Digital Radio Action Plan

FM coverage study prediction definitions and methodology
Version 1.0 - Final

1. Introduction

FM coverage predictions have traditionally been carried out in accordance with internationally agreed ITU planning criteria. These use a median field strength in a pixel[1] (ie. 50% locations), at 10m agl assuming a directional roof-mounted receiving antenna. Although this is far from being the case for the vast majority of FM listening today, we suggest that it is still an appropriate way of predicting coverage.

However, the change in the way people now listen to FM radio (primarily to portable & mobile devices with non-directional aerial attached) does need to be reflected in any coverage numbers generated As a result we propose to achieve this by counting those covered at two additional, lower, levels of quality.

2. Definitions of FM Coverage

For the purposes of this study FM coverage will be defined as specified in the table one below.

Minimum field strength[1]	Environment	FM coverage type	Assumptions
54 dBμV/m	Rooftop aerial	Stereo	Receiver antenna directivity (as per ITU Rec. BS 599) Protected from interference for both 50% and 5% time conditions
	Indoor portable	Robust mono	No antenna directivity Protected from interference for both 50% and 5% time conditions
48 dBμV/m	Indoor portable	Variable mono	No antenna directivity Protected from interference for both 50% and 5% time conditions
	In-vehicle	Robust mono	No antenna directivity Protected from interference for both 50% and 5% time conditions
42 dBμV/m	In-vehicle	Variable mono	No antenna directivity Protected from interference for both 50% and 5% time conditions

Table one, definitions of FM coverage.

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[1] For the purposes of this study all services are predicted to pixels of 100 metres square.
[1] At 10m agl in the absence of interference and calculated for 50% time propagation conditions.

2.1 Assessment of interference

Protection ratios to be used are as specified in ITU-R Rec. 412-9, these are reproduced in table two below. Steady interference will be calculated for 50% time propagation conditions and tropospheric interference will be calculated for 5% time propagation conditions. For stereo services, stereo protection ratios will be used and for mono services, mono protection ratios will be used. Receiver aerial discrimination will only be used for the calculation of stereo reception.

No adjustment will be made to co-channel protection ratios for services that broadcast co-programme material.

Carrier frequency spacing (kHz)	Radio frequency protection ratio (dB)			
	Monophonic		Stereophonic	
	Steady interference	Tropospheric interference	Steady interference	Tropospheric interference
0	36	28	45	37
100	12	12	33	25
200	6	6	7	7
300	-7	-7	-7	-7
400	-20	-20	-20	-20

Table two, protection ratios to be used; as defined in ITU-R recommendation 412-9.

All definitions of coverage should take into account interference from UK transmitters (using the best known information at the time of prediction). Transmitters within 400 kHz of the wanted transmitter may cause interference and should be considered in interference calculations.

Ideally account would also be taken of incoming international interference. However, due to the lack of verifiable data about the implementation of neighbouring administrations assignments this is not believed to be possible in practice.

3. Method for quantifying FM coverage

In order to correspond to the methods used for DAB coverage the FM coverages derived above will be quantified in the same ways:

3.1 Population coverage

Assessment of population coverage will use postal delivery points. The data set for this will be the same as the one used for DAB and will include both domestic and commercial premises. The data points having been aggregated to a single number per 100 metre pixel.

3.2 Area coverage

Assessment of area coverage will be carried out using a single data set comprising the following road types:

- Motorways

- all A roads

Again the length of roads will be aggregated to a single figure for each individual 100 metre pixel.

Road Type	Total UK Length
Motorway	3,767 km
'A' Roads	49,121 km

Table 2: UK Road lengths used in calculations

For local networks, coverage should be expressed as the proportion of each type of road within the relevant target area.

3.3 Figures to be produced

For the delivery point cases given in table three below the number of points at or above the minimum field strength will be calculated along with the percentage of the total number of points in the relevant service area.

For the road length cases given in table three below the total length of road at or above the minimum field strength will be calculated along with the percentage of the total road length in the relevant service area.

FM Coverage Type	Data set to be counted
Stereo	Number of delivery points where the service exceeds the defined threshold for Stereo reception
Good mono	Number of delivery points where the service exceeds the defined threshold for mono reception
Good Mono	Length of motorways and A-roads at which the service exceeds the defined threshold
Variable mono	Number of delivery points where the service exceeds the defined threshold for mono reception
Variable Mono	Length of motorways and A-roads at which the service exceeds the defined threshold

Table three, data sets to be calculated.