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Technical Bases for T-DAB Planning

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1. INTRODUCTION

This Annex contains information relevant to the establishment of the CEPT T-DAB Plan in the VHF frequency band.

Relevant T-DAB system parameters and network concepts, including a description of single frequency networks (SFN), are contained in the following documents:

- European Standard EN 300 401 "Radio broadcasting systems; Digital Audio Broadcasting (DAB) to mobile, portable and fixed receivers", (ETSI);
- ITU-R Special Publication "Terrestrial and Satellite Digital Sound Broadcasting to Vehicular, Portable and Fixed Receivers in the VHF/UHF Bands" (Geneva, 1995);
- Document EBU BPN003Rev.3 "Technical Bases for T-DAB Services Network Planning and Compatibility with existing Broadcasting Services" (Geneva, February 2003)¹;
- Recommendation ITU-R BS.774-2 and Recommendation ITU-R BS.1114-6.
- Geneva 2006 Regional Agreement

2. FIELD STRENGTH CONSIDERATIONS

2.1 General

The minimum equivalent field strength values are given for three frequencies (60 MHz, 100 MHz and 230 MHz) and for different conditions; these values are derived from the corresponding minimum block power flux density values (see document EBU BPN-003Rev.3).

These values were used to establish the Plan in Annex 1 and are suitable for mobile reception. In the case that portable indoor reception is required the administrations concerned should bilaterally agree upon appropriate technical basis for co-ordination.

The calculations used for this assume that the receiving antenna, which is believed to be representative for mobile and portable reception, is at a height of 1.5 metres above ground level, omni-directional, and has a gain slightly lower than that of a dipole.

2.2 General field strength prediction²

The field strength prediction method used (50% locations, 50% time for the wanted signal and 50% locations, 1% time for the unwanted signal), together with the correction factors given in 2.2.1 and 2.2.2, is described below.

Mixed land-sea paths are calculated according to the interpolation method given in section 4 of the Appendix.

For the calculation of tropospheric (1% time) and steady (50% time) interference, see Recommendation ITU-R BT.655.

2.2.1 Location percentage requirements and associated correction

¹ EBU BPN-003Rev.3 can be obtained from the ERO web site.;

The required location percentage for T-DAB services is 99%. Therefore, taking into account an estimated standard deviation of 5.5 dB, an increase of 13 dB (2.33×5.5 dB) shall be applied to the field strength values (50% locations) as given in the Appendix to this Annex to obtain the 99% location values required for planning a T-DAB service.

2.2.2 Receiving antenna height gain correction

The propagation curves used relate to a receiving antenna height of 10 metres above ground, whereas a T-DAB service will be planned primarily for mobile reception, i.e. with an effective receiving antenna height of about 1.5 metres. An allowance of 10 dB is necessary to convert the minimum required T-DAB field strength at a vehicle antenna height of 1.5 metres to the equivalent value at 10 metres.

2.2.3 Minimum wanted field strength used for planning

Table 1 contains values for the three VHF bands³, with the inclusion of a correction of 13 dB for location percentage and of 10 dB for height gain.

Frequency band	Band I *)	Band II	Band III
Minimum equivalent field strength (dB(μ V/m))	25	31	35
Location percentage correction factor (50% to 99%) (dB)	+13	+13	+13
Antenna height gain correction (dB)	+10	+10	+10
Minimum median field strength for planning (dB(μ V/m))	48	54	58

Table 1: Minimum median field strengths (dB(μ V/m)) at an antenna height of 10 metres

*) The following difficulties have been identified with Band I:

- the large dimensions of transmitting antennas;
- the dimensions and complexity of receiving antennas;
- higher man-made noise;
- the addition of up to 40 dB to the minimum wanted field strength to take account of interference caused by sporadic E propagation.

2.3 Unwanted emissions

2.3.1 Spectrum masks for T-DAB out-of-band emissions

The out-of-band radiated signal in any 4 kHz band shall be constrained by one of the masks defined in Figure 1.

Case 1: The solid line mask shall apply to T-DAB transmitters operating in areas critical for adjacent channel T-DAB to T-DAB interference, and in any case when it is necessary to protect other services operating on adjacent frequencies on a primary basis.

³ Band I (47-68 MHz); Band II (87.5-108 MHz) and Band III (limited to 230 - 240 MHz)

Case 2: The dashed line mask shall apply to T-DAB transmitters in other cases.

2.3.2 Protection of distress and safety frequencies

The 121.5 MHz and 243 MHz distress and safety frequencies must be protected from unwanted emissions from T-DAB transmitters. These distress signals are monitored by aircraft, and by search and rescue satellites in orbit at altitudes of about 850 km. Consequently, a potentially large number of T-DAB transmitters will be simultaneously within the coverage area of the satellite.

To ensure the reliable detection of distress signals, an absolute limit for unwanted emissions of not more than -50 dBm measured in a 50 kHz band centred on 121.5 MHz and 243 MHz is required. This level is calculated to remove all possibility of harmful interference and is described below.

i) - Parameters of the search and rescue satellite system

Altitude of the satellite	: 850 km
Minimum elevation of the satellite from the distress beacon	: 5 degrees
Maximum distance from the beacon to the satellite	: 2890 km
Free space attenuation	: 149.4 dB
Gain of the satellite antenna in the direction of the beacon	: -5 dB
e.i.r.p. of the beacon	: 12 dBm
Bandwidth	: 46 kHz
C/I required	: 20 dB

ii) - Required protection from T-DAB transmissions

Maximum elevation of the satellite from the T-DAB transmitter	: 90 degrees
Minimum distance from the T-DAB transmitter to the satellite	: 850 km
Free space attenuation	: 138.7 dB
Gain of the satellite antenna in the direction of the T-DAB transmitter	: 1 dB
Bandwidth ratio between 1536 kHz and 46 kHz	: 15.2 dB

Maximum allowable cumulated interfering power from T-DAB transmitters:

$$I_{\max} = 12 - 20 - (149.4 + 5 - 138.7 + 1 - 15.2) = -9.5 \text{ dBm}$$

It should be noted that the SARSAT mission would no longer be possible with a C/I < 10 dB.

iii) - Calculation of the limit for unwanted emissions

The radio horizon at 850 km altitude is about 2890 km. Therefore, nearly all the T-DAB transmitters in the CEPT area are potentially within the radio horizon, and the total number of emissions could eventually significantly exceed 10000. The worst case is taken using free-space attenuation from the T-DAB transmitters and not considering the details of the interference mechanisms. A bandwidth of about 50 kHz is required in the satellite receiver to accommodate the poor frequency stability of emergency beacons operating under extreme environmental stress. The limit for unwanted emissions can therefore be calculated as follows:

Cumulative unwanted emission limit	-9.5 dBm
Per transmitter	$-9.5 - 10\log(10\ 000) = -49.5 \text{ dBm}$

Absolute unwanted emission limit
per T-DAB transmitter:

-50 dBm measured in a 50 kHz band centred on
243.0 MHz.

3. POSITION OF FREQUENCY BLOCKS

Table 2 shows the adopted harmonised channelling plan. This is based on tuning increments of 16 kHz and guard bands of 176 kHz between adjacent T-DAB frequency blocks.

Within each 7 MHz television channel, four T-DAB frequency blocks have been accommodated, giving common centre frequencies for T-DAB frequency blocks, irrespective of the TV system used.

To enhance compatibility with TV sound, the guard bands for T-DAB frequency blocks A in Channel N and D in Channel N-1 are between 320 kHz and 336 kHz..

The channelling plan for the band 230 - 240 MHz accommodates six T-DAB frequency blocks, but this is only achieved by dividing it into two parts as shown in Figure 2. The narrow guard band between blocks 13C and 13D will not allow the use of these two blocks in adjacent service areas.

[illegible]**Table 2: T-DAB frequency blocks**

4. SHARING AND COMPATIBILITY

⁴ Note: In arriving at these values, it has been assumed that the T-DAB transmitting and receiving equipment must allow for the use of adjacent T-DAB frequency blocks in adjacent areas, i.e. using a 176 kHz guard band.

4.1 Intra-service (T-DAB interfered with by T-DAB)

The T-DAB co-block protection ratio is 10 dB.

Table 3 below shows the values for the maximum permissible interfering field strength used for planning.

The standard deviation of the location variation of a T-DAB signal is assumed to be 5.5 dB (see Appendix). The field strength values for wanted and unwanted signals are assumed to be uncorrelated. To protect wanted T-DAB signals for 99% of locations against interference from another T-DAB transmission, a propagation correction of $2.33 \times 5.5 \times \sqrt{2} = 18$ dB as well as the T-DAB protection ratio (T-DAB to T-DAB) of 10 dB shall be taken into account.

$$E_I^{Max} = E_W^{Min} - PR - PC$$

where

- E_I^{Max} = maximum permissible interfering field strength
 E_W^{Min} = minimum median equivalent field strength
 PR = protection ratio
 PC = propagation correction

Frequency band	Minimum wanted field strength (dB(μV/m)) (50% locations, 10 m height)	Protection ratio T-DAB interfered with by T-DAB (dB)	Propagation correction (dB)	Maximum permissible interfering field strength (dB(μV/m))
BAND I	48	10	18	20*
BAND II	54	10	18	26*
BAND III	58	10	18	30*

* In the case of an SFN, this figure shall be increased by 3 dB.

Table 3: Maximum permissible interfering field strength (T-DAB to T-DAB)

4.2 Inter-service (T-DAB versus Other services)

4.2.1 T-DAB interfered with by other services

The maximum allowable field strength of an interfering signal (FS_I) to protect the minimum wanted field strength of a T-DAB signal (FS_{T-DAB}) is calculated as follows:

$$\text{Maximum allowable } FS_I = (FS_{T-DAB} - PR - 18) \text{ dB}(\mu\text{V/m}).$$

The following tables contain the protection ratio values used in the calculations.

The service information is shown as follows, for example:

Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
AL	58.0	10000

where

- **AL** is the service identifier;
- **58.0** is the T-DAB field strength to be protected in dB(μ V/m) for Band III; see Table 1 for the values applicable to Bands I and II;
- **10000** is the other service transmit antenna height (in metres).

The columns in the table relating to the above example have the following meaning:

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

where

- **-0.9** is the frequency difference in MHz, i.e. the centre frequency of the interfering other service minus the centre frequency of the T-DAB block suffering interference;*
- **-66.0** is the required protection ratio in dB.

* In the case of an interfering TV signal the vision carrier frequency has to be taken instead of the centre frequency of the TV channel.

Aeronautical safety service 1		
Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
AL	58.0	10000

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

CZE service. No information, CW interference data used		
Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
CA	58.0	10.0

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Aeronautical safety service 2		
Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
DA	58.0	10000

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

Aeronautical safety service (Germany); DB. The centre frequency is 235.0 MHz and the first channel is at 231.0 MHz. The values used are the same as those for the ME service		
Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
DB	58.0	10000.0

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military tactical distance measuring system (DME) Sweden (236 MHz). No information, CW interference data used		
Service identifier	Field strength to be protected in dB(μ V/m) for Band III	Transmit antenna height (m)
H1	58.0	10.0

Δf (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military tactical distance measuring system (DME) Sweden (241 MHz). No information, CW interference data used .											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
H2	58.0							25.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military tactical distance measuring system (DME) Sweden (238.5 MHz)											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
H3	58.0							500.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile Navy service in Sweden (233.1 MHz, 233.2 MHz, 233.3 MHz) transmit only											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
H4	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military narrowband FM system, analogue (47 - 68 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
MB	48.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military narrowband FM system, digital (47 - 68 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
MC	48.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military narrowband FM system, frequency hopping (47 - 68 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
MD	48.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system, analogue Minimum separation distance is 1 km. Frequency range is 230 to just above 240 MHz, but channel frequencies are not identical in all countries. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
ME	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system, digital (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MF	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system, frequency hopping (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MG	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile Navy service, analogue (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MI	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile Navy service, digital (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MJ	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile Navy service, frequency hopping (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MK	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military fixed services (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
ML	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Distress frequency 243 MHz. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MN	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military Mobile and Fixed (tactical) services. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MT	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile radio - low power devices S2 data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
MU	58.0							10.0			

Δ f (MHz)	-2.0	-1.9	-1.8	-1.7	-1.6	-1.5	-1.4	-1.3	-1.2	-1.1	-1.0
PR (dB)	-48.0	-47.9	-47.1	-46.7	-46.4	-46.0	-45.4	-45.1	-43.9	-38.4	-37.5
Δ f (MHz)	-0.9	-0.8	-0.8	-0.7	-0.6	-0.5	-0.4	-0.3	-0.2	-0.1	0.0
PR (dB)	-28.9	-12.9	-4.9	-1.0	2.1	3.5	4.3	4.1	4.4	4.1	4.0
Δ f (MHz)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.8	0.9	1.0
PR (dB)	4.1	4.4	4.1	4.3	3.5	2.1	-1.0	-4.9	-12.9	-28.9	-37.5
Δ f (MHz)	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0	
PR (dB)	-38.4	-43.9	-45.1	-45.4	-46.0	-46.4	-46.7	-47.1	-47.9	-48.0	

Mobile services - narrowband (12.5 kHz)FM system. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
M1	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile services - narrowband (12.5 kHz)FM system. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
M2	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

UHF satellite, space to earth, above 240 MHz. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
NO	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Paging - low power, local area (49 to 49.5 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
PA	48.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile services - narrowband (12.5 kHz)FM system. No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
RA	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Wideband FM sound mono											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
S1	58.0							10.0			

Δ f (MHz)	-1.3	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.7	-0.6	-0.5	-0.4
PR (dB)	-45.1	-43.9	-38.4	-37.5	-28.9	-12.9	-4.9	-1.0	2.1	3.5	4.3
Δ f (MHz)	-0.3	-0.2	-0.1	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
PR (dB)	4.1	4.4	4.1	4.0	4.1	4.4	4.1	4.3	3.5	2.1	-1.0
Δ f (MHz)	0.8	0.8	0.9	1.0	1.1	1.2	1.3				
PR (dB)	-4.9	-12.9	-28.9	-37.5	-38.4	-43.9	-45.1				

Wideband FM sound stereo											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
S2	58.0							10.0			

Δ f (MHz)	-1.3	-1.2	-1.1	-1.0	-0.9	-0.8	-0.8	-0.7	-0.6	-0.5	-0.4
PR (dB)	-45.1	-43.9	-38.4	-37.5	-28.9	-12.9	-4.9	-1.0	2.1	3.5	4.3
Δ f (MHz)	-0.3	-0.2	-0.1	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
PR (dB)	4.1	4.4	4.1	4.0	4.1	4.4	4.1	4.3	3.5	2.1	-1.0
Δ f (MHz)	0.8	0.8	0.9	1.0	1.1	1.2	1.3				
PR (dB)	-4.9	-12.9	-28.9	-37.5	-38.4	-43.9	-45.1				

I/PAL (Band I)											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TA	48.0							10.0			

Δ f (MHz)	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0
PR (dB)	-42.0	-23.5	-10.0	-3.0	-2.0	-3.0	-24.0	-21.0	-23.0	-31.0	-31.5
Δ f (MHz)	-2.5	-2.0	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7
PR (dB)	-30.0	-28.5	-25.0	-19.5	-17.5	-11.0	-7.0	-1.5	-1.5	-4.0	-5.5
Δ f (MHz)	0.8	0.9	1.0	2.0	3.0						
PR (dB)	-13.5	-17.0	-20.0	-33.0	-47.5						

B/PAL (Band I)											
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Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TB	48.0							10.0			

Δ f (MHz)	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0
PR (dB)	-47.0	-18.0	-5.0	-3.0	-5.0	-20.0	-22.0	-31.5	-31.5	-29.0	-26.5
Δ f (MHz)	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	-23.0	-18.5	-16.0	-9.0	-5.0	-3.0	-0.5	-3.0	-4.0	-12.0	-16.0
Δ f (MHz)	1.0	2.0									
PR (dB)	-19.5	-45.3									

D/SECAM, K/SECAM (Band I)											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TC	48.0							10.0			

Δ f (MHz)	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0
PR (dB)	-47.0	-42.5	-3.0	-2.5	-3.0	-37.5	-21.5	-18.5	-20.5	-26.5	-33.5
Δ f (MHz)	-2.5	-2.0	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7
PR (dB)	-31.5	-29.0	-26.5	-18.5	-16.5	-9.0	-6.0	-3.0	-2.5	-4.0	-4.5
Δ f (MHz)	0.8	0.9	1.0	2.0							
PR (dB)	-12.0	-22.0	-25.0	-46.0							

L/SECAM (Band I)											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TD	48.0							10.0			

Δ f (MHz)	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0
PR (dB)	-46.5	-42.5	-15.5	-13.0	-15.0	-26.5	-18.5	-17.0	-18.0	-23.0	-31.5
Δ f (MHz)	-2.5	-2.0	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7
PR (dB)	-30.5	-27.5	-24.5	-18.0	-16.5	-8.0	-5.0	-1.5	1.5	-2.0	-3.5
Δ f (MHz)	0.8	0.9	1.0	2.0	3.0						
PR (dB)	-12.5	-18.5	-19.0	-31.0	-46.8						

B/SECAM (Band I), B/PAL (T2) data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TE	48.0							10.0			

Δ f (MHz)	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0
PR (dB)	-47.0	-18.0	-5.0	-3.0	-5.0	-20.0	-22.0	-31.5	-31.5	-29.0	-26.5
Δ f (MHz)	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	-23.0	-18.5	-16.0	-9.0	-5.0	-3.0	-0.5	-3.0	-4.0	-12.0	-16.0
Δ f (MHz)	1.0	2.0									
PR (dB)	-19.5	-45.3									

D/PAL (Band I)											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TF	48.0							10.0			

Δ f (MHz)	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0
PR (dB)	-47.0	-42.5	-3.0	-2.5	-3.0	-37.5	-21.5	-20.0	-22.0	-31.5	-31.5
Δ f (MHz)	-2.5	-2.0	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7
PR (dB)	-29.0	-26.5	-23.0	-18.5	-16.0	-9.0	-5.0	-3.0	-0.5	-3.0	-4.0
Δ f (MHz)	0.8	0.9	1.0	2.0							
PR (dB)	-12.0	-16.0	-19.0	-45.3							

B/PAL (FM+Nicam) (Band I)											
Service identifier	Field strength to be protected in dB(μV/m) for Band I							Transmit antenna height (m)			
TG	48.0							10.0			

Δ f (MHz)	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0	-2.5	-2.0
PR (dB)	-47.0	-18.0	-5.0	-3.0	-5.0	-20.0	-22.0	-31.5	-31.5	-29.0	-26.5
Δ f (MHz)	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7	0.8	0.9
PR (dB)	-23.0	-18.5	-16.0	-9.0	-5.0	-3.0	-0.5	-3.0	-4.0	-12.0	-16.0
Δ f (MHz)	1.0	2.0									
PR (dB)	-19.5	-45.3									

PMR (5 kHz channel spacing). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
XA	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Finnish Alarm System, 230 to 231 MHz (Block 13A). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
XB	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system (aeronautical frequencies). No information											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
XE	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Radio microphones (VHF). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
XM	58.0							10.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Video link											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YB	58.0							10.0			

Δ f (MHz)	-8.0	-7.5	-7.0	-6.5	-6.0	-5.5	-5.0	-4.5	-4.0	-3.5	-3.0
PR (dB)	-42.0	-23.5	-10.0	-3.0	-2.0	-3.0	-24.0	-21.0	-23.0	-31.0	-31.5
Δ f (MHz)	-2.5	-2.0	-1.5	-1.0	-0.9	-0.8	-0.7	-0.6	0.0	0.6	0.7
PR (dB)	-30.0	-28.5	-25.0	-19.5	-17.5	-11.0	-7.0	-1.5	-1.5	-4.0	-5.5
Δ f (MHz)	0.8	0.9	1.0	2.0	3.0						
PR (dB)	-13.5	-17.0	-20.0	-33.0	-47.5						

Military air-ground-air system, frequency hopping (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YC	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system, frequency hopping (230 - 243 MHz). No information, CW interference data used											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YD	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Mobile Navy (aircraft) service (230 - 243 MHz). New type											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YE	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

Distress frequency 243 MHz. New type											
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Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YG	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

Audio link special											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YH	58.0							5000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-66.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-66.0

Military air-ground-air system, frequency hopping (230 - 243 MHz). No information, CW interference data used (as YC)											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YT	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Military air-ground-air system, frequency hopping (230 - 243 MHz). No information, CW interference data used (as YC)											
Service identifier	Field strength to be protected in dB(μV/m) for Band III							Transmit antenna height (m)			
YW	58.0							10000.0			

Δ f (MHz)	-0.9	-0.8	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.6	0.8	0.9
PR (dB)	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0

Where no information concerning protection ratios for T-DAB suffering interference from other services has been supplied to the Planning Meeting, the administrations concerned should develop appropriate sharing criteria by mutual agreement. When available one could use the relevant ITU-R Recommendations or ECC and ERC Decisions and Recommendations..

4.2.2 Other services interfered with by T-DAB

The maximum allowable field strength of an interfering signal (FS_I) to protect the minimum wanted field strength of an other service ($FS_{\text{other service}}$) is calculated as follows:

$$\text{Max. allowable } FS_I = (FS_{\text{other service}} - PR) \text{ dB}(\mu\text{V/m})$$

or where the other service is television broadcasting:

$$\text{Max. allowable } FS_I \text{ for tropospheric interference} = (FS_{\text{other service}} - PR_{1\% \text{ time}}) \text{ dB}(\mu\text{V/m});$$

$$\text{Max. allowable } FS_I \text{ for continuous interference} = (FS_{\text{other service}} - PR_{50\% \text{ time}}) \text{ dB}(\mu\text{V/m}).$$

Note: Where relevant, receiving antenna directivity or polarization discrimination must be taken into account.

The required separation distance is given where known.

The following tables contain the field strength to be protected, the protection ratio values used in the calculations and the maximum permitted field strength values derived from those values. .

The service information is shown as follows, for example:

Aeronautical safety service 1			
Service identifier	Field strength to be protected in	Receiver height (m)	Separation distance (m)

	dB(μ V/m)		
AL	26.0	10000.0	1000.0

where

- **AL** is the service identifier;
- **26.0** is the other service field strength to be protected in dB(μ V/m);
- **10000.0** is the other service receiver height in metres to be used if it is mobile;
- **1000.0** is the required separation distance in metres, where known.

The columns in the table have the following meaning:

Δf (MHz)	-2.500	-2.000	-1.500	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.630
PR (dB) 1%	-0.1	3.8	21.0	32.0	39.8	43.0	39.5	37.3	39.3	38.0	24.5
PR (dB) 50%	5.9	10.3	25.5	38.0	46.8	48.3	44.3	41.8	45.5	42.5	30.0
dB (μ V/m) 1%	48.1	44.2	27.0	16.0	8.2	5.0	8.5	10.7	8.7	10.0	23.5
dB (μ V/m) 50%	42.1	37.7	22.5	10.0	1.2	-0.3	3.7	6.2	2.5	5.5	18.0

where

- **-2.500** is the frequency difference in MHz, i.e .the interfering T-DAB block centre frequency minus the centre frequency of the other service suffering interference;*
- **-0.1** is the protection ratio in dB required for tropospheric interference;
- **5.9** is the protection ratio in dB required for continuous interference (if known);
- **48.1** is the maximum permitted 1% time T-DAB field strength in dB(μ V/m) in the other service coverage area;
- **42.1** is the maximum permitted 50% time T-DAB field strength in dB(μ V/m) in the other service coverage area (specified only in the case of a TV signal suffering interference).

* In the case of a TV signal suffering interference the vision carrier frequency has to be taken instead of the centre frequency of the TV channel.

Aeronautical safety service 1			
Service identifier	Field strength to be protected in dB(μ V/m)	Receiver height (m)	Separation distance (m)
AL	26.0	10000.0	1000.0

Δf (MHz)	-10.000	-9.000	-0.800	-0.600	-0.400	-0.200	0.000	0.200	0.400	0.600	0.800
PR (dB) 1%	-66.0	-6.6	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6
dB (μ V/m) 1%	92.0	32.6	32.6	23.3	22.8	21.9	19.5	21.9	22.8	23.3	32.6
Δf (MHz)	9.000	10.000									
PR (dB) 1%	-6.6	-66.0									
dB (μ V/m) 1%	32.6	92.0									

CZE service, values used as for PMR (5 kHz channel spacing)			
Service identifier	Field strength to be protected in dB(μ V/m)	Receiver height (m)	Separation distance (m)
CA	15.0	10.0	

Δf (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μ V/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δf (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μ V/m) 1%	64.0	73.0									

Aeronautical safety service 2; Type A receiver. First channel 230.05 MHz			
Service identifier	Field strength to be protected in dB(μ V/m)	Receiver height (m)	Separation distance (m)
DA	26.0	10000.0	1000.0

Δf (MHz)	-10.20	-6.550	-6.350	-6.150	-5.930	-5.770	0.000	10.000			
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PR (dB) 1%	-56.0	-56.0	-54.0	-49.0	-33.0	6.0	6.0	6.0			
dB (μV/m) 1%	82.0	82.0	80.0	75.0	59.0	20.0	20.0	20.0			

Aeronautical safety service (Germany); DB. The centre frequency is 235.0 MHz and the first channel is at 231.0 MHz											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
DB	26.0					10000.0			1000.0		

Δ f (MHz)	-5.250	-4.470	-4.270	0.000	9.770	9.970	10.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Military tactical distance measuring system (DME) Sweden (236 MHz)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
H1	73.0					500.0					

Δ f (MHz)	-0.700	-0.500	0.000	0.500	0.700						
PR (dB) 1%	-60.0	6.0	6.0	6.0	-60.0						
dB (μV/m) 1%	133.0	67.0	67.0	67.0	133.0						

Military tactical distance measuring system (DME) Sweden (241 MHz)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
H2	53.0					10000.0			1000.0		

Δ f (MHz)	-2.700	-0.500	0.000	0.500	2.700						
PR (dB) 1%	-60.0	6.0	6.0	6.0	-60.0						
dB (μV/m) 1%	113.0	47.0	47.0	47.0	113.0						

Military tactical distance measuring system (DME) Sweden (238.5 MHz); transmit only											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
H3	53.0					10.0					

Δ f (MHz)	-0.900	-0.800	-0.600	-0.400	-0.200	0.000	0.200	0.400	0.600	0.800	0.900
PR (dB) 1%	-60.0	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6	-60.0
dB (μV/m) 1%	113.0	59.6	50.3	49.8	48.9	46.5	48.9	49.8	50.3	59.6	113.0

Mobile Navy service in Sweden (233.1 MHz, 233.2 MHz, 233.3 MHz)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
H4	48.0					5.0					

Δ f (MHz)	-0.140	0.000	0.140								
PR (dB) 1%	-60.0	-10.0	-60.0								
dB (μV/m) 1%	108.0	58.0	108.0								

Military narrowband FM system, analogue (47 - 68 MHz). M2 values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MB	15.0					10.0					

Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Military narrowband FM system, digital (47 - 68 MHz). M2 values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MC	15.0					10.0					

Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Military narrowband FM system, frequency hopping (47 - 68 MHz). M2 values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MD	15.0					10.0					

Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Military air-ground-air system, analogue (type B and C receivers). Minimum separation distance is 1 km. Frequency range is 230 to just above 240 MHz, but channel frequencies are not identical in all countries											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
ME	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Military air-ground-air system, digital (230 - 243 MHz). ME data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MF	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Military air-ground-air system, frequency hopping (230 - 243 MHz). ME data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MG	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Mobile Navy service, analogue (230 - 243 MHz). ME data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MI	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Mobile Navy service, digital (230 - 243 MHz). ME data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MJ	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Mobile Navy service, frequency hopping (230 - 243 MHz). ME data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MK	26.0					10000.0			1000.0		

Δ f (MHz)	-1.750	-0.970	-0.770	0.000	0.770	0.970	1.750				
PR (dB) 1%	-81.0	-46.0	-1.0	-1.0	-1.0	-46.0	-81.0				
dB (μV/m) 1%	107.0	72.0	27.0	27.0	27.0	72.0	107.0				

Military fixed services (230 - 243 MHz). MT values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
ML	20.0					10.0					

Δ f (MHz)	-2.000	-1.000	0.000	1.000	2.000						
PR (dB) 1%	-5.0	15.0	25.0	15.0	-5.0						
dB (μV/m) 1%	25.0	5.0	-5.0	5.0	25.0						

Distress frequency 243 MHz											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MN	26.0					10.0					

Δ f (MHz)	-0.800	0.000	0.800								
PR (dB) 1%	-60.0	-60.0	-60.0								
dB (μV/m) 1%	86.0	86.0	86.0								

Military mobile service. Centre frequency 232.625 MHz											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MQ	26.0					10000.0			1000.0		

Δ f (MHz)	-2.63	-2.625	0.000	2.625	2.630						
PR (dB) 1%	-60.0	-1.0	-1.0	-1.0	-60.0						
dB (μV/m) 1%	86.0	27.0	27.0	27.0	86.0						

Military mobile service. Centre frequency 242.5 MHz											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MR	26.0					10000.0			1000.0		

Δ f (MHz)	-2.510	-2.500	0.000	2.500	2.510						
PR (dB) 1%	-60.0	-1.0	-1.0	-1.0	-60.0						
dB (μV/m) 1%	86.0	27.0	27.0	27.0	86.0						

Military Mobile and Fixed (tactical) services											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MT	20.0					10.0					

Δ f (MHz)	-2.000	-1.000	0.000	1.000	2.000						
PR (dB) 1%	-5.0	15.0	25.0	15.0	-5.0						
dB (μV/m) 1%	25.0	5.0	-5.0	5.0	25.0						

Mobile radio - low power devices. Wideband FM (stereo) data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
MU	54.0					10.0					

Δ f (MHz)	-1.000	-0.900	-0.800	0.000	0.800	0.900	1.000				
PR (dB) 1%	-12.0	5.0	38.0	38.0	38.0	5.0	-12.0				
dB (μV/m) 1%	66.0	49.0	16.0	16.0	16.0	49.0	66.0				

Mobile services - narrowband FM system (12.5 kHz) interfered with by a single T-DAB block. T-DAB assumed to be always higher in frequency than PMR. M2 values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
M1	15.0					10.0					
Δ f (MHz)	-92	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Narrowband FM system interfered with by two or more T-DAB blocks											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
M2	36.0					10.0					
Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	94.0	85.0	77.0	73.0	70.0	50.0	48.0	50.0	70.0	73.0	77.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	85.0	94.0									

UHF satellite, space to earth, above 240 MHz. No information (-60 dB)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
NO	0.0					10.0					
Δ f (MHz)	-0.800	0.000	0.800								
PR (dB) 1%	-60.0	-60.0	-60.0								
dB (μV/m) 1%	60.0	60.0	60.0								

Paging - low power, local area, 49 to 49.5 MHz											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
PA	26.0					10.0					
Δ f (MHz)	-0.900	-0.800	0.000	0.800	0.900						
PR (dB) 1%	-43.0	-25.0	-9.0	-25.0	-43.0						
dB (μV/m) 1%	69.0	51.0	35.0	51.0	69.0						

Mobile services - narrowband FM system (12.5 kHz) interfered with by a single T-DAB block. T-DAB assumed to be always higher in frequency than PMR. M2 values used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
RA	15.0					10.0					
Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Wideband FM sound mono											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
S1	48.0					10.0					
Δ f (MHz)	-1.000	-0.900	-0.800	0.000	0.800	0.900	1.000				
PR (dB) 1%	-22.0	-16.0	18.0	18.0	18.0	-16.0	-22.0				
dB (μV/m) 1%	70.0	64.0	30.0	30.0	30.0	64.0	70.0				

Wideband FM sound stereo											
Service identifier	Field strength to be protected in dB(μ V/m)					Receiver height (m)			Separation distance (m)		
S2	54.0					10.0					

Δf (MHz)	-1.000	-0.900	-0.800	0.000	0.800	0.900	1.000				
PR (dB) 1%	-12.0	5.0	38.0	38.0	38.0	5.0	-12.0				
dB (μ V/m) 1%	66.0	49.0	16.0	16.0	16.0	49.0	66.0				

I/PAL (Band I)											
Service identifier	Field strength to be protected in dB(μ V/m)					Receiver height (m)			Separation distance (m)		
TA	48.0					10.0					

Δf (MHz)	-2.500	-2.000	-1.500	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.630
PR (dB) 1%	-0.1	3.8	21.0	32.0	39.8	43.0	39.5	37.3	39.3	38.0	24.5
PR (dB) 50%	5.9	10.3	25.5	38.0	46.8	48.3	44.3	41.8	45.5	42.5	30.0
dB (μ V/m) 1%	48.1	44.2	27.0	16.0	8.2	5.0	8.5	10.7	8.7	10.0	23.5
dB (μ V/m) 50%	42.1	37.7	22.5	10.0	1.2	-0.3	3.7	6.2	2.5	5.5	18.0
Δf (MHz)	5.670	5.890	5.950	6.550	7.200	7.550	7.900				
PR (dB) 1%	25.5	29.7	31.0	31.0	31.0	19.0	-2.0				
PR (dB) 50%	29.1	29.7	31.0	31.0	31.0	19.0	-2.0				
dB (μ V/m) 1%	22.5	18.3	17.0	17.0	17.0	29.0	50.0				
dB (μ V/m) 50%	18.9	18.3	17.0	17.0	17.0	29.0	50.0				

B/PAL with two FM sound sub-carriers (Band I)											
Service identifier	Field strength to be protected in dB(μ V/m)					Receiver height (m)			Separation distance (m)		
TB	48.0					10.0					

Δf (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.740	6.440
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	30.5	32.0	30.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	38.3	40.0	38.0
dB (μ V/m) 1%	49.5	18.0	6.0	6.0	11.0	16.0	9.0	9.0	17.5	16.0	18.0
dB (μ V/m) 50%	46.2	12.0	0.0	0.0	6.0	12.0	2.7	2.7	9.7	8.0	10.0
Δf (MHz)	6.490	6.740	7.240								
PR (dB) 1%	27.0	1.0	0.2								
PR (dB) 50%	35.0	9.0	7.7								
dB (μ V/m) 1%	21.0	47.0	47.8								
dB (μ V/m) 50%	13.0	39.0	40.3								

D/SECAM (Band I). Sound-to- vision power ratio is -10 dB as requested by Hungary and Poland											
Service identifier	Field strength to be protected in dB(μ V/m)					Receiver height (m)			Separation distance (m)		
TC	48.0					10.0					

Δf (MHz)	-2.350	-2.000	-1.500	-1.000	-0.500	0.000	0.500	1.000	1.500	2.000	2.500
PR (dB) 1%	-0.1	8.6	18.0	29.8	36.5	42.3	42.0	42.1	40.8	37.7	33.6
PR (dB) 50%	9.9	18.6	28.0	36.8	43.5	49.3	49.0	49.1	47.8	44.7	40.6
dB (μ V/m) 1%	48.1	39.4	30.0	18.2	11.5	5.7	6.0	5.9	7.2	10.3	14.4
dB (μ V/m) 50%	38.1	29.4	20.0	11.2	4.5	-1.3	-1.0	-1.1	0.2	3.3	7.4
Δf (MHz)	3.000	3.500	4.000	4.500	5.000	5.500	5.850	6.000	6.500	7.200	7.250
PR (dB) 1%	31.6	33.7	38.1	38.6	37.2	28.5	20.2	20.7	22.0	20.0	17.0
PR (dB) 50%	38.6	40.7	45.1	45.6	44.2	35.5	28.1	28.6	30.0	28.0	25.0
dB (μ V/m) 1%	16.4	14.3	9.9	9.4	10.8	19.5	27.8	27.3	26.0	28.0	31.0
dB (μ V/m) 50%	9.4	7.3	2.9	2.4	3.8	12.5	19.9	19.4	18.0	20.0	23.0
Δf (MHz)	7.430										
PR (dB) 1%	0.6										
PR (dB) 50%	10.0										
dB (μ V/m) 1%	47.4										
dB (μ V/m) 50%	38.0										

L/SECAM (Band I)											
Service identifier	Field strength to be protected in dB(μ V/m)					Receiver height (m)			Separation distance (m)		
TD	48.0					10.0					

Δf (MHz)	-2.400	-2.000	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.500	5.750
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PR (dB) 1%	0.0	6.0	28.0	38.0	39.0	35.0	32.0	34.0	33.0	32.0	42.0
PR (dB) 50%	7.0	13.0	32.0	42.0	44.0	39.0	36.0	38.0	37.0	34.0	50.0
dB (μV/m) 1%	48.0	42.0	20.0	10.0	9.0	13.0	16.0	14.0	15.0	16.0	6.0
dB (μV/m) 50%	41.0	35.0	16.0	6.0	4.0	9.0	12.0	10.0	11.0	14.0	-2.0
Δ f (MHz)	6.000	7.000	7.250	7.900							
PR (dB) 1%	42.0	42.0	42.0	0.0							
PR (dB) 50%	50.0	50.0	50.0	8.0							
dB (μV/m) 1%	6.0	6.0	6.0	48.0							
dB (μV/m) 50%	-2.0	-2.0	-2.0	40.0							

B/SECAM (Band I), B/PAL data used											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
TE	48.0					10.0					

Δ f (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.740	6.440
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	30.5	32.0	30.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	38.3	40.0	38.0
dB (μV/m) 1%	49.5	18.0	6.0	6.0	11.0	16.0	9.0	9.0	17.5	16.0	18.0
dB (μV/m) 50%	46.2	12.0	0.0	0.0	6.0	12.0	2.7	2.7	9.7	8.0	10.0
Δ f (MHz)	6.490	6.740	7.240								
PR (dB) 1%	27.0	1.0	0.2								
PR (dB) 50%	35.0	9.0	7.7								
dB (μV/m) 1%	21.0	47.0	47.8								
dB (μV/m) 50%	13.0	39.0	40.3								

D/PAL (Band I)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
TF	48.0					10.0					

Δ f (MHz)	-2.350	-2.000	-1.500	-1.000	-0.500	0.000	0.500	1.000	1.500	2.000	2.500
PR (dB) 1%	-0.1	8.6	18.0	29.8	36.5	42.3	42.0	42.1	40.8	37.7	33.6
PR (dB) 50%	9.9	18.6	28.0	36.8	43.5	49.3	49.0	49.1	47.8	44.7	40.6
dB (μV/m) 1%	48.1	39.4	30.0	18.2	11.5	5.7	6.0	5.9	7.2	10.3	14.4
dB (μV/m) 50%	38.1	29.4	20.0	11.2	4.5	-1.3	-1.0	-1.1	0.2	3.3	7.4
Δ f (MHz)	3.000	3.500	4.000	4.500	5.000	5.500	5.850	6.000	6.500	7.200	7.250
PR (dB) 1%	31.6	33.7	38.1	38.6	37.2	28.5	20.2	20.7	22.0	20.0	17.0
PR (dB) 50%	38.6	40.7	45.1	45.6	44.2	35.5	28.1	28.6	30.0	28.0	25.0
dB (μV/m) 1%	16.4	14.3	9.9	9.4	10.8	19.5	27.8	27.3	26.0	28.0	31.0
dB (μV/m) 50%	9.4	7.3	2.9	2.4	3.8	12.5	19.9	19.4	18.0	20.0	23.0
Δ f (MHz)	7.430										
PR (dB) 1%	0.6										
PR (dB) 50%	10.0										
dB (μV/m) 1%	47.4										
dB (μV/m) 50%	38.0										

B/PAL (FM+Nicam) (Band I)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
TG	48.0					10.0					

Δ f (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.300	5.500
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	31.0	31.0	31.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	36.8	32.6	33.0
dB (μV/m) 1%	49.5	18.0	6.0	6.0	11.0	16.0	9.0	9.0	17.0	17.0	17.0
dB (μV/m) 50%	46.2	12.0	0.0	0.0	6.0	12.0	2.7	2.7	11.2	15.4	15.0
Δ f (MHz)	6.200	6.450	6.850	7.250							
PR (dB) 1%	31.0	31.0	19.0	-5.0							
PR (dB) 50%	31.0	31.0	19.0	-5.0							
dB (μV/m) 1%	17.0	17.0	29.0	53.0							
dB (μV/m) 50%	17.0	17.0	29.0	53.0							

I/PAL (Band III)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
T1	55.0					10.0					

Δf (MHz)	-2.500	-2.000	-1.500	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.630
PR (dB) 1%	-0.1	3.8	21.0	32.0	39.8	43.0	39.5	37.3	39.3	38.0	24.5
PR (dB) 50%	5.9	10.3	25.5	38.0	46.8	48.3	44.3	41.8	45.5	42.5	30.0
dB ($\mu V/m$) 1%	55.1	51.2	34.0	23.0	15.2	12.0	15.5	17.7	15.7	17.0	30.5
dB ($\mu V/m$) 50%	49.1	44.7	29.5	17.0	8.2	6.7	10.7	13.2	9.5	12.5	25.0
Δf (MHz)	5.670	5.890	5.950	6.550	7.200	7.550	7.900				
PR (dB) 1%	25.5	29.7	31.0	31.0	31.0	19.0	-2.0				
PR (dB) 50%	29.1	29.7	31.0	31.0	31.0	19.0	-2.0				
dB ($\mu V/m$) 1%	29.5	25.3	24.0	24.0	24.0	36.0	57.0				
dB ($\mu V/m$) 50%	25.9	25.3	24.0	24.0	24.0	36.0	57.0				

B/PAL with two FM sound sub-carriers (Band III)											
Service identifier	Field strength to be protected in dB($\mu V/m$)					Receiver height (m)			Separation distance (m)		
T2	55.0					10.0					

Δf (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.740	6.440
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	30.5	32.0	30.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	38.3	40.0	38.0
dB ($\mu V/m$) 1%	56.5	25.0	13.0	13.0	18.0	23.0	16.0	16.0	24.5	23.0	25.0
dB ($\mu V/m$) 50%	53.2	19.0	7.0	7.0	13.0	19.0	9.7	9.7	16.7	15.0	17.0
Δf (MHz)	6.490	6.740	7.240								
PR (dB) 1%	27.0	1.0	0.2								
PR (dB) 50%	35.0	9.0	7.7								
dB ($\mu V/m$) 1%	28.0	54.0	54.8								
dB ($\mu V/m$) 50%	20.0	46.0	47.3								

D/SECAM (Band III). Sound-to-vision power ratio is -10 dB as requested by Hungary and Poland											
Service identifier	Field strength to be protected in dB($\mu V/m$)					Receiver height (m)			Separation distance (m)		
T3	55.0					10.0					

Δf (MHz)	-2.350	-2.000	-1.500	-1.000	-0.500	0.000	0.500	1.000	1.500	2.000	2.500
PR (dB) 1%	-0.1	8.6	18.0	29.8	36.5	42.3	42.0	42.1	40.8	37.7	33.6
PR (dB) 50%	9.9	18.6	28.0	36.8	43.5	49.3	49.0	49.1	47.8	44.7	40.6
dB ($\mu V/m$) 1%	55.1	46.4	37.0	25.2	18.5	12.7	13.0	12.9	14.2	17.3	21.4
dB ($\mu V/m$) 50%	45.1	36.4	27.0	18.2	11.5	5.7	6.0	5.9	7.2	10.3	14.4
Δf (MHz)	3.000	3.500	4.000	4.500	5.000	5.500	5.850	6.000	6.500	7.200	7.250
PR (dB) 1%	31.6	33.7	38.1	38.6	37.2	28.5	20.2	20.7	22.0	20.0	17.0
PR (dB) 50%	38.6	40.7	45.1	45.6	44.2	35.5	28.1	28.6	30.0	28.0	25.0
dB ($\mu V/m$) 1%	23.4	21.3	16.9	16.4	17.8	26.5	34.8	34.3	33.0	35.0	38.0
dB ($\mu V/m$) 50%	16.4	14.3	9.9	9.4	10.8	19.5	26.9	26.4	25.0	27.0	30.0
Δf (MHz)	7.430										
PR (dB) 1%	0.6										
PR (dB) 50%	10.0										
dB ($\mu V/m$) 1%	54.4										
dB ($\mu V/m$) 50%	45.0										

L/SECAM (Band III)											
Service identifier	Field strength to be protected in dB($\mu V/m$)					Receiver height (m)			Separation distance (m)		
T4	55.0					10.0					

Δf (MHz)	-2.400	-2.000	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.500	5.750
PR (dB) 1%	0.0	6.0	28.0	38.0	39.0	35.0	32.0	34.0	33.0	32.0	42.0
PR (dB) 50%	7.0	13.0	32.0	42.0	44.0	39.0	36.0	38.0	37.0	34.0	50.0
dB ($\mu V/m$) 1%	55.0	49.0	27.0	17.0	16.0	20.0	23.0	21.0	22.0	23.0	13.0
dB ($\mu V/m$) 50%	48.0	42.0	23.0	13.0	11.0	16.0	19.0	17.0	18.0	21.0	5.0
Δf (MHz)	6.000	7.000	7.250	7.900							
PR (dB) 1%	42.0	42.0	42.0	0.0							
PR (dB) 50%	50.0	50.0	50.0	8.0							
dB ($\mu V/m$) 1%	13.0	13.0	13.0	55.0							
dB ($\mu V/m$) 50%	5.0	5.0	5.0	47.0							

B/SECAM (Band III). B/PAL data used											
Service identifier	Field strength to be protected in					Receiver height (m)			Separation distance (m)		

	dB(μV/m)										
T5	55.0				10.0						

Δ f (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.740	6.440
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	30.5	32.0	30.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	38.3	40.0	38.0
dB (μV/m) 1%	56.5	25.0	13.0	13.0	18.0	23.0	16.0	16.0	24.5	23.0	25.0
dB (μV/m) 50%	53.2	19.0	7.0	7.0	13.0	19.0	9.7	9.7	16.7	15.0	17.0
Δ f (MHz)	6.490	6.740	7.240								
PR (dB) 1%	27.0	1.0	0.2								
PR (dB) 50%	35.0	9.0	7.7								
dB (μV/m) 1%	28.0	54.0	54.8								
dB (μV/m) 50%	20.0	46.0	47.3								

D/PAL (Band III)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
T6	55.0				10.0						

Δ f (MHz)	-2.350	-2.000	-1.500	-1.000	-0.500	0.000	0.500	1.000	1.500	2.000	2.500
PR (dB) 1%	-0.1	8.6	18.0	29.8	36.5	42.3	42.0	42.1	40.8	37.7	33.6
PR (dB) 50%	9.9	18.6	28.0	36.8	43.5	49.3	49.0	49.1	47.8	44.7	40.6
dB (μV/m) 1%	55.1	46.4	37.0	25.2	18.5	12.7	13.0	12.9	14.2	17.3	21.4
dB (μV/m) 50%	45.1	36.4	27.0	18.2	11.5	5.7	6.0	5.9	7.2	10.3	14.4
Δ f (MHz)	3.000	3.500	4.000	4.500	5.000	5.500	5.850	6.000	6.500	7.200	7.250
PR (dB) 1%	31.6	33.7	38.1	38.6	37.2	28.5	20.2	20.7	22.0	20.0	17.0
PR (dB) 50%	38.6	40.7	45.1	45.6	44.2	35.5	28.1	28.6	30.0	28.0	25.0
dB (μV/m) 1%	23.4	21.3	16.9	16.4	17.8	26.5	34.8	34.3	33.0	35.0	38.0
dB (μV/m) 50%	16.4	14.3	9.9	9.4	10.8	19.5	26.9	26.4	25.0	27.0	30.0
Δ f (MHz)	7.430										
PR (dB) 1%	0.6										
PR (dB) 50%	10.0										
dB (μV/m) 1%	54.4										
dB (μV/m) 50%	45.0										

B/PAL (FM+Nicam) (Band III)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
T7	55.0				10.0						

Δ f (MHz)	-1.900	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.200	5.300	5.500
PR (dB) 1%	-1.5	30.0	42.0	42.0	37.0	32.0	39.0	39.0	31.0	31.0	31.0
PR (dB) 50%	1.8	36.0	48.0	48.0	42.0	36.0	45.3	45.3	36.8	32.6	33.0
dB (μV/m) 1%	56.5	25.0	13.0	13.0	18.0	23.0	16.0	16.0	24.0	24.0	24.0
dB (μV/m) 50%	53.2	19.0	7.0	7.0	13.0	19.0	9.7	9.7	18.2	22.4	22.0
Δ f (MHz)	6.200	6.450	6.850	7.250							
PR (dB) 1%	31.0	31.0	19.0	-5.0							
PR (dB) 50%	31.0	31.0	19.0	-5.0							
dB (μV/m) 1%	24.0	24.0	36.0	60.0							
dB (μV/m) 50%	24.0	24.0	36.0	60.0							

PMR (5 kHz channel spacing)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
XA	15.0				10.0						

Δ f (MHz)	-0.920	-0.870	-0.820	-0.795	-0.782	-0.770	0.000	0.770	0.782	0.795	0.820
PR (dB) 1%	-58.0	-49.0	-41.0	-37.0	-34.0	-14.0	-12.0	-14.0	-34.0	-37.0	-41.0
dB (μV/m) 1%	73.0	64.0	56.0	52.0	49.0	29.0	27.0	29.0	49.0	52.0	56.0
Δ f (MHz)	0.870	0.920									
PR (dB) 1%	-49.0	-58.0									
dB (μV/m) 1%	64.0	73.0									

Finnish Alarm System. Frequency range 230 to 231 MHz (Block 13A)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
XB	37.0				10.0						

Δ f (MHz)	-0.600	-0.500	0.000	0.500	0.600						
PR (dB) 1%	-60.0	10.0	10.0	10.0	-60.0						
dB (μV/m) 1%	97.0	27.0	27.0	27.0	97.0						

Military air-ground-air system based on aeronautical blocks. No information (-60 dB)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
XE	0.0				0.0						

Δ f (MHz)	-0.100	0.000	0.100								
PR (dB) 1%	-60.0	-60.0	-60.0								
dB (μV/m) 1%	60.0	60.0	60.0								

Radio microphones (VHF). S1 (WB FM mono) data used											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
XM	48.0				10.0						

Δ f (MHz)	-1.000	-0.900	-0.800	0.000	0.800	0.900	1.000				
PR (dB) 1%	-22.0	-16.0	18.0	18.0	18.0	-16.0	-22.0				
dB (μV/m) 1%	70.0	64.0	30.0	30.0	30.0	64.0	70.0				

Audio link (F)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
YA	29.0				10.0						

Δ f (MHz)	-0.900	-0.800	-0.700	0.000	0.700	0.800	0.900				
PR (dB) 1%	-60.0	-6.0	30.0	30.0	30.0	-6.0	-60.0				
dB (μV/m) 1%	89.0	35.0	-1.0	-1.0	-1.0	35.0	89.0				

Video link (F)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
YB	29.0				500.0						

Δ f (MHz)	-13.000	-12.000	0.000	12.000	13.000						
PR (dB) 1%	-46.0	20.0	20.0	20.0	-46.0						
dB (μV/m) 1%	75.0	9.0	9.0	9.0	75.0						

Air-ground-air system 1 (F)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
YC	10.0				10000.0				1000.0		

Δ f (MHz)	-1.750	-0.970	-0.930	-0.770	0.770	0.930	0.970	1.750			
PR (dB) 1%	-84.0	-49.0	-40.0	-4.0	-4.0	-40.0	-49.0	-84.0			
dB (μV/m) 1%	94.0	59.0	50.0	14.0	14.0	50.0	59.0	94.0			

Air-ground-air system 2 (F)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
YD	10.0				10000.0				1000.0		

Δ f (MHz)	-1.75	-0.970	-0.930	-0.770	0.770	0.930	0.970	1.750			
PR (dB) 1%	-84.	-49.0	-40.0	-4.0	-4.0	-40.0	-49.0	-84.0			
dB (μV/m) 1%	94.0	59.0	50.0	14.0	14.0	50.0	59.0	94.0			

Navy channels (F)											
Service identifier	Field strength to be protected in dB(μV/m)				Receiver height (m)				Separation distance (m)		
YE	10.0				10000.0				1000.0		

Δ f (MHz)	-1.75	-0.970	-0.930	-0.770	0.770	0.930	0.970	1.750			
PR (dB) 1%	-84.0	-49.0	-40.0	-4.0	-4.0	-40.0	-49.0	-84.0			
dB (μV/m) 1%	94.0	59.0	50.0	14.0	14.0	50.0	59.0	94.0			

Military Mobile and Fixed (tactical) services. Tactical link (F)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YF	20.0					10.0					

Δ f (MHz)	-2.000	-1.000	0.000	1.000	2.000						
PR (dB) 1%	-5.0	15.0	25.0	15.0	-5.0						
dB (μV/m) 1%	25.0	5.0	-5.0	5.0	25.0						

Safety and distress (F)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YG	16.0					10000.0			1000.0		

Δ f (MHz)	-0.800	-0.600	-0.400	-0.200	0.000	0.200	0.400	0.600	0.800		
PR (dB) 1%	-6.6	2.7	3.2	4.1	6.5	4.1	3.2	2.7	-6.6		
dB (μV/m) 1%	22.6	13.3	12.8	11.9	9.5	11.9	12.8	13.3	22.6		

Audio link (F)											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YH	29.0					5000.0					

Δ f (MHz)	-0.900	-0.800	-0.700	0.700	0.800	0.900					
PR (dB) 1%	-60.0	-6.0	30.0	30.0	-6.0	-60.0					
dB (μV/m) 1%	89.0	35.0	-1.0	-1.0	35.0	89.0					

Telemetry as air-ground-air system 1 (F) YC											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YT	10.0					10000.0			1000.0		

Δ f (MHz)	-1.10	-0.970	-0.930	-0.770	0.770	0.930	0.970	1.100			
PR (dB) 1%	-60.0	-49.0	-40.0	-4.0	-4.0	-40.0	-49.0	-60.0			
dB (μV/m) 1%	70.0	59.0	50.0	14.0	14.0	50.0	59.0	70.0			

Telemetry as air-ground-air system 1 (F) YC											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YW	10.0					10000.0			1000.0		

Δ f (MHz)	-1.100	-0.970	-0.930	-0.770	0.770	0.930	0.970	1.100			
PR (dB) 1%	-60.0	-49.0	-40.0	-4.0	-4.0	-40.0	-49.0	-60.0			
dB (μV/m) 1%	70.0	59.0	50.0	14.0	14.0	50.0	59.0	70.0			

L/SECAM											
Service identifier	Field strength to be protected in dB(μV/m)					Receiver height (m)			Separation distance (m)		
YX	55.0					10.0					

Δ f (MHz)	-2.400	-2.000	-1.000	0.000	1.000	2.000	3.000	4.000	5.000	5.500	5.750
PR (dB) 1%	0.0	6.0	28.0	38.0	39.0	35.0	32.0	34.0	33.0	32.0	42.0
PR (dB) 50%	7.0	13.0	32.0	42.0	44.0	39.0	36.0	38.0	37.0	34.0	50.0
dB (μV/m) 1%	55.0	49.0	27.0	17.0	16.0	20.0	23.0	21.0	22.0	23.0	13.0
dB (μV/m) 50%	48.0	42.0	23.0	13.0	11.0	16.0	19.0	17.0	18.0	21.0	5.0
Δ f (MHz)	6.000	7.000	7.250	7.500	7.900						
PR (dB) 1%	42.0	42.0	42.0	12.0	0.0						
PR (dB) 50%	50.0	50.0	50.0	20.0	8.0						
dB (μV/m) 1%	13.0	13.0	13.0	43.0	55.0						
dB (μV/m) 50%	5.0	5.0	5.0	35.0	47.0						

Where no information concerning protection ratios for other services suffering interference from T-DAB has been supplied to the Planning Meeting, the administrations concerned should develop appropriate sharing criteria by mutual agreement. When available one could use the relevant ITU-R Recommendations or ECC and ERC Decisions and Recommendations,.

5. T-DAB REFERENCE NETWORK

The principles adopted by the CEPT for the introduction of T-DAB allow a reasonable compromise between the density of the transmitters required to support the desired coverage for mobile reception and the potential to re-use the same frequency block with another programme content in other areas.

5.1 Definitions

The **reference point** is the point on the boundary of a Reference Network from which outgoing interference is calculated, see also Figure 4. Incoming interference is calculated at the same point.

In the following text, two distances are defined; see also Figure 3 .

i) The **separation distance** is the distance required between the borders (or peripheries) of two coverage areas served by either T-DAB services or by two different services. There will often be two separation distances, one for each service, because of different field strengths to be protected or because of different protection ratios for the two services. In such cases the longer of these two distances shall be used.

ii) The **transmitter distance** is the distance between adjacent transmitter sites in an SFN.

5.2 T-DAB transmitter network structures

T-DAB networks consist of one of three basic models or combinations thereof:

i) a single transmitter;

ii) a single frequency network (SFN) using non-directional transmitting antennas, also referred to as an "open network";

iii) an SFN using directional transmitting antennas along the periphery of the coverage area, also referred to as a "closed network".

5.3 T-DAB reference single frequency network

5.3.1 Reference network for T-DAB planning

A reference network is a tool for developing appropriate values for separation distances and for estimating how much interference a typical SFN might produce at a given distance.

In interfering field strength calculations the power sum method is used. In the case of mixed land-sea paths, field strengths are first calculated individually for an all-land path and an all-sea path, each of the same distance as the mixed path concerned. A linear interpolation is then performed

between the field strengths for all-land and all-sea paths at the required distance from the border of the SFN according to the following formula:

$$E_M = E_L + \frac{d_s}{d_T}(E_S - E_L)$$

where

- E_M = field strength for a mixed land-sea path
- E_L = field strength for an all-land path
- E_S = field strength for an all-sea path
- d_s = length of the sea path
- d_T = length of the total path.

All field strengths are in dB(μ V/m).

In all-sea path calculations it is assumed that the network and its coverage area are on land and that the sea starts from the edge of the coverage area. For land paths a terrain roughness figure Δh of 50 metres is assumed.

5.3.2 Reference network structure

The reference network (V-RN1) used for the frequency allotment process is defined as follows (see also Figure 4):

- | | |
|---|---|
| • Hexagonal structure: | Closed |
| • Transmitter distance: | 60 km |
| • Transmitting antenna height: | 150 m |
| • Central transmitter e.r.p: | 100 W (Band III), 10 W (Band I) |
| • Radiation pattern of the central transmitter: | Omni-directional |
| • Peripheral transmitter e.r.p: | 1 kW (Band III), 100 W (Band I) |
| • Radiation pattern of peripheral transmitters: | See Figure 5 |
| • Main lobe of directional antennas: | In the direction of the central transmitter |

When using the field strength prediction method described in the Appendix to this Annex, the reference network produces the required coverage inside the network. The effective wanted field strength on the border of the reference network is about 3 dB higher than the minimum field strength for planning. This makes it possible to allow 3 dB more interference at the edge of the network.

Thus the maximum interfering field strength from another co-channel T-DAB service on the border of the reference network is:

$$E_I^{Max} = E_W^{Min} - PR - PC + 3$$

where

- E_I^{Max} = maximum interfering field strength on the border of the reference network
- E_W^{Min} = minimum median wanted field strength for planning
- PR = protection ratio, in this case 10 dB
- PC = propagation correction 18 dB (50% to 99% locations correction factor).

The additional 3 dB margin is not allowed for the other services because during the frequency block allotment procedure each source of interference is considered separately and their power sum is not calculated.

Thus the maximum interfering field strength from any other service on the border of the reference network is:

$$E_I^{Max} = E_W^{Min} - PR - PC$$

where

- E_I^{Max} = maximum interfering field strength on the border of the reference network
- E_W^{Min} = minimum median wanted field strength for planning
- PR = protection ratio, depending on service under consideration
- PC = propagation correction 18 dB.

The interfering field strengths for land, cold sea and warm sea paths produced by a reference network are shown in Figures 6a, 6b and 6c. Separation distances for Band III are 81, 142 and 173 km for land, cold sea and warm sea paths respectively.

Where the field strength is calculated within 1 km of the transmitter site location, receiving antenna discrimination should not be taken into account.

5.3.3 Nominal transmitter location for the calculation of potential T-DAB interference to the aeronautical mobile service

The centre of the reference network shall be used as the nominal location for the network to calculate interference to an aeronautical reception test point. In this case the power used for calculations is:

23.8 dBW in Band I

33.8 dBW in Band III

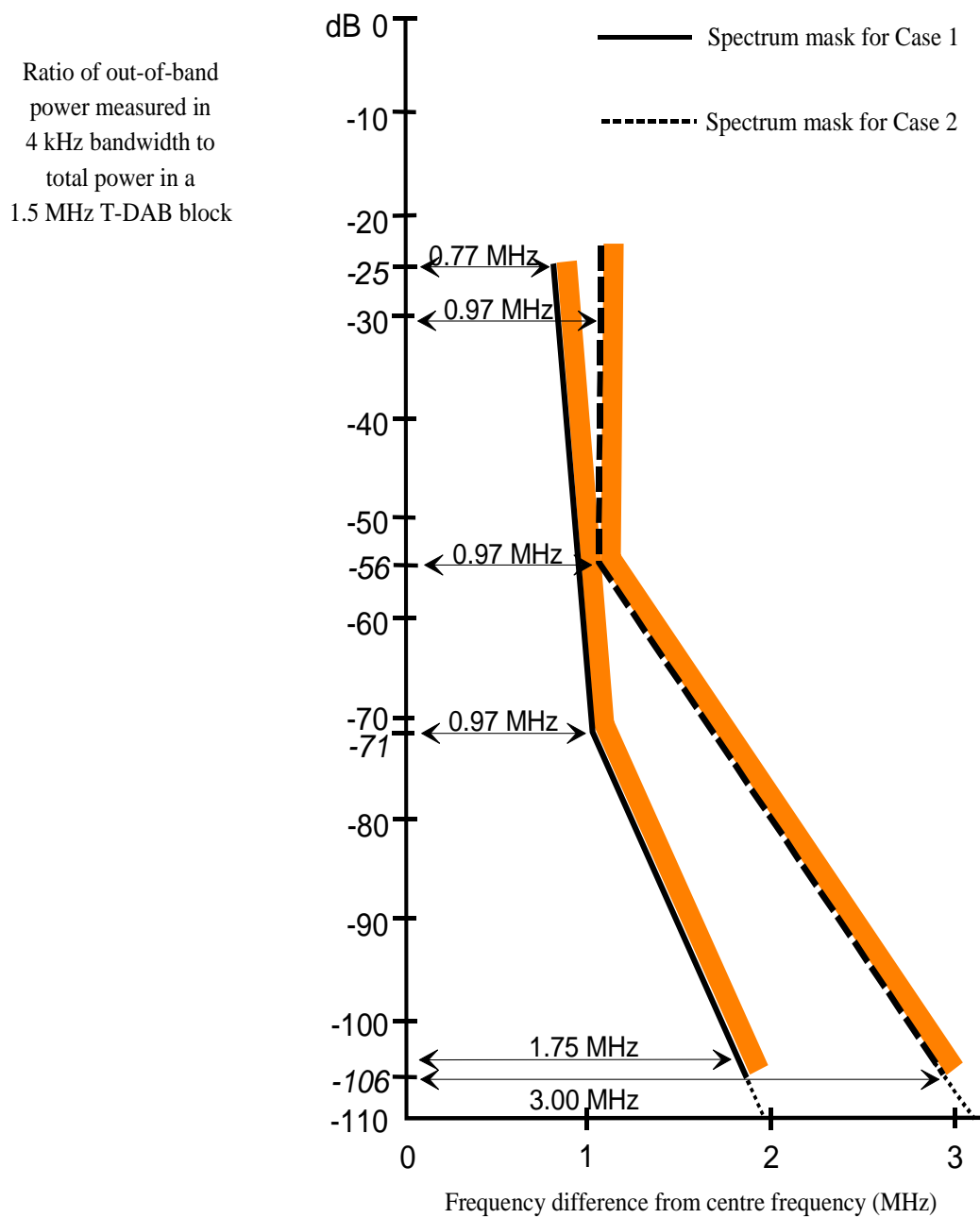


Figure 1: Spectrum masks for T-DAB out-of-band emissions

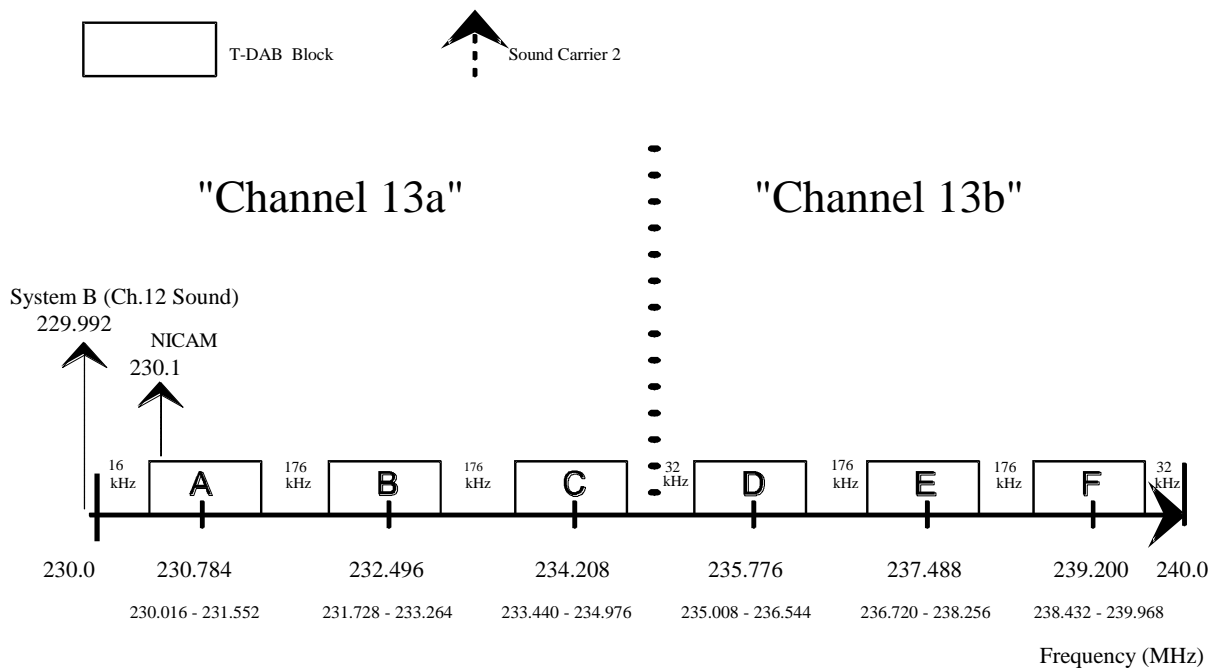
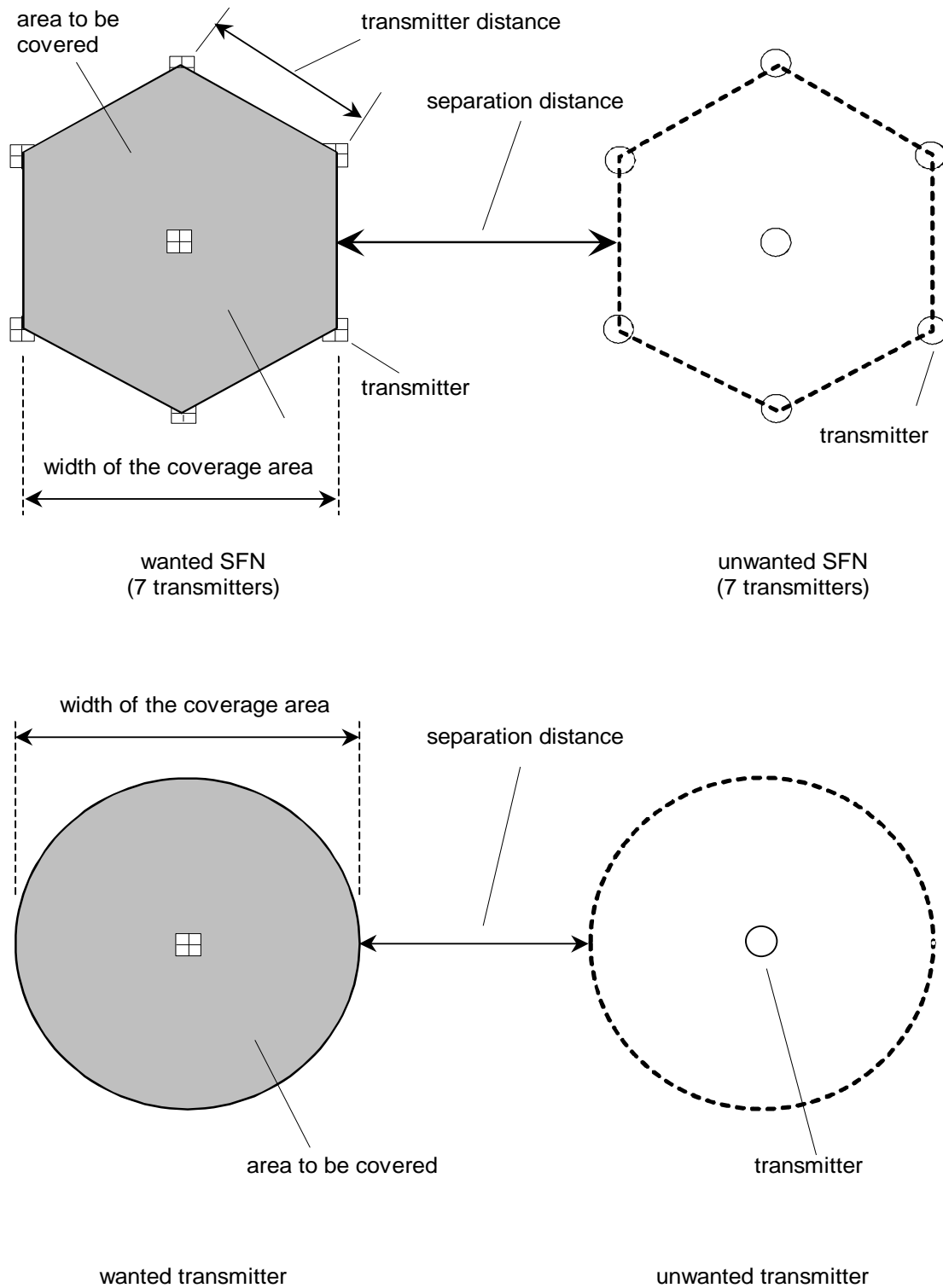


Figure 32: Position of T-DAB blocks in Channel 13



**Figure 3: Definition of distances for different network structures
(SFN, single transmitter)**

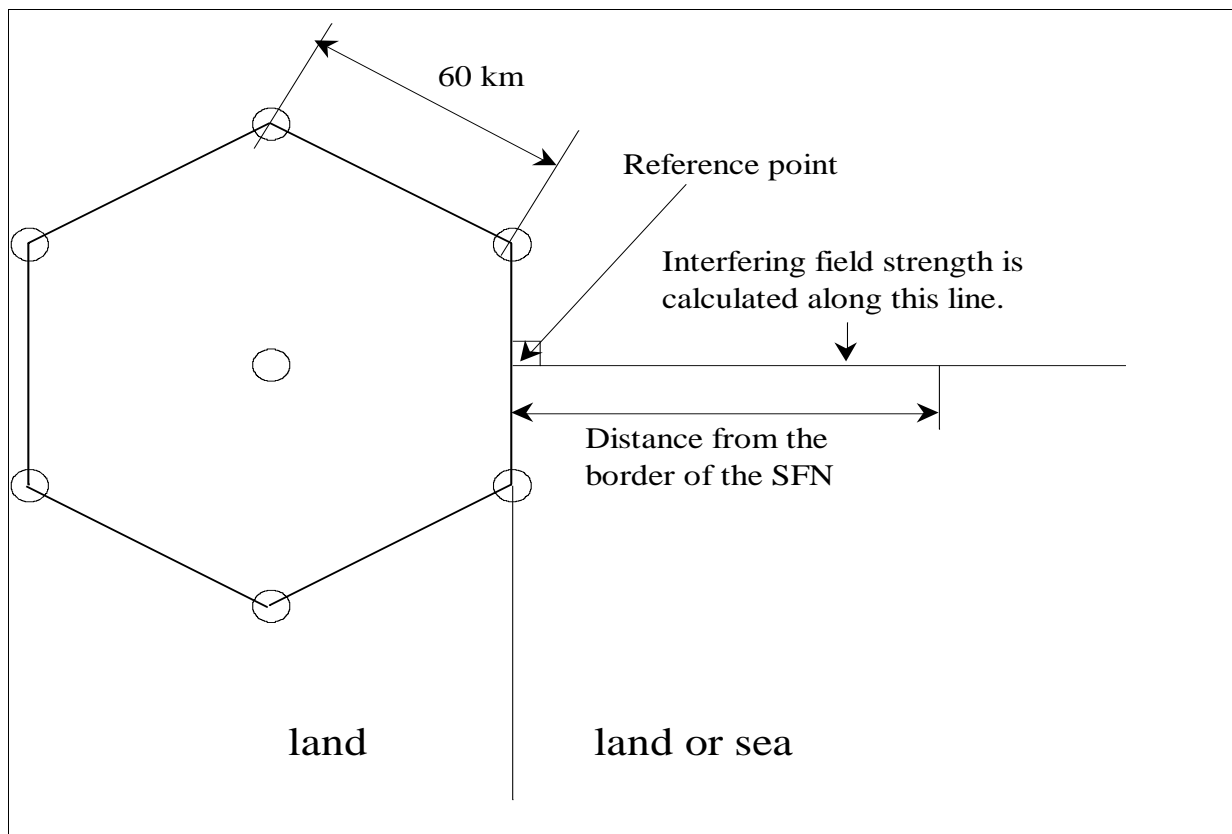


Figure 4: Information related to the interfering field strength calculation for the reference network (V-RN1)

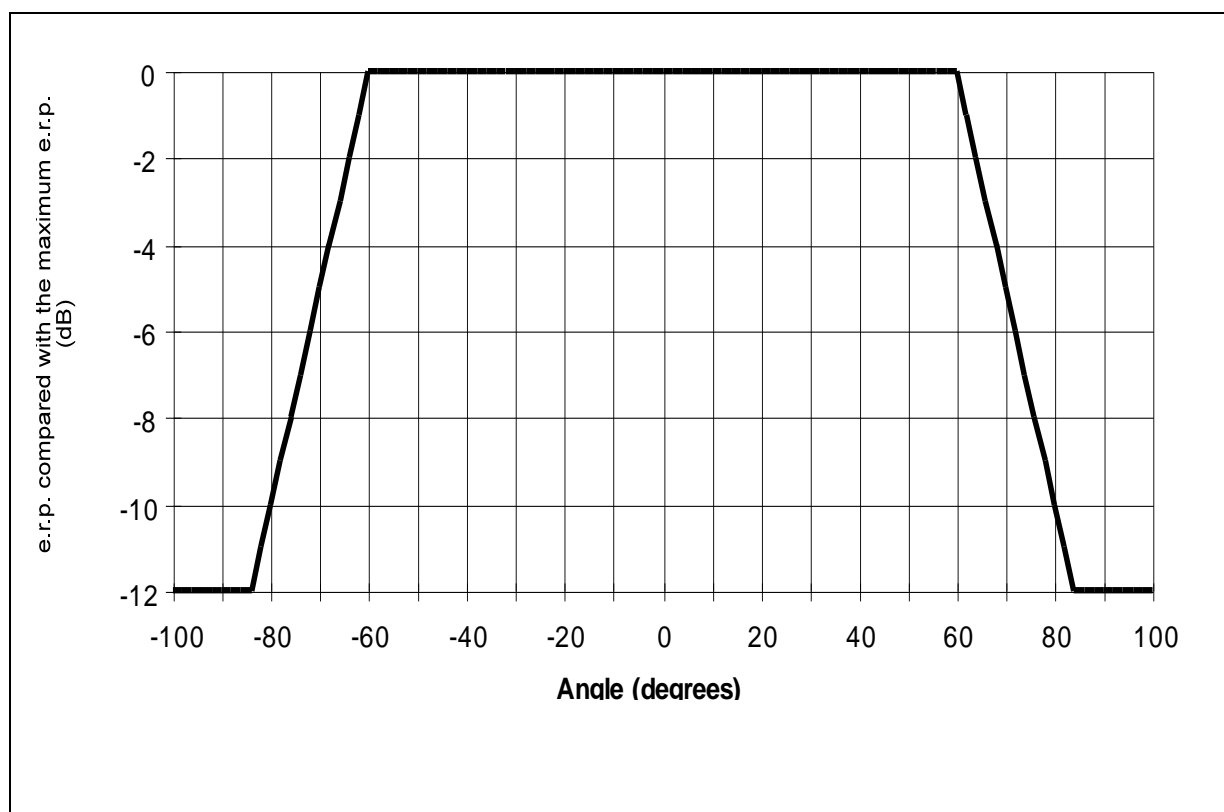


Figure 5: Radiation pattern of the peripheral transmitters

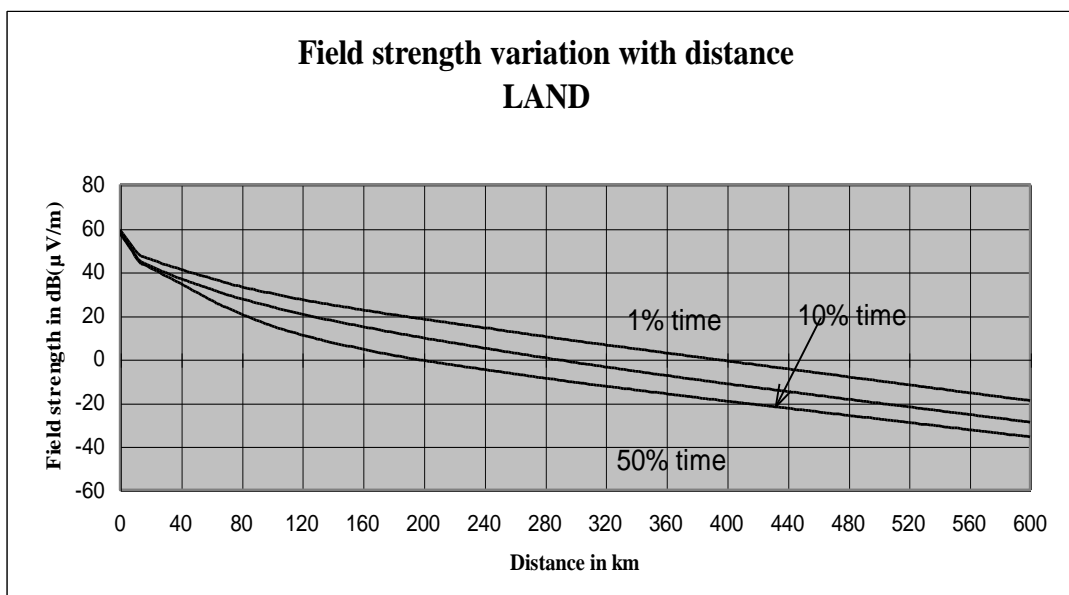


Figure 6a

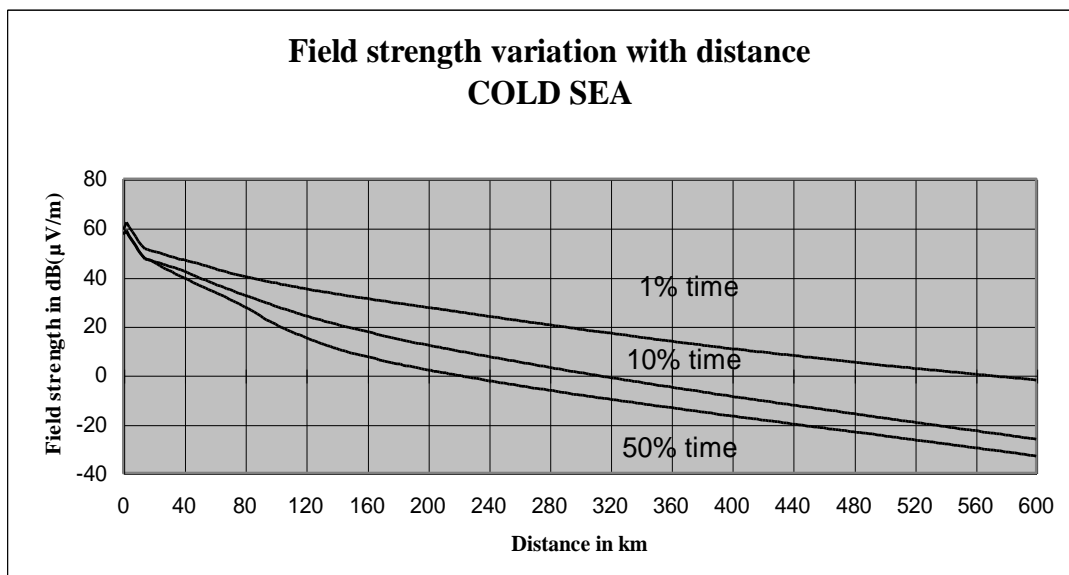


Figure 6b

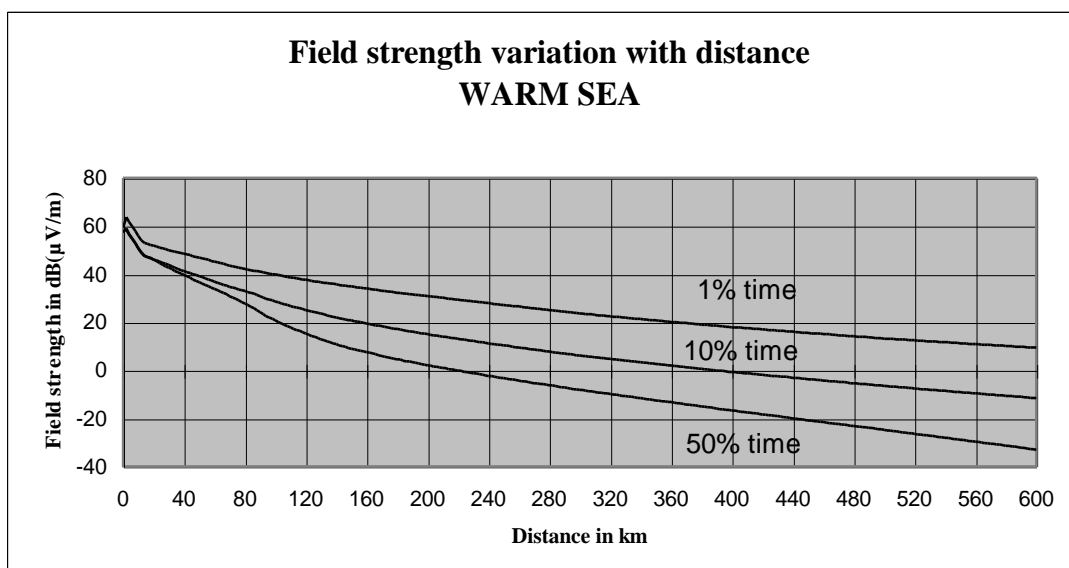


Figure 6c

Figures 6a, 6b, 6c: Interfering field strength produced by the reference network V-RN1