

RECOMMENDATION ITU-R F.1670-1*

Protection of fixed wireless systems from terrestrial digital video and sound broadcasting systems in shared VHF and UHF bands

(Question ITU-R 216/9)

(2004-2006)

Scope

This Recommendation deals with protection of fixed wireless systems from terrestrial digital video and sound broadcasting systems in shared VHF and UHF bands.

The ITU Radiocommunication Assembly,

considering

- a) that it is important to establish compatibility and sharing criteria between the fixed service (FS) and the broadcasting service in the VHF and UHF bands where appropriate;
- b) that the emission characteristics of terrestrial digital video broadcasting (DVB) and digital audio broadcasting (DAB) in these bands may be approximated by white Gaussian noise, in respect to reception by the fixed wireless system (FWS);
- c) that the direction of arrival of the terrestrial DVB or DAB signal, relative to the FWS main beam, influences the maximum allowable field strength at the receiving antenna,

recommends

1 that the interference power threshold level, P_r at the FWS station receiver input, for sharing between terrestrial DVB or DAB stations and FWS receiving stations may be determined from the following formula:

$$P_r = -114 + 10 \log B_v + F + I/N + P_o \quad \text{dBm} \quad (1)$$

F : noise figure of the FWS receiver (dB)

I/N : protection criterion for the FWS receiver (dB)

B_v : equivalent noise bandwidth of the FWS receiver (MHz)

P_o : noise increase (dB) due to man-made noise typical value is 1 dB for VHF band and 0 dB for UHF band;

2 that the maximum allowable interfering field strength at the FWS antenna from the terrestrial DVB or DAB signal (dB(μV/m)) derived from *recommends* 1, in the transmitter bandwidth B_i , may be calculated as follows (for the relationship between field strength and power, see Annex 1):

$$\text{Field strength (dB(μV/m))} = -37 + F + I/N - G + L + 10 \log (B_i) + P_o + 20 \log f - K \quad (2)$$

* This Recommendation should be brought to the attention of Radiocommunication Study Groups 1 and 6.

- G : FWS antenna gain (dBi)
 L : cable feeder loss of the FWS receiver (dB)
 B_i : digital broadcast bandwidth (MHz)
 f : centre frequency of the interfering broadcasting signal (MHz)
 K : overlap correction factor (dB), from Tables 1 and 2 in Annex 2, if applicable;

3 that, for this case, an interference criterion $I/N = -6$ dB may be applied in these bands (see Note 1).

4 that in the absence of an actual radiation pattern, Recommendation ITU-R F.699 may be used.

NOTE 1 – This is equivalent to a 1 dB increase of the FWS receiver noise floor.

Annex 1

Technical considerations including the relationship between field strength and power

- a) Signals from terrestrial DVB and DAB systems operating in the VHF and UHF bands are similar to white noise (see Fig. 1), and can be considered homogenous along the 7 or 8 MHz TV channel (which is not the case for analogue TV (AnTV)) see Fig. 1, and 1.3 MHz DAB (which is not the case for analogue sound).
- b) The exact calculations of potential interference require the receiver characteristics of all FWS. It may not be practical to check specific interference and protection ratios, to assess the interference from terrestrial DVB and DAB to FWS.
- c) The broadcasting service typically uses field strength in $\mu\text{V/m}$ and $\text{dB}(\mu\text{V/m})$ units; while F-series ITU-R Recommendations refer to power values (dBm).
- d) The resulting field strengths differ significantly for the different receiver bandwidths. Recommendation ITU-R SM.1541 provides spectrum masks for the terrestrial DVB, and Recommendation ITU-R BS.1114 for the terrestrial DAB.
- e) The allowed interference criterion is used for determining the maximum allowable field strength (similar to nuisance interfering field strength), which should be equivalent to the minimum usable field strength (see Recommendation ITU-R V.573), minus the protection ratio (see No. 1.170 of the Radio Regulations).
- f) The sensitivity of FWS point-to-point (P-P) or point-to-multipoint (P-MP) systems equals the $(kTB F)_{\text{dB}} + (C/N)_{\text{dB}}$. The maximum allowed interfering signal (and the maximum interfering field strength) equals: Sensitivity – C/I . If $C/N = C/I$, the interfering terrestrial DVB and DAB signals equal the equivalent $kTB F$. For equivalent added protection of 6 dB, the interference, I , equals kTB . The $kTB F$ is the value to be protected for a 3 dB sensitivity degradation, and $(kTB F) - 6$ dB for 1 dB degradation. For an equivalent noise figure of 6 dB, the criterion of interference, I , from terrestrial DVB and DAB into the input of the FWS receiver equals -144 dB(W/MHz) or -114 dB(m/MHz), independent of frequency. For this case, the interference