RECOMMENDATION ITU-R F.1100

RADIO-FREQUENCY CHANNEL ARRANGEMENTS FOR RADIO-RELAY SYSTEMS OPERATING IN THE 55 GHz BAND

(Question ITU-R 108/9)

(1994)

The ITU Radiocommunication Assembly,

considering

a) that the band 54.25-58.20 GHz is allocated to the fixed and mobile services and that the propagation characteristics of this band are ideally suited to very short range digital and analogue radio system applications;

b) that differing applications of various administrations may require different radio-frequency channel arrangements;

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

d) that lower and upper limits of the bands are not uniform and vary internationally;

e) that the applications in this frequency band may require differing channel bandwidths;

f) that a high degree of compatibility between radio-frequency channels of different arrangements can be achieved by selecting channel centre frequencies within a homogeneous basic pattern;

g) that the differing digital hierarchies used in various countries or regions may require the use of homogeneous basic patterns with differing intervals;

h) that standardization of radio-frequency channel arrangements is desirable since atmospheric absorption is only significant in the upper part of the band,

recommends

1. that the preferred radio-frequency channel arrangements for the band 54.25-58.2 GHz should be based on homogeneous patterns;

2. that the homogeneous pattern with a preferred 3.5 MHz interval be defined by the relation:

$$f_p = f_r + 3.5\,p \qquad \text{MHz}$$

where:

$$1 \leq p \leq 1\,128$$

f_r: reference frequency of the homogeneous pattern;

3. that the homogeneous pattern with a preferred 2.5 MHz interval be defined by the relation:

$$f_p = f_r + 2.5\,p \qquad \text{MHz}$$

where:

$$1 \leq p \leq 1\,579$$

f_r: reference frequency of the homogeneous pattern;

4. that the reference frequency of the homogeneous pattern for international connections should be:

$f_r = 54\,250$ MHz;

5. that all go channels should be in one half of any bi-directional band, and all return channels in the other;

6. that the channel spacings, *XS*, the centre gap, *YS*, and the distance to the lower- and upper-band limits, Z_1S and Z_2S, should be agreed by the administrations concerned, dependent on the application and channel capacity envisaged (see Recommendation ITU-R F.746 for definitions of *XS*, *YS* and *ZS*).

Note 1 – Examples of radio-frequency channel arrangements based on § 2 and 3 are described in the Annexes to this Recommendation.

ANNEX 1

Radio-frequency channel arrangement in the band 54.25-57.20 GHz in accordance with § 2

In cases where a large fade margin is required, such as short-hop applications requiring a high availability, the difference in path loss between the transmit and receive channels, caused by the difference in atmospheric absorption, is of reduced significance compared to the total faded attenuation, including that due to precipitation. A single radio-frequency channel arrangement then becomes viable over a wide bandwidth such as 54.25-57.20 GHz.

An example of such a radio-frequency channel arrangement based on § 2 of this Recommendation for carrier spacings of 140 MHz, 56 MHz, 28 MHz and 14 MHz, is derived as follows:

Let f_0 be the centre frequency of 55 727 MHz = $f_r + (422 \times 3.5)$ 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,

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

a) for systems with a carrier spacing of 140 MHz:

lower half of band: $f_n = f_0 - 1\,505 + 140\,n$ MHz

upper half of band: $f'_n = f_0 - 35 + 140\,n$ MHz

where:

$n = 1, 2, 3, \ldots 10$

b) for systems with a carrier spacing of 56 MHz:

lower half of band: $f_n = f_0 - 1\,463 + 56\,n$ MHz

upper half of band: $f'_n = f_0 + 7 + 56\,n$ MHz

where:

$n = 1, 2, 3, \ldots 25$

c) for systems with a carrier spacing of 28 MHz:

lower half of band: $f_n = f_0 - 1\,449 + 28\,n$ MHz

upper half of band: $f'_n = f_0 + 21 + 28\,n$ MHz

where:

n = 1, 2, 3, . . . 50

d) for systems with a carrier spacing of 14 MHz:

lower half of band: $f_n = f_0 - 1\,442 + 14\,n$ MHz

upper half of band: $f'_n = f_0 + 28 + 14\,n$ MHz

where:

n = 1, 2, 3, . . . 100

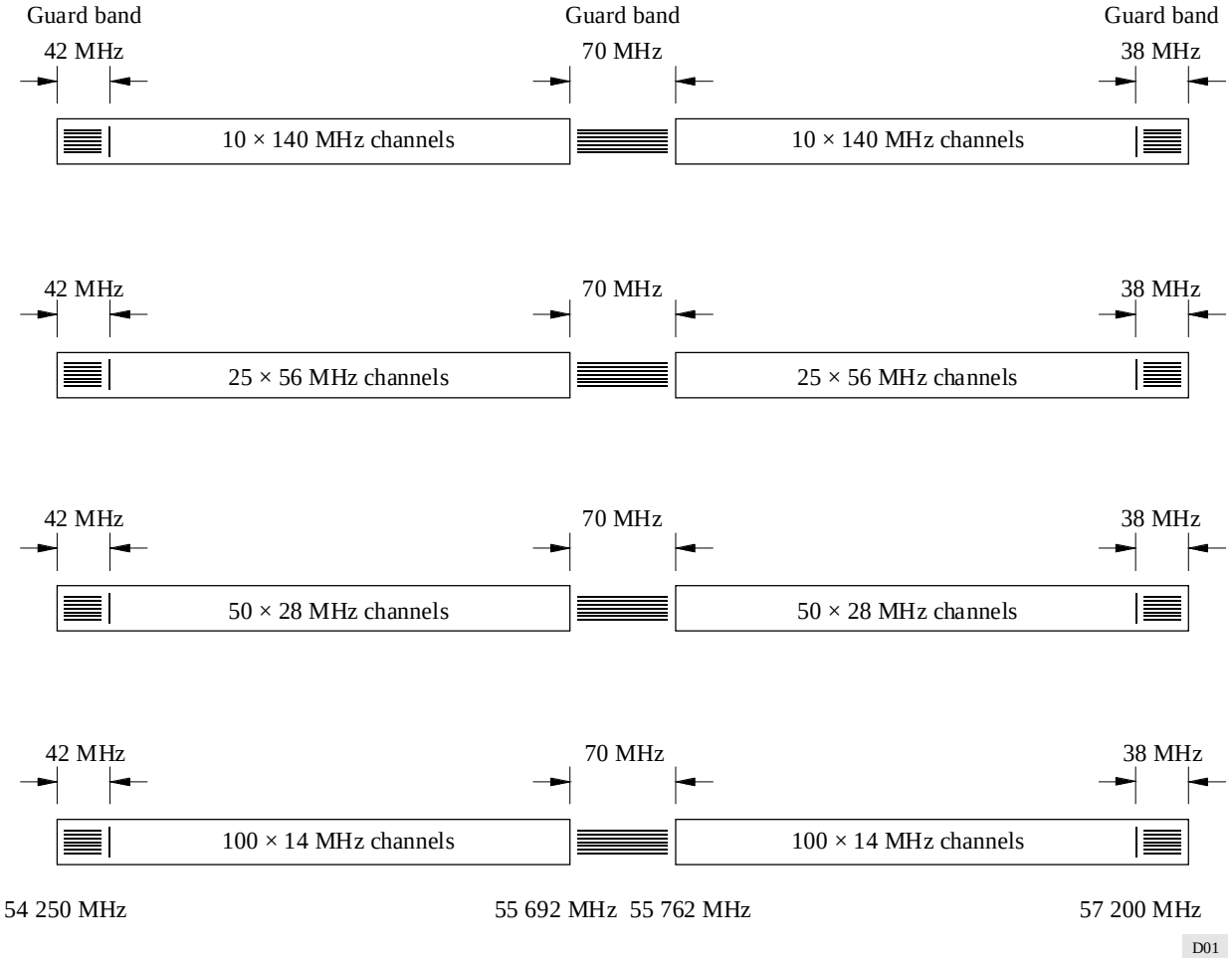
Note 1 – The radio-frequency channel arrangements of a) above have the use of channels 1 and 10 restricted to medium capacity systems due to the narrow centre guard band whilst channels 2 to 9 may be used for high capacity systems.

Note 2 – Figure 1 gives occupied spectrum in the 54.25-57.20 GHz band. The centre and edge guard bands may be reduced, by agreement between administrations, to allow the use of an increased number of lower capacity systems.

This is achieved by the addition of extra channels derived from the homogeneous pattern of § 2.

FIGURE 1

Occupied spectrum 54.25-57.20 GHz band



ANNEX 2

Radio-frequency channel arrangements in the band 57.2-58.2 GHz in accordance with § 3

As an example the radio-frequency channel arrangement in the 57.2-58.2 GHz band may be composed of ten channels of 100 MHz based on § 3 of this Recommendation (see Table 1 below).

Only vertically polarized transmissions are recommended at this time.

TABLE 1

Channel centre frequencies

Channel number	Frequency (GHz)	Channel number	Frequency (GHz)
1	57.25	6	57.75
2	57.35	7	57.85
3	57.45	8	57.95
4	57.55	9	58.05
5	57.65	10	58.15