to operate at an AAT greater than 91 meters must reduce its EIRP in accordance with the following table; however, in