

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.

(c) As an additional requirement in any band where the Commission makes assignments according to a specified channel plan, provisions must be made to prevent the emission included within the occupied bandwidth from radiating outside the assigned channel at a level greater than that specified in § 101.111.

[61 FR 26677, May 28, 1996, as amended at 62 FR 23167, Apr. 29, 1997; 63 FR 6105, Feb. 6, 1998; 63 FR 9448, Feb. 25, 1998; 63 FR 14039, Mar. 24, 1998; 63 FR 36611, July 7, 1998; 66 FR 35110, July 3, 2001; 67 FR 43038, June 26, 2002; 68 FR 4956, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 69 FR 16832, Mar. 31, 2004; 70 FR 4787, Jan. 31, 2005; 76 FR 59572, Sept. 27, 2011]

§ 101.109 Bandwidth.

(a) Each authorization issued pursuant to these rules will show, as the emission designator, a symbol representing the class of emission which must be prefixed by a number specifying the necessary bandwidth. This figure does not necessarily indicate the bandwidth actually occupied by the emission at any instant. In those cases where part 2 of this chapter does not provide a formula for the computation of the necessary bandwidth, the occupied bandwidth may be used in the emission designator.

(b) Stations in this service will be authorized any type of emission, method of modulation, and transmission characteristic, consistent with efficient use of the spectrum and good engineering practice, except that Type B, damped-wave emission will not be authorized.

(c) The maximum bandwidth which will be authorized per frequency assigned is set out in the table that follows. Regardless of the maximum authorized bandwidth specified for each frequency band, the Commission reserves the right to issue a license for less than the maximum bandwidth if it appears that a lesser bandwidth would be sufficient to support an applicant's intended communications.

Frequency band (MHz)	Maximum authorized bandwidth
928 to 929	25 kHz ^{1 5 6}
932 to 932.5, 941 to 941.5	12.5 kHz ^{1 5 6}
932.5 to 935, 941.5 to 944	200 kHz ¹
952 to 960	200 KHz ^{1 5 6}
1,850 to 1,990	10 MHz ¹
2,110 to 2,130	3.5 MHz
2,130 to 2,150	800 or 1600 KHz ¹
2,150 to 2,160	10 MHz
2,160 to 2,180	3.5 MHz
2,180 to 2,200	800 or 1600 KHz ¹
2,450 to 2,483.5	625 KHz ²
2,483.5 to 2,500	800 KHz
3,700 to 4,200	20 MHz
5,925 to 6,425	¹ 60
6,425 to 6,525	25 MHz
6,525 to 6,875	30 MHz ¹
6,875 to 7,125	25 MHz ¹
10,550 to 10,680	5 MHz ¹
10,700 to 11,700	¹ 80
12,200 to 12,700 ⁸	500 megahertz
12,700 to 13,150	50 MHz
13,200 to 13,250	25 MHz
17,700 to 18,140	220 MHz ¹
18,140 to 18,142	2 MHz
18,142 to 18,580	6 MHz
18,580 to 18,820	20 MHz ¹
18,820 to 18,920	10 MHz
18,920 to 19,160	20 MHz ¹
19,160 to 19,260	10 MHz
19,260 to 19,700	220 MHz ¹
21,200 to 23,600	50 MHz ^{1 4}
24,250 to 25,250	40 MHz ⁷
27,500 to 28,350	850 MHz
29,100 to 29,250	150 MHz
31,000 to 31,075	75 MHz
31,075 to 31,225	150 MHz
31,225 to 31,300	75 MHz
38,600 to 40,000	50 MHz ⁷
71,000 to 76,000	5000 MHz
81,000 to 86,000	5000 MHz
92,000 to 95,000	(⁹)

¹The maximum bandwidth that will be authorized for each particular frequency in this band is detailed in the appropriate frequency table in § 101.147. If contiguous channels are aggregated in the 928–928.85/952–952.85/956.25–956.45 MHz, the 928.85–929/959.85–960 MHz, or the 932–932.5/941–941.5 MHz bands, then the bandwidth may exceed that which is listed in the table.

²1250 KHz, 1875 KHz, or 2500 KHz on a case-by-case basis.

³To be specified in authorization. For the band 92 to 95 GHz, maximum bandwidth is licensed in one segment of 2 GHz from 92–94 GHz and one 0.9 GHz segment from 94.1 to 95 GHz, or the total of the loaded band if smaller than the assigned bandwidth.

⁴For exceptions, see § 101.147(s).

⁵A 12.5 kHz bandwidth applies only to frequencies listed in § 101.147(b)(1) through (4).

⁶For frequencies listed in § 101.147(b)(1) through (4), consideration will be given on a case-by-case basis to authorizing bandwidths up to 50 kHz.

⁷For channel block assignments in the 24,250–25,250 MHz and 38,600–40,000 MHz bands, the authorized bandwidth is equivalent to an unpaired channel block assignment or to either half of a symmetrical paired channel block assignment. When adjacent channels are aggregated, equipment is permitted to operate over the full channel block aggregation without restriction.

●●●● ●● ●●●●●●●● ●● Unwanted emissions shall be suppressed at the aggregate channel block edges based on the same roll-off rate as is specified for a single channel block in § 101.111(a)(1) or in § 101.111(a)(2)(ii) and (iii) as appropriate.

⁸For incumbent private operational fixed point-to-point stations in this band (those not licensed as MVDDS), the maximum bandwidth shall be 20 MHz.

§ 101.111

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[61 FR 26677, May 28, 1996, as amended at 61 FR 44181, Aug. 28, 1996; 62 FR 23167, Apr. 29, 1997; 62 FR 24582, May 6, 1997; 63 FR 6105, Feb. 6, 1998; 65 FR 17449, Apr. 3, 2000; 65 FR 38329, June 20, 2000; 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4956, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 70 FR 29997, May 25, 2005; 75 FR 41771, July 19, 2010; 76 FR 59572, Sept. 27, 2011; 77 FR 54432, Sept. 5, 2012]

§ 101.111 Emission limitations.

(a) The mean power of emissions must be attenuated below the mean output power of the transmitter in accordance with the following schedule:

(1) When using transmissions other than those employing digital modulation techniques:

(i) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 decibels;

(ii) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 decibels;

(iii) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log_{10}$ (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(2) When using transmissions employing digital modulation techniques (see § 101.141(b)) in situations not covered in this section:

(i) For operating frequencies below 15 GHz, in any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 50 decibels:

$A = 35 + 0.8(P - 50) + 10 \log_{10} B$. (Attenuation greater than 80 decibels or to an absolute power of less than -13 dBm/1MHz is not required.)
where:

A = Attenuation (in decibels) below the mean output power level.

P = Percent removed from the center frequency of the transmitter bandwidth.

B = Authorized bandwidth in MHz.

NOTE: MVDDS operations in the 12.2–12.7 GHz band shall use 24 megahertz for the value of B in the emission mask equation set

forth in this section. The emission mask limitation shall only apply at the 12.2–12.7 GHz band edges and does not restrict MVDDS channelization bandwidth within the band.

(ii) For operating frequencies above 15 GHz, in any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 50 percent up to and including 250 percent of the authorized bandwidth: As specified by the following equation but in no event less than 11 decibels:

$A = 11 + 0.4(P - 50) + 10 \log_{10} B$. (Attenuation greater than 56 decibels or to an absolute power of less than -13 dBm/1MHz is not required.)

(iii) In any 1 MHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least $43 + 10 \log_{10}$ (the mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation. The authorized bandwidth includes the nominal radio frequency bandwidth of an individual transmitter/modulator in block-assigned bands. Equipment licensed prior to April 1, 2005 shall only be required to meet this standard in any 4 kHz band.

(iv) The emission mask for LMDS and the 24 GHz Service shall use the equation in paragraph (a)(2)(ii) of this section and apply it only to the band edge of each block of spectrum, but not to subchannels established by licensees. The value of P in the equation is the percentage removed from the carrier frequency and assumes that the carrier frequency is the center of the actual bandwidth used. The emission mask can be satisfied by locating a carrier of the subchannel sufficiently far from the channel edges so that the emission levels of the mask are satisfied. The LMDS or 24 GHz emission mask shall use a value B (bandwidth) of 40 MHz, for all cases even in the case where a narrower subchannel is used (for instance the actual bandwidth is 10 MHz) and the mean output power used in the calculation is the sum of the output power of a fully populated channel. For block assigned channels, the out-of-band emission limits apply only outside the assigned band of operation and not within the band.