

**Recommendation T/R 25-08 (Lecce 1989, revised in Vienna 1999, revised in Utrecht 2005,
revised in Brussels 2008)**

**PLANNING CRITERIA AND COORDINATION OF FREQUENCIES IN THE LAND MOBILE
SERVICE IN THE RANGE 29.7-921 MHz**

Recommendation approved by the Working Group Frequency Management

"The European Conference of Postal and Telecommunications Administrations,

considering

- a) that the rapid development of the land mobile service makes assigning frequencies increasingly difficult;
- b) that each new frequency assignment must be coordinated with frequencies already assigned in the same geographical area for use by the stations of neighbouring administration(s);
- c) that the probability of obtaining a successful coordination diminishes rapidly as a function of the number of radio stations;
- d) that coordination is often required for frequency assignments for use distant from the border;
- e) that the difficulties encountered with this coordination depend on a great number of parameters (technical, operational or topographical);
- f) that agreements have successfully been concluded between some administrations concerning coordination of frequencies for the land mobile service, notably the "HCM Agreement"¹⁾ which also contains details of propagation issues and co-ordination procedures;
- g) that in order to facilitate coordination and to avoid inefficient frequency usage in border areas, a large number of parameters (technical and operational) need to be presented in an agreed format;
- h) that it is desirable that channelling arrangements for the land mobile services be harmonised;
- i) that in order to reduce the risks of harmful interference and facilitating coordination, the lowest possible antenna height and the lowest possible radiated power, and wherever possible, directional antennas should normally be used;
- j) that ECC Report 97 contains a study of methods required to carry out the calculations of interference across a border for a number of technologies. Administrations may consider using the methods and the results described in Report 97 in their bi- or multilateral agreements;
- k) that ECC Report 108 contains a study and proposes the method of Border Code Coordination between CDMA-PAMR Systems in the 450 MHz band. Administrations may consider using the methods and the results described in ECC Report 108 in their bi- or multilateral agreements;
- l) that European common frequency allocations are given in ERC Report 25;
- m) that there are ERC and ECC Decisions, Recommendations and Reports concerning the use of frequencies in the range 29.7-921 MHz;
- n) that there are some applications (e.g. GSM, GSM-R and IMT) in this frequency range that are not covered by this Recommendation;
- o) that the definitions used in this Recommendation shall be those of Article 1 of the Radio Regulations, unless otherwise specified herein;

recommends

1. that CEPT member administrations should enter into co-ordination agreements with their neighbouring countries. "HCM Agreement"¹⁾ or parts of it may be used as a basis for these agreements, if applicable provisions are given in "HCM Agreement";
2. that CEPT member administrations should endeavour to comply with the following provisions when assigning frequencies to stations in the land mobile service, particularly in border areas, where coordination with neighbouring countries is necessary."

1) **HCM Agreement(Harmonised Calculation Method) between the administrations of Austria, Belgium, the Czech Republic, Germany, France, Hungary, the Netherlands, Croatia, Italy, Liechtenstein, Lithuania, Luxembourg, Poland, Romania, the Slovak Republic, Slovenia and Switzerland on the Coordination of frequencies between 29.7 MHz and 39.5 GHz for Fixed Service and Land Mobile Service** (Vilnius, November 05). The latest version of this agreement can be found from www.ero.dk/Deliverables/Agreements/HCM Agreement, Vilnius 2005

1. PROVISIONS RELATED TO OPERATING CONDITIONS AND CHOICE OF FREQUENCIES

1.1. Harmonised use of frequency bands in different countries

Whenever practicable the same frequency bands should be assigned in the different countries for similar type of use, like Professional (Private) Mobile Radio (PMR), Public Access Mobile Radio (PAMR), transport, life-saving services for cross-border links, etc. For this purpose, relevant ERC and ECC Decisions, which designate and identify certain frequency bands or their parts for some particular application, should be used as a primary guidance for trans-national harmonisation of frequency use.

1.2. Use of frequencies in border area

In frontier areas, a set of frequencies may be shared between certain users in adjacent countries in order to allow for necessary cross-border communications or otherwise make the most effective use of the frequency spectrum. Such shared frequencies shall be frequencies assigned in a particular region, by a bi- or multilateral agreement of Administrations concerned, to users with similar traffic conditions and using comparable equipment. The number of stations per channel might also be coordinated in the same agreement. Administrations may also conclude bilateral or multilateral agreement in order to utilise spectrum in border areas (e.g. preferential use of frequencies, code co-ordination etc.)

2. PROVISIONS OF A TECHNICAL NATURE

2.1. Channelling

2.1.1 Analogue and digital narrow band land mobile applications (channel spacing up to 25 kHz)

Administrations should select centre frequencies using the following formula. This formula should be used whenever possible, but at least in new and re-farmed bands.

$$F_{CH} = \text{Band Edge} - (\text{Channel Spacing}/2) + n * \text{Channel Spacing}$$

where:

F_{CH} = centre frequency

$n = 1, 2, 3, \dots$ - channel number;

Band Edge is lower edge of allocated frequency band, MHz, e.g. 47, 68, 146, 174, 380, 406.1, ...

NOTE: Before 1999 the following formula was used (old formula):

$$F_{CH} = \text{Band Edge} + n * \text{channel spacing}$$

Channelling arrangements based on this old formula are still in use in some bands in some countries but the usage should be aligned with the current formula whenever possible.

2.1.2 Digital wide band land mobile applications

Administrations should select centre frequencies as follows:

For systems with a channel bandwidth of 50 kHz, 100 kHz or 150 kHz the centre frequencies should be selected according to the preferred formula in section 2.1.1.

For systems with a channel bandwidth of 200 kHz the centre frequencies should be selected according to the preferred formula in section 2.1.1 with an option to offset these centre frequencies by 100 kHz.

For systems with a channel bandwidth of 1.25 MHz the centre frequencies should be selected according to the preferred formula in section 2.1.1 with an option to offset these centre frequencies by multiples of 12.5 kHz, in order to provide flexibility to locate the centre frequencies in the optimum position within the band.

2.2. Duplex or two-frequency simplex channel separation and location of sub-bands

In so far as Administrations are in a position to define the duplex separation, its values and the respective positions of the sub-bands as given in Annex 1 should be taken into consideration.

The frequencies of emissions of base or repeater stations should be placed in the upper band and those of mobile stations in the lower band. The same positions of upper and lower bands should be selected for bordering/adjacent countries (see examples in Annex 1).

2.3. Co-ordination thresholds

Indicative co-ordination thresholds for narrowband (up to 25 kHz) applications (co-channel, 50% locations, 10% time, 10 m receiving antenna height, at the border-line) are:

0 dB(μ V/m) for frequencies between 29.7 and 47 MHz ;
6 dB (μ V/m) for frequencies between 47 and 108 MHz ;
12 dB (μ V/m) for frequencies between 108 and 380MHz ;
18 dB (μ V/m) for frequencies between 380 and 400 MHz ;
20 dB (μ V/m) for frequencies between 400 and 606 MHz ;
26 dB (μ V/m) for frequencies between 606 and 921 MHz.

For digital wide band land mobile applications (*channel bandwidth*: > 25 kHz) a value of

$6 \times \log_{10} (\text{channel bandwidth} / 25 \text{ kHz}) \text{ dB}$

should be added to the values above. This formula is valid for 25 kHz, 200 kHz and 1.25 MHz and interpolates values for systems in between these points. ¹

For example, for a 200 kHz channel at 919 MHz, the co-ordination threshold becomes:

$$6 \times \log_{10} (200 \text{ kHz} / 25 \text{ kHz}) + 26 \text{ dB } (\mu\text{V/m}) = 31.42 \text{ dB } (\mu\text{V/m}).$$

In some cases, especially in lower frequency bands, interference may occur even if these thresholds are not exceeded.

2.4. Planning characteristics in border areas

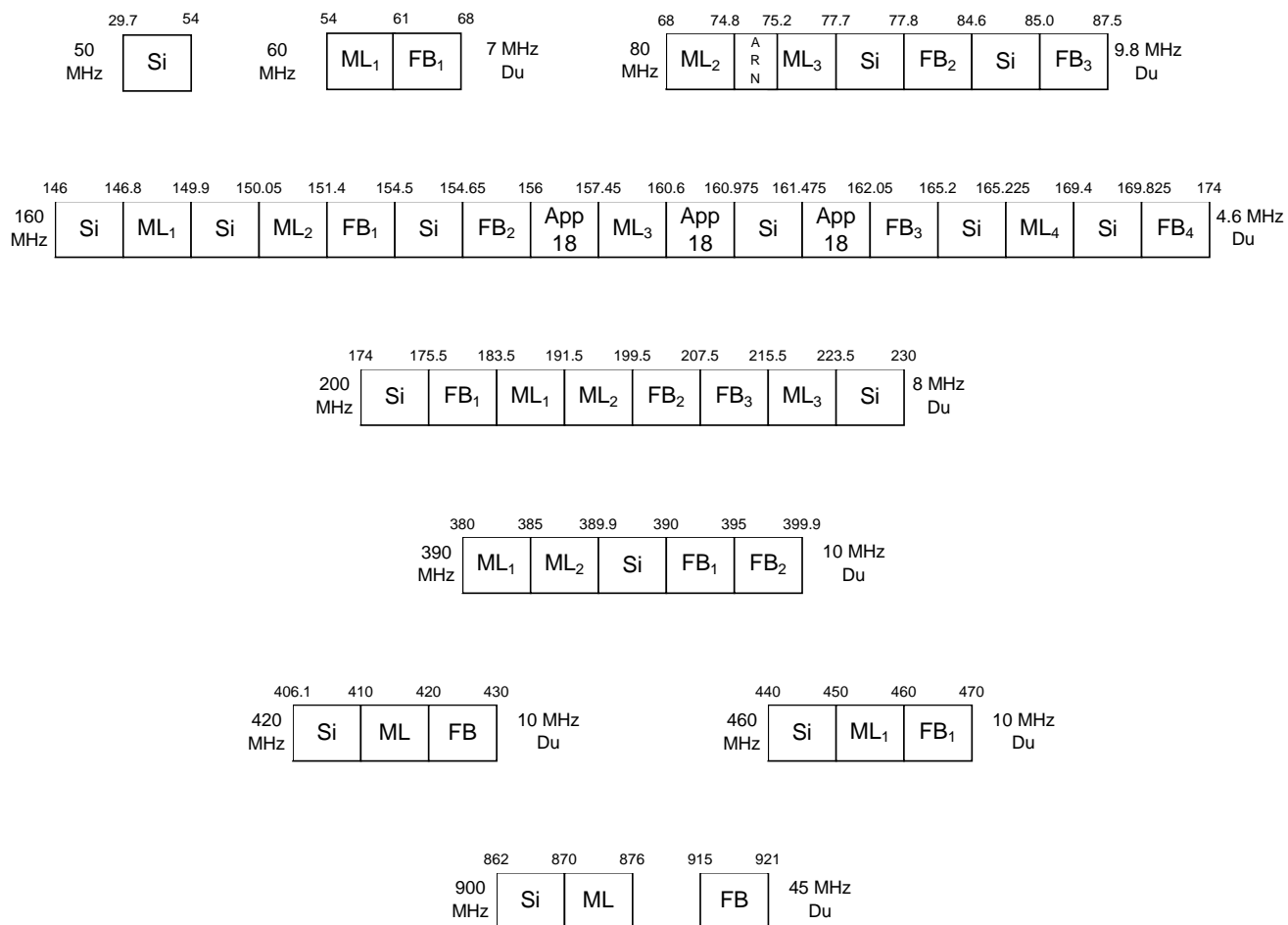
The location, the power and the antenna heights of all stations in the network should be selected in such a way that their range is confined, as far as possible, to the zone to be covered by the intended service. Excessive antenna heights and transmitter outputs should be avoided, by using several locations of reduced height wherever possible. In border areas directional antennas should be used in order to minimise the interference potential.

The effective radiated power and the height of the antenna should be as low as possible in relation to the area to be served.

¹ The formula was derived according to the assumption that the permissible interference levels in the 400 - 606 MHz range are 25dB μ V/m and 30dB μ V/m for 200 kHz and 1.25 MHz wideband digital systems respectively. It is assumed that three 25 kHz channels may fall into one 200 kHz channel and ten 25 kHz channels or three 200 kHz channels may fall into one 1.25 MHz channel. The 5 and 10 dB relaxation compared to the value of 20dB μ V/m for narrowband system is around $6 \times \log_{10}$ of the ratio of the bandwidths..

Annex 1

Recommended spacing, use and location of upper, lower and simplex bands (based on the ERC Report 25)



Key to symbols:

- ARN Aeronautical radionavigation (ILS/Marker beacons)
- Du Duplex operation
- FB Base station
- ML Mobile station
- Si Simplex operation
- App 18 Use in accordance with RR Appendix 18 "Table of Transmitting Frequencies in the VHF Maritime Mobile Band"