

International Telecommunication Union

ITU-R
Radiocommunication Sector of ITU

Recommendation ITU-R F.2004
(03/2012)

**Radio-frequency channel arrangements
for fixed service systems operating
in the 92-95 GHz range**

F Series
Fixed service

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.

The regulatory and policy functions of the Radiocommunication Sector are performed by World and Regional Radiocommunication Conferences and Radiocommunication Assemblies supported by Study Groups.

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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
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BS	Broadcasting service (sound)
BT	Broadcasting service (television)
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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.2004

**Radio-frequency channel arrangements for fixed service systems
operating in the 92-95 GHz range**

(Question ITU-R 247/5)

(2012)

Scope

This Recommendation describes channel arrangements in the portions of the frequency range 92.0-95.0 GHz allocated to the fixed service. The arrangements are based on a homogeneous pattern of 50 MHz slots and are proposed for either, frequency division duplex (FDD) or time division duplex (TDD) applications.

The ITU Radiocommunication Assembly,

considering

- a) that, within the frequency range 92-95 GHz, the bands 92.0-94.0 GHz and 94.1-95 GHz are allocated to the fixed service;
- b) that the propagation characteristics of the 92.0-95.0 GHz band are ideally suited for use of short-range digital radio links in high-density networks;
- c) that in the frequency range a high antenna directivity is achievable even with small-size antennas, increasing the density of equipment and further reducing the risk of interference within the same and other services;
- d) that differing applications licensed by various administrations may require different radio-frequency channel arrangements;
- e) that the applications in this frequency band may require differing channel bandwidths;
- f) that several services with various transmission signal characteristics and capacities may be in simultaneous use in this frequency band;
- g) that the low end of the frequency band is suitable for the longest-hop radio links because the atmospheric attenuation is less than at the top of the band,

recommends

- 1** that the preferred radio-frequency channel arrangement for the 92.0-95.0 GHz band should be based on homogeneous patterns;
- 2** that the channel arrangements for time division duplex (TDD) systems in the frequency range 92.0-95.0 GHz should be defined as given in Annex 1;
- 3** that the channel arrangements for frequency division duplex (FDD) systems in the frequency range 92-95.0 GHz should be defined as given in Annex 2.

Annex 1

Radio-frequency channel arrangements in the band 92.0-95.0 GHz* for systems using TDD

Let: f_r : be the reference frequency of 92 000 MHz,
 f_n : be the centre frequency of a radio-frequency channel in the band 92-95 GHz,

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

a) for systems with a channel separation of 100 MHz: $f_n = f_r + 100 n$ MHz

where: $n = 1, 2, \dots, 19, 22, 23, \dots, 29$ (Notes 1 and 2)

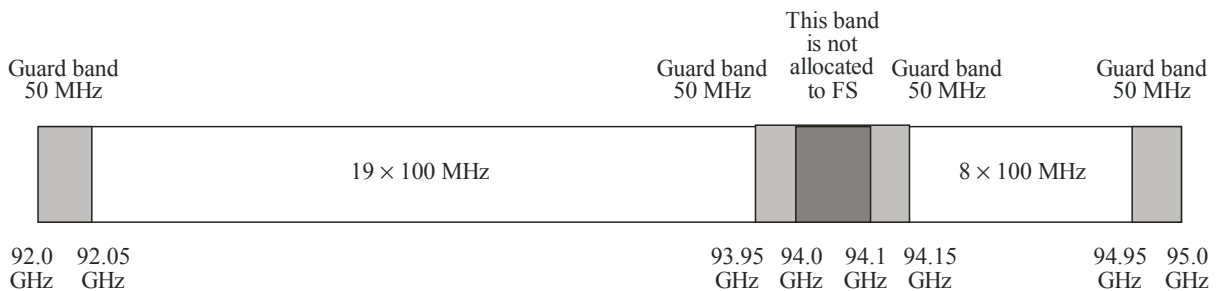
b) for systems with a channel separation of 50 MHz: $f_n = f_r + 25 + 50 n$ MHz

where: $n = 1, 2, \dots, 39, 43, 44, \dots, 58$ (Note 1).

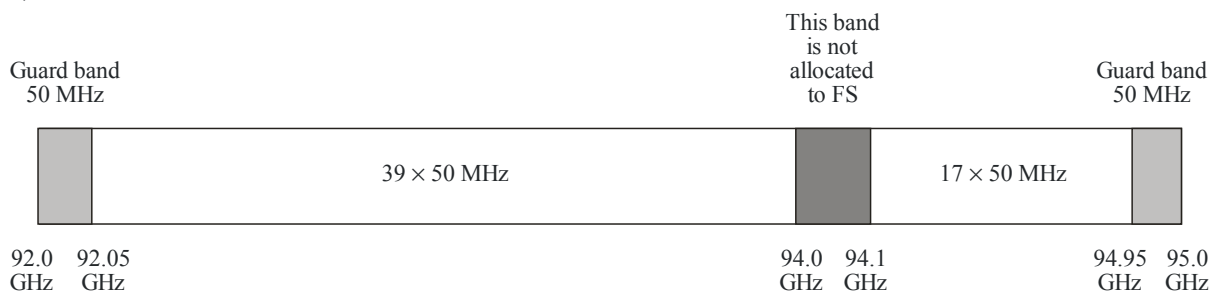
FIGURE 1

Occupied spectrum: 92 to 95 GHz band (Note 1)

a) 100 MHz channels



b) 50 MHz channels



Note 1 – Figure 1 gives occupied spectrum in the 92.0-95.0 GHz for the systems using TDD. Channels with $n = 20$ and 21 of the 100 MHz arrangement and $N = 40$ and 41 of the 50 MHz arrangement are not to be used.

Note 2 – Channel arrangements with a carrier spacing of 200, 300, ..., MHz are possible by channel concatenation.

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* The band 94-94.1 GHz is not allocated to the fixed service in the Radio Regulations.

Annex 2

Radio-frequency channel arrangement in the band 92.0-95.0 GHz* for systems using FDD

The radio-frequency channel arrangement for channel separations of 100 MHz and 50 MHz shall be derived as follows:

- Let f_r : be the reference frequency of 92 000 MHz,
 f_n : be the centre frequency (MHz) of the radio-frequency channel in the lower half of the band,
 f'_n : be the centre frequency (MHz) of the radio-frequency channel in the upper half of the band,
 TX/RX separation = 1 500 MHz,
 band separation = 100 MHz,

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

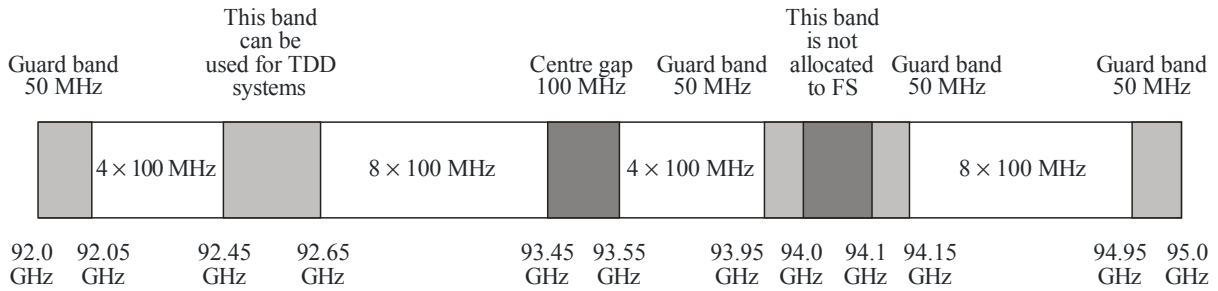
- a) for systems with a channel separation of 100 MHz:
 lower half of the band: $f_n = f_r + 100 n$
 upper half of the band: $f'_n = f_r + 1 500 + 100 n$
 where $n = 1, 2, 3, 4, 7, 8, \dots, 14$ (Notes 1 and 2)
- b) for systems with a channel separation of 50 MHz:
 lower half of the band: $f_n = f_r + 25 + 50 n$
 upper half of the band: $f'_n = f_r + 1 525 + 50 n$
 where $n = 1, 2, 3, \dots, 9, 12, 13, \dots, 28$ (Note 1).

* The band 94-94.1 GHz is not allocated to the fixed service in the Radio Regulations.

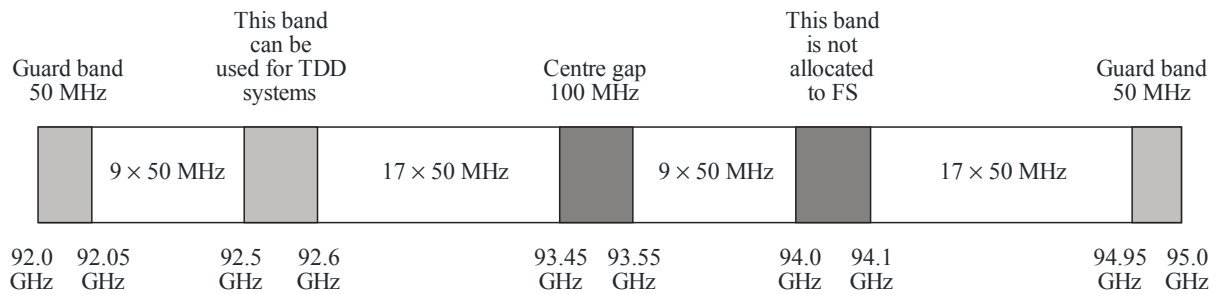
FIGURE 2

Occupied spectrum: 92.0 to 95.0 GHz band (Note 1)

a) 100 MHz channels



b) 50 MHz channels



Note 1 – Figure 2 gives occupied spectrum in the 92.0-95.0 GHz for the systems using FDD. Channels with $n = 5'$ and $6'$ of the 100 MHz arrangement and with $n = 10'$ and $11'$ of the 50 MHz arrangement are not to be used. Unpaired frequency bands 92.45-92.65 GHz of the 100 MHz arrangement and 92.5-92.6 GHz of the 50 MHz arrangement, can be used for systems using TDD.

Note 2 – Channel arrangements with a carrier spacing of 200, 300, ..., MHz are possible by channel concatenation.