

§ 74.936 Emissions and bandwidth.

(a) An ITFS station may employ amplitude modulation (C3F) for the transmission of the visual signal and frequency modulation (F3E) or (G3E) for the transmission of the aural signal when transmitting a standard analog television signal. Quadrature amplitude modulation (QAM), digital vestigial sideband modulation (VSB), quadrature phase shift key modulation (QPSK), code division multiple access (CDMA) and orthogonal frequency division multiplex (OFDM) emissions may be employed, subject to compliance with the policies set forth in the *Declaratory Ruling and Order*, 11 FCC Rcd 18839 (1996). Use of OFDM also is subject to the subsequently *Digital Declaratory Ruling and Order*, DA 99-554 (Mass Med. Bur. rel. Mar. 19, 1999). Other digital emissions may be added to those authorized above, including emissions with non-uniform power spectral density, if the applicant provides information in accordance with the guidelines and procedures set forth in the *Declaratory Ruling and Order* which clearly demonstrates the spectral occupancy and interference characteristics of the emission. The licensee may subchannelize its authorized bandwidth, provided that digital modulation is employed and the aggregate power does not exceed the authorized power for the channel, and may utilize all or a portion of its authorized bandwidth for ITFS response stations authorized pursuant to § 74.939. The licensee may also, jointly with affected adjacent channel licensees, transmit utilizing bandwidth in excess of its authorized frequencies, provided that digital modulation is employed, all power spectral density requirements set forth in this part are met and the out-of-band emissions restrictions set forth in § 74.936 are met at the edges of the channels employed. The wider channels thus created may be redivided to create narrower channels.

(b) Notwithstanding the above, any digital emission which complies with the out-of-band emission restrictions of § 21.908 of this chapter may be used in the following circumstances:

(1) At any ITFS main or booster station transmitter which is located more than 160.94 km (100 miles) from the

nearest boundary of all cochannel and adjacent channel ITFS and MDS protected service areas, including Basic Trading Areas and Partitioned Service Areas; and

(2) At all ITFS response station transmitters within a response service area if all points along the response service area boundary line are more than 160.94 km (100 miles) from the nearest boundary of all cochannel and adjacent channel ITFS and MDS protected service areas, including Basic Trading Areas and Partitioned Service Areas; and

(3) At any ITFS transmitter where all parties entitled by this part to interference protection from that transmitter have mutually consented to the use at that transmitter of such emissions.

(c) The maximum out-of-band power of an ITFS station transmitter or booster transmitting on a single 6 MHz channel with an EIRP in excess of -9 dBW employing analog modulation shall be attenuated at the channel edges by at least 38 dB relative to the peak visual carrier, then linearly sloping from that level to at least 60 dB of attenuation at 1 MHz below the lower band edge and 0.5 MHz above the upper band edge, and attenuated at least 60 dB at all other frequencies. The maximum out-of-band power of an ITFS station transmitter or booster transmitting on a single 6 MHz channel or a portion thereof with an EIRP in excess of -9 dBW (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths) employing digital modulation shall be attenuated at the 6 MHz channel edges at least 25 dB relative to the licensed average 6 MHz channel power level, then attenuated along a linear slope to at least 40 dB at 250 kHz beyond the nearest channel edge, then attenuated along a linear slope from that level to at least 60 dB at 3 MHz above the upper and below the lower licensed channel edges, and attenuated at least 60 dB at all other frequencies. Notwithstanding the foregoing, in situations where an ITFS station or booster station transmits, or where adjacent channel licensees jointly transmit, a single signal over more than one contiguous 6 MHz channel

utilizing digital modulation with an EIRP in excess of -9 dBW (or, when subchannels or superchannels are used, the appropriately adjusted value based upon the ratio of 6 MHz to the subchannel or superchannel bandwidth), the maximum out-of-band power shall be attenuated at the channel edges of those combined channels at least 25 dB relative to the power level of each channel, then attenuated along a linear slope from that level to at least 40 dB at 250 kHz above or below the channel edges of those combined channels, then attenuated along a linear slope from that level to at least 60 dB at 3 MHz above the upper and below the lower edges of those combined channels, and attenuated at least 60 dB at all other frequencies. However, should harmful interference occur as a result of emissions outside the assigned channel, additional attenuation may be required. A transmitter licensed prior to November 1, 1991, that remains at the station site initially licensed, and does not comply with this paragraph, may continue to be used for its life if it does not cause harmful interference to the operation of any other licensee. Any non-conforming transmitter replaced after November 1, 1991, must be replaced by a transmitter meeting the requirements of this paragraph.

(d) A booster transmitting on multiple contiguous or non-contiguous channels carrying separate signals (a "broadband" booster) with an EIRP in excess of -9 dBW per 6 MHz channel and employing analog, digital or a combination of these modulations shall have the following characteristics:

(1) For broadband boosters operating in the frequency range of 2.150-2.160/2 GHz, the maximum out-of-band power shall be attenuated at the upper and lower channel edges forming the band edges by at least 25 dB relative to the licensed analog peak visual carrier or digital average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths), then linearly sloping from that level to at least 40 dB of attenuation at 0.25 MHz above and below the band edges, then linearly sloping from that level to at least 60 dB of attenuation at 3.0 MHz above and below the

band edges, and attenuated at least 60 dB at all other frequencies.

(2) For broadband boosters operating in the frequency range of 2.500-2.690 GHz, the maximum out-of-band power shall be attenuated at the upper and lower channel edges forming the band edges by at least 25 dB relative to the licensed analog peak visual carrier or digital average power level (or, when subchannels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths), then linearly sloping from that level to at least 40 dB of attenuation at 0.25 MHz above and below the band edges, then linearly sloping from that level to at least 50 dB of attenuation at 3.0 MHz above and below the band edges, then linearly sloping from that level to at least 60 dB of attenuation at 20 MHz above and below the band edges, and attenuated at least 60 dB at all other frequencies.

(3) Within unoccupied channels in the frequency range of 2.500-2.690 GHz, the maximum out-of-band power shall be attenuated at the upper and lower channel edges of an unoccupied channel by at least 25 dB relative to the licensed analog peak visual carrier power level or digital average power level of the occupied channels (or, when subchannels or 125 kHz channels are used, the appropriately adjusted value based upon the ratio of the channel-to-subchannel bandwidths), then linearly sloping from that level to at least 40 dB of attenuation at 0.25 MHz above and below the occupied channel edges, then linearly sloping from that level to at least 50 dB of attenuation at 3.0 MHz above and below the occupied channel edges, and attenuated at least 50 dB at all other unoccupied frequencies.

(e) Boosters operating with an EIRP less than -9 dBW per 6 MHz channel shall have no particular out-of-band power attenuation requirement, except that if they cause harmful interference, their operation shall be terminated within 2 hours of notification by the Commission until the interference can be cured.

(f) The maximum out-of-band power of an ITFS response station using all or part of a 6 MHz channel, employing digital modulation and transmitting

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with an EIRP greater than -6 dBW per 6 MHz channel shall be attenuated (as measured in accordance with § 21.908(e)) at the 6 MHz channel edges at least 25 dB relative to the average 6 MHz channel power level, then attenuated along a linear slope to at least 40 dB at 250 kHz beyond the nearest channel edge, then attenuated along a linear slope from that level to at least 60 dB at 3 MHz above the upper and below the lower licensed channel edges, and attenuated at least 60 dB at all other frequencies. The maximum out-of-band power of an ITFS response station using all or part of a 6 MHz channel, employing digital modulation and transmitting with an EIRP no greater than -6 dBW per 6 MHz channel shall be attenuated (as measured in accordance with § 21.908(e)) at the channel edges at least 25 dB relative to the average 6 MHz channel transmitter output power level (P), then attenuated along a linear slope to at least 40 dB or $33+10\log(P)$ dB, whichever is the lesser attenuation, at 250 kHz beyond the nearest channel edge, then attenuated along a linear slope from that level to at least 60 dB or $43+10\log(P)$ dB, whichever is the lesser attenuation, at 3 MHz above the upper and below the lower licensed channel edges, and attenuated at least 60 dB or $43+10\log(P)$ dB, whichever is the lesser attenuation, at all other frequencies. Where ITFS response stations with digital modulation utilize all or part of more than one contiguous 6 MHz channel to form a larger channel (e.g., a channel of width 12 MHz), the above-specified attenuations shall be applied only at the upper and lower edges of the overall combined channel. Notwithstanding these provisions, should harmful interference occur as a result of emissions outside the assigned channel(s), additional attenuation may be required by the Commission.

(g) The requirements of § 73.687(c)(2) will be considered to be satisfied insofar as measurements of operating power are concerned if the transmitter is equipped with instruments for determining the combined visual and aural operating power. However, licensees are expected to maintain the operating powers within the limits specified in § 74.935. Measurements of the separate

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visual and aural operating powers must be made at sufficiently frequent intervals to insure compliance with the rules, and in no event less than once a month. However, the provisions of § 73.687(c)(2) and of this paragraph shall not be applicable to ITFS response stations or to low power ITFS booster stations authorized pursuant to § 74.985(e).

(h) Compliance with the out-of-band emissions limitations shall be established in accordance with § 21.908(e) of this chapter.

[63 FR 65117, Nov. 25, 1998, as amended at 64 FR 63740, Nov. 22, 1999; 65 FR 46622, July 31, 2000]

§ 74.937 Antennas.

(a) In order to minimize the hazard of harmful cochannel and adjacent channel interference from other stations, directive receiving antennas should be used at all receiving locations other than response station hubs and response stations operating with an EIRP no greater than -6 dBW per 6 MHz channel. The choice of receiving antennas is left to the discretion of the licensee. However, for the purpose of interference calculations, except as set forth in § 74.939, the general characteristics of the reference receiving antenna shown in Figure 1 of this section (i.e., a 0.6 meter (2 foot) parabolic reflector antenna, are assumed to be used in accordance with the provisions of § 74.903(a)(3) unless pertinent data is submitted of the actual antenna in use for reception. Licensees may install receiving antennas with general characteristics superior to those of the reference antenna. Should interference occur and it can be demonstrated that the existing receiving antenna is inadequate, a more suitable antenna should be installed. In such cases, installation of the new receiving antenna will be the responsibility of the system operator serving the receive site. A response station operating with an EIRP no greater than -6 dBW per 6 MHz channel may use an omnidirectional receiving antenna. However, for the purpose of interference protection, such response stations will be treated as if utilizing a receive antenna meeting the requirements of the reference receiving antenna shown in Figure 1 of this section.