

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 reported 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.

(i)(1) When the licensed facilities are to be operated in the band 38,600 MHz to 40,000 MHz and the facilities are located within 16 kilometers of the boundaries of an Economic Area, each licensee must complete the frequency coordination process of subsection 101.103(d) with respect to neighboring EA licensees and existing licensees within its EA service area that may be affected by its operation prior to initiating service. In addition to the technical parameters listed in subsection 101.103(d), the coordinating licensee must also provide potentially affected parties technical information related to its subchannelization plan and system geometry.

(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 licensee, either electronically or

in writing, within 10 days of notification. Every reasonable effort should be made by all licensees to eliminate all problems and conflicts. If no response to notification is received within 10 days, the licensee will be deemed to have made reasonable efforts to coordinate and may commence operation without a response. The beginning of the 10-day period is determined pursuant to § 101.103(d)(v).

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§ 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.

(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 sideband 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 75 dB; 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.

(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) Mobile operation is permitted on any of the MAS frequency bands on a primary basis.

(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 and all point-to-multipoint channels in the 18 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 no case may EIRP exceed 70 dBm on the 10.6 GHz channels.

AAT (meters)	EIRP dBm
Above 300	+38
251 to 300	41
201 to 250	43
151 to 200	49
101 to 150	55
100 and below	85

(7) Each application for new or modified nodal station on channels numbered 21, 22, 23, and 24 in the 10.6 GHz band must include an analysis of the potential for harmful interference to all other licensed and previously applied for co-channel and adjacent channel stations located within 80 kilometers of the location of the proposed station. The criteria contained in §101.103(d)(2) must be used in this analysis. Applicants must certify that copies of this analysis have been served on

all parties which might reasonably be expected to receive interference above the levels set out in §101.103(d)(2) within 5 days of the date the subject application is filed with the Commission.

(8) If the potential interference will exceed the prescribed limits, a statement shall be submitted with the application for new or modified stations to the effect that all parties have agreed to accept the higher level of interference.

(d) Effective August 1, 1985, when a fixed station that conforms to the technical standards of this subpart (or, in the case of the 12,200-12,700 MHz band, a direct broadcast satellite station) receives or will receive interference in excess of the levels specified in this section as a result of an existing licensee's use of non-conforming equipment authorized between July 20, 1961 and July 1, 1976, and the interference would not result if the interfering station's equipment complied with the current technical standards, the licensee of the non-conforming station must take whatever steps are necessary to correct the situation up to the point of installing equipment which fully conforms to the technical standards of this subpart. In such cases, if the engineering analysis demonstrates that:

(1) The conforming station would receive interference from a non-conforming station in excess of the levels specified in this section; and

(2) The interference would be eliminated if the non-conforming equipment were replaced with equipment which complies with the standards of this subpart, the licensee (or prospective licensee) of the station which would receive interference must provide written notice of the potential interference to both the non-conforming licensee and the Commission's office in Gettysburg, PA. The non-conforming licensee must make all required equipment changes within 180 days from the date of official Commission notice informing the licensee that it must upgrade its equipment, unless an alternative solution has been agreed to by all parties involved in the interference situation. If a non-conforming licensee fails to make all required changes within the

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specified period of time, the Commission may require the licensee to suspend operation until the changes are completed.

(e) *Interference dispute resolution procedures.* Should a licensee licensed under this part receive harmful interference from another licensee licensed under this chapter, the parties involved shall comply with the dispute resolution procedures set forth herein:

(1) The licensee experiencing the harmful interference shall notify the licensee believed to be causing the harmful interference and shall supply information describing its problem and supporting its claim;

(2) Upon receipt of the harmful interference notice, the licensee alleged to be causing the harmful interference shall respond immediately and make every reasonable effort to identify and resolve the conflict; and

(3) Licensees are encouraged to resolve the harmful interference prior to contacting the Commission.

[61 FR 26677, May 28, 1996, as amended at 63 FR 68983, Dec. 14, 1998; 65 FR 17449, Apr. 3, 2000; 65 FR 38329, June 20, 2000]

§ 101.107 Frequency tolerance.

(a) The carrier frequency of each transmitter authorized in these services must be maintained within the following percentage of the reference frequency except as otherwise provided in paragraph (b) of this section or in the applicable subpart of this part (unless otherwise specified in the instrument of station authorization the reference frequency will be deemed to be the assigned frequency):

Frequency (MHz)	Frequency Tolerance (percent)		
	All fixed and base stations	Mobile stations over 3 watts	Mobile stations 3 watts or less
928 to 929 ^{2,5}	0.0005	.....	.....
932 to 932.5 ²	0.00015	.....	.....
932.5 to 935 ²	0.00025	.....	.....
941 to 941.5	0.00015	.....	.....
941.5 to 944	0.00025	.....	.....
952 to 960 ⁷ .....	.....	.....	.....
944.0 to 1,000	0.0005	0.0005	0.0005
1,850 to 1,990	0.002	.....	.....
2,110 to 2,200	0.001	.....	.....
2,200 to 12,200 ^{1,3} ..	0.005	0.005	0.005
2,450 to 2,500	0.001	.....	.....
3,700 to 4,200	0.005	.....	.....
5,925 to 6,875	0.005	.....	.....
10,550 to 11,700	0.005	.....	.....
12,200 to 13,250 ⁶ ...	0.005	.....	.....

Frequency (MHz)	Frequency Tolerance (percent)		
	All fixed and base stations	Mobile stations over 3 watts	Mobile stations 3 watts or less
12,200 to 17,700	0.03	0.03	0.03
17,700 to 18,820 ^{4,5} ..	0.003	.....	.....
18,820 to 18,920 ^{4,5} ..	0.001	.....	.....
18,920 to 19,700 ^{4,5} ..	0.003	.....	.....
19,700 to 27,500 ⁶ ...	0.03	.....	.....
27,500 to 28,350	0.001	.....	.....
29,100 to 29,250	0.001	.....	.....
31,000 to 31,075 ⁸ ...	0.001	.....	.....
31,075 to 31,225 ⁸ ...	0.001	.....	.....
31,225 to 31,300 ⁸ ...	0.001	.....	.....
31,300 to 40,000 ⁶ ...	0.03 ⁹	0.03	0.03

¹Applicable only to common carrier LTTS stations. Beginning Aug. 9, 1975, this tolerance will govern the marketing of LTTS equipment and the issuance of all such authorizations for new radio equipment. Until that date new equipment may be authorized with a frequency tolerance of .03 percent in the frequency range 2,200 to 10,500 MHz and .05 percent in the range 10,500 MHz to 12,200 MHz, and equipment so authorized may continue to be used for its life provided that it does not cause interference to the operation of any other licensee.

²Equipment authorized to be operated on frequencies between 890 and 940 MHz as of Oct. 15, 1956, must maintain a frequency tolerance within 0.03 percent subject to the condition that no harmful interference is caused to any other radio station.

³See subpart G of this part for the stability requirements for transmitters used in the Digital Electronic Message Service.

⁴Existing authorized equipment with a frequency tolerance of ±0.03% may be marketed until December 1, 1988. Equipment installed and operated prior to December 1, 1988 may continue to operate after that date with a minimum frequency tolerance of ±0.03%. However, the replacement of equipment requires that the ±0.003% tolerance be met.

⁵For remote stations with 12.5 KHz bandwidth, the tolerance is ±0.00015%.

⁶Applicable to private operational fixed point-to-point microwave only. For exceptions see § 101.147.

⁷For private operational fixed point-to-point microwave systems, with a channel greater than or equal to 50 KHz bandwidth, ±0.0005%; for multiple address master stations, regardless of bandwidth, ±0.00015%; for multiple address remote stations with 12.5 KHz bandwidths, ±0.00015%; for multiple address remote stations with channels greater than 12.5 KHz bandwidth, ±0.0005%.

⁸For stations authorized prior to March 11, 1997, and for non-Local Multipoint Distribution Service stations authorized pursuant to applications refiled no later than June 26, 1998, the transmitter frequency tolerance shall not exceed 0.030 percent.

⁹Equipment authorized to be operated in the 38,600-40,000 MHz band is exempt from the frequency tolerance requirement noted in the above table.

(b) Heterodyne microwave radio systems may be authorized at a somewhat less restrictive frequency tolerance (up to .01 percent) to compensate for frequency shift caused by numerous repeaters between base band signal insertion. Where such relaxation is sought, applicant must provide all calculations and indicate the desired tolerance over each path. In such instances the radio transmitters and receivers used must individually be capable of complying with the tolerance specified in paragraph (a) of this section. Heterodyne operation is restricted to channel bandwidth of 10 MHz or greater.