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| **Radiocommunication Study Groups** |  |
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| Source: Document 5C/TEMP/25, [5C/37](https://www.itu.int/md/R19-WP5C-C-0037/en) | **Annex 7 to Document 5C/59-E** |
| **4 August 2020** |
| **English only** |
| Annex 7 to Working Party 5C Chairman’s Report |
| PRELIMINARY DRAFT REVISION OF RECOMMENDATION ITU-R F.383-9 |
| Radio-frequency channel arrangements for high-capacity fixed wireless systems operating in the lower 6 GHz (5 925 to 6 425 MHz) band |

(Question ITU-R 247-1/5)

(1959-1963-1966-1982-1986-1990-1992-1999-2001-2007-2013)

Summary of the revision

This revision includes a new 59.3 MHz RF channel width as described in a modified *recommends* 5. The scope has been modified accordingly.

Scope

This Recommendation provides radio-frequency (RF) channel arrangements for high-capacity fixed wireless systems (FWSs) operating in the 5 925 to 6 425 MHz band, which may also be used for low- and medium-capacity systems through high-capacity channel subdivision. The main text of as well as Annexes 1 to 3 to this Recommendation present a number of RF arrangements with channel separation of 5, 10, 20, 28, 29.65, 40, 59.3 and 80 MHz in this frequency band.

Key words

Fixed service, point to point, channel bandwidth, channel arrangement, 6 GHz

Abbreviations

MHz Megahertz

GHz Gigahertz

Related ITU Recommendations and Reports

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

The ITU Radiocommunication Assembly,

considering

*a)* that it is desirable to interconnect fixed wireless systems (FWSs) on international links in the 6 GHz band at radio frequencies (RF);

*b)* that many interfering effects can be substantially reduced by a carefully planned arrangement of the radio frequencies in FWS employing several RF channels;

*c)* that the use of digital modulation permits the use of the RF channel arrangements, originally defined for 1 800 telephone channel systems, for the transmission of digital channels with a bit rate of the order of synchronous digital hierarchy bit rates or equivalent or higher data rate traffic;

*d)* that for these digital radio systems, further economies are possible by accommodating go and return channels on a single antenna;

*e)* that digital techniques such as cross-polar interference cancellers (XPIC) may significantly contribute to the cross-polar discrimination improvement factor (XIF, defined in Recommendation ITU-R F.746), thus counteracting multipath propagation-induced depolarization;

*f)* that when very high-capacity links (e.g. twice STM-1, Synchronous Transfer Mode-1 or equivalent or higher data rate traffic) are required, further economy may be achieved using system bandwidths wider than the recommended channel separation, associated to high efficient modulation formats;

*g)* that some administrations may need to deploy also low- and medium-capacity systems,

recommends

**1** that the preferred RF channel arrangement for up to eight 29.65 MHz go and return channels with each channel accommodating a capacity of the order of synchronous digital hierarchy bit rates or equivalent or higher data rate traffic and operating at frequencies in the lower 6 GHz band (Note 5), should be as shown in Figs 1A, 1B or 1C and should be derived as follows:

Let *f*0 be the frequency (MHz) of the centre of the band of frequencies occupied (see *recommends* 6);

 *fn* be the centre frequency (MHz) of one RF channel in the lower half of the band;

  be the centre frequency (MHz) of one RF channel in the upper half of the band;

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

 lower half of the band: *fn* = *f*0 – 259.45 + 29.65 *n* MHz

 upper half of the band:  = *f*0 – 7.41 + 29.65 *n* MHz

where:

 *n* = 1, 2, 3, 4, 5, 6, 7 or 8;

FIGURE 1A

Radio-frequency alternated channel arrangement for fixed wireless systems
operating in the 6 GHz band for use in international connections

(All frequencies in MHz)



FIGURE 1b

Radio-frequency alternated channel arrangement for fixed wireless systems
operating in the 6 GHz band for use in international connections

(All frequencies in MHz)



FIGURE 1c

Radio-frequency co-channel arrangement for fixed wireless systems
operating in the 6 GHz band for use in international connections

(All frequencies in MHz)



**2** that, in a section over which the international connection is arranged, all the go channels should be in one half of the band, and all the return channels should be in the other half of the band;

**3** that the go and return channels on a given section should preferably use polarizations as shown below and in Fig. 1A (see Note 1):

 Go Return

 H(V) 1, 3 , 5, 7 1’, 3’, 5’, 7’

 V(H) 2, 4, 6, 8 2’, 4’, 6’, 8’.

In past deployment of analogue systems up to 1 800 channels, the following alternative arrangement of polarization, shown also in Fig. 1B, has been used and possibly maintained in the initial migration to digital systems; it might still be in use by agreement between the administrations concerned (see Note 1):

 Go Return

 H(V) 1, 3, 5, 7 2’, 4’, 6’, 8’

 V(H) 2, 4, 6, 8 1’, 3’, 5’, 7’.

**4** that when the equipment and network characteristics permit, co-channel frequency reuse of the arrangement in Fig. 1C can be employed, with the agreement of the administrations concerned, for improving spectral efficiency;

**5** that when very high capacity links (e.g. twice STM-1 or equivalent of higher data rate traffic) are required and network coordination permits, channel width of 59.3 MHz could be used as follows:

5.1 RF channel arrangement for up to four go and return channels using a RF channel width of 59.3 MHz defined as follow (see Figure 2):

 lower half of the band: *fn* = *f*0 – 274.275 + 59.3 *n* MHz

 upper half of the band:  = *f*0 – 22.235 + 59.3 *n* MHz

where:

 *n* = 1, 2, 3, 4;

fIGURE 2

59.3 MHz radio-frequency channel arrangement for radio-relay
systems operating in the lower 6 GHz band
(All frequencies in MHz)



**5.2** administrations desiring more flexible use of 59.3 MHz channels for easing the planning of dense networks in combination with existing 29.65 MHz links, may consider the use of an interleaved RF channels arrangement for up to seven 59.3 MHz go and return channels defined as follows (see figure 3):

 lower half of the band: *fn* = *f0* – 244.625 + 29.65n MHz

 upper half of the band: *fn****’*** = *f0* + 7.415 + 29.65n MHz

where:

n = 1, 2, …7

It should be noted that odd channels (n = 1, 3, 5, 7) are the same of the four channels provided by *recommends* 5.1 above

FIGURE 3

RF interleaved channel arrangements for channels with 59.3 MHz separation
(All frequencies in MHz)



**6** that the preferred centre frequency is 6 175.0 MHz; in addition, other centre frequencies may be used by agreement between the administrations concerned.

NOTE 1 – When common transmit-receive antennas are used and channel 8 is used together with channel 1’, either in the arrangement of Fig. 1A or in the even more problematic arrangement of Figs 1B and 1C, special branching and filters arrangement may be needed for limiting mutual impairments and permitting their common operation.

NOTE 2 – In a number of administrations in Region 1, a RF channel arrangement given in Annex 2 to this Recommendation is used in the frequency band 5 925 to 6 425 MHz.

NOTE 3 – Some administrations use different RF channel arrangement in the frequency band 5 925‑6 425 MHz for high capacity digital FWS with a capacity of up to 2 × STM-1 or equivalent or higher data rate traffic (see Annex 1).

NOTE 4 – Some administrations use different RF channel arrangements in the frequency band 5 925‑6 425 MHz for digital FWS with various capacities up to STM-1 or equivalent or higher data rate traffic (see Annex 3).

NOTE 5 – Actual bit rates including overhead may be as much as 5% or more higher than net transmission rates.

Annex 1

Frequency arrangements derived from a homogeneous frequency pattern
for the 6 GHz band with channel separations of 40 MHz

*[Note: No change is proposed to this Annex]*

Annex 2

RF channel arrangement for FWS operating in the 6 GHz band
with a channel separation of 28 MHz

*[Note: No change is proposed to this Annex]*

Annex 3

RF channel arrangements in the lower 6 GHz band
using 5, 10, 20 and 40 MHz channel separation

*[Note: No change is proposed to this Annex]*