



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

## ERC RECOMMENDATION (01)03

### USE OF PARTS OF THE BAND 27.5-29.5 GHz FOR FIXED WIRELESS ACCESS (FWA)

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

#### INTRODUCTION

Point-to-Multipoint (PMP) systems, developed in accordance with ETSI EN 301 213 -1,-2,-3 can vary significantly in their system characteristics and design (e.g. access scheme, duplex method and modulation), thus having different impact on each other.

In order to avoid interference of systems operating on the same frequency or in the same geographical area measures must be introduced which allow for a coexistence of systems independent from their specific system characteristics and design.

This Recommendation aims to assist Administrations in the assignment of frequency blocks for the operation of Fixed Wireless Access (FWA) systems in parts of the band 27.5 - 29.5 GHz.

It should be noted that the measures in this Recommendation which are aimed to ensure coexistence, namely the size of the necessary guard band and the guard distance between neighbouring assignments were derived from studies ([ERC Report 99](#) on "*The analysis of the coexistence of two FWA cells in the 24.5-26.5 GHz and 27.5-29.5 GHz bands*"), considering only systems using 4 level modulation schemes and channel sizes up to 28 MHz which were considered to be the most common.

Administrations applying this Recommendation should therefore consider that the measures, which are recommended for this specific but so far most common set of systems, correspond to the actual systems being deployed.

In order to further assist in the assignment for FWA systems Administrations should consider the [ERC Report 97](#) on "*FWA spectrum engineering & frequency management guidelines (qualitative)*".

“The European conference of Postal and Telecommunications Administrations,

*considering*

- a) that ERC Decision ERC/DEC/(00)09 identifies the range 28.0525-28.4445 GHz and 29.0605-29.4525 GHz for the use of FS systems;
- b) that the ERC Decision further decides that the bands 27.8285 – 28.0525 GHz and 28.8365 – 29.0605 GHz shall be used by FS systems and uncoordinated FSS earth stations in geographically separated zones defined on a national basis;
- c) that within CEPT the use parts of the band 27.5 - 29.5 GHz along with other bands has also been identified as suitable for the implementation of Fixed Wireless Access systems (ERC/REC/13-04);
- d) that Fixed Wireless Access Systems in the range 27.5 - 29.5 GHz are expected to provide telecommunication services to the user with capacity requirements of up to several Mbit/s, carrying e.g. circuit –or packet-oriented traffic;
- e) that within CEPT several administrations will introduce also Point-to-Point and Point-to-Multipoint systems for infrastructure for mobile networks in parts of the band, following the channel plan recommended in ERC- Recommendation T/R 13-02;

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- f) that sufficient capacity and flexibility for deployment of multiple systems within a desired service area can be achieved by the aggregation of contiguous frequency slots from a homogeneous pattern;
- g) that it would be beneficial if such a homogeneous pattern can be made compatible with the channel plan proposed in ERC-Recommendation T/R 13-02 for fixed service;
- h) that the slot size considered for the deployment of FWA in order to satisfy the needs of the operators is 28 MHz in each duplex subband, which would be in line with ERC-Recommendation T/R 13-02;
- i) that operators may advantageously deploy equipment with a variety of central frequencies and bandwidths within their block 28 MHz assignment to meet their operational needs;
- j) that both time division duplex (TDD) systems and frequency division duplex (FDD) FWA systems could be accommodated, provided that appropriate co-existence criteria are met;
- k) that to ensure coexistence between systems operating in the same area and in the adjacent frequency blocks, guard bands would have to be introduced between neighbouring FWA systems;
- l) that the estimated size of the guard band needed is equal to the greater channel used by the two neighbouring systems;
- m) that through appropriate regulations and co-operation between neighbouring operators the size of the guard bands could be reduced;
- n) that guidance material is available to assist administrations with the assignment of frequency blocks to operators for fixed wireless access systems (see ERC Reports 99 and 97);
- o) that ERC Report 99 is limited in its assessment of FWA co-existence for systems employing modulation schemes more complex than 4-level or utilising channel spacings of up to 28MHz ;
- p) that to ensure coexistence between systems operating in the same frequency blocks but neighbouring areas, separation guard distances would have to be introduced between neighbouring FWA systems;
- q) that the number of 28 MHz slots required by a system to provide service will depend on the channel width and cellular structure;
- r) that spectrum efficiency is optimised when the size of the block assigned to the operators is appropriately broad (e.g. 4 slots of 28 MHz) as it would reduce the total amount of the required guard band (in the case of uncoordinated deployment) or it would allow an easier and viable co-operation among operators (in case of co-operative deployments);
- s) that the statistical multiplexing gain and as a consequence the possible number of users as well as the quality (equivalent to the allowed peak rate) perceived by the user is optimised when the size of the block assigned to the operators is appropriately broad;
- t) that the system economy is optimised when the size of the block assigned to the operators is appropriately broad as it would allow and encourage the deployment of system with a broader channel size;
- u) that a balance between the advantages of broader spectrum assignments and the constraints brought about by the limitation of FS spectrum availability needs to be considered;

recommends

- 1 that those administrations planning to implement FWA in the whole or parts of the bands referred to in *considering* a) and b), should, assign frequency blocks comprising slots aligned with the 28 MHz channel raster identified in T/R 13-02;
- 2 that in the case of deployment of FDD systems the upper subband should be used for the transmission from the terminals to the central station (hub) and the lower for the transmission from the central station to the terminals;
- 3 that in the case of systems operating in adjacent frequency blocks in the same area, adequate inter-assignment protection should be ensured through the introduction of guard bands between neighbouring block assignments; such guard band may be explicit outside the blocks allocated to the operators or included within such blocks;

- 4 that, based on ERC Report 99, the size of the guard bands to ensure adequate inter-assignment protection of FDD systems should be at least equal to 28 MHz (NOTE 1, NOTE 2); the guard band may consist of one unused slot of frequency, or of two slots used only with one polarisation, adjacent to slots used on the opposite polarisation (see the figures in annex 1);
- 5 that, based on ERC Report 99, for deployment of TDD systems alongside TDD or FDD systems, the guard band should be 2x28 MHz (NOTE 1, NOTE 2, NOTE 3); the guard band may consist of two unused slots of frequency, or one unused slot of frequency and two slots used only with one polarisation, adjacent to slots used on the opposite polarisation (see the figures in annex 3);
- 6 that, based on ERC Report 99, when TDD systems are accommodated and the size of the guard bands is 1x28 MHz, a TDD hub must be at least 500 m from any other hub (Note 3);
- 7 that those administrations intending to leave to the neighbouring operators the responsibility of the inter-operator protection required by Recommends 4, 5 or 6 should consider adequate increased spectrum requirements (as specified in Recommends 3) within the assigned blocks (see annex 2);
- 8 that administrations encourage co-operation between operators in neighbouring frequency blocks and the guard band could then be considered as an "edge" band: this means that guard band may become usable by the operators by the means of mutual co-ordination involving in particular co-site or near site sharing and co-ordinated cell planning;
- 9 that in the case of systems operating in the same frequency block in neighbouring areas, adequate inter-assignment protection should be ensured through the introduction of reasonable guard distances between the boundaries of the neighbouring assignment areas where the same frequency block has been assigned; the size of guard distance should be chosen so that there is a minimum distance of 20 km between central stations and terminals and 40 km between central stations of neighbouring systems. (For further information on required and reasonable guard distances see the ERC Report 99);
- 10 that administrations encourage co-operation between operators in the same frequency block in neighbouring areas to reduce the size of guard distances through co-ordinated deployment and advantageous use of specific topographical or operational detail."

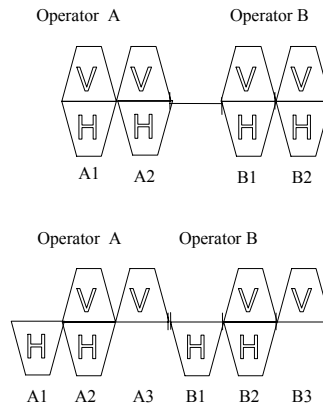
NOTE 1: That if an alternative pattern based on 3.5, 7 or 14 MHz slots is envisaged in some portions of the band, then the appropriate inter-assignment guard band is to be evaluated on a case by case basis.

NOTE 2: That administrations facing the introduction of systems using channels broader than 28 MHz (e.g. 56 MHz) should take into account that the relative guard bands should be enlarged proportionally.

NOTE 3: This situation could be improved for the introduction of FWA TDD systems through the application of mitigation techniques. At least one, semi-autonomous or autonomous cell planning, is under study.

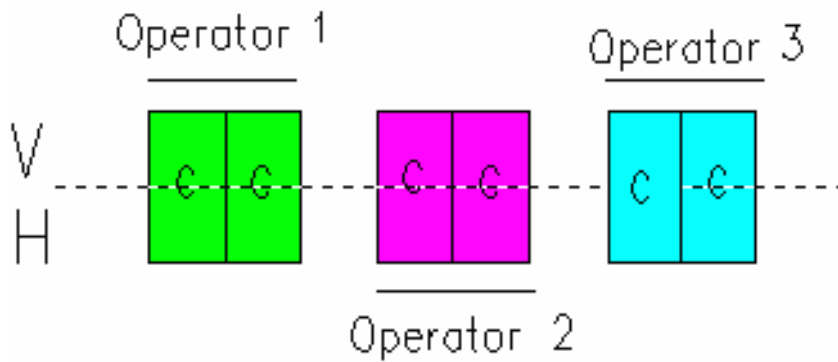
**Annex 1**

A possible arrangements for the guard band, with or without using XPD (Cross Polar Discrimination) protection, is shown in figure 1



**Figure 1**

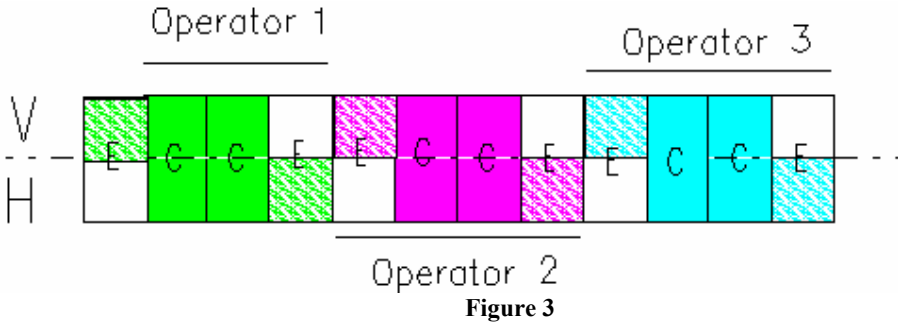
A possible frequency allocation example with guard bands outside the blocks is shown in figure 2



**Figure 2**

Annex 2

A possible frequency allocation example with guard bands inside the blocks is shown in figure 3



- each Operator has 2x28 MHz „interference free“ slots plus 2x28 MHz edge slots
- Operators are pushed finding a degree of co-ordination needed in order to fully or partially utilise the „edge (E)“ frequency slots
- Operators have the flexibility to start deployment using the „interference free (C)“ frequency slots and to choose the best co-operation solution with no constraints and without being in a hurry

C = centre frequency; E = edge frequency

An other example of possible reuse of the guard band is shown in figure 4

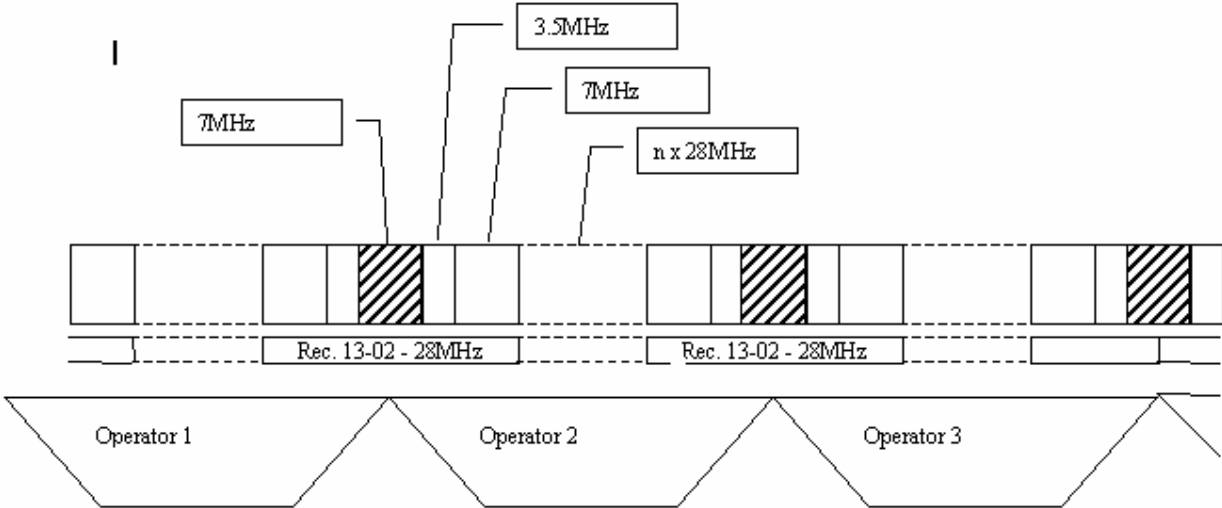


Figure 4

Annex 3

A possible arrangements for the guard band, with or without using XPD (Cross Polar Discrimination) protection, and without autonomous cell planning, is shown in figure 5

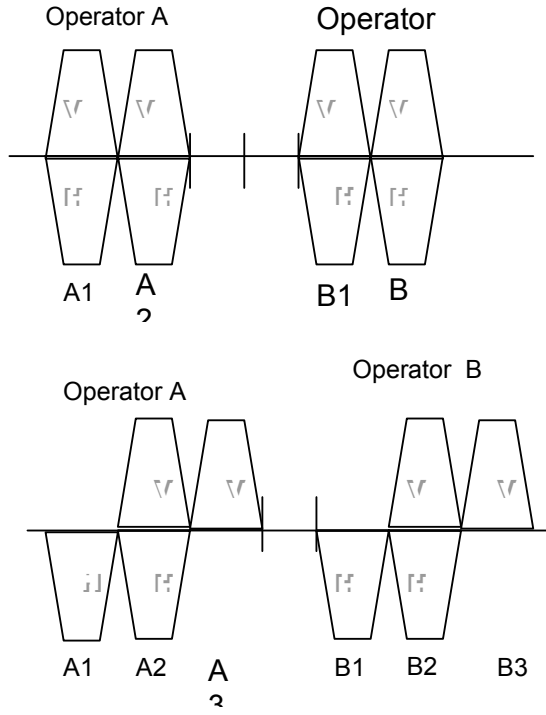


Figure 5

A possible frequency allocation example with guard bands outside the blocks and without autonomous cell planning is shown in Figure 6

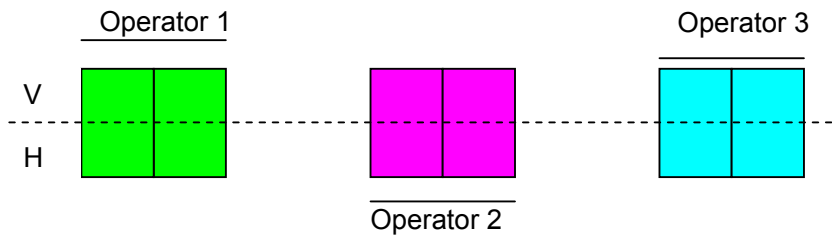


Figure 6