

Resposta da SAP REG à Consulta da ANACOM sobre o acesso sem fios de banda larga

8 de Janeiro de 2007

A SAP REG tem o prazer de comentar o documento de consulta da ANACOM sobre o acesso sem fios de banda larga (Determinação de 23.11.2006). O interesse da SAP REG na consulta está relacionado com a utilização de frequências atribuídas e utilizadas por sistemas no serviço fixo por satélite (FSS).

Nos Regulamentos de radiocomunicações da UIT, a banda de 3,4-4,2 GHz está atribuída ao serviço fixo por satélite. Esta banda é extensamente utilizada por vários operadores FSS e é também utilizada por operadores de serviço móvel por satélite (MSS) para TT&C e para fornecer ligações de conexão para serviços móveis por satélite e serviços de radionavegação por satélite. Estudos recentes realizados por alguns operadores por satélite identificaram mais de 1000 locais de estações na Europa nesta banda, incluindo 22 em Portugal. Poderá haver outras estações terrestres utilizadas por outros operadores, e sabe-se que existem mais estações terrenas nesta banda, mas a sua localização é desconhecida. No que se refere, em particular, às estações terrenas de mera recepção, em muitos casos não necessitam de estar licenciadas e como tal é frequente a sua localização ser desconhecida das autoridades reguladoras. Chamamos a atenção para o facto de Portugal ter implementado a Decisão ERC/DEC(99)26 que isenta as estações terrenas de mera recepção da necessidade de uma licença.

No que respeita à nova Decisão preliminar ECC contida no Anexo 1 ao documento de consulta, a SAP REG fez comentários sobre este documento em ECC(06)147. Este documento apresenta ainda as nossas opiniões sobre a viabilidade de operações BWA nas bandas de 3,4-3,8 GHz. A contribuição da SAP REG encontra-se em anexo a este documento para fins informativos. A figura abaixo é tirada da Figura 1 do documento em anexo e mostra mais pormenorizadamente a situação para Portugal.

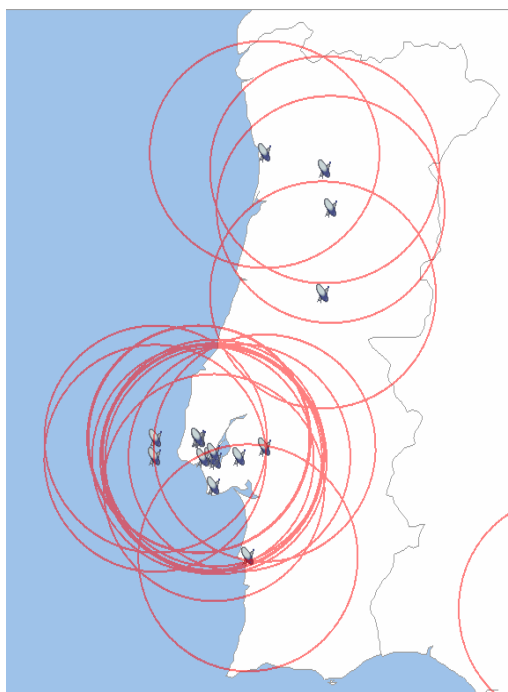


Figura 1 – Estações terrenas de banda C na Europa. Pormenor da Figura 1 no doc ECC(06)147

A atribuição para o FSS nesta banda é partilhada com o serviço fixo. Tradicionalmente, significou que estações terrenas partilharam a banda com ligações fixas ponto a ponto. Estes sistemas são idealmente adequados para partilhar o mesmo espectro, desde que ambos empreguem antenas de feixe grande e estreito em locais fixos e com uma direcção de pontaria fixa. Poderá ser necessário coordenar as estações terrenas com as estações de ponto a ponto fixas mas, regra geral, é algo viável. A situação é diferente para os novos sistemas BWA propostos. Estes sistemas empregam estações centrais com antenas de feixe largo que visam maximizar a cobertura e que, normalmente, seriam implementadas no terreno de forma a fornecer cobertura contínua numa grande área geográfica. Os terminais de utilizador ou "estações terminais" nos sistemas BWA podem ser fixos, nómadas ou móveis. Em qualquer dos casos, têm também potencial para provocar interferência nas estações terrenas FSS. Assim, se em Portugal os sistemas BWA forem introduzidos em bandas atribuídas ao FSS, isto irá inevitavelmente restringir as oportunidades de implementação no terreno de novas estações terrenas no futuro, levando, possivelmente, a um congelamento nas actuais operações de estações terrenas em Portugal. Tal como todos os serviços de radiocomunicação comercial, o FSS necessita de desenvolver os seus serviços e atrair novos clientes. Por conseguinte, as autoridades reguladoras deverão assegurar a existência de condições apropriadas para permitir que tal aconteça.

O novo relatório preliminar 100 ECC contém estudos de partilha entre estações terrenas FSS e sistemas BWA. Conforme descrito na secção IV.3 do relatório preliminar ECC, existem dois critérios de interferência a considerar relativamente à protecção adequada de estações terrenas FSS, um "critério a curto prazo" e um "critério a longo prazo". Os estudos mostraram que para satisfazer ambos os critérios, a distância de separação máxima requerida entre uma estação central BWA e uma estação terrena FSS representativa varia entre 270 km e 320 km. Estas distâncias são referidas no relatório como "distâncias de mitigação" para indicar que se poderão obter distâncias mais curtas através da coordenação de cada uma das estações centrais BWA. Embora sejam viáveis estações mais pequenas através da coordenação de

sistemas BWA, a exclusão de áreas geográficas grandes e significativas dos sistemas BWA é inevitável devido à necessidade de proteger estações terrenas FSS.

Dado que os sistemas FSS e BWA não partilham naturalmente o mesmo espectro, recomendamos vivamente que os sistemas BWA não sejam introduzidos em bandas partilhadas com o FSS. Segundo o Quadro Nacional de Atribuição de Frequências da ANACOM, a banda 3,4-3,6 GHz não é atribuída ao FSS, mas apenas a sistemas FWA. Embora alguns operadores FSS utilizem esta banda noutros países europeus, como em Portugal, esta banda não está atribuída ao FSS, sugerimos vivamente que quaisquer sistemas BWA na gama 3,4-4,2 GHz sejam limitados à banda abaixo dos 3,6 GHz. Deverão considerar-se igualmente bandas alternativas para sistemas BWA, por exemplo, a banda de 2,5-2,690 GHz. Se em Portugal se introduzissem sistemas BWA na banda acima dos 3,6 GHz, todas as estações terrenas de FSS teriam que ser protegidas contra interferência. Além disso, todas as estações terrenas existentes teriam que ser protegidas em toda a banda 3,4-4,2 GHz e com base na operação com qualquer satélite no arco geostacionário. Isto seria necessário para permitir a estas estações terrenas mudarem para satélites diferentes e frequências diferentes dentro da banda, sempre que necessário, para satisfazer os requisitos operacionais.

Se estações terrenas FSS e sistemas BWA operarem em partes diferentes das mesmas bandas de frequência, é também necessário assegurar a protecção das estações terrenas FSS contra emissões indesejadas de sistemas BWA e de saturação de receptor. Estas questões estão descritas no relatório preliminar 100 ECC. As distâncias de separação necessárias advindas destas questões de partilha são inferiores às advindas das operações de co-frequência, mas ainda assim requerem um certo nível de coordenação.

Resumindo, fazemos as seguintes recomendações:

1. As operações BWA devem ser limitadas a bandas não atribuídas ao FSS em Portugal, por exemplo, 2,5-2,690 GHz ou 3,4-3,6 GHz.
2. No que se refere à banda acima dos 3,6 GHz, a ANACOM deve considerar cuidadosamente a viabilidade deste tipo de operações em Portugal, tendo em conta os requisitos de protecção das estações terrenas FSS. Deve, nomeadamente, considerar a protecção para estações terrenas de mera recepção e considerar a viabilidade de implementação no terreno de novas estações terrenas em Portugal.
3. Se as operações BWA vierem a ser autorizadas em Portugal em qualquer uma das partes da 3,4-4,2 GHz, todas as operações FSS terão que ser totalmente protegidas contra interferência. Isto teria necessariamente que incluir protecção contra emissões indesejadas e efeitos de saturação de receptores de estações terrenas.

A SAP REG aprecia o facto de lhe ter sido dado a oportunidade de comentar o documento de consulta da ANACOM e solicita, com toda a cortesia que os seus comentários sejam devidamente tidos em consideração.

Anexo: A contribuição da SAP REG para ECC.



15th meeting
Nicosia, 27 November - 1 December 2006

Date issued: November 20, 2006

Source: SAP REG & Global VSAT Forum (GVF)

Subject: Proposed use of the band 3.4-3.8 GHz for BWA systems

Summary:

This contribution assesses the feasibility and desirability of the use of the bands 3.4-3.6 GHz and 3.6-3.8 GHz for BWA in Europe based on the need to share the spectrum with the fixed satellite service. As shown in the following pages, the use of the band 3.55-3.8 GHz by BWA systems would be subject to severe geographical constraints and would constrain the deployment of new FSS earth stations.

Proposal:

1) The band 3.55-3.8 GHz should not be designated for BWA systems by the ECC. Decides 1 of the draft Decision should be modified as follows:

1. that spectrum shall be designated for BWA deployment, within the band 3400-3550 MHz, subject to market demand and with due consideration of other services deployed in these bands;

Other consequential changes to the Decision should be made consistent with the deletion of the band 3550-3800 MHz.

2) Decides 4 of the draft Decision should be modified as follows:

4. that for the deployment of BWA networks in the frequency bands identified in Decides 1, administrations shall take into account the situation regarding the use of the frequency band in the concerned area by other services/systems (e.g. FS, FSS, ENG/OB, etc) and that coordination of the BWA stations with the other existing services/systems may be required.

3) A new decides should be added as follows:

- 4bis.* that, administrations shall also give due consideration to FSS earth stations operating in frequency bands above 3.55 GHz when addressing coordination requirements for BWA systems.

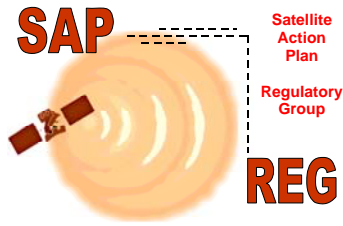
4) The ECC should consider developing a new report giving guidance for administrations in coordinating BWA systems with FSS earth stations.

5) The allocation to the mobile service in the Radio Regulations and in the European Common Allocation Table (ERC Report 25) should remain secondary.

6) The ECC should consider designating the band 3.4-4.2 GHz to the FSS.

Background:

The ECC has been developing deliverables related to the use of the band 3.4-3.8 GHz for Broadband Wireless Access systems. JPT BWA has developed a new ECC Decision which proposes, among other things, to designate the band 3400-3600 MHz and/or 3600-3800 MHz for BWA systems. At the same time, WG SE has prepared a new ECC Report on Compatibility Studies in the band 3400-3800 MHz Between Broadband Wireless Access (BWA) Systems and Other Services (Draft ECC Report 100).



Sharing Between BWA systems & FSS Earth Stations In The band 3.4-3.8 GHz

1. Introduction

The ECC has been developing deliverables related to the use of the band 3.4-3.8 GHz for Broadband Wireless Access systems. JPT BWA has developed a new ECC Decision which proposes, among other things, to designate the band 3400-3600 MHz and/or 3600-3800 MHz for BWA systems. The JPT BWA has also prepared a CEPT Report in response to the EC Mandate on BWA. At the same time, WG SE has prepared a new ECC Report on Compatibility Studies In The Band 3400-3800 MHz Between Broadband Wireless Access (BWA) Systems And Other Services (Draft ECC Report 100).

The compatibility studies have examined sharing between FSS earth stations and BWA stations and give some idea of the separation distances that will be required. However, within the ECC there has to date been no assessment of whether the use of the band 3.4-3.8 GHz for BWA is either feasible or desirable. In this contribution, SAP REG ¹ presents information for the ECC on the use of the band 3.4-3.8 GHz by FSS earth stations in Europe which gives an indication of the likely constraints on BWA systems and on FSS systems.

It should also be noted that the C-band downlink band, 3.4-4.2 GHz, is under threat not only from potential new BWA systems but also from new terrestrial IMT systems. The band 3.4-4.2 GHz is one of the candidate bands for identification for the terrestrial component of IMT at WRC-07.

2. Required separation distances

A critical factor to determine the feasibility of sharing between FSS earth stations and BWA systems is the required geographic separation distance.

For international coordination of terrestrial services with FSS earth stations, coordination areas are determined by Appendix 7 of the Radio Regulations. For inland paths, the coordination distances are typically several hundred kilometres and for sea paths the coordination distances may be more

¹ SAP REG members include Alcatel Alenia Space, Connexion by Boeing, EADS Space, Europa-Max, Eutelsat, France Telecom, GVF, Hispasat, Hughes Network Systems, ICO Global Communications, Inmarsat Ventures PLC, Intelsat, New Skies Satellites N.V., ONDAS Media, ROSE Vision, SES Global, Telespazio, Terrestar, Thuraya and WorldSpace Europe.

than 1000 km. Actual required separation distances should be based at least in part on the interference criterion used in Appendix 7 but the actual separation distance for a BWA central station or terminal station would often be less than these coordination distances as a consequence of characteristics specific to the particular station and its location. For example, the use of detailed terrain data can lead to smaller distances. However, the Appendix 7 coordination distances can be considered upper bounds of the required separation distances for terrestrial stations.

Typical separation distances for BWA systems have been studied by CEPT and are contained in Draft ECC Report 100. The results show a range of values, depending on the type of BWA station, the interference criterion, and on terrain modelling. It is apparent that the greatest separation distances are required for BWA central stations.

As described in section IV.3 of the draft ECC Report, there are two interference criteria to be considered for the adequate protection of FSS earth stations, a “short term criterion” and a “long term criterion”. The studies have shown that to meet both criteria, for a representative FSS earth station, the maximum distances required for BWA central stations are between 270 km and 320 km. These distances are referred to as “mitigation distances” in the report, to indicate that smaller distances may be achievable through coordination of each BWA central station.

Naturally, in some cases, BWA stations closer than these distances may be possible. For example, if BWA stations with lower e.i.r.p. density or lower antenna height are used, smaller distances will likely be achievable. The distances also depend on the terrain around the earth station and BWA station, which varies from one location to another. However, for BWA central stations with “CS-1” characteristics, the mitigation area can, in some cases, be almost a circle of radius several hundred km, centred on the FSS earth station, as indicated in the example shown in Fig. 5.4.5(a) of draft ECC Report 100.

When considering the overall feasibility of sharing, at a national or international scale, it would of course be unreasonable to consider only the worst case situations. Hence a distance should be chosen to represent a typical or average situation and for this purpose a distance of 100 km around each earth station can be taken. In some cases, BWA central stations beyond this distance would exceed the protection requirements for earth stations and could not be deployed. In other cases, BWA central stations within this distance would be able to meet the protection requirements on the earth station and could be deployed. A reference figure of 100 km can therefore be used to give a reasonable overall indication of the areas within which deployment of BWA stations will not be possible.

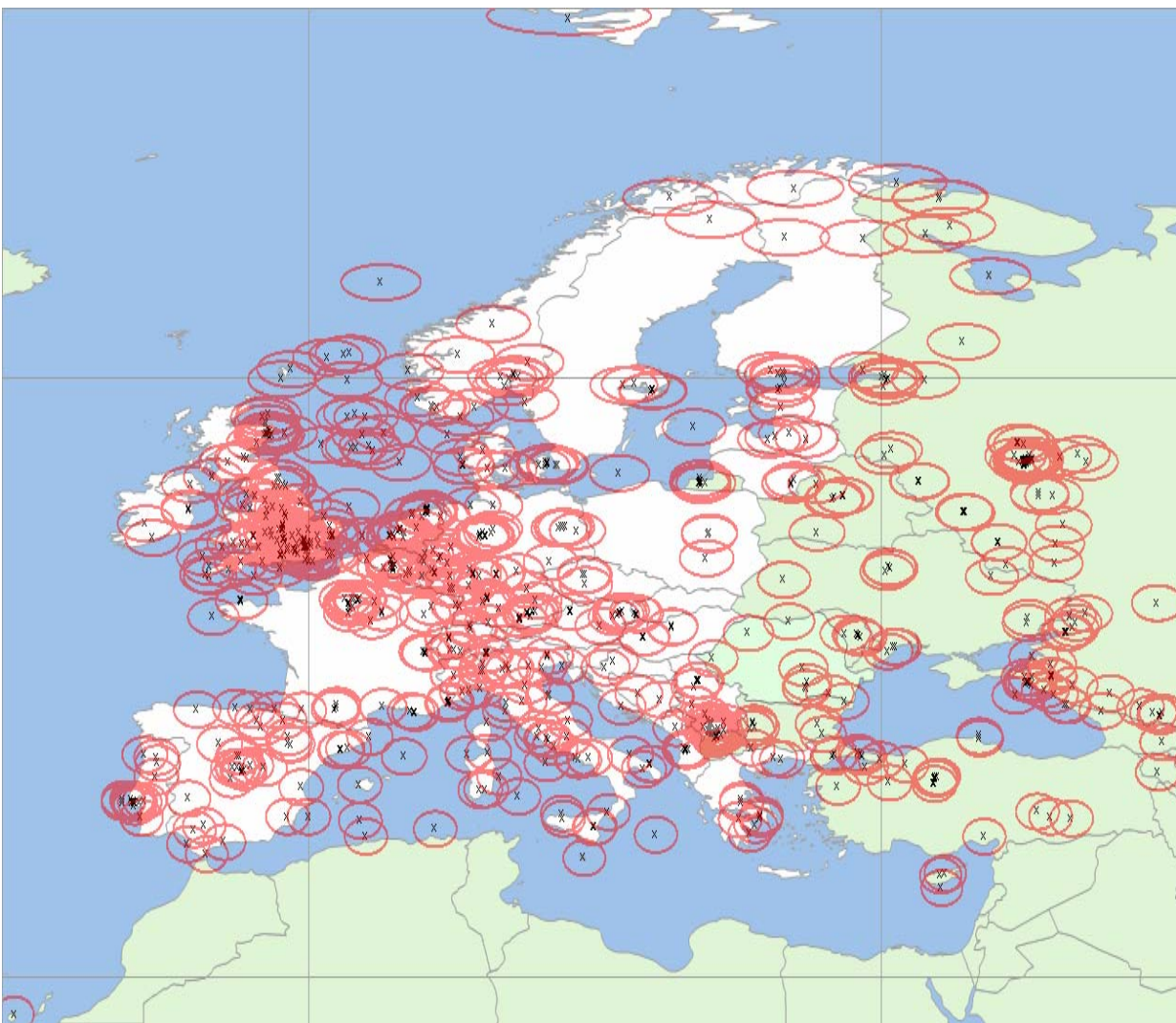
3. European earth station operations

C-band earth stations are operated in Europe by a many different operators. Based on information available to SAP REG and ESOA members, more than 1000 C-band earth station locations in Europe have been identified to date.

Other earth stations exist for which the locations are not known to ESOA and SAP REG members. Receive only earth stations in the band 3.4-4.2 GHz are in use and in most countries they are exempt from licensing in accordance with ERC/DEC/(99)26. Hence their locations are often unavailable. Furthermore, there are military users of C-band FSS networks who often do not make available the locations of their earth stations.

At many of these locations there are several earth station antennas, which can operate to satellites at a range of azimuths and elevation angles. Earth station operations typically require the ability to switch from one satellite to another, or from one transponder to another. Hence most earth stations would reasonably require protection throughout the C-band and on the basis of operating to GSO satellites within a range of the geostationary arc. While most earth stations in Europe operate in the range above 3.6 GHz, some earth stations operate in the band 3.4-3.6 GHz and this includes earth stations used to provide the feeder links for mobile satellite systems which provide safety-of-life services. Furthermore, it is envisaged that the fixed satellite service will make increased use of the 3.4-3.6 GHz range in the future, due in part to congestion in other parts of C-band, and therefore more earth stations in this part of the band should be anticipated. However, it is acknowledged that there is currently little FSS use of the band below 3.55 GHz in Europe.

Based on the reference figure of 100 km zones around each earth station, the Figure 1 shows the areas likely available for BWA systems.



**Figure 1 Locations of FSS C-band Earth Station, excluding TVROs
(data as available 6 Nov 2006)**

With reference to Figure 1, it is apparent that large geographic areas fall within the red circles where BWA operation will be impossible or will be severely constrained. These zones include areas of high population densities (e.g. London, Paris, Berlin). In some countries, for example the

UK, Germany, Italy and Spain, there is relatively little free area and most of the country is within the red circles. If the band 3.4-3.8 GHz were to be designated for BWA systems, large and important geographic areas of Europe would not be usable for BWA deployment.

Furthermore, if new BWA systems were to be deployed in the areas outside the circles, this would limit the possibilities for new FSS earth stations in Europe, since coordination of a new earth station with a deployed BWA network would most likely be impossible. This would severely constrain the ability of the FSS to deploy new earth stations, leading to an effective freeze on the current deployment. Furthermore, C-band TVROs undoubtedly exist in areas outside the red circles, and more may be deployed in the future, that would be vulnerable to interference from BWA stations.

The band 3.55-4.2 GHz is the core of the C-band downlink spectrum and is used by large numbers of earth stations throughout Europe. While we are aware that some administrations have already authorised fixed wireless systems in parts of this band, SAG REG considers that the band 3.55-4.2 GHz is not suitable for widespread or harmonised deployment of BWA systems in Europe. SAP REG therefore objects to the designation of this band for BWA in the draft new Decision.

As the band 3.4-3.55 GHz is currently used by relatively few earth stations, SAP REG could reluctantly accept the use of this band for BWA. SAG REG does note however that its members face potential difficulties for the future deployment of earth stations in this band if BWA systems are widely deployed.

SAP REG therefore proposes that Decides 1 be modified as follows:

1. that spectrum shall be designated for BWA deployment, within the band 3400-3550 MHz, subject to market demand and with due consideration of other services deployed in these bands;

It is to be noted that SAP REG makes this proposal on the premise that the remainder of C-band (3.55-4.2 GHz) will remain available with no significant constraints arising from sharing with new terrestrial services. Other consequential changes to the Decision should be made consistent with the deletion of the band 3550-3800 MHz.

4. Coordination of BWA stations

It is apparent from the studies in draft Report 100 that the geographic separation distances for terminal stations are generally smaller than those for central stations. Nonetheless, for both terminal stations and central stations, the distances are such that international coordination would be required in many cases. For trans-border coordination, the current coordination provisions of the Radio Regulations are probably adequate in this respect and SAP REG assumes that these will continue to apply.

The text of *Decides 4*, as currently drafted, states:

4. that for the deployment of BWA networks in the frequency bands identified in Decides 1, administrations shall take into account the situation regarding the use of the frequency band in the concerned area by other services/systems (e.g. FS, FSS, ENG/OB, etc) and that coordination of the BWA central stations with the other existing services/systems may be required.

It is not apparent why it is proposed that coordination be limited to *central* stations only. It is clear that terminal stations also have a significant potential to cause interference to FSS earth stations, and hence there can be no justification for removing the need for coordination. Perhaps it is

envisaged that interference from BWA terminals stations can be managed through coordination, as if the interference originates from a single point at the central station. If this is the case, the terminal stations could in some cases be coordinated by treating the aggregation of terminals stations as if they were a single central station, transmitting on the same frequencies as the terminal stations. The feasibility of this approach is something that needs further and careful consideration. However even if feasible, this does not remove the requirement for coordination of all BWA stations.

For these reasons, Decides 4 should cover coordination of both the BWA central stations and the terminal stations. It is proposed to modify Decides 4 as follows:

4. that for the deployment of BWA networks in the frequency bands identified in Decides 1, administrations shall take into account the situation regarding the use of the frequency band in the concerned area by other services/systems (e.g. FS, FSS, ENG/OB, etc) and that coordination of the BWA stations with the other existing services/systems may be required.

Protection of earth station receivers is required with respect to unwanted emissions from BWA stations and to prevent receiver saturation, as discussed in the draft ECC Report. Hence, for example, an earth station receiving FSS downlink emissions in the band above 3.55 GHz will require protection from BWA systems operating below 3.55 GHz. While the separation distances will be smaller than those required for co-frequency operations, some geographic separation will be required. The concept of coordination is normally applied only with respect to co-frequency operations and hence it is necessary in this case to extend the scope of Decides 4 through the addition of a new decides:

- 4bis.* that, administrations shall also give due consideration to FSS earth stations operating in frequency bands above 3.55 GHz when addressing coordination requirements for BWA systems.

It is critical that appropriate measures are introduced to ensure that all existing earth stations within CEPT are fully protected from interference from BWA systems. While draft ECC Report 100 gives some example calculations of the separation distances, further and more explicit guidance could be developed in an ECC Report for use by administrations in coordination of BWA stations with FSS earth stations. SAP REG suggests that ECC consider the development of such a report.

5. Mobile BWA systems

The draft new Decision would allow for the “flexible usage mode” BWA systems, i.e. would allow for the use of fixed, mobile and “nomadic” BWA systems.

The band 3.4-3.8 GHz is allocated to the fixed service on a primary basis in both the Radio Regulations and the European Table Of Frequency Allocations And Utilisations (ERC Report 25). This reflects the fact that sharing with traditional point-point radio-relay systems is feasible, due in part, to the highly directional antennas used by radio-relay systems. Unfortunately, new fixed BWA systems, while possibly classed as fixed service systems, employ wide beam antennas to maximise coverage, often with the aim of providing blanket coverage over a given area. Hence this type of fixed service system is less amenable to sharing with other services.

The sharing situation is even worse if mobile systems are envisaged. It is important to realise that the band 3.4-3.8 GHz is allocated to the mobile service in Region 1 on a secondary basis only in both the Radio Regulations and the European Table Of Frequency Allocations And Utilisations (ERC Report 25). This is not a mistake, but reflects the fact that the international community has

recognised that mobile systems are generally unsuitable for sharing with FSS earth stations. Particularly for Europe, where countries are relatively small, the notification of a typical mobile station within a country causes a significant and often unnecessary constraints on the available locations for new earth stations in the same country, and in neighbouring countries. SAP REG therefore proposes that mobile BWA systems should continue to operate on a secondary basis in the international context. This would allow mobile BWA systems to be coordinated with FSS earth stations on the basis of their central stations at fixed, known locations and would therefore allow for the assessment of interference to existing earth stations. It would however prevent administrations from coordinating typical mobile stations throughout their country even in geographic areas where none are planned to actually operate.

6. Conclusions

This contribution is, we believe, the only analysis of the feasibility of operation of BWA systems in the 3.4-3.8 GHz bands in Europe. On the basis of this analysis, it is concluded that:

- The band designated for BWA systems in CEPT be limited to the band 3.4-3.55 GHz.
- Coordination of both BWA central stations and terminal stations should be required with respect to FSS earth stations.
- Administrations should take account of the possible interference from BWA systems to FSS earth stations operating above 3.55 GHz.
- The allocation to the mobile service in the Radio Regulations and in the European Common Allocation Table should remain on a secondary basis.
- The ECC should develop a new report giving guidance for administrations in coordinating BWA systems with FSS earth stations.

SAP REG requests that the ECC considers these proposals before adopting the draft new Decision.

Finally, considering the extremely high importance of C-band for the fixed satellite operations in Europe, the ECC should consider designating the band 3.4-4.2 GHz to the fixed satellite service.