



Recommendation ITU-R F.747-1
(03/2012)

**Radio-frequency channel arrangements for
fixed wireless system operating
in the 10.0-10.68 GHz band**

F Series
Fixed service



International
Telecommunication
Union

Foreword

The role of the Radiocommunication Sector is to ensure the rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services, including satellite services, and carry out studies without limit of frequency range on the basis of which Recommendations are adopted.

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Series of ITU-R Recommendations

(Also available online at <http://www.itu.int/publ/R-REC/en>)

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

Note: This ITU-R Recommendation was approved in English under the procedure detailed in Resolution ITU-R 1.

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RECOMMENDATION ITU-R F.747-1

**Radio-frequency channel arrangements for fixed wireless system
operating in the 10.0-10.68 GHz band**

(Question 247/5)

(1992-2012)

Scope

This Recommendation provides radio-frequency channel arrangements for fixed wireless systems operating in the 10.0-10.68 GHz band or within its sub-bands. The channel arrangements specified in Annexes 1 to 4 are based on frequency separations of 3.5, 7, 14 or 28 MHz (derived from a 3.5 MHz homogeneous pattern), or frequency separations of 2.5 or 5 MHz (derived from a 1.25 MHz homogeneous pattern).

The ITU Radiocommunication Assembly,

considering

- a) that the 10.0 to 10.68 GHz frequency range is allocated, directly in the Table of Frequency Allocations or through footnotes, to the fixed and mobile services;
- b) that this band is advantageous for various digital fixed wireless system applications using point-to-point or point-to-multipoint systems;
- c) that such systems are already in extensive use and are expected to be used more extensively in the future;
- d) that differing applications for various administrations may require different frequency plans;
- e) that several applications with various transmission signal characteristics and capacities may be in simultaneous use in this frequency band;
- f) that the specific band assigned to each application by each administration may vary from one country to another;
- g) that the applications in this frequency band may require different channel bandwidths;
- h) that a high degree of compatibility between radio-frequency channels of different arrangements can be achieved by selecting all channel centre frequencies from a homogeneous basic pattern;
- j) that the differing digital hierarchies used in various countries or regions may require the use of homogeneous basic patterns with different intervals;
- k) that when very high capacity links (e.g. twice Synchronous transfer mode 1 (STM-1)) are required, further benefits may be obtained using system bandwidths wider than the recommended channel separation, associated to highly efficient modulation formats;
- l) that Recommendation ITU-R F.1568 provides guidance on frequency block arrangements for fixed wireless access systems in the band 10.15 to 10.3 GHz paired with 10.5 to 10.65 GHz;
- m) that administrations may choose to allocate certain parts of the bands to one-way links, for example electronic news gathering/outside broadcast (ENG/OB) links within the tuning range 10.0-10.68 GHz, in agreement to the recommended radio-frequency channel arrangements,

recommends

1 that frequency plans for the 10.0 to 10.68 GHz band should be based on homogeneous patterns;

2 that the homogeneous pattern, for the 10.5 to 10.68 GHz band, with a preferred 3.5 MHz interval be defined by the relation:

$$f_n = f_r - 1\,200.5 + 3.5 n \quad \text{MHz}$$

where the reference frequency of the homogeneous pattern is:

$$f_r = 11\,701 \text{ MHz}$$

and the number of radio-frequency pattern slots is:

$$1 \leq n \leq 50$$

(see Annex 1);

3 that the homogeneous pattern, for the 10.55 to 10.68 GHz band, with a preferred 1.25 MHz interval be defined by the relation:

$$f_n = f_r - 1\,151 + 1.25 n \quad \text{MHz}$$

where the reference frequency of the homogeneous pattern is:

$$f_r = 11\,701 \quad \text{MHz}$$

and the number of radio-frequency pattern intervals is:

$$1 \leq n \leq 103$$

(see Annex 2);

4 that the homogeneous pattern, for the whole 10.0 to 10.68 GHz band, with a preferred 3.5 MHz interval, be defined by the relation:

$$f_n = f_r - 1\,701 + 3.5 n \quad \text{MHz}$$

where the reference frequency of the homogeneous pattern is:

$$f_r = 11\,701 \text{ MHz}$$

and the number of radio-frequency pattern intervals is:

$$1 \leq n \leq 194$$

(see Annexes 3 and 4);

5 that the channel spacings, the centre gap, and the distance to the lower and upper band limits, the reference frequency, as well as any further subdivision or combination of radio-frequency channels should be agreed by the administrations concerned, dependent on the application and channel capacity envisaged;

6 that when very high capacity links (e.g. twice STM-1) are required and network coordination permits, with the agreement of the administrations concerned, the use of any two adjacent 28 MHz channels, eventually provided by a specific channel arrangement derived from *recommends* 4, is possible for wider bandwidth systems with centre frequency lying in the central point of the distance between the two 28 MHz adjacent channels.

Annex 1

Description of a radio-frequency channel arrangement in the band 10.5 to 10.68 GHz using the homogeneous pattern described in *recommends 2*

The channel arrangement is as follows:

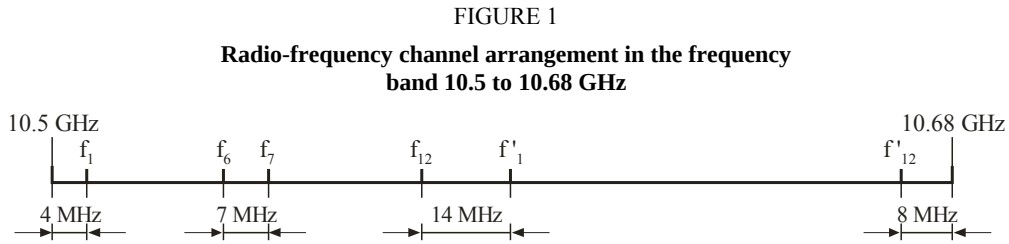
- lower half of the band: $f_n = f_r - 1\,204 + 7\,m$ MHz
- upper half of the band: $f'_n = f_r - 1\,113 + 7\,m$ MHz

The 12 values of m from 1 to 12 will provide the twelve channel frequencies of each half-band.

The reference frequency f_r is:

$$f_r = 11\,701 \quad \text{MHz}$$

This arrangement is illustrated in Fig. 1.



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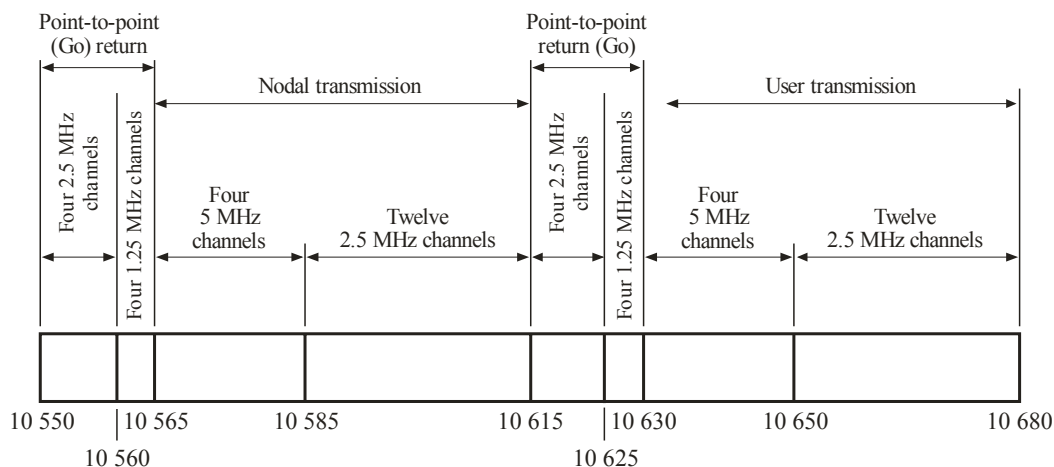
Annex 2

Description of a radio-frequency channel arrangement in the band 10.55 to 10.68 GHz using the homogeneous pattern described in *recommends 3*

The channel arrangement assigns separate frequency band portions to point-to-point and to point-to-multipoint transmission, respectively, as shown in Fig. 2. Two different channel bandwidths are available for each of the two services: 1.25 and 2.5 MHz for the point-to-point service, 2.5 and 5.0 MHz for the digital electronic message service (DEMS). Each assigned radio-frequency channel may be subdivided as desired for greater usage versatility and higher spectral efficiency.

FIGURE 2

Radio-frequency channel arrangement for the 10.55 to 10.68 GHz band
(All frequencies are in MHz)



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Annex 3

**Description of a radio-frequency channel arrangement in the band
10.15 to 10.3 GHz paired with 10.5 to 10.65 GHz using the
homogeneous pattern described in *recommends 4***

When specific channel arrangements are required, the frequencies of individual channels are expressed by the following relationships:

Let f_0 be the reference frequency of the pattern = 11 701 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.

a) For systems with a carrier spacing of 28 MHz (Note 1):

lower half of band: $f_n = (f_0 - 1\,561 + 28n)$ MHz;

upper half of band: $f'_n = (f_0 - 1\,211 + 28n)$ MHz;

where

$$n = 1, 2 \dots 5.$$

b) For systems with a carrier spacing of 14 MHz:

lower half of band: $f_n = (f_0 - 1\,554 + 14n)$ MHz;

upper half of band: $f'_n = (f_0 - 1\,204 + 14n)$ MHz;

where

$$n = 1, 2 \dots 10.$$

- c) For systems with a carrier spacing of 7 MHz:
 lower half of band: $f_n = (f_0 - 1\,550.5 + 7n)$ MHz;
 upper half of band: $f'_n = (f_0 - 1\,200.5 + 7n)$ MHz;

where

$$n = 1, 2 \dots 20.$$

- d) For systems with a carrier spacing of 3.5 MHz:
 lower half of band: $f_n = (f_0 - 1\,552.25 + 3.5n)$ MHz;
 upper half of band: $f'_n = (f_0 - 1\,202.25 + 3.5n)$ MHz;

where

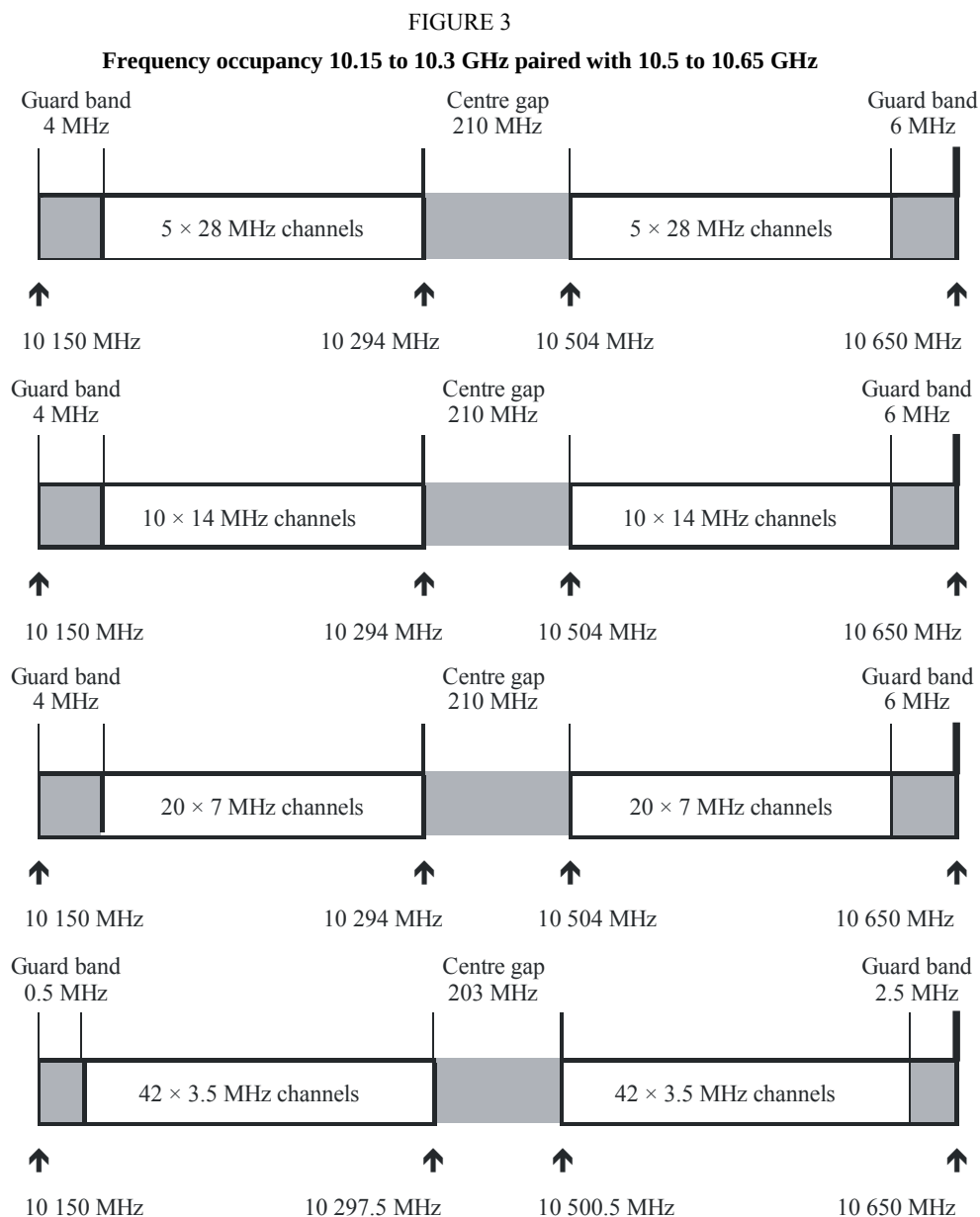
$$n = 1, 2 \dots 42.$$

Figure 3a) shows the relevant band occupancy.

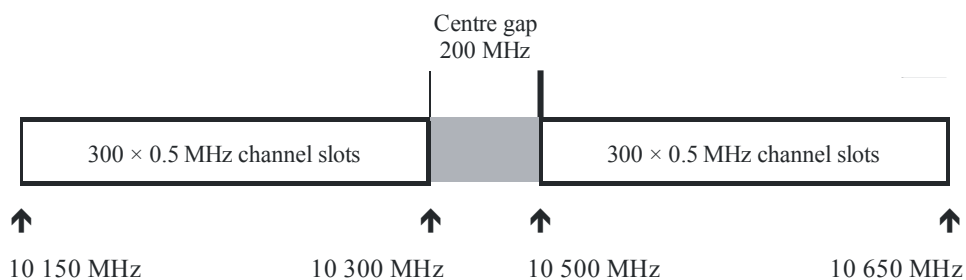
When frequency block assignment is desired, the blocks can be more flexibly built up by aggregation of 0.5 MHz basic slots of the whole bands shown in Fig. 3b).

NOTE 1 – The 28 MHz channels of this arrangement are coincident with the 28 MHz blocks referred to in Recommendation ITU-R F.1568.

NOTE 2 – The channel arrangement in this Annex is also used as basic paired arrangement in Annex 4.



a) 3.5/7/14/28 MHz channel arrangements based on 3.5 MHz pattern



b) 0.5 MHz slots for building up frequency blocks assignments

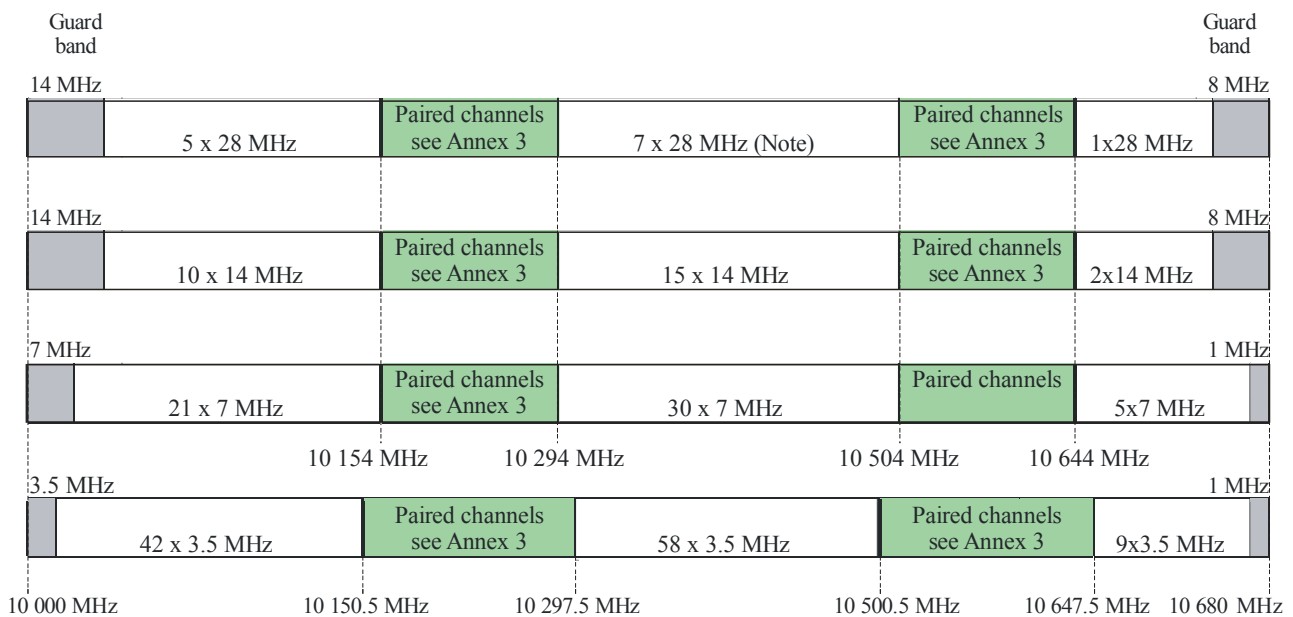
Annex 4

Description of a radio-frequency channel arrangement in the band 10.0 to 10.68 GHz for paired and unpaired channels using the homogeneous pattern described in *recommends 4*

In Italy, this frequency band is used, with radio channels of different width, for the transmission of digital TV signals with different coding formats.

The channel arrangement offers the paired (go/return) channels, in the band 10.15-10.3 GHz paired with 10.5-10.65 GHz band, equal to those described in Annex 3, as well as other channels, for paired or unpaired use, obtained by contiguous extension of 3.5, 7, 14 and 28 MHz channels in the lower portion of the band 10.0-10.15 GHz, in the upper portion 10.65-10.68 GHz and in the centre gap 10.3-10.5 GHz. The arrangement is shown in Fig. 4.

FIGURE 4
Frequency occupancy 10.0 to 10.68 GHz



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NOTE – With an inner 14 MHz slot free.