Electronic Communications Committee (ECC)
within the European Conference of Postal and Telecommunications Administrations (CEPT)

ECC RECOMMENDATION (05)02
(Revised Dublin 2009)

USE OF THE 64-66 GHz FREQUENCY BAND FOR FIXED SERVICE

Recommendation approved by the Working Group "Spectrum Engineering" (SE)

INTRODUCTION

The band 64-66 GHz has been opened for use by Fixed Service (FS) systems in some European countries. In particular, this band seems very suitable for very short distance links deployed in dense scenarios. This recommendation provides an approach for deployment of such FS links in this band.

It is considered that the physical propagation features in this band make possible a lighter licensing regime than usually used for FS systems, which may include access to spectrum through the use of flexible frequency arrangements, block (or blocks).

“The choice of the appropriate assignment method remains a decision for national administrations.

considering

a) that the 64-66 GHz band is allocated to the Fixed Service on a Primary Basis in the European Common Allocation table and the ITU Radio Regulations (RR);

b) that this band is also allocated to other radiocommunications services on a co-primary basis;

c) that ITU RR No. 5.547 identifies the 64-66 GHz band for high density applications in the FS;

d) that the 64-66 GHz band is suitable for the deployment of high capacity point-to-point links;

e) that administrations may wish to combine the use of PP radio systems in the 64-66 GHz band with the 57-64 GHz band according to ECC/REC/(09)01 possibly with channel overlapping the boundary between these bands. Due regard should be given to the different maximum e.i.r.p. limits defined in the two bands;

f) that ETSI has developed EN 302 217-3 for the FS point-to-point equipment in this frequency band;

g) that the very short distance links in the 64-66 GHz band call for a light licensing regime as described in ECC Report 80;

h) that the atmospheric attenuation in this band may not be sufficient to ensure that a high density of links can be achieved without suitable management to avoid interference;

i) that the information on fixed links to be deployed in this band will be required to evaluate the impact of new links on existing links;

j) that for those administrations wishing to examine in their national assignment process if the interference threshold has been exceeded, interference criteria need to be defined;

k) that the level of interference threshold of a victim receiver may be also established based on ECC/REC/(01)05;

recommends

1. that the use of FS in the 64-66 GHz band be limited to point-to-point systems;

2. that operating frequencies for point-to-point links in this band be assigned or recorded on a link-by-link basis;

3. that for administrations or operators wishing to determine the impact of new links on existing links, single and aggregate interference criteria may be derived using guidance given in ECC/REC/(01)05. An example of applying this procedure for FS in the band 64-66 GHz is given in Annex 1;

4. that administrations who wish to implement a light licensing regime for FS links in this frequency band may refer to the example provided in Annex 2;

5. that administrations choose either to allow assignments in this band without a specific channel arrangement, or establish an arrangement based on simplified frequency slots arrangement as shown in Annex 3;

6. that administrations, who wish to use the block assignment procedure, form blocks consistent with the frequency slots arrangement given in Annex 3, defining suitable safeguards for interference avoidance between adjacent blocks."

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

Annex 1

EXAMPLE OF DERIVATION OF INTERFERENCE CRITERIA

The interference criteria for single entry and aggregate interference can be derived from the characteristics of the equipment that may be found in ETSI EN 302 217-3.

For example, tETSI EN 302 217-3 specifies for class 2 equipment (e.g. QPSK) that a co-channel interference with C/I=23 dB should result in RSL degradation of no more than 1 dB for the BER $\leq 10^{-6}$ thresholds, and C/I=19 dB should result in RSL degradation of no more than 3 dB.

Assuming that this recommendation is relevant to flexible system bandwidth, the triggers for defining acceptable interference should be defined in terms of absolute interference power density determining an I/N = - 6 dB for 1 dB degradation (single entry interference) and I/N=-2 dB for 3 dB degradation (aggregate interference).

This can be derived, for example, with the simple assumption that the equivalent system noise bandwidth is ~ 30% less than the Occupied Bandwidth (e.g. a OccBw=500 MHz corresponds to an equivalent NoiseBw ~350 MHz).

The figure of C/I=23 dB for 1dB degradation implies a 6 dB lower system C/N (C/N = 17dB).
Assuming -61 dBm RSL level for the 500 MHz system, it is possible to derive the parameters necessary for defining the trigger interference power density level:

- Receiver Noise Density: N (dBm/MHz)= -61 -17 – 10log(500*0.7)= - 103.5 dBm/MHz

Therefore in this example the interference criteria for single entry interference could be expressed as follows:

- Trigger Interference Power Density I (for 1 dB degradation)= -103.5 – 6 = -109.5 dBm/MHz.

Similarly, the interference criteria for aggregate interference in this example could be expressed as follows:

- Trigger Interference Power Density I (for 3 dB degradation)= -103.5 – 2 = -105.5 dBm/MHz

Note: the possible variation of the percentage ratio between noise bandwidth and the Occupied Bandwidth, due to different implementation (e.g. roll-off factor), is considered contained within an additional ±10%, resulting in an error of ~ ± 0.5 dB.

Annex 2

EXAMPLE OF TECHNICAL BACKGROUND FOR IMPLEMENTING LIGHT LICENSING APPROACH FOR FS LINKS IN THE BAND 64-66 GHz

To assist the planning of links, a light licensing approach can be considered. The light licensing regime, as described in ECC Report 80, does not mean licence exempt use, but rather using a simplified set of conventional licensing mechanisms and attributes within the scope decided by administration. This planning is delegated to the licensee.

This process at least requires that the Administration records the following set of simple criteria for each licensed link and makes the data available publicly (perhaps via the internet):

- Date of application (In order to assign priority);
- Transmit and receive centre frequencies;
- Equipment type, specifying relevant transmitter/receiver parameters. It is up to the administration to define this set of required parameters for recording. (To assist in the identification of operational parameters, to conduct interference analyses, e.g. following methodology in Annex 1);
- Link location (geographic coordinates, height/direction of antenna);
- The antenna gain and radiation pattern envelope. (e.g. derived from ETSI EN 302 217-4-2, which specifies two alternative envelopes, class 2 and class 3).

Subject to the set of conditions set by the administration, it is left to the operator to conduct any compatibility studies or coordinate as necessary to ensure that harmful interference is not caused to existing links registered in the database. For example, an operator wishing to install a new link could calculate the interference that the new link will create to the existing links in the database. Then it will be possible to determine whether this new link will interfere with existing links. If so, the new link could be re-planned to meet the interference requirements of existing links in the database. Otherwise, the new link may be also co-ordinated with existing operators, who might suffer from the interference.

To assist with the resolution of disputes, licences are issued with a “date of priority”: interference complaints between licensees may therefore be resolved on the basis of these dates of priority (as with international assignments).

Annex 3

EXAMPLES OF POSSIBLE FREQUENCY SLOT ARRANGEMENTS IN THE BAND 64-66 GHz

This annex gives examples of frequency slot arrangements for both FDD and TDD applications. The 30 MHz slots for both types of applications can be aggregated to form larger blocks/channels as required by the national administration.

Administration may wish to combine the use of PP radio systems in the 64-66 GHz band with the 57-64 GHz band according to ECC/REC/(09)01. These radio systems may also be deployed within a channel overlapping the boundary with the 64-66 GHz band as well as being paired within this band, using either a number of 30 MHz slots and the lower 10 MHz guard band from the arrangements of figure A3.2 or 50MHz slots according to the slot arrangements of figure A3.3. It should be noted that the lower e.i.r.p. limitation in the 57-64 GHz band may require different regulatory provisions between these bands at a national level, noting that for the 64-66 GHz band, only the Radio Regulations e.i.r.p. limit of 55 dBW applies.

FDD arrangement with 30 MHz slots

Figure A3.1 shows the basic FDD arrangement consisting of 33 paired 30 MHz slots, which can be aggregated to form paired FDD channels/blocks consisting of several slots.

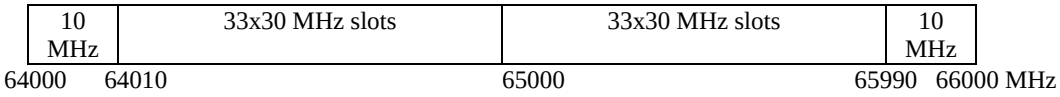

Figure A3.1: Frequency Division Duplex arrangement (duplex separation: 990 MHz)

TDD arrangement with 30 MHz slots

Figure A3.2 shows the basic TDD arrangement consisting of 66 slots of 30 MHz, which can be aggregated to form TDD channels/blocks consisting of several slots.

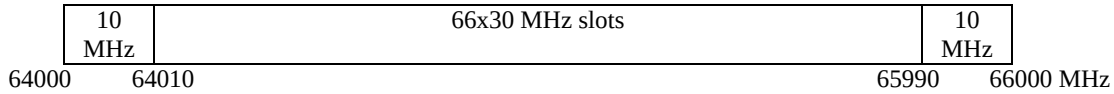

Figure A3.2: Time Division Duplex arrangement

Arrangement with 50 MHz slots

Figure A3.3 shows the basic slot arrangement consisting of 39 slots of 50 MHz. This arrangement is valid for both FDD and TDD. There is no need for a lower guard band of 50 MHz when used in conjunction with the ECC/REC(09)01 (57-64 GHz).

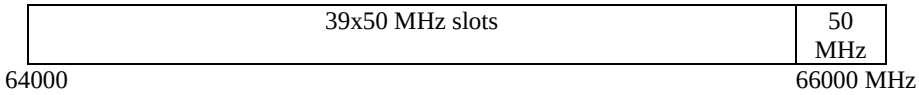

Figure A3.3: Arrangement with 50 MHz slots when used in conjunction with the ECC/REC/(09)01

Figure A3.4 shows the basic slot arrangement consisting of 38 slots of 50 MHz. This arrangement is valid for both FDD and TDD when it is not used in conjunction with ECC/REC/(09)01.

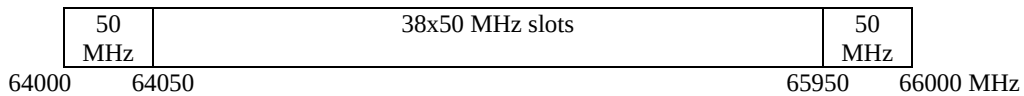

Figure A3.4: Arrangement with 50 MHz slots when it is not used in conjunction with the ECC/REC/(09)01