

CEPT/ERC/RECOMMENDATION 12-05 E (Rome 1996, revised June 2007)

**HARMONISED RADIO FREQUENCY CHANNEL ARRANGEMENTS FOR DIGITAL
TERRESTRIAL FIXED SYSTEMS OPERATING IN THE BAND 10.0 - 10.68 GHz**

Recommendation adopted by Working Group "Spectrum Engineering" (WGSE)

"The European Conference of Postal and Telecommunications Administrations,

considering

1. that CEPT has a long term objective to harmonise the use of frequencies throughout Europe,
2. that CEPT should develop radio frequency channel arrangements in consultation with organisations developing standards for radio systems, in order to make the most effective use of the spectrum available,
3. that any radio frequency channel arrangement should incorporate a provision for the future introduction of improved equipment standards,
4. that frequency reuse techniques, supported also by modern techniques such as Cross-polar Interference Cancellers (XPIC) may significantly improve the spectrum usage in dense networks,
5. that, when very high capacity links are required, further economy may be achieved using wider channel bandwidth associated to high efficient modulation formats,

noting

- a) that CEPT/ERC Report 25 allocates the paired bands 10.15 - 10.3 and 10.5 - 10.65 GHz for fixed systems including point to multipoint, and the removal of the Mobile service from the band 10.5 - 10.68 GHz,
- b) that Article S5 of the Radio Regulations allocates the band 10 - 10.45 GHz on an equal primary basis to the Fixed and Radiolocation services, and the band 10.6 - 10.68 GHz to the Fixed, Earth Exploration Satellite (passive), Radio Astronomy, and Space Research services,
- c) that CEPT/ERC has defined the band 10.0 - 10.68 GHz as one of the harmonised tuning ranges for ENG/OB equipment,
- d) that in some countries sharing studies indicate sharing between Fixed and Radar systems is feasible,
- e) that in some countries it is not currently practicable to implement the paired band 10.15 - 10.3 and 10.5 - 10.65 GHz due to military requirements,
- f) that in some countries coordination is required between the Fixed and Radioastronomy services in the 10.6 - 10.68 GHz band (see CEPT/ERC Report 36),

recommends

1. that CEPT administrations which have the paired bands 10.15 - 10.3 and 10.5 - 10.65 GHz available for the Fixed service should follow the recommended radio frequency channel arrangements given in Annex A,
2. that administrations which have different paired bands available may allow the current channel arrangements to remain unchanged until the year 2015, and may determine, on a national basis, the degree of protection given. International coordination between existing and new systems shall be in accordance with article S11 of the Radio Regulations,
3. that administrations may consider merging any of two adjacent 28 MHz channels specified in Annex A to create one 56 MHz channel, with centre frequency lying in the central point of the distance between the merged channels. This decision may be subject to minimum bit rate obligations. To assist international co-ordination, administrations may refer to the channel identifiers described in Annex B,
4. that administrations may choose to allocate certain parts of the bands to one way links, for example ENG/OB links within the tuning range 10.0 - 10.68 GHz, in agreement to the recommended radio frequency channel arrangements given in Annex A,
5. that further sharing studies between Fixed and Radar systems in these bands need to be completed.”

Note:

Please check the CEPT web site (<http://www.ero.dk>) for the up to date position on the implementation of this and other ERC and ECC Recommendations.

Annex A

DERIVATION OF RADIO FREQUENCY CHANNELS

The radio frequency channel arrangements for the 10 to 10.68 GHz band are based on channel slots of 0.5 MHz and are derived as follows:

$$f_p = f_0 - 1701 + 0.5p \text{ (MHz)}$$

where p ranges from 0 to 1359

Let f_0 be the reference frequency of the pattern = 11701 MHz

and f_p be the lower edge frequency (MHz) of each slot

Within the band 10.15 - 10.3 GHz ($p = 300$ to 599) paired with 10.5 - 10.65 GHz ($p = 1000$ to 1299) equipment will utilise a duplex spacing of 350 MHz.

For point-to-multipoint systems discrete channel centre frequencies can be obtained from within the 0.5 MHz slots.

For other systems the channel centre frequencies could be derived by multiplication of the 0.5 MHz slots as indicated below:

Let f_0 be the reference frequency of the pattern = 11701 MHz
 f_n be the centre frequency (MHz) of a radio frequency channel in the lower half of the band
 f'_n be the centre frequency (MHz) of a radio frequency channel in the upper half of the band

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

- (a) For systems with a carrier spacing of 28 MHz
 Lower half of band: $f_n = (f_0 - 1561 + 28n)$ MHz
 Upper half of band: $f'_n = (f_0 - 1211 + 28n)$ MHz
 where $n = 1, 2 \dots 5$
- (b) For systems with a carrier spacing of 14 MHz
 Lower half of band: $f_n = (f_0 - 1554 + 14n)$ MHz
 Upper half of band: $f'_n = (f_0 - 1204 + 14n)$ MHz
 where $n = 1, 2 \dots 10$
- (c) For systems with a carrier spacing of 7 MHz
 Lower half of band: $f_n = (f_0 - 1550.5 + 7n)$ MHz
 Upper half of band: $f'_n = (f_0 - 1200.5 + 7n)$ MHz
 where $n = 1, 2 \dots 20$
- (d) For systems with a carrier spacing of 3.5 MHz
 Lower half of band: $f_n = (f_0 - 1552.25 + 3.5n)$ MHz
 Upper half of band: $f'_n = (f_0 - 1202.25 + 3.5n)$ MHz
 where $n = 1, 2 \dots 42$

Table 1. Calculated parameters according to ITU-R Recommendation F 746

| <i>XS</i> MHz | <i>n</i> | <i>f</i>₁ MHz | <i>f</i>_{<i>n</i>} MHz | <i>f</i>'₁ MHz | <i>f</i>'_{<i>n</i>} MHz | <i>Z</i>₁<i>S</i> MHz | <i>Z</i>₂<i>S</i> MHz | <i>YS</i> MHz | <i>DS</i> MHz |
|--------------------------------|-----------------|---|--|--|---|---|---|--------------------------------|--------------------------------|
| 28 | 1,2 ... 5 | 10168 | 10280 | 10518 | 10630 | 18 | 20 | 238 | 350 |
| 14 | 1,2 ... 10 | 10161 | 10287 | 10511 | 10637 | 11 | 13 | 224 | 350 |
| 7 | 1,2 ... 20 | 10157.5 | 10290.5 | 10507.5 | 10640.5 | 7.5 | 9.5 | 217 | 350 |
| 3.5 | 1,2 ... 42 | 10152.25 | 10295.75 | 10502.25 | 10645.75 | 2.25 | 4.25 | 206.5 | 350 |

XS Separation between centre frequencies of adjacent channels

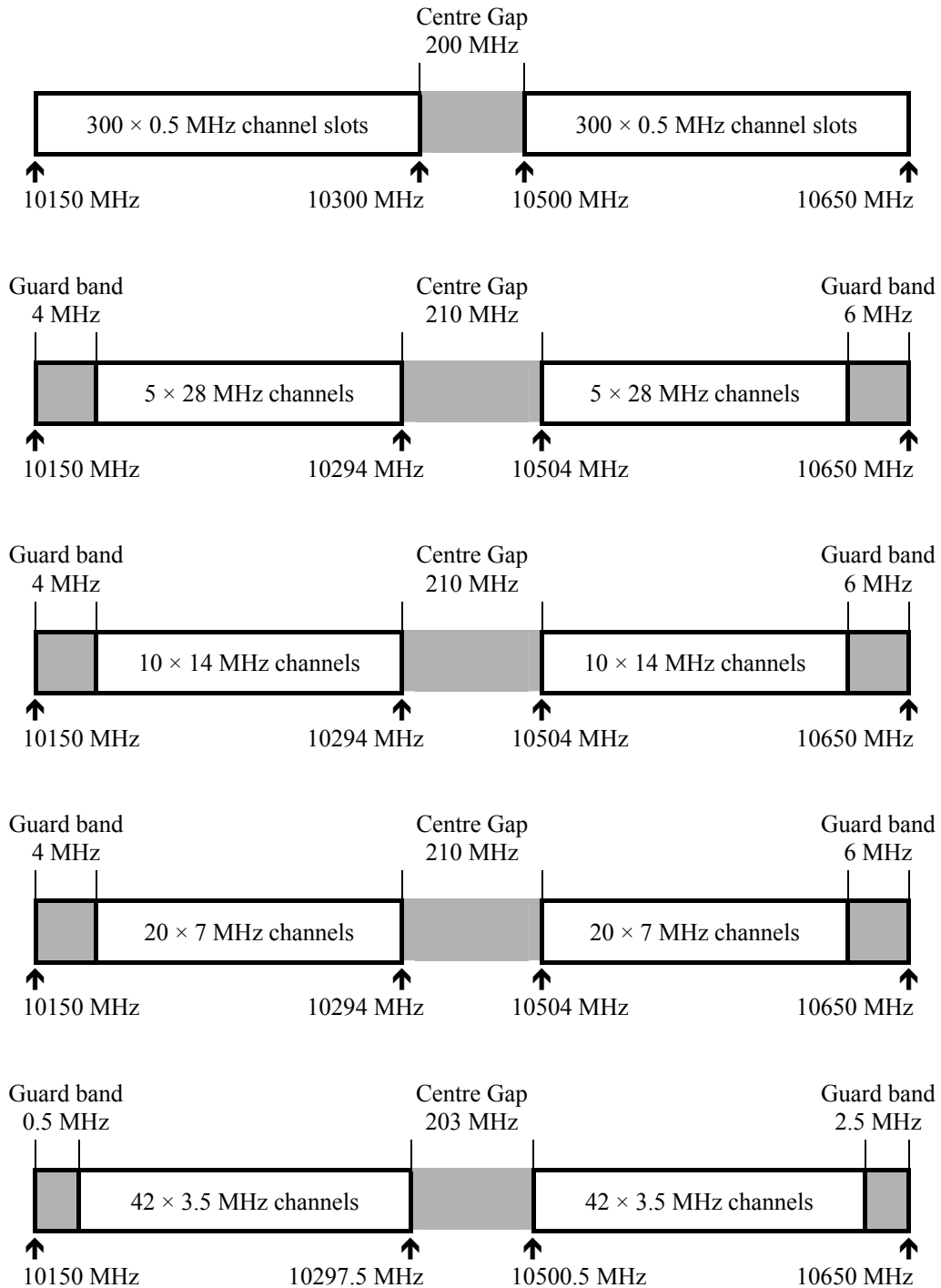
YS Separation between centre frequencies of the closest go and return channels

*Z*₁*S* Separation between the lower band edge and the centre frequency of the first channel

*Z*₂*S* Separation between the centre frequency of the final channel and the upper band edge

DS Duplex Spacing ($f'_n - f_n$)

Table 2. Occupied spectrum: 10.15 - 10.65 GHz band



Annex B

CHANNEL IDENTIFIERS FOR DERIVATIVE 56 MHz CHANNELS

The derivative 56 MHz channels (ref. Recommends 3) in the paired bands 10.15-10.3/10.5-10.65 GHz can be identified by using the following numbering:

$$\begin{aligned} f_n &= (f_0 - 1547 + 28n) \text{ MHz} \\ f'_n &= (f_0 - 1197 + 28n) \text{ MHz} \\ n &= 1, 2, \dots, 4 \\ f_0 &= 11701 \text{ MHz} \end{aligned}$$

Note: The numbering is just for identification of the channelling. It should be noted, that adjacent channel numbers can not be used on the same physical link due to channel overlap. See diagram below for channel arrangement example.

