RECOMMENDATION ITU-R F.1520-1

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

(Questions ITU-R 108/9 and ITU-R 229/9)

(2001-2002)

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 in the Radio Regulations (RR) No. 5.547 identifies the 31.8-33.4 GHz band as being available for high-density applications in the FS;

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

d) that RR No. 5.547A states that administrations should take practical measures to minimize the potential interference between stations in the FS and airborne stations in the radionavigation service in the 31.8-33.4 GHz band, taking into account the operational needs of the airborne radar systems;

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

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

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

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

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

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

l) that different block sizes may be required to suit various applications,

recognizing

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,

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.

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 and 56 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 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:

$n = 1, 2, 3, \ldots 12$

b)   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:

$n = 1, 2, 3, \ldots 27$

c)   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:

      $n = 1, 2, 3, \dots 54$

d)   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:

      $n = 1, 2, 3, \dots 108$

e)   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:

      $n = 1, 2, 3, \dots 216$.

NOTE 1 – Systems using time division duplex (TDD) techniques can operate in both sub-bands and the centre gap.

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

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)
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 $(f'_n - f_n)$.

FIGURE 1

Occupied spectrum: 31.8 to 33.4 GHz band
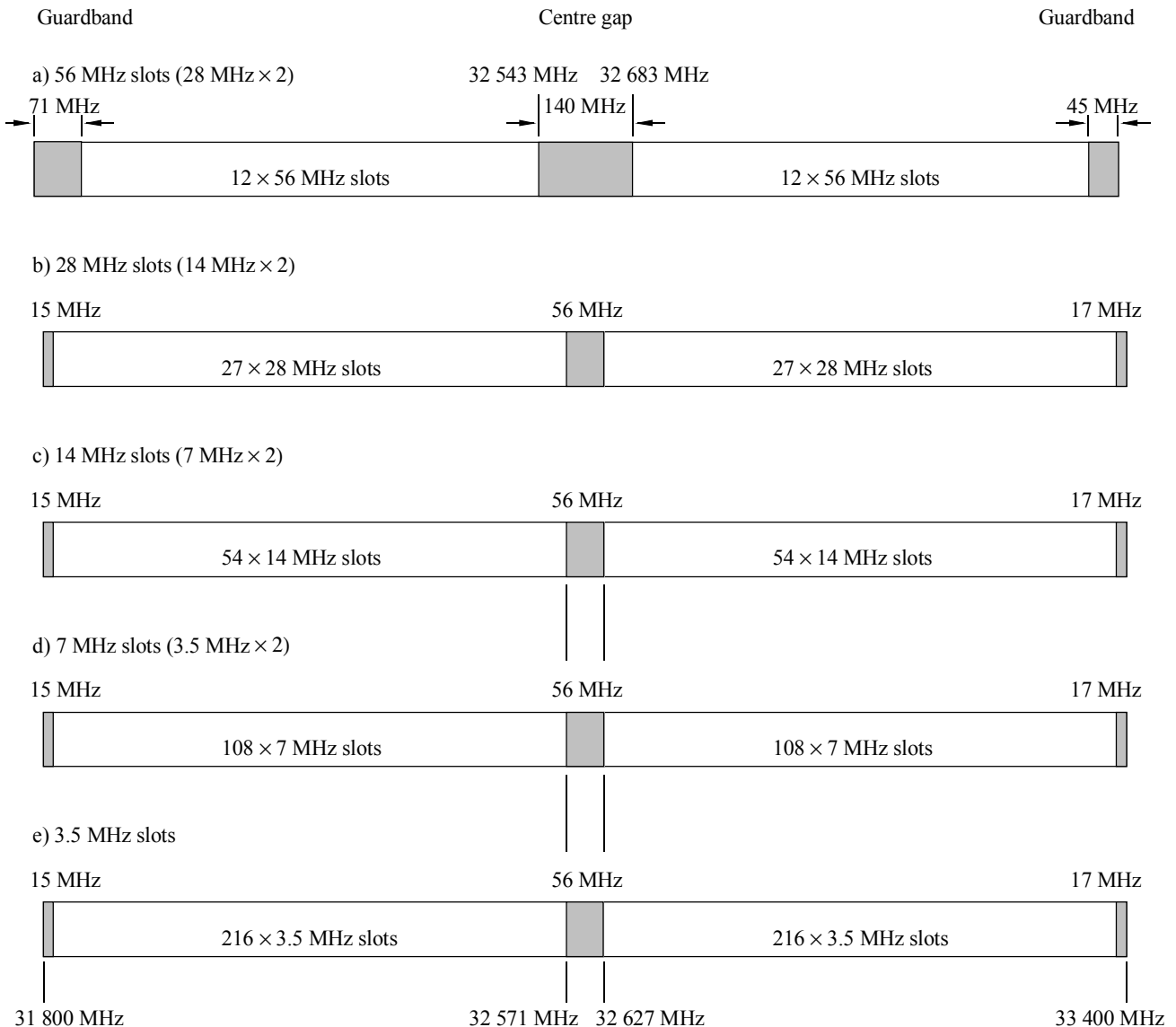
ANNEX 2

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

Guardband		Centre gap		Guardband
71 MHz		140 MHz		45 MHz

12 × 56 MHz blocks   12 × 56 MHz blocks

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FIGURE 3

Guardband		Centre gap		Guardband
71 MHz		140 MHz		45 MHz

3 × 112 MHz   3 × 56 MHz   168 MHz   3 × 112 MHz   3 × 56 MHz   168 MHz

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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 operate in both sub-bands and the centre guardband.

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