

(d) Compliance with radio frequency exposure requirements. To ensure compliance with the Commission's radio frequency exposure requirements in §§1.1307(b), 2.1091 and 2.1093 of this chapter, fixed TVBDs shall be accompanied by instructions on measures to take to ensure that persons maintain a distance of at least 40 cm from the device, as well as any necessary hardware that may be needed to implement that protection. These instructions shall be submitted with the application for certification. Personal/portable TVBDs that meet the definition of portable devices under §2.1093 of this chapter and that operate with a source-based time-averaged output of less than 20 mW will not be subject to routine evaluation for compliance with the radio frequency exposure guidelines, while devices that operate with a source-based time-average output power greater than 20 mW will be subject to the routine evaluation requirements.

**§15.711 Interference avoidance mechanisms.**

(a) Except as provided in §15.717, television channel availability for a TVBD is determined based on either the geo-location and database access mechanism described in paragraph (b) of this section or spectrum sensing described in paragraph (c) of this section.

(1) A TVBD shall rely on the geo-location and database access mechanism to identify available television channels consistent with the interference protection requirements of §15.712. Such protection will be provided for the following authorized services: digital television stations, digital and analog Class A, low power, translator and booster stations; translator receive operations; fixed broadcast auxiliary service links; private land mobile service/commercial radio service (PLMRS/CMRS) operations; offshore radio-telephone service; and cable system head-ends. In addition, protection shall be provided in border areas near Canada and Mexico in accordance with §15.712(g).

(2) For low power auxiliary services authorized pursuant to §§74.801 through 74.882 of this chapter, including wireless microphones, a TVBD shall rely on the geo-location and database access

mechanism to identify available television channels to provide interference protection to registered locations of such operations, consistent with the requirements of §15.712, and shall rely on spectrum sensing to identify available television channels to provide interference protection to all other operations.

**(b) Geo-location and database access.**

(1) The geographic coordinates of a fixed TVBD shall be determined to an accuracy of  $\pm 50$  meters by either an incorporated geo-location capability or a professional installer. In the case of professional installation, the party who registers the fixed TVBD in the database will be responsible for assuring the accuracy of the entered coordinates. The geographic coordinates of a fixed TVBD shall be determined at the time of installation and first activation from a power-off condition, and this information may be stored internally in the TVBD. If the fixed TVBD is moved to another location or if the stored coordinates become altered, the operator shall re-establish the device's:

(i) Geographic location and store this information in the TVBD either by means of the device's incorporated geo-location capability or through the services of a professional installer; and

(ii) Registration with the database based on the device's new coordinates.

(2) A Mode II personal/portable device shall incorporate a geo-location capability to determine its geographic coordinates to an accuracy of  $\pm 50$  meters. The device must re-establish its position each time it is activated from a power-off condition.

(3)(i) Fixed devices must access a TV bands database over the Internet to determine the TV channels that are available at their geographic coordinates prior to their initial service transmission at a given location. Operation is permitted only on channels that are indicated in the database as being available for TVBDs. Fixed TVBDS shall access the database at least once a day to verify that the operating channels continue to remain available. Operation must cease immediately if the channel is no longer available.

(ii) Mode II personal/portable devices must access a TV bands database over

the Internet to determine the TV channels that are available at their geographic coordinates prior to their initial service transmission at a given location. Operation is permitted only on channels that are indicated in the database as being available for TVBDs. A Mode II personal/portable device must access the database for a list of available channels each time it is activated from a power-off condition and re-check its location and the database for available channels if it changes location during operation. A Mode II personal/portable device that has been in a powered state shall re-check its location and access the database daily to verify that the operating channel(s) continue to be available.

(iii) If a fixed or mode II TVBD fails to contact the TV bands database during any given day, it may continue to operate until 11:59 PM of the following day at which time it must cease operations unless it has contacted the TV bands database during the intervening period.

(iv) Personal/portable devices operating in Mode I shall obtain a list of channels on which they may operate from a master device.

(4) All geographic coordinates shall be referenced to the North American Datum of 1983 (NAD 83).

(c) *Spectrum sensing*—(1) *Detection threshold.* (i) All fixed and personal/portable TVBDs must be capable of detecting ATSC digital TV, NTSC analog TV and wireless microphone signals using analog or digital modulation methods. The required detection thresholds are.

(A) ATSC signals: -114 dBm, averaged over a 6 MHz bandwidth;

(B) NTSC signals: -114 dBm, averaged over a 100 kHz bandwidth;

(C) Wireless microphone signals: -114 dBm, averaged over a 200 kHz bandwidth.

(ii) The detection thresholds are referenced to an omnidirectional receive antenna with a gain of 0 dBi. If a receive antenna with a minimum directional gain of less than 0 dBi is used, the detection threshold shall be reduced by the amount in dB that the minimum directional gain of the antenna is less than 0 dBi. Minimum directional gain shall be defined as the

antenna gain in the direction and at the frequency that exhibits the least gain. Alternative approaches for the sensing antenna are permitted, *e.g.*, electronically rotateable antennas, provided the applicant for equipment authorization can demonstrate that its sensing antenna provides at least the same performance as an omnidirectional antenna with 0 dBi gain.

(2) *Low power auxiliary device channel availability check time.* A TVBD may start operating on a TV channel if no wireless microphone or other low power auxiliary device signals above the detection threshold are detected within a minimum time interval of 30 seconds.

(3) *TV channel availability check time.* A TVBD is required to check for TV signals for a minimum time interval of 30 seconds. If a TV signal is detected on a channel indicated as available for use by the database system, the device will provide a notice of that detection to the operator of the device and a means for the operator to optionally remove the channel from the device's list of available channels.

(4) *In-service monitoring.* A TVBD must perform in-service monitoring of an operating channel a minimum of once every 60 seconds. There is no minimum channel availability check time for in-service monitoring.

(5) *Channel move time.* After a wireless microphone or other low power auxiliary device signal is detected on a TVBD operating channel, all transmissions by the TVBD must cease within two seconds.

(6) Personal/portable devices operating in the client mode shall identify to the fixed or Mode II personal/portable device those television channels on which it senses any signals above the detection threshold. The fixed or Mode II device shall respond in accordance with the provisions of this paragraph as if it had detected the signal itself.

(7) TVBDs communicating either directly with one another or linked through a base station must share information on channel occupancy determined by sensing. If any device in a local area group or network determines that a channel is occupied, all other

§ 15.712

47 CFR Ch. I (10–1–10 Edition)

linked devices will also be required to respond in accordance with the provisions of this paragraph as if it had detected the signal itself.

(d) A TVBD must incorporate the capability to display a list of identified available channels and its operating channels.

(e) Fixed TVBDs shall transmit identifying information. The identification signal must conform to a standard established by a recognized industry standards setting organization. The identification signal shall carry sufficient information to identify the device and its geographic coordinates.

(f) If a fixed TVBD device does not have a direct connection to the Internet and has not yet been initialized and registered with the TV bands database, consistent with § 15.713, but can receive the transmissions of another fixed TVBD, the device needing initialization may transmit to that other device on either a channel that the other TVBD has transmitted on or on a channel which the other TVBD indicates is available for use to access the database to register its location and receive a list of channels that are available for it to use. Subsequently, the newly registered TVBD must only

use the television channels that the database indicates are available for it to use. Such fixed devices must re-contact the database through another fixed device to review their list of available channels at least once every 60 seconds. A fixed device may not operate as a client to another fixed device.

(g) A personal/portable TVBD operating in Mode I may only transmit upon receiving the transmissions of fixed or Mode II TVBD. A personal/portable device operating in Mode I may transmit on either an operating channel of the fixed or Mode II TVBD or on a channel the fixed or Mode II TVBD indicates is available for use.

§ 15.712 Interference protection requirements.

(a) Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations:

(1) *Protected contour.* TVBDs must protect digital and analog TV services within the contours shown in the following table. The contours are based on the R-6602 curves contained in § 73.699 of this chapter.

Type of station	Protected contour		
	Channel	Contour (dBu)	Propagation curve
Analog: Class A TV, LPTV, translator and booster .....	Low VHF (2–6) .....	47	F(50,50)
	High VHF (7–13) .....	56	F(50,50)
	UHF (14–69) .....	64	F(50,50)
Digital: Full service TV, Class A TV, LPTV, translator and booster.	Low VHF (2–6) .....	28	F(50,90)
	High VHF (7–13) .....	36	F(50,90)
	UHF (14–51) .....	41	F(50,90)

(2) *Required separation distance.* Fixed TVBDs and personal/portable TVBDs operating in Mode II must be located outside the contours indicated in paragraph (a)(1) of this section of co-channel and adjacent channel stations by at least the minimum distances specified in the following table. Personal/portable TVBDs operating in Mode II must comply with the separation distances specified for an unlicensed device with an antenna height of less than 3 meters. Alternatively, Mode II personal/portable TVBDs may operate at closer separation distances, including inside

the contour of adjacent channel stations, provided the power level is reduced as specified in § 15.709(a)(2).

Antenna height of unlicensed device	Required separation (km) from digital or analog TV (full service or low power) protected contour	
	Co-channel (km)	Adjacent channel (km)
Less than 3 meters .....	6.0	0.1
3–Less than 10 meters ...	8.0	0.1
10–30 meters .....	14.4	0.74

(b) *Translator receive sites and cable headends.* For translator receive sites