**Recommendation T/R 13-01 E (Montreux 1993)**

# PREFERRED CHANNEL ARRANGEMENTS FOR FIXED SERVICES IN THE RANGE 1-3 GHz

Recommendation proposed by the Working Group "Frequency Management" (FM)

*Text of the Recommendation adopted by the "European Radiocommunications Committee" (ERC):*

The European Conference of Postal and Telecommunications Administrations,

*considering:*

1) that following decisions taken at WARC-92, new fixed service channelling arrangements are required in the range 1 - 3 GHz in order to enable future new services to be accommodated;

2) that there are technical and economic factors that will require continued operation of fixed services in the 1-3 GHz range;

3) that there is a range of different fixed service applications, requiring various channel bandwidths, which need to be accommodated in the 1 - 3 GHz range.

*noting*

a) that in the context of this recommendation the guard band is defined as the frequency difference between the edge of the band and the channel edge;

b) that the separation band is defined as the band between the go and return halves, from edge of the bands used by other services;

c) that the centre gap is defined as the frequency difference between the upper and lower channel edges of the go and return halves of the band;

d) that TX/RX separation is defined as the frequency separation between the centre frequency of the transmitter and the centre frequency of the associated receiver.

*recommends:*

1) that the fixed service in the band 1350 - 1375 MHz paired with 1492 - 1517 MHz should be operated in accordance with the channel plan given in Annex A;

2) that the fixed service in the band 1375 - 1400 MHz paired with 1427 - 1452 MHz should be operated in accordance with the channel plan given in Annex B;

3) that the fixed service in the band 2025 - 2110 MHz paired with 2200 - 2290 MHz should be operated in accordance with the channel plan given in Annex C[1] ;

4) that the fixed service in the band 2520 - 2593 MHz paired with 2597 - 2670 MHz should be operated in accordance with the channel plan given in Annex D.

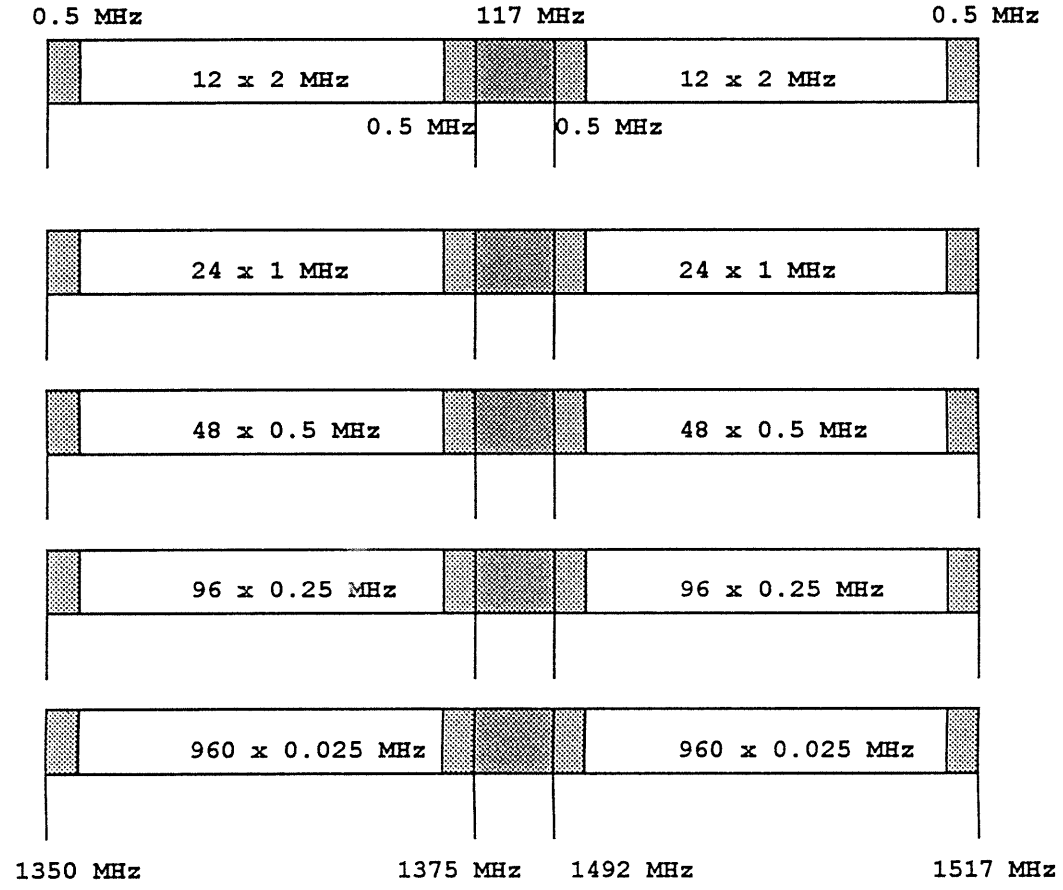
1 the outermost channels should be utilised last, to provide further time for detailed study of compatibility with future mobile services in the adjacent bands (to commence when detailed work on technical standards for the new mobile services defining parameters relevant to spectrum management begins).

# ANNEX A

## Frequency band 1350-1375 MHz paired with 1492-1517 MHz

Due to the fact that this band only offers 25 MHz of spectrum for each direction of transmission it will be limited to low capacity digital systems for point-to-point and point-to-multipoint systems. The basic pattern of the proposed channel arrangement is a symmetric 2 MHz raster based on CCIR Recommendation 701 which offers the maximum amount of possible channels. Further channel plans for the transmission of lower bit rates are derived from the basic pattern by means of subdivision.

The following detailed channel arrangement is proposed:




Let

fo be the centre frequency of **1433.5** MHz
fn be the centre frequency of the radio-frequency channel in the lower half of the band
fn' be the centre frequency of the radio-frequency channel in the upper half of the band
TX/RX separation = **142** MHz
Separation band = **117** MHz

then the frequencies of individual channels are expressed by the following relationships :

a) for systems with a carrier spacing of 2 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 84 + 2n | |
| upper half of the band: | fn' = fo + 58 + 2n | where n = 1, ... 12 |

b ) for systems with a carrier spacing of 1 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 83.5 + 1n | |
| upper half of the band: | fn' = fo + 58.5 + 1n | where n = 1, ... 24 |

c) for systems with a carrier spacing of 0.5 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 83.25 + 0.5n | |
| upper half of the band: | fn' = fo + 58.75 + 0.5n | where n = 1, ... 48 |

d) for systems with a carrier spacing of 0.25 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 83.125 + 0.25n | |
| upper half of the band: | fn' = fo + 58.875 + 0.25n | where n = 1, ... 96 |

e) for systems with a carrier spacing of 0.025 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 83.0125 + 0.025n | |
| upper half of the band: | fn' = fo + 58.9875 + 0.025n | where n = 1, .. 960 |

For 75 kHz channel spacing use the 0.025 MHz formula restricted to n = 2, 5, 8, .....

f) for systems with a carrier spacing of 3.5 MHz derived from the 0.5 MHz channels by multiplication and with 2 MHz guard bands

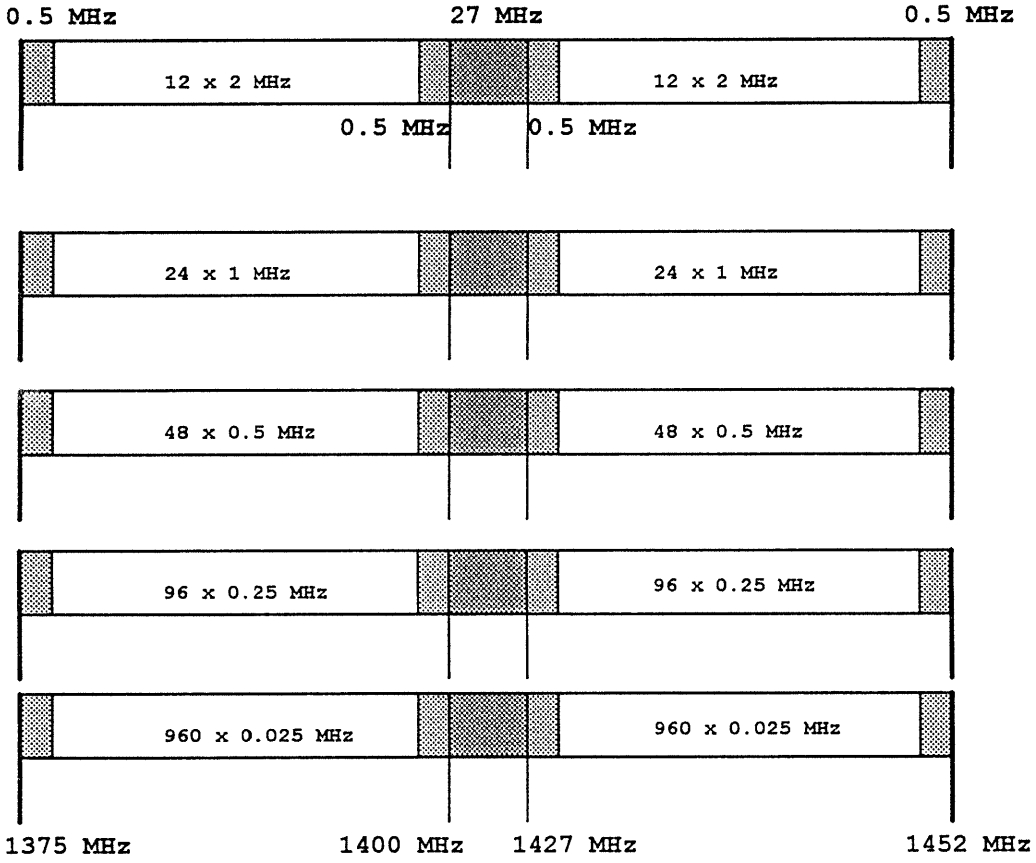
| | | |
|---|---|---|
| lower half of the band: | fn = fo - 83.25 + 3.5n | |
| upper half of the band: | fn' = fo + 58.75 + 3.5n | where n = 1, ... 6 |

# ANNEX B

## Frequency band 1375-1400 MHz paired with 1427-1452 MHz

This band is comparable to band 1350-1375 MHz/1492-1517 MHz and therefore is used for the same kind of applications. Thus the channel arrangement has been developed on a similar basis.

The following detailed channel plan is proposed:




Let

fo be the centre frequency of **1413.5** MHz
fn be the centre frequency of the radio-frequency channel in the lower half of the band
fn' be the centre frequency of the radio-frequency channel in the upper half of the band
TX/RX separation = **52** MHz
Separation band = 27 MHz

then the frequencies of individual channels are expressed by the following relationships :

a) for systems with a carrier spacing of 2 MHz

lower half of the band: $fn = fo - 39 + 2n$
upper half of the band: $fn' = fo + 13 + 2n$ where n = 1, ... 12

b) for systems with a carrier spacing of 1 MHz

| | | |
|---|---|---|
| lower half of the band: | $fn = fo - 38.5 + 1n$ | |
| upper half of the band: | $fn' = fo + 13.5 + 1n$ | where n = 1, ... 24 |

c) for systems with a carrier spacing of 0.5 MHz

| | | |
|---|---|---|
| lower half of the band: | $fn = fo - 38.25 + 0.5n$ | |
| upper half of the band: | $fn' = fo + 13.75 + 0.5n$ | where n = 1, ... 48 |

d) for systems with a carrier spacing of 0.25 MHz

| | | |
|---|---|---|
| lower half of the band: | $fn = fo - 38.125 + 0.25n$ | |
| upper half of the band: | $fn' = fo + 13.875 + 0.25n$ | where n = 1, ... 96 |

e) for systems with a carrier spacing of 0.025 MHz

| | | |
|---|---|---|
| lower half of the band: | $fn = fo - 38.0125 + 0.025n$ | |
| upper half of the band: | $fn' = fo + 13.9875 + 0.025n$ | where n = 1, ... 960 |

For 75 kHz channel spacing use the 0.025 MHz formula restricted to n = 2, 5, 8 , ...

f) for systems with a carrier spacing of 3.5 MHz derived from the 0.5 MHz channels by multiplication and with 2 MHz guard bands

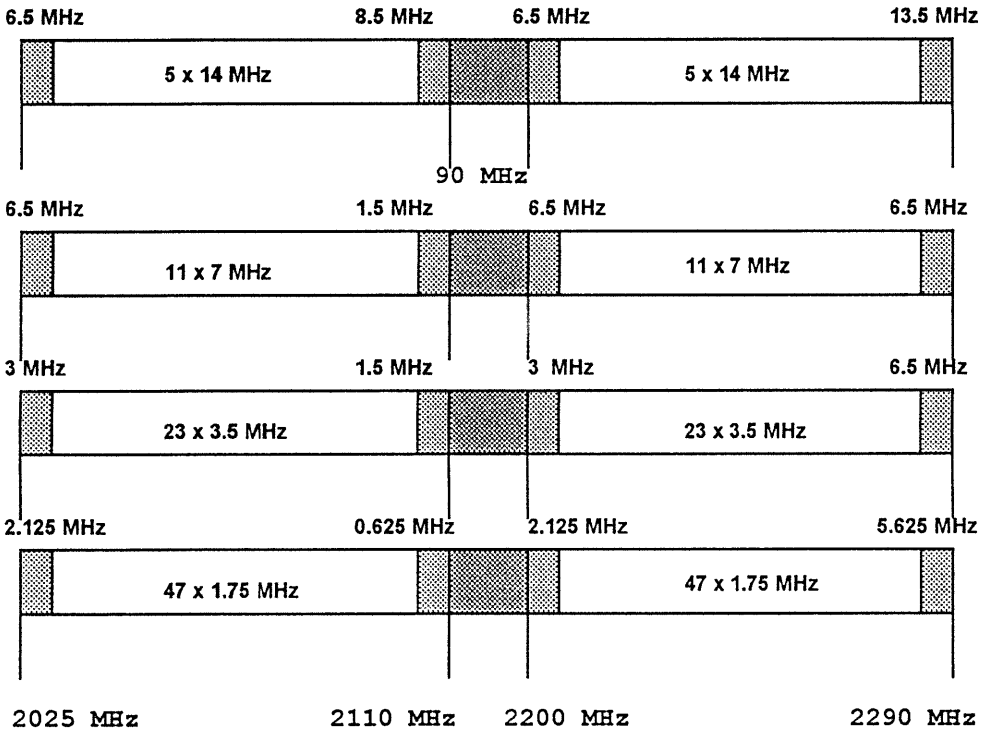
| | | |
|---|---|---|
| lower half of the band: | $fn = fo - 38.25 + 3.5n$ | |
| upper half of the band: | $fn' = fo + 13.75 + 3.5n$ | where n = 1, ... 6 |

# ANNEX C

## Frequency band 2025-2110 MHz paired with 2200-2290 MHz

Future use of this band will be for some traditional multi-channel, multi-hop radio relay systems and also for modern access radio applications. It is therefore essential that the new channel plans allow sufficient flexibility to support a range of equipment capacities, modulation schemes and transmission techniques.

The following detailed channel plan is proposed.




Let

fo be the centre frequency of **2155** MHz
fn be the centre frequency of the radio-frequency channel in the lower half of the band
fn' be the centre frequency of the radio-frequency channel in the upper half of the band
TX/RX separation = 175 MHz
Separation band = 90 MHz

then the frequencies of individual channels are expressed by the following relationships:

a) for systems with a carrier spacing of 14 MHz

lower half of the band: $fn = fo - 130.5 + 14n$
upper half of the band: $fn' = fo + 44.5 + 14n$ where $n = 1, \ldots 5$

b ) for systems with a carrier spacing of 7 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 127.0 + 7n | |
| upper half of the band: | fn' = fo + 48.0 + 7n | where n = 1, ...11 |

c) for systems with a carrier spacing of 3.5 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 128.75 + 3.5n | |
| upper half of the band: | fn' = fo + 46.25 + 3.5n | where n = 1, ... 23 |

d) for systems with a carrier spacing of 1.75 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 130.500 + 1.75n | |
| upper half of the band: | fn' = fo + 44.500 + 1.75n | where n = 1, ... 47 |

Note 1

To accomodate equipment currently available, some countries will initially deploy equipment on a 2 MHz spaced plan defined as follows:

for systems with a carrier spacing of 2 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 130.5 + 2n | |
| upper half of the band: | fn' = fo + 44.5 + 2n | where n = 1 , ... 42 |

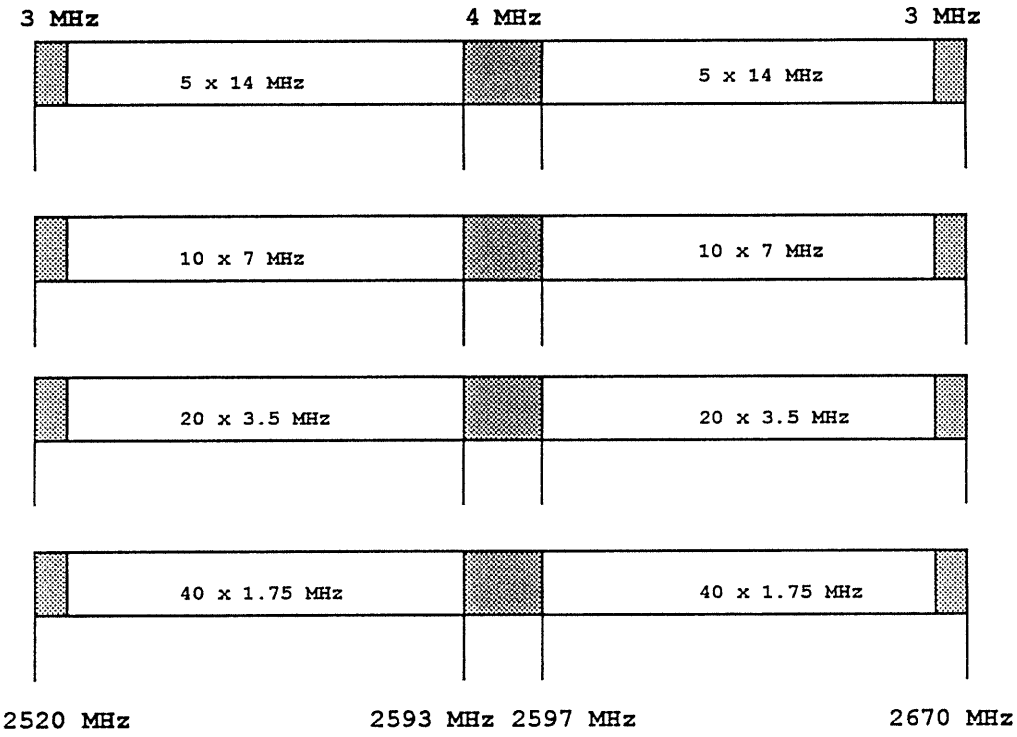
Channel arrangements with carrier spacings of 1.0, 0.5, ... , 0.025 MHz are possible and derived by means of subdivision.

# ANNEX D

## Frequency band 2520-2670 MHz

Future use of this band is seen to be for point-to-point and point-to-multipoint systems for single and multi-hop applications. Again it is essential for the channel plan to allow sufficient flexibility to support a range of equipment capacities and modulation schemes. The following proposal provides 14, 7, 3.5 and 1.75 MHz channels.

The following detailed channel plan is proposed :




Let

fo be the centre frequency of **2595** MHz
fn be the centre frequency of the radio-frequency channel in the lower half of the band
fn' be the centre frequency of the radio-frequency channel in the upper half of the band
TX/RX separation = 74 MHz

then the frequencies of individual channels are expressed by the following relationships :

a) for systems with a carrier spacing of 14 MHz

lower half of the band: $fn = fo - 79 + 14n$
upper half of the band: $fn' = fo - 5 + 14n$ where $n = 1, \ldots 5$

b ) for systems with a carrier spacing of 7 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 75.5 + 7n | |
| upper half of the band: | fn' = fo - 1.5 + 7n | where n = 1, ...10 |

c) for systems with a carrier spacing of 3.5 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 73.75 + 3.5n | |
| upper half of the band: | fn' = fo + 0.25 + 3.5n | where n = 1, ... 20 |

d) for systems with a carrier spacing of 1.75 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 72.875 + 1.75n | |
| upper half of the band: | fn' = fo + 1.125 + 1.75n | where n = 1, ... 40 |

Note 1

To accomodate equipment currently available, some countries will initially deploy equipment on a 2 MHz spaced plan defined as follows:

for systems with a carrier spacing of 2 MHz

| | | |
|---|---|---|
| lower half of the band: | fn = fo - 73 + 2n | |
| upper half of the band: | fn' = fo + 1 + 2n | where n = 1, ... 35 |

Channel arrangements with carrier spacings of 1.0, 0.5, ..... , 0.025 MHz are possible and derived by means of subdivision.