European Radiocommunications Committee (ERC)
within the European Conference of Postal and Telecommunications Administrations (CEPT)

ERC RECOMMENDATION 12-12 (Luxembourg 1999, revised 2001)

RADIO FREQUENCY CHANNEL ARRANGEMENT FOR FIXED SERVICE SYSTEMS OPERATING IN THE BAND 55.78 – 57.0 GHz

Recommendation adopted by the Working Group "Spectrum Engineering" (WGSE)

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that CEPT should develop radio frequency channel arrangements in consultation with organisations developing standards for radio systems, in order to make the most effective use of the spectrum available;

b) that the propagation characteristics of the 55.78 – 57.0 GHz are ideally suited for use of short range digital radio links in high density networks;

c) WRC2000 S5.557 states that in the band 55.78-56.26 GHz, in order to protect stations in the EESS (passive), the maximum power density delivered by the transmitter to the antenna of a fixed service station is limited to -26dB(W/MHz)

d) that characteristics of FS systems to be deployed in this band are provided in the relevant standard (eg maximum transmit power and unwanted emission limits)

noting

a) that Radio Regulations allocate the band 55.78 – 57.0 GHz on a primary basis for Earth Exploration Satellite (passive), Fixed, Inter-Satellite, Mobile and Space Research (passive) services;

b) that in the frequency range a high antenna directivity is achievable even with small size antennas, increasing the density of equipment and further reducing risk of interference with same and other services;

c) that differing applications licensed by various administrations may require different radio-frequency channel arrangements;

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

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

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 low end of the frequency band is suitable for the longest hop radio links because the atmospheric attenuation is less than at the top of the band;

Edition of 10.10.01

recommends

1) that the CEPT Administrations should follow the recommended channel arrangements for time division duplex (TDD) systems in the frequency range 55.78 – 57.0 GHz given in **Annex A**;

2) that the CEPT Administrations should follow the recommended channel arrangements for frequency division duplex (FDD) systems in the frequency range 55.78 – 57.0 GHz given in **Annex B**."

Note:
Please check the ERO web site (http//:www.ero.dk) for the up to date position on the implementation of this and other ECC and ERC Recommendations.

ANNEX A

RADIO-FREQUENCY CHANNEL ARRANGEMENTS IN THE BAND 55.78 – 57.0 GHz FOR SYSTEMS USING TDD

Let f_r be the reference frequency of 55786 MHz,
f_n be the centre frequency of a radio-frequency channel in the band 55.78 – 57.0 GHz,

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

a) for systems with a channel separation of 56 MHz:

$$f_n = f_r + 28 + 56\ n \quad \text{MHz}$$

where:

n = 1, 2, 3, ...20

b) for systems with a channel separation of 28 MHz:

$$f_n = f_r + 42 + 28\ n \quad \text{MHz}$$

where:

n = 1, 2, 3, ...40

b) for systems with a channel separation of 14 MHz:

$$f_n = f_r + 49 + 14\ n \quad \text{MHz}$$

where:

n = 1, 2, 3, ...80

d) for systems with a channel separation of 7 MHz:

$$f_n = f_r + 52.5 + 7\ n \quad \text{MHz}$$

where:

n = 1, 2, 3, ...160

e) for systems with a channel separation of 3.5 MHz:

$$f_n = f_r + 54.25 + 3.5n \quad \text{MHz}$$

where:

n = 1, 2, 3, ...320

Calculated parameters according to ITU-R Rec. 746

TABLE 1

XS MHz	n	f1 MHz	fn MHz	Z1S MHz	Z2S MHz
56	1,...20	55870	56934	90	66
28	1,...40	55856	56948	76	52
14	1,...80	55849	56955	69	45
7	1,…160	55845.5	56958.5	65.5	41.5
3.5	1,…320	55843.75	56960.25	63.75	39.75

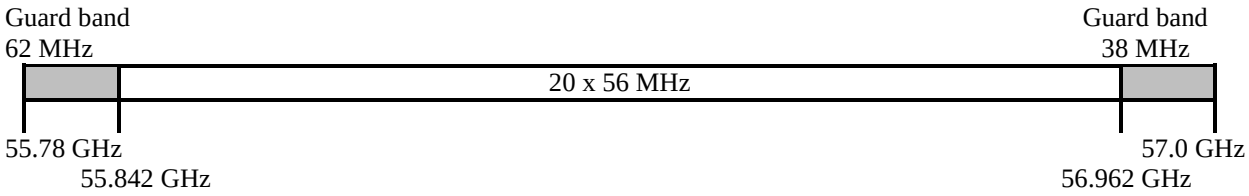
XS Separation between centre frequencies of adjacent channels
Z1S Separation between the lower band edge and the centre frequency of the first channel
Z2S Separation between centre frequencies of the final channel and the upper band edge

ANNEX A

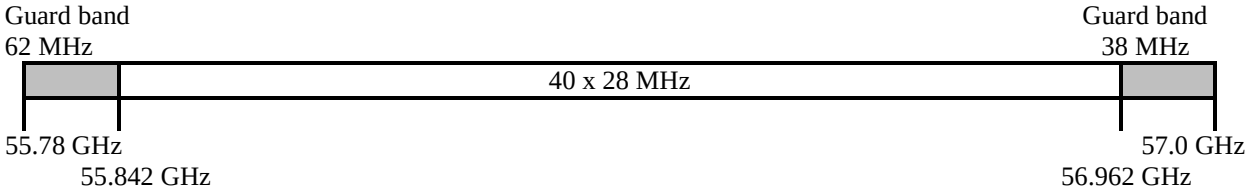
Figure 1

Occupied spectrum: 55.78 to 57 GHz Band

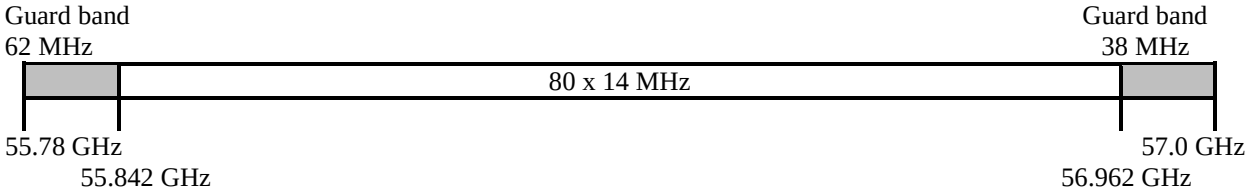
a) 56 MHz channels



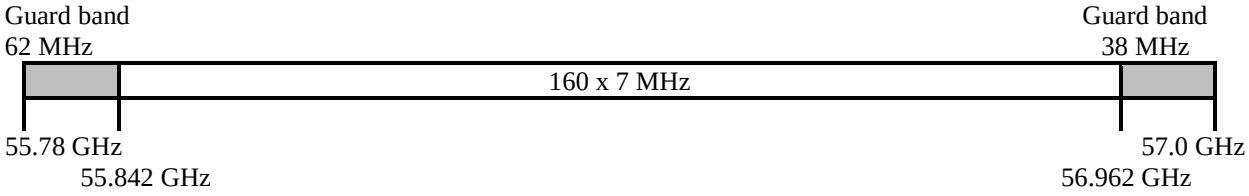
b) 28 MHz channels



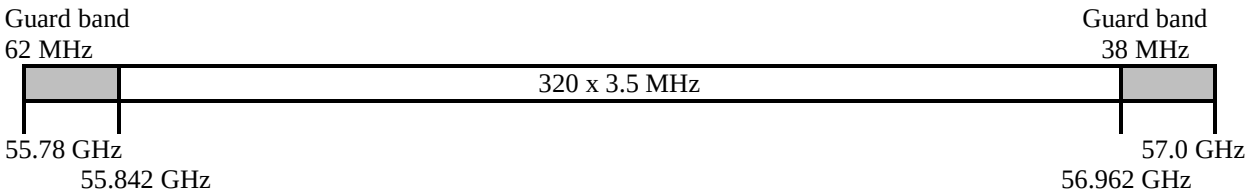
c) 14 MHz channels



c) 7 MHz channels



c) 3.5 MHz channels



ANNEX B

Radio-frequency channel arrangement in the band 55.78 – 57 GHz for systems using FDD

The radio frequency channel arrangement for channel separations of 56 MHz, 28 MHz and 14 MHz shall be derived as follows:

Let

fr be the reference frequency of 55814 MHz,

fn be the centre frequency (MHz) of the radio-frequency channel in the lower half of the band,

fn' be the centre frequency (MHz) of the radio-frequency channel in the upper half of the band,

TX/RX separation = 616 MHz,
Band separation = 112 MHz,

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

a) for systems with a channel separation of 56 MHz:

lower half of the band:	fn = fr + 56 n	
upper half of the band:	fn' = fr + 616 + 56 n	where n = 1,2, … 9

b) for systems with a channel separation of 28 MHz:

lower half of the band:	fn = fr + 14 + 28 n	
upper half of the band:	fn' = fr + 630 + 28 n	where n = 1, 2, 3, … 18

c) for systems with a channel separation of 14 MHz:

lower half of the band:	fn = fr + 21 + 14 n	
upper half of the band:	fn' = fr + 637 + 14 n	where n = 1, 2, 3, … 36

d) for systems with a channel separation of 7 MHz:

lower half of the band:	fn = fr + 24.5 + 7 n	
upper half of the band:	fn' = fr + 640.5 + 7 n	where n = 1, 2, 3, … 72

e) for systems with a channel separation of 3.5 MHz:

lower half of the band:	fn = fr + 26.25 + 3.5 n	
upper half of the band:	fn' = fr + 642.25 + 3.5 n	where n = 1, 2, 3, … 144

ANNEX B

Table 1

Calculated parameters according to ITU-R Rec. 746

XS MHz	n	f1 MHz	fn MHz	f'1 MHz	f'n MHz	Z1S MHz	Z2S MHz	YS MHz	DS MHz
56	1,...9	55870	56318	56486	56934	90	66	168	616
28	1,...18	55856	56332	56472	56948	76	52	140	616
14	1,...36	55849	56339	56465	56955	69	45	126	616
7	1,…72	55845.5	56342.5	56461.5	56958.5	65.5	41.5	119	616
3.5	1,…144	55843.75	56344.25	56459.75	56960.25	63.75	39.5	115.5	616

XS Separation between centre frequencies of adjacent channels

YS Separation between centre frequencies of the closest go and return channels

Z1S Separation between the lower band edge and the centre frequency of the first channel

Z2S Separation between centre frequencies of the final channel and the upper band edge

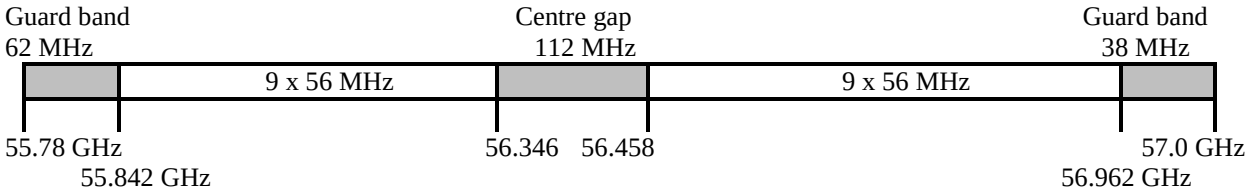
DS Duplex spacing (f'n - fn)

ANNEX B

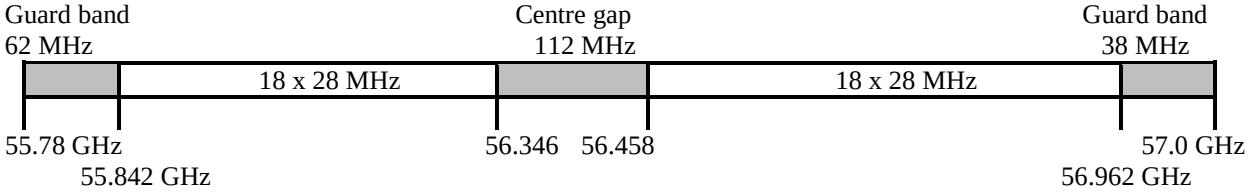
Figure 1

Occupied spectrum: 55.78 to 57 GHz Band

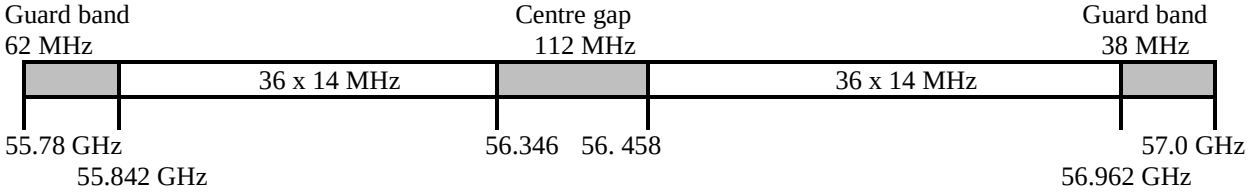
a) 56 MHz channels



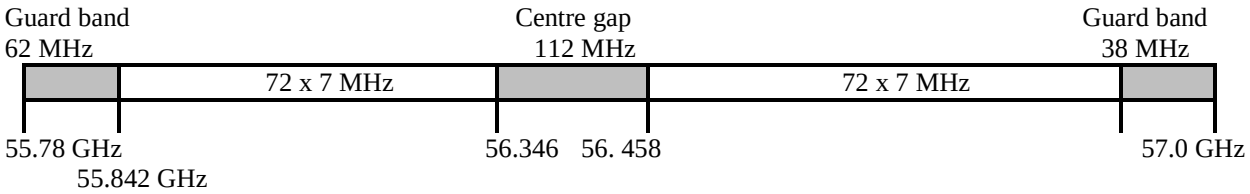
b) 28 MHz channels



c) 14 MHz channels



c) 7 MHz channels



c) 3.5 MHz channels