International Telecommunication Union

ITU-R

Radiocommunication Sector of ITU

Recommendation ITU-R F.1520-4
(02/2023)

Radio-frequency arrangements for systems in the fixed service operating in the band 31.8-33.4 GHz

F Series
Fixed service

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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.1520-4

Radio-frequency arrangements for systems in the fixed service operating in the band 31.8-33.4 GHz

(Question ITU-R 247/5)

(2001-2002-2003-2011-2023)

Scope

This Recommendation specifies radio-frequency channel arrangements for fixed service systems with channel separation of 3.5, 7, 14, 28, 56, 112 and 224 MHz (including 56 MHz block arrangements) in the band 31.8-33.4 GHz which has been identified for use for high density applications in the fixed service (HDFS).

Keywords

Fixed service, point-to-point, channel bandwidth, channel arrangement, 32 GHz

Abbreviations

FDD	Frequency division duplex
FS	Fixed service
HDFS	High density applications in the fixed service
RF	Radio frequency
RNS	Radionavigation service
RR	Radio Regulations
TDD	Time division duplex

Related ITU Recommendations and Reports

Recommendation ITU-R F.746 – Radio-frequency arrangements for fixed service systems

Recommendation ITU-R F.1571 – Mitigation techniques for use in reducing the potential for interference between airborne stations in the radionavigation service and stations in the fixed service in the band 31.8-33.4 GHz

The ITU Radiocommunication Assembly,

considering

a) that the band 31.8-33.4 GHz is allocated, among others, to the fixed service (FS) on a primary basis;

b) that the 31.8-33.4 GHz band is available for high-density applications in the FS;

c) that sharing in the 31.8-33.4 GHz band with radionavigation service (RNS), space research service (deep space, space-to-Earth) and inter-satellite service is considered to be feasible;

d) that harmonized radio frequency (RF) arrangements can facilitate effective use of the spectrum;

e) that several systems with various transmission signal characteristics and capacities may be in simultaneous use in this frequency band;

f) that certain frequency block arrangements can be achieved by aggregating the frequency channels given in Annex 1;

g) that it may sometimes be desirable to interleave additional RF channels between those of the main pattern;

h) that a high degree of compatibility between FS systems of different frequency arrangements can be achieved by selecting channel centre frequencies within a homogeneous basic pattern;

i) that each region or country will have specific needs in how to use the band;

j) that different block sizes may be required to suit various applications;

k) that the traffic capacity required for fixed wireless links is continuously growing,

recognizing

a) that some applications in this frequency band may require differing architectures (point-to-point and multipoint systems), channel bandwidths, and systems characteristics including the accommodation of symmetrical and asymmetrical traffic; and may require the use of frequency block-based arrangements that may or may not align with the channel arrangement in Annex 1;

b) that, in accordance with No. **5.547A** of the Radio Regulations (RR), administrations should take practical measures to minimize the potential interference between stations in the FS and airborne stations in the RNS in the 31.8-33.4 GHz band, taking into account the operational needs of the airborne radar systems,

noting

a) that Recommendation ITU-R F.1571 recommends that the airborne stations in the RNS are encouraged to use the centre gap in the RF arrangements for the FS in order to facilitate the compatibility between stations in the FS and RNS, in particular in the vicinity of urban areas;

b) that additionally, where an administration is planning to operate airborne stations in the RNS within spectrum extending beyond the centre gap of the RF arrangements for the FS, further planning at the national level of the specific frequencies used by both FS and RNS may need to be considered,

recommends

1 that administrations should consider the RF channel arrangement given in Annex 1 for FS systems deployment in the 31.8-33.4 GHz frequency band;

2 that when additional RF channels interleaved between those of the main pattern, as described in Annex 1, are required, the values of the centre frequencies of these RF channels should be below those of the corresponding main channel frequencies by a value of half the considered channel spacing;

3 that those administrations wishing to implement FS systems in this band using a block-based frequency arrangement should consider the guidance given in Recommendation ITU-R F.1519;

4 that administrations wishing to implement block based arrangements, based on block-size increments of 56 MHz, should consider the arrangement in Annex 2;

5 that administrations are encouraged to avoid, where practicable, the use of the centre gap of the RF arrangements by the fixed service.

Annex 1

Radio-frequency channel arrangement in the band 31.8-33.4 GHz

The RF channels for separations of 3.5 MHz, 7 MHz, 14 MHz, 28 MHz, 56 MHz, 112 MHz and 224 MHz shall be derived as follows:

let f_r be the reference frequency of 32 599 MHz,

f_n be the centre frequency (MHz) of the RF channel in the lower half of the band,

f_n' be the centre frequency (MHz) of the RF channel in the upper half of the band,

frequency duplex spacing = 812 MHz,

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

a) for channel separation of 224 MHz with interleaved arrangement by granularity of 112 MHz:

lower half of the band: $f_n = f_r - 728 + 112\,n$

upper half of the band: $f'_n = f_r + 84 + 112\,n$

where:

n = 1, 2, 3, … 5

b) for channel separation of 224 MHz without interleaved arrangement:

lower half of the band: $f_n = f_r - 840 + 224\,n$

upper half of the band: $f'_n = f_r - 28 + 224\,n$

where:

n = 1, 2, 3

c) for channel separation of 112 MHz:

lower half of the band: $f_n = f_r - 784 + 112\,n$

upper half of the band: $f'_n = f_r + 28 + 112\,n$

where:

n = 1, 2, 3, … 6

d) for channel separation of 56 MHz:

lower half of the band: $f_n = f_r - 756 + 56\,n$

upper half of the band: $f'_n = f_r + 56 + 56\,n$

where:

n = 1, 2, 3, … 12

e) for a channel separation of 28 MHz:

lower half of the band: $f_n = f_r - 798 + 28\,n$

upper half of the band: $f'_n = f_r + 14 + 28\,n$

where:

n = 1, 2, 3, … 27

f) for a channel separation of 14 MHz:

lower half of the band: $f_n = f_r - 791 + 14\,n$

upper half of the band: $f'_n = f_r + 21 + 14\,n$

where:

n = 1, 2, 3, … 54

g) for a channel separation of 7 MHz:

lower half of the band: $f_n = f_r - 787.5 + 7\,n$

upper half of the band: $f'_n = f_r + 24.5 + 7\,n$

where:

n = 1, 2, 3, … 108

h) for a channel separation of 3.5 MHz:

lower half of the band: $f_n = f_r - 785.75 + 3.5\,n$

upper half of the band: $f'_n = f_r + 26.25 + 3.5\,n$

where:

n = 1, 2, 3, … 216.

NOTE 1 – Systems using time division duplex (TDD) techniques can also operate in the above-defined sub-bands.

Centre gap = 56 MHz for the 3.5, 7, 14 and 28 MHz channel separations, 140 MHz for the 56 MHz, 112 MHz and 224 MHz channel separations.

TABLE 1

Calculated parameters according to Recommendation ITU-R F.746

XS **(MHz)**	***n***	f_1 **(MHz)**	f_n **(MHz)**	f'_1 **(MHz)**	f'_n **(MHz)**	ZS_1 **(MHz)**	ZS_2 **(MHz)**	***YS*** **(MHz)**	***DS*** **(MHz)**
224[1]	1, …, 5	31 983	32 431	32 795	33 243	183	157	364	812
224[2]	1, …, 3	31 983	32 431	32 795	33 243	183	157	364	812
112	1, …, 6	31 927	32 487	32 739	33 299	127	101	252	812
56	1, ..., 12	31 899	32 515	32 711	33 327	99	73	196	812
28	1, ..., 27	31 829	32 557	32 641	33 369	29	31	84	812
14	1, ..., 54	31 822	32 564	32 634	33 376	22	24	70	812
7	1, ..., 108	31 818.5	32 567.5	32 630.5	33 379.5	18.5	20.5	63	812
3.5	1, ..., 216	31 816.75	32 569.25	32 628.75	33 381.25	16.75	18.75	59.5	812

XS: separation between centre frequencies of adjacent channels.

YS: separation between centre frequencies of the closest go and return channels.

ZS_1: separation between the lower band edge and the centre frequency of the lowest channel in the lower sub-band.

ZS_2: separation between centre frequency of the highest channel in the upper sub-band and the upper band edge.

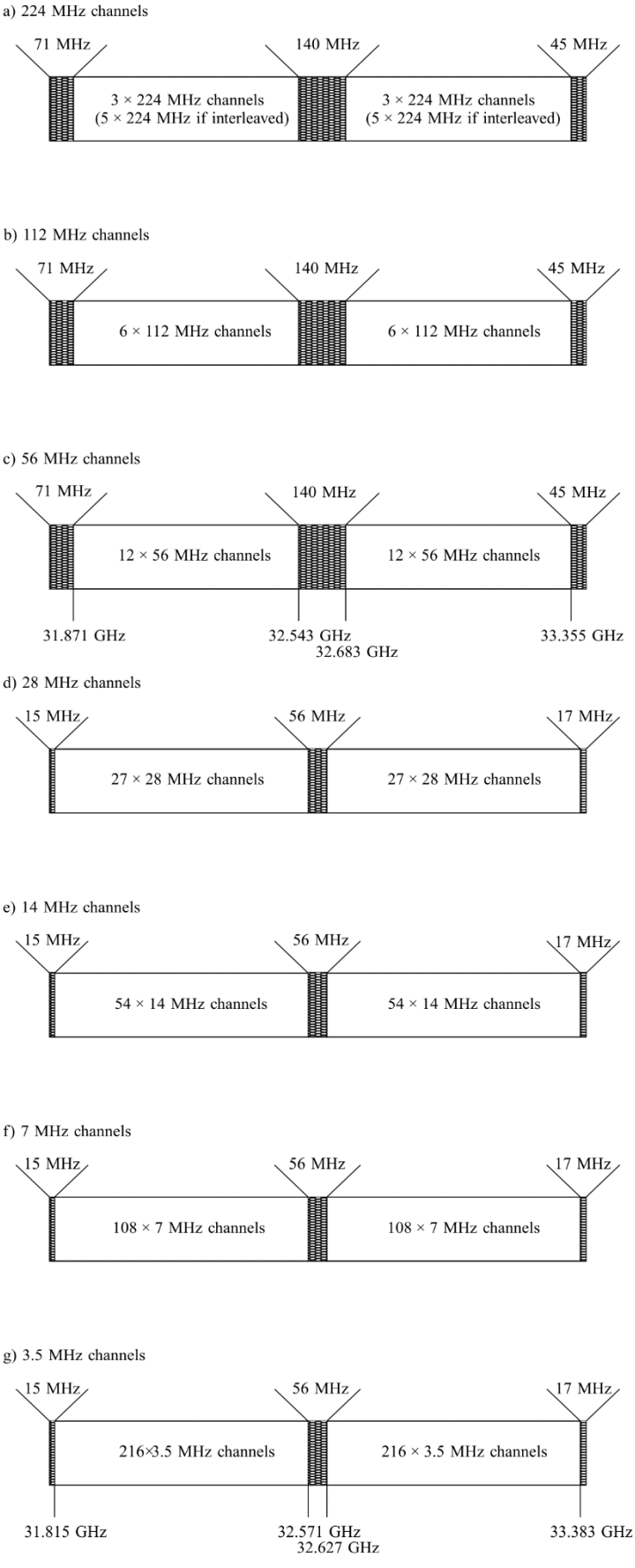
DS: duplex spacing $(f'_n - f_n)$.

[1] This refers to channel separation of 224 MHz with interleaved arrangement as specified in item a).

[2] This refers to channel separation of 224 MHz without interleaved arrangement as specified in item b).

FIGURE 1

Occupied spectrum: 31.8 to 33.4 GHz



Annex 2

Radio-frequency block arrangement in the band 31.8-33.4 GHz using block size increments of 56 MHz

This Annex provides an example RF block arrangement for the band 31.8-33.4 GHz using block size increments of 56 MHz. Guidance is provided on a flexible approach to specifying portions of the band for RF channel assigned point-to-point systems and RF block allocated systems.

For frequency division duplex (FDD) the band is divided into twelve (56 + 56) MHz symmetrically paired frequency blocks as follows:

TABLE 2

Paired block	Lower frequency sub-band block (MHz)	Upper frequency sub-band block (MHz)
A/A'	31 871-31 927	32 683-32 739
B/B'	31 927-31 983	32 739-32 795
C/C'	31 983-32 039	32 795-32 851
D/D'	32 039-32 095	32 851-32 907
E/E'	32 095-32 151	32 907-32 963
F/F'	32 151-32 207	32 963-33 019
G/G'	32 207-32 263	33 019-33 075
H/H'	32 263-32 319	33 075-33 131
I/I'	32 319-32 375	33 131-33 187
K/K'	32 375-32 431	33 187-33 243
L/L'	32 431-32 487	33 243-33 299
M/M'	32 487-32 543	33 299-33 355

Different RF block arrangements can be achieved by aggregating the frequency blocks specified in Table 2.

As an example, the band may contain several aggregated blocks, arranged in a way shown in Table 3.

TABLE 3

Paired block	Lower frequency block (MHz)	Upper frequency block (MHz)
1 (2 × 112 MHz block)	31 871-31 983	32 683-32 795
2 (2 × 112 MHz block)	31 983-32 095	32 795-32 907
3 (2 × 112 MHz block)	32 095-32 207	32 907-33 019
4 (2 × 56 MHz block)	32 207-32 263	33 019-33 075
5 (2 × 56 MHz block)	32 263-32 319	33 075-33 131
6 (2 × 56 MHz block)	32 319-32 375	33 131-33 187
7 (2 × 168 MHz block)	32 375-32 543	33 187-33 355

The 56 MHz block arrangement and possible aggregation are shown below in Figs 2 and 3, respectively.

FIGURE 2

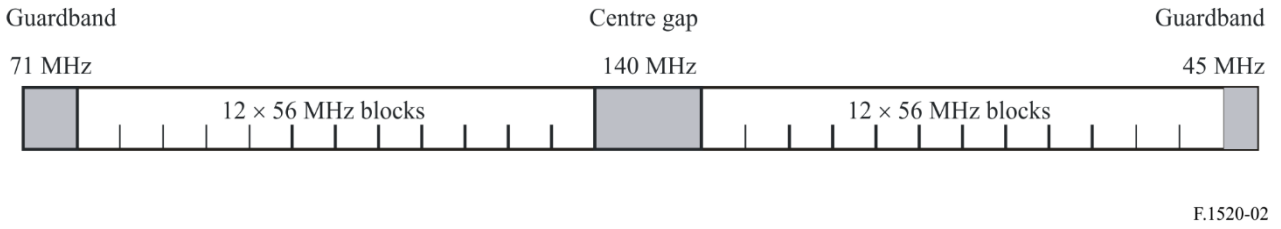


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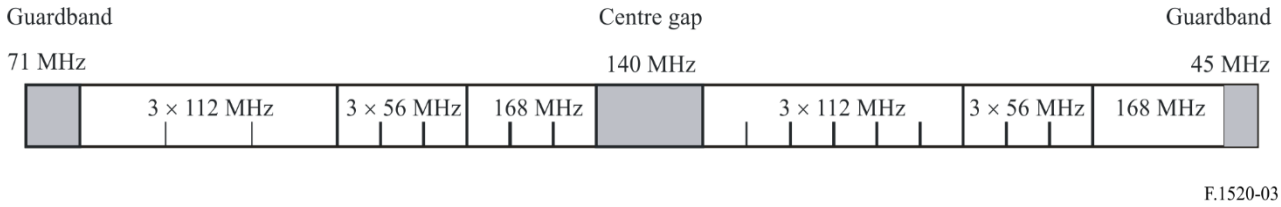
FIGURE 3



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For FDD systems, the blocks located in the lower part of each sub-band should be used preferably with the upper sub-band for uplink transmissions, and lower sub-band for downlink transmissions. Systems using TDD can also operate in the above-defined sub-bands.

Arrangements stated in Figs 2 and 3 do not preclude the use of other blocks or block pairs.