following equation may in no event be less than 50 + 10 $\log_{10}$ N decibels:

$A = 50 + 0.0333(F - 0.5B) + 10 \log_{10} N$ 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:

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

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

(4) For DEMS channels in the 17,700–19,700 MHz band:

(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 $\log_{10}$ N decibels:

$A = 50 + 0.06(F - 0.5B) + 10 \log_{10} N$ 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:

$A = 80 + 10 \log_{10} N$ 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 that 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.

(d) *Interference to passive sensors.* These limitations are necessary to minimize the probability of harmful interference to reception in the 10.6–10.68 GHz and 31–31.3 GHz bands onboard space stations in the Earth exploration-satellite service (passive).

(1) *10.6–10.68 GHz.* (i) Fixed stations are restricted to point-to-point operations, with each station supplying not more than −3 dBW of transmitter power to the antenna, producing not more than 40 dBW of EIRP, and radiating at an antenna main beam elevation angle of 20° or less. Licensees holding a valid authorization on August 6, 2015 to operate in this band may continue to operate as authorized, subject to proper license renewal. Licensees are urged to:

(A) Limit the maximum transmitter power supplied to the antenna to −15 dBW; and

(B) Employ automatic transmitter power control (ATPC).

(ii) The maximum transmitter power supplied to the antenna of stations using ATPC may be increased by a value corresponding to the ATPC range, up to a maximum of −3 dBW.

(2) *31–31.3 GHz.* For fixed stations authorized after August 6, 2018, the unwanted emissions power in any 100 MHz of the 31.3–31.5 GHz band shall be limited to −38 dBW (−38 dBW/100 MHz), as measured at the input to the antenna.

[61 FR 26677, May 28, 1996, as amended at 62 FR 24582, May 6, 1997; 65 FR 59358, Oct. 5, 2000; 67 FR 43038, June 26, 2002; 68 FR 4957, Jan. 31, 2003; 69 FR 3266, Jan. 23, 2004; 69 FR 31746, June 7, 2004; 80 FR 38912, July 7, 2015]

§ 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 the effective radiated power of this station. Further, the output power of a transmitter on any authorized frequency in this service may not exceed the following:

Frequency band (MHz)	Maximum allowable EIRP[1,2]	
	Fixed[1,2] (dBW)	Mobile (dBW)
928.0–929.0(2)	+ 17	
932.0–932.5(2)	+ 17	
932.5–935.0	+ 40	
941.0–941.5(2)	+ 30	+ 14
941.5–944.0	+ 40	
952.0–960.0(2)	+ 40	+ 14
1,850–1,990	+ 45	
2,110–2,150	+ 45	
2,150–2,180[3]	+ 45	
2,180–2,200	+ 45	
2,450–2,500	+ 45	
2,500–2,686		
2,686–2,690	+ 45	
3,700–4,200	+ 55	
5,925–6,425	+ 55	
6,425–6,525		+ 35
6,525–6,875	+ 55	
6,875–7,125	+ 55	
10,550 to 10,600[5]	+ 55	
10,600 to 10,680[5]	+ 40	
10,700–11,700	+ 55	
12,200–12,700[11]	+ 50	
12,700–13,200[4]	+ 50	
13,200–13,250[4]	+ 55	
14,200–14,400[12]	+ 45	

Frequency band (MHz)	Maximum allowable EIRP[1][2]	
	Fixed[1][2] (dBW)	Mobile (dBW)
17,700–18,600	+ 55	
18,600–18,800[6]	+ 35	
18,800–19,700	[5] + 55	
21,200–23,600[10]	+ 55	
24,250–25,250	[5] + 55	
29,100–29,250	([7])	
31,000 to 31,075[8][9]	30 dBW/MHz	30 dBW/MHz
31,075 to 31,225[8][9]	30 dBW/MHz	30 dBW/MHz
31,225 to 31,300[8][9]	30 dBW/MHz	30 dBW/MHz
71,000–76,000[13]	+ 55	+ 55
81,000–86,000[13]	+ 55	+ 55
92,000–95,000	+ 55	+ 55

[1] Per polarization.

[2] For multiple address operations, see § 101.147. Remote alarm units that are part of a multiple address central station projection system are authorized a maximum of 2 watts.

[3] When an omnidirectional antenna is authorized in the 2150–2160 MHz band, the maximum power shall be 60 dBm.

[4] Also see § 101.145.

[5] The output power of a DEMS System nodal transmitter shall not exceed 0.5 watt per 250 kHz. The output power of a DEMS System user transmitter shall not exceed 0.04 watt per 250 kHz. The transmitter power in terms of the watts specified is the peak envelope power of the emission measured at the associated antenna input port. The operating power shall not exceed the authorized power by more than 10 percent of the authorized power in watts at any time. Frequencies from 10,600–10,680 MHz are subject to footnote US265 in the Table of Frequency Allocations in § 2.106 of the Commission's Rules. Stations authorized prior to April 1, 2003 to exceed the 40 dBW limit may continue to operate at their authorized output power level indefinitely, provided that neither end point of the relevant link is relocated.

[6] Maximum power delivered to the antenna shall not exceed −3 dBw.

[7] See § 101.113(c).

[8] For 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 output power shall not exceed 0.050 watt.

[9] For subscriber transceivers authorized in these bands, the EIRP shall not exceed 55 dBw or 42 dBw/MHz.

[10] See § 101.147(s).

[11] The EIRP for MVDDS stations is limited to 14.0 dBm per 24 MHz (−16.0 dBW per 24 MHz). Incumbent point-to-point stations may use up to + 50 dBW except for low power systems which were licensed under § 101.147(q).

[12] Beginning March 1, 2005, no new LTTS operators will be licensed and no existing LTTS licensees will be renewed in the 14.2–14.4 GHz band.

[13] The maximum transmitter power is limited to 3 watts (5 dBW) unless a proportional reduction in maximum authorized EIRP is required under § 101.115. The maximum transmitter power spectral density is limited to 150 mW per 100 MHz.

(b) The power of transmitters that use Automatic Transmitter Power Control shall not exceed the power input or output specified in the instrument of station authorization. The power of non-ATPC transmitters shall be maintained as near as practicable to the power input or output specified in the instrument of station authorization.

(c)(1) *Transmitter power limitations.* Point-to-point stations in the 29.1–29.25 GHz band for the LMDS backbone between LMDS hubs shall be limited to a maximum allowable e.i.r.p. density per carrier of 23 dBW/MHz in any one megahertz in clear air, and may exceed this limit by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value due to precipitation and only to the extent that the link is impaired.

(2) *Hub transmitter EIRP spectral area, density limit.* LMDS applicants shall demonstrate that, under clear air operating conditions, the maximum aggregate of LMDS transmitting hub stations in a Basic Trading Area in the 29.1–29.25 GHz band will not transmit a co-frequency hub-to-subscriber e.i.r.p. spectral area density in any azimuthal direction in excess of X dBW/(MHz-km^2) when averaged over any 4.375 MHz band, where X is defined in Table 1. Individual hub stations may exceed their clear air e.i.r.p.s by employment of adaptive power control in cases where link propagation attenuation exceeds the clear air value and only to the extent that the link is impaired.

(i) The e.i.r.p. aggregate spectral area density is calculated as follows:

$$10\log_{10}\ 1/A\sum_{i=1}^{N} pigi\ \text{dBW/MHz-km}^2$$

where:

N = number of co-frequency hubs in BTA.

A = Area of BTA in km^2.

pi = spectral power density into antenna of i-th hub (in W/MHz).

gi = gain of i-th hub antenna at zero degree elevation angle.

Each pi and gi are in the same 1 MHz within the designated frequency band.

(ii) The climate zones in Table 1 are defined for different geographic locations within the US as shown in Appendix 28 of the ITU Radio Regulations.

TABLE 1[1]

Climate zone	e.i.r.p. Spectral Density (Clear Air) (dBW/MHz-km^2)[2]
1	−23
2	−25
3,4,5	−26

[1] LMDS system licensees in two or more BTAs may individually or collectively deviate from the spectral area density computed above by averaging the power over any 200 km by 400 km area, provided that the aggregate interference to the satellite receiver is no greater than if the spectral area density were as specified in Table 1. A showing to the Commission comparing both methods of computation is required and copies shall be served on any affected non-GSO 20/30 GHz MSS providers.

[2] See § 21.1007(c)(i) for the population density of the BTA.

(3) *Hub transmitter e.i.r.p. spectral area density limit at elevation angles above the*