



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

ECC RECOMMENDATION (11)01

GUIDELINES FOR ASSIGNMENT OF FREQUENCY BLOCKS FOR FIXED WIRELESS SYSTEMS IN THE BANDS 24.5-26.5 GHz, 27.5-29.5 GHz AND 31.8-33.4 GHz

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

INTRODUCTION

Point-to-Multipoint (PMP) systems, developed in accordance with ETSI EN 302 326-2 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 and infrastructure support in parts of the bands 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 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 099 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 097 on "*FWA spectrum engineering & frequency management guidelines (qualitative)*".

Consequent to WRC-03 allocations for HDFSS, ECC/DEC/(05)01 has consolidated the band segmentation and mitigation conditions between FS and FSS with dedicated exclusive sub-bands for long-term deployment since year 2005. However, existing FS and FSS systems, deployed before that date in some portions of the band according the now withdrawn ERC/DEC/(00)09, might require specific care until their complete dismissal.

“The European conference of Postal and Telecommunications Administrations,

considering

- a) that ECC/DEC/(05)01 identifies the range 27.9405-28.4445 GHz and 28.9485-29.4525 GHz for the exclusive use by FS systems and further decides that the bands 27.8285-27.9405 GHz which, being unpaired, is suitable only for new deployments of unidirectional PP links or TDD FWA systems;
- b) that within CEPT the use of parts of the bands 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 GHz bands have been identified as suitable for the implementation of Fixed Wireless Access systems;
- c) that Fixed Wireless Access Systems in the ranges 24.5-26.5 GHz, 27.5-29.5 GHz and 31.8-33.4 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;

- d) that within CEPT, several administrations already have or will introduce also Point-to-Point and Point-to-Multipoint systems for infrastructure for mobile networks in parts of these bands, following the channel plan recommended in ERC Recommendation T/R 13-02 ;
- e) that this Recommendation may provide the desirable flexibility for the use of the 31.8-33.4 GHz band, taking into account the sharing conditions between FS and RNS studied in this band in the Recommendation ITU-R/REC F.1571 ;
- f) that sharing in the 31.8-33.4 GHz band between Fixed Service and Radionavigation Service (RNS) is considered as feasible (footnote 5.547A) taking into account Recommendation ITU-R F.1571 ;
- g) that ERC/REC/(01)02 provides the preferred channel arrangements for the FS in the band 31.8-33.4 GHz;
- h) 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;
- i) 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;
- j) 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;
- k) 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;
- l) 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;
- m) 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;
- n) that the estimated size of the guard band needed is equal to the greater channel used by the two neighbouring systems;
- o) that through appropriate regulations and co-operation between neighbouring operators the size of the guard bands could be reduced;
- p) that guidance material is available to assist administrations for assessing the spectrum requirements on the FS to provide infrastructure to support the UMTS/IMT networks (see ECC Report 019);
- q) that guidance material is available to assist administrations with the assignment of frequency blocks to operators for fixed wireless access systems (see ERC Reports 099 and 097);
- r) 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;
- s) 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 ;
- t) that the number of 28 MHz slots required by a system to provide service will depend on the channel width and cellular structure and it is expected that a minimum of 1 or 2 slots would be required;
- u) 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) ;
- v) 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 ;
- w) 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 ;
- x) 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.

recommendations

- 1) that those administrations planning to implement FWA in the whole or parts of the bands 24.5-26.5 GHz, 27.5-29.5 GHz, 31.8-33.4 GHz, should assign frequency blocks comprising slots aligned with the 28 MHz channel raster identified in ERC Recommendation T/R 13-02 and ERC/REC 01-02.
- 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 (CS) and the lower for the transmission from the central station to the terminals.
- 3) that in the case of FWA 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 099, 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 099, 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 099, when TDD systems are accommodated and the size of the guard bands is 1x28 MHz, a TDD CS must be at least 500 m from any other CS (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 099).
- 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 subject of ETSI TR 102 073-1. Note:

Annex 1

GUARD-BANDS ALTERNATIVES

Possible arrangements for the guard band are shown in Figure 1.

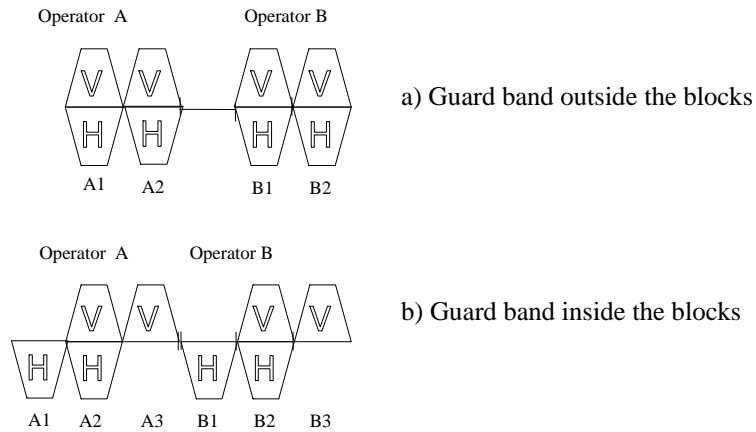


Figure 1

Note: Equipment could operate with or without using XPD (Cross Polar Discrimination) protection, as appropriate.

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

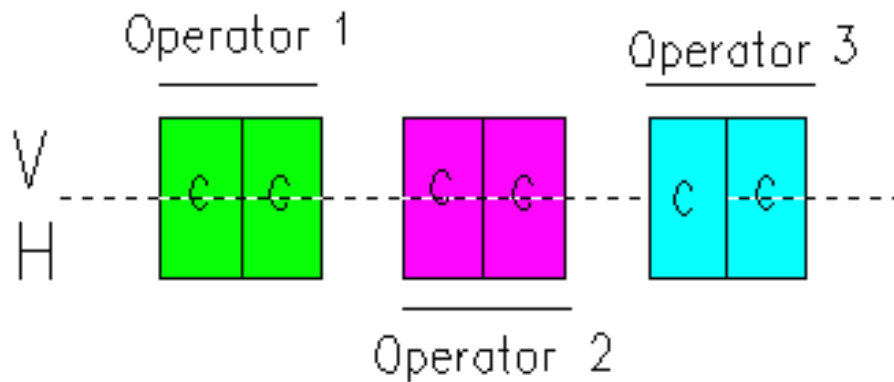


Figure 2

Annex 2

EXAMPLES OF GUARD BANDS INSIDE THE BLOCKS

A possible frequency block assignment example with guard bands inside the blocks is shown in Figure 3.

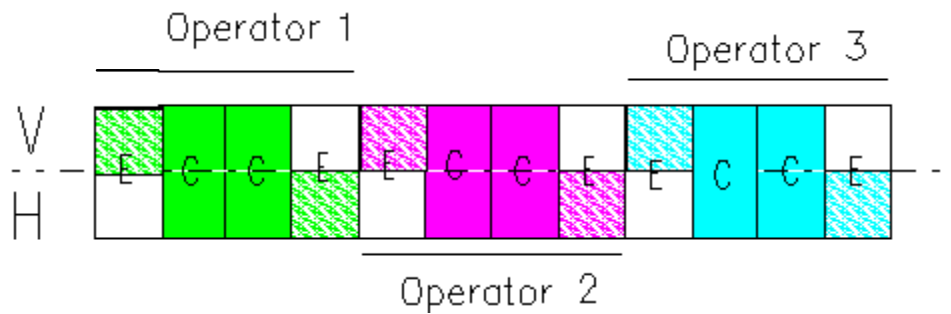


Figure 3

- 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

Note: Equipment could operate with or without using XPD (Cross Polar Discrimination) protection, as appropriate.

Another example, shown only for the 28 GHz band, of possible reuse of the guard bands inside the blocks, using the outermost portions of the blocks for lower size channels, is shown in Figure 4.

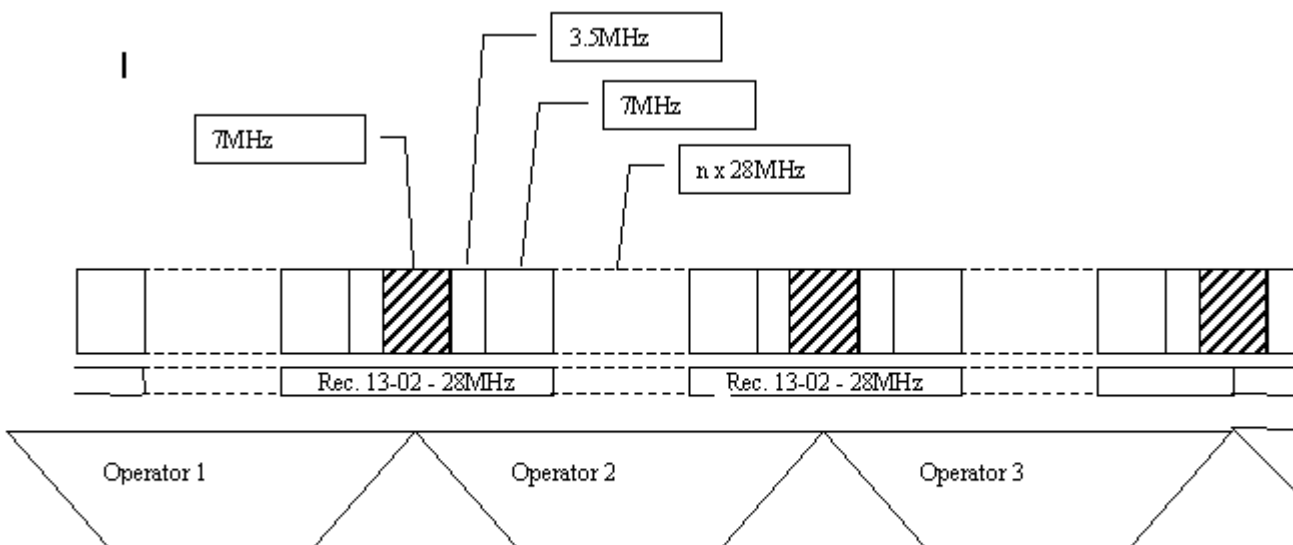


Figure 4

Annex 3

EXAMPLES OF GUARD BANDS WITH GENERIC TDD SYSTEMS

Possible arrangements for the guard band, requiring 2x28 MHz size, when TDD systems are concerned, without any mitigation factor, without autonomous cell planning and/or coordinated CS physical distance), are shown in Figure 5

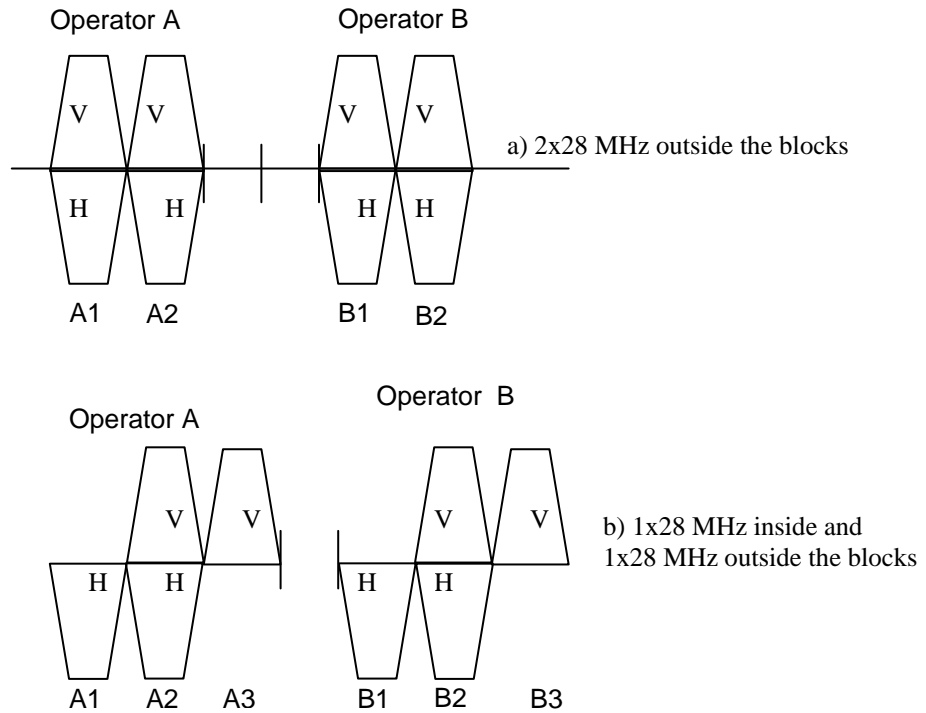


Figure 5

Note: Equipment could operate with or without using XPD (Cross Polar Discrimination) protection, as appropriate.

Possible frequency allocation examples with guard bands outside the blocks, without coordinated CS distances and/or autonomous cell planning, are shown in Figure 6.

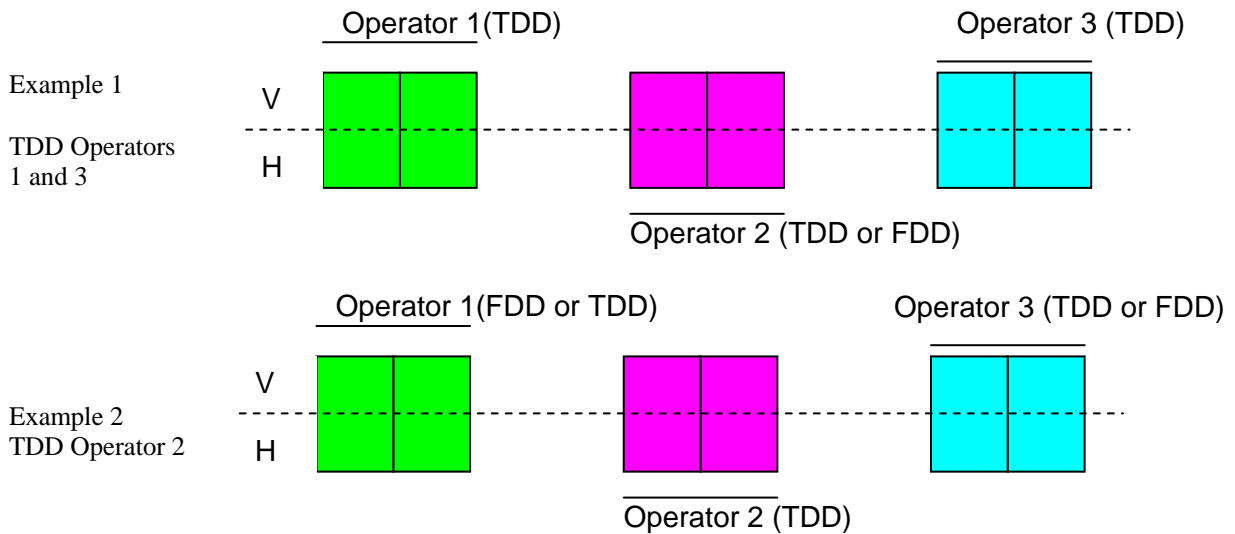


Figure 6