RECOMMENDATION ITU-R F.1242

RADIO-FREQUENCY CHANNEL ARRANGEMENTS FOR DIGITAL RADIO SYSTEMS OPERATING IN THE RANGE 1 350 MHz TO 1 530 MHz

(Question ITU-R 136/9)

(1997)

The ITU Radiocommunication Assembly,

considering

a) that as a result of the World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum (Malaga-Torremolinos, 1992) (WARC-92) many administrations may wish to plan fixed service systems around the bands designated for new mobile, mobile-satellite and broadcast-satellite services;

b) that it is sometimes desirable to be able to interconnect low and medium capacity digital radio systems on international circuits using radio frequencies in the 1.5 GHz band;

c) that many interfering effects can be substantially reduced by a carefully planned arrangement of the radio frequencies in radio systems employing several radio-frequency channels;

d) that sharing between the fixed service (FS) and mobile service (MS), mobile-satellite service (MSS) or broadcasting-satellite service (BSS) may be possible by using adequate geographical and/or frequency separation;

e) that administrations may have different requirements for sharing spectrum with the FS, and they may not require all the spectrum allocated to MS, MSS or BSS;

f) that in Region 1, the band 1 350-1 400 MHz is allocated to the FS,

recommends

1 that where the introduction of new MS, MSS and/or BSS limits the FS to the band 1 350 to 1 375 MHz paired with 1 492 to 1 517 MHz, a radio-frequency channel arrangement with up to twelve go and return channels is used (carrier spacing of 2 MHz), which is derived as follows:

Let f_0 be the band centre frequency of 1 433.5 MHz,

f_n be the centre frequency of a radio-frequency channel in the lower half of the band,

f_n' be the centre frequency of a radio-frequency channel in the upper half of the band,

DS (Tx/Rx duplex spacing) = 142 MHz,

then the frequencies of individual channels with a carrier spacing of 2 MHz are expressed by the following relationships:

lower half of band: $f_n = f_0 - 84 + 2n$ MHz

upper half of band: $f_n' = f_0 + 58 + 2n$ MHz

where n = 1, 2, 3, ... 12.

For lower spacings, the frequencies of individual channels are expressed by the following relationships:

Carrier spacing of 1 MHz:

lower half of band: $f_n = f_0 - 83.5 + 1n$ MHz

upper half of band: $f_n' = f_0 + 58.5 + 1n$ MHz where $n = 1, 2, 3, ... 24$.

Carrier spacing of 0.5 MHz:

lower half of band: $f_n = f_0 - 83.25 + 0.5\, n$ MHz

upper half of band: $f_n' = f_0 + 58.75 + 0.5\, n$ MHz

where $n = 1, 2, 3, ... 48$.

Carrier spacing of 0.25 MHz:

lower half of band: $f_n = f_0 - 83.125 + 0.25\, n$ MHz

upper half of band: $f_n' = f_0 + 58.875 + 0.25\, n$ MHz

where $n = 1, 2, 3, ... 96$.

Channel arrangements with lower carrier spacings are possible by means of further channel subdivision.

Channel arrangements with carrier spacing of 3.5 MHz are possible by means of concatenation of the 0.5 MHz plan. The frequencies of individual channels are expressed by the following relationship:

lower half of band: $f_n = f_0 - 83.25 + 3.5\, n$ MHz

upper half of band: $f_n' = f_0 + 58.75 + 3.5\, n$ MHz

where $n = 1, 2, 3 ... 6$;

2 that where the introduction of new MS, MSS and/or BSS limits the FS to the band 1 375 to 1 400 MHz paired with 1 427 to 1 452 MHz, a radio-frequency channel arrangement with up to twelve go and return channels is used (carrier spacing of 2 MHz), which is derived as follows:

Let f_0 be the band centre frequency of 1 413.5 MHz,

f_n be the centre frequency of a radio-frequency channel in the lower half of the band,

f_n' be the centre frequency of a radio-frequency channel in the upper half of the band,

DS (Tx/Rx duplex spacing) = 52 MHz,

then the frequencies of individual channels with a carrier spacing of 2 MHz are expressed by the following relationships:

lower half of band: $f_n = f_0 - 39 + 2\, n$ MHz

upper half of band: $f_n' = f_0 + 13 + 2\, n$ MHz

where $n = 1, 2, 3, ... 12$.

For lower carrier spacings, the frequencies of individual channels are expressed by the following relationships:

Carrier spacing of 1 MHz:

lower half of band: $f_n = f_0 - 38.5 + 1\, n$ MHz

upper half of band: $f_n' = f_0 + 13.5 + 1\, n$ MHz

where $n = 1, 2, 3, ... 24$.

Carrier spacing of 0.5 MHz:

lower half of band: $f_n = f_0 - 38.25 + 0.5\, n$ MHz

upper half of band: $f_n' = f_0 + 13.75 + 0.5\, n$ MHz

where $n = 1, 2, 3, ... 48$.

Carrier spacing of 0.25 MHz:

lower half of band: $f_n = f_0 - 38.125 + 0.25\,n$ MHz

upper half of band: $f_n' = f_0 + 13.875 + 0.25\,n$ MHz

where $n = 1, 2, 3, ... 96$.

Channel arrangements with lower carrier spacings are possible by means of further channel subdivision.

Channel arrangements with carrier spacing of 3.5 MHz are possible by means of concatenation of the 0.5 MHz plan. The frequencies of individual channels are expressed by the following relationship:

lower half of band: $f_n = f_0 - 38.25 + 3.5\,n$ MHz

upper half of band: $f_n' = f_0 + 13.75 + 3.5\,n$ MHz

where $n = 1, 2, 3, ... 6$;

3 that where the band 1 350-1 400 MHz is not available for the FS and where the introduction of new MS, MSS and/or BSS limits the FS to the band 1 427-1 452 MHz paired with the band 1 492-1 517 MHz (Note 1), a radio-frequency channel arrangement with up to twelve go and return channels is used (carrier spacing of 2 MHz), which is derived as follows:

Let f_0 be the band centre frequency of 1 472 MHz,

f_n be the centre frequency of a radio-frequency channel in the lower half of the band,

f_n' be the centre frequency of a radio-frequency channel in the upper half of the band,

DS (Tx/Rx duplex spacing) = 65 MHz,

then the frequencies of individual channels with a carrier spacing of 2 MHz are expressed by the following relationships:

lower half of band: $f_n = f_0 - 45.5 + 2\,n$ MHz

upper half of band: $f_n' = f_0 + 19.5 + 2\,n$ MHz

where $n = 1, 2, 3, ... 12$.

For lower carrier spacings, the frequencies of individual channels are expressed by the following relationships:

Carrier spacing of 1 MHz:

lower half of band: $f_n = f_0 - 45 + 1\,n$ MHz

upper half of band: $f_n' = f_0 + 20 + 1\,n$ MHz

where $n = 1, 2, 3, ... 24$.

Carrier spacing of 0.5 MHz:

lower half of band: $f_n = f_0 - 44.75 + 0.5\,n$ MHz

upper half of band: $f_n' = f_0 + 20.25 + 0.5\,n$ MHz

where $n = 1, 2, 3, ... 48$.

Carrier spacing of 0.25 MHz:

lower half of band: $f_n = f_0 - 44.625 + 0.25\,n$ MHz

upper half of band: $f_n' = f_0 + 20.375 + 0.25\,n$ MHz

where $n = 1, 2, 3, ... 96$.

Channel arrangements with lower carrier spacings are possible by means of further channel subdivision.

A radio-frequency channel arrangement with carrier spacing of 3.5 MHz can be accommodated with up to seven go and return channels, the frequencies of individual channels being expressed by the following relationships:

lower half of band: $f_n = f_0 - 46.5 + 3.5\,n$ MHz

upper half of band: $f_n' = f_0 + 18.5 + 3.5\,n$ MHz

where $n = 1, 2, 3, ... 7$.

NOTE 1 – Prior to WARC-92, the band 1 427 to 1 530 MHz has been reported to be used for small capacity analogue and digital systems with a radio-frequency channel arrangement based on a carrier spacing of 0.5 MHz. The frequencies of individual channels are expressed by the following relationships:

lower half of band: $f_n = f_0 - 51.5 + 0.5\,n$ MHz

upper half of band: $f_n' = f_0 + 14 + 0.5\,n$ MHz

where:

$f_0 = 1\,478.5$ MHz

$n = 1, 2, 3, \dots 74$.