

(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]

**§ 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 <sup>1 5 6</sup>
932 to 932.5, 941 to 941.5 ....	12.5 kHz <sup>1 5 6</sup>
932.5 to 935, 941.5 to 944 ....	200 kHz <sup>1</sup>
952 to 960 .....	200 kHz <sup>1 5 6</sup>
1,850 to 1,990 .....	10 MHz <sup>1</sup>
2,110 to 2,130 .....	3.5 MHz
2,130 to 2,150 .....	800 or 1600 KHz <sup>1</sup>
2,150 to 2,160 .....	10 MHz
2,160 to 2,180 .....	3.5 MHz
2,180 to 2,200 .....	800 or 1600 KHz <sup>1</sup>
2,450 to 2,483.5 .....	625 KHz <sup>2</sup>
2,483.5 to 2,500 .....	800 KHz

Frequency band (MHz)	Maximum authorized bandwidth
3,700 to 4,200 .....	20 MHz
5,925 to 6,425 .....	30 MHz <sup>1</sup>
6,425 to 6,525 .....	25 MHz
6,525 to 6,875 .....	10 MHz <sup>1</sup>
10,550 to 10,680 .....	5 MHz <sup>1</sup>
10,700 to 11,700 .....	40 MHz <sup>1</sup>
12,200 to 12,700 .....	20 MHz <sup>1</sup>
13,200 to 13,250 .....	25 MHz
17,700 to 18,140 .....	220 MHz <sup>1</sup>
18,140 to 18,142 .....	2 MHz
18,142 to 18,580 .....	6 MHz
18,580 to 18,820 .....	20 MHz <sup>1</sup>
18,820 to 18,920 .....	10 MHz
18,920 to 19,160 .....	20 MHz <sup>1</sup>
19,160 to 19,260 .....	10 MHz
19,260 to 19,700 .....	220 MHz <sup>1</sup>
21,200 to 23,600 .....	100 MHz <sup>4</sup>
24,250 to 25,250 .....	40 MHz
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 <sup>7</sup>
Above 40,000 .....	( <sup>3</sup> )

<sup>1</sup> The 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.

<sup>2</sup> 1250 KHz, 1875 KHz, or 2500 KHz on a case-by-case basis.

<sup>3</sup> To be specified in authorization.

<sup>4</sup> For exceptions, see § 101.147(s).

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

<sup>6</sup> For 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.

<sup>7</sup> For channel block assignments in the 38,600–40,000 MHz band, 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.

**Note to Footnote 7:** 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 paragraphs 101.111(a)(ii) and (iii) of this chapter.

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**§ 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

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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  $43+10 \text{ Log}_{10}$  (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:

$$A = 35 + 0.8(P - 50) + 10 \text{ Log}_{10} B. \text{ (Attenuation greater than 80 decibels is not required.)}$$

where:

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

P = Percent removed from the carrier frequency.

B = Authorized bandwidth in MHz.

(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:

$$A = 11 + 0.4(P - 50) + 10 \text{ Log}_{10} B. \text{ (Attenuation greater than 56 decibels is not required.)}$$

(iii) In any 4 KHz band, the center frequency of which is removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least  $43+10 \text{ Log}_{10}$  (mean output power in watts) decibels, or 80 decibels, whichever is the lesser attenuation.

(3) For Digital Termination System channels used in the Digital Electronic Message Service (DEMS) operating in the 10,550-10,680 MHz band:

(i) In any 4 KHz band, the center frequency of which is removed from the edge of the DEMS channel by up to and including 1.125 times the DEMS sub-channel bandwidth: As specified by the following equation but in no event be less than  $50+10 \text{ log}_{10} N$  decibels:

$$A = 50 + 0.0333(F - 0.5B) + 10 \text{ log}_{10} N \text{ decibels}$$

Where:

A = Attenuation (in decibels) below means output power level contained within the DEMS channel for a given polarization.

B = Bandwidth of DEMS channel (in KHz).

F = Absolute value of the difference between the center frequency of the 4 KHz band measured and the center frequency of the DEMS channel (in KHz).

N = Number of active subchannels of the given polarization within the DEMS channel.

(ii) In any 4 KHz band within the authorized DEMS band the center frequency of which is removed from the center frequency of the DEMS channel by more than the sum of 50% of the DEMS channel bandwidth plus 1.125 times the subchannel bandwidth: As specified by the following equation but in no event less than 80 decibels:

$$A = 80 + 10 \text{ log}_{10} N \text{ decibels}$$

(iii) In any 4 KHz band the center frequency of which is outside the authorized DEMS band: At least  $43+10 \text{ log}_{10}$  (mean output power in watts) decibels.

(4) For Digital Termination System channels used in the Digital Electronic Message Service (DEMS) operating in the 17,700-19,700 and 24,250-25,250 MHz bands:

(i) In any 4 KHz band, the center frequency of which is removed from the frequency of the center of the DEMS channel by more than 50 percent of the DEMS channel bandwidth up to and including 50 percent plus 500 KHz: As specified by the following equation but in no event be less than  $50+10 \text{ log}_{10} N$  decibels:

$$A = 50 + 0.06(F - 0.5B) + 10 \text{ log}_{10} N \text{ decibels}$$

Where:

A = Attenuation (in decibels) below means output power level contained within the DEMS channel for a given polarization.

B = Bandwidth of DEMS channel (in KHz).

F = Absolute value of the difference between the center frequency of the 4 KHz band

measured and the center frequency of the DEMS channel (in KHz).

N = Number of active subchannels of the given polarization within the DEMS channel.

(ii) In any 4 KHz band within the authorized DEMS band, the center frequency of which is removed from the center frequency of the DEMS channel by more than the sum of 50 percent of the channel bandwidth plus 500 KHz: As specified by the following equation but in no event less than 80 decibels:

$$A=80+10 \log_{10} N \text{ decibels}$$

(iii) In any 4 KHz band the center frequency of which is outside the authorized Digital Message Service band: At least  $43+10 \log_{10}$  (mean output power in watts) decibels.

(5) When using transmissions employing digital modulation techniques on the 900 MHz multiple address frequencies with a 12.5 KHz bandwidth, the power of any emission must be attenuated below the unmodulated carrier power of the transmitter (P) in accordance with the following schedule:

(i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 2.5 KHz up to and including 6.25 KHz: At least  $53 \log_{10} (fd/2.5)$  decibels;

(ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 6.25 KHz up to and including 9.5 KHz: At least  $103 \log_{10} (fd/3.9)$  decibels;

(iii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 9.5 KHz up to and including 15 KHz: At least  $157 \log_{10} (fd/5.3)$  decibels; and

(iv) On any frequency removed from the center of the authorized bandwidth by a displacement frequency greater than 15 KHz: At least 50 plus  $10 \log_{10}(P)$  or 70 decibels, whichever is the lesser attenuation.

(6) When using transmissions employing digital modulation techniques on the 900 MHz multiple address frequencies with a bandwidth greater than 12.5 KHz, the power of any emission must be attenuated below the unmodulated carrier power of the

transmitter (P) in accordance with the following schedule:

(i) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 5 KHz up to and including 10 KHz: At least  $83 \log_{10} (fd/5)$  decibels;

(ii) On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in KHz) of more than 10 KHz up to and including 250 percent of the authorized bandwidth: At least  $116 \log_{10} (fd/6.1)$  decibels or 50 plus  $10 \log_{10} (P)$  or 70 decibels, whichever is the lesser attenuation; and

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

(b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in paragraph (a) of this section.

(c) The emission of an unmodulated carrier is prohibited except for test purposes as required for proper station and system maintenance.

[61 FR 26677, May 28, 1996, as amended at 62 FR 24582, May 6, 1997]

#### § 101.113 Transmitter power limitations.

(a) On any authorized frequency, the average power delivered to an antenna in this service must be the minimum amount of power necessary to carry out the communications desired. Application of this principle includes, but is not to be limited to, requiring a licensee who replaces one or more of its antennas with larger antennas to reduce its antenna input power by an amount appropriate to compensate for the increased primary lobe gain of the replacement antenna(s). In no event shall the average equivalent isotropically radiated power (EIRP), as referenced to an isotropic radiator, exceed the values specified below. In cases of harmful interference, the Commission may, after notice and opportunity for hearing, order a change in