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RADIO SPECTRUM POLICY GROUP

Draft RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband

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REMARKS ON THE STATUS OF THIS DOCUMENT

The following draft Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband has been agreed for public consultation by the RSPG at its plenary meeting on 20 February 2013.

It must be noted that this draft Opinion, particularly its annexes dealing with the identification of frequency bands with potential for wireless broadband are work in progress. The RSPG has not taken any final decision with respect to recommending particular portions of spectrum for wireless broadband and welcomes in this regard any feedback from stakeholders on the proposals in the draft Opinion and its annexes.

Following the public consultation and based also on the comments received, the RSPG plans to finalise the draft Opinion and its annexes, and present them at the next RSPG plenary meeting for approval.

Draft RSPG Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband

I. Introduction

Article 2 of the amended Commission Decision[1] establishing a Radio Spectrum Policy Group states that, "*the RSPG shall assist and advise the Commission on radio spectrum policy issues, on coordination of policy approaches, on the preparation of multiannual radio spectrum policy programmes and, where appropriate, on harmonised conditions with regard to the availability and efficient use of radio spectrum necessary for the establishment and functioning of the internal market*". RSPG opinions should help in substantiating by qualitative and, wherever possible, quantitative indicators whether a European Union objective can be better achieved at EU level, taking into account the principle of subsidiarity[2].

In April 2012 the RSPG received a request from the European Commission for advice on the strategic issues and challenges to be addressed in Europe in order to meet the objective to satisfy the demand for wireless broadband services in the context of the latest regulatory environment[3]. The request also aimed at providing transparency on the policy approach, and to provide stakeholders with information which may be useful in establishing their own individual plans, including planning and timing elements.

The Commission also requested that the envisaged time frame should include both the period 2012-2015 where the Council and European Parliament have already set an objective of a minimum of 1200 MHz to be available for wireless broadband and also extend to the period 2015-2020 which coincides with the longer tail of the Digital Agenda for Europe.

More specifically the RSPG was requested to:

- "Assess the possible solutions and options for meeting the future demand for wireless broadband services in the time frame 2013-2020, including the intermediate target in the RSPP to make 1200 MHz of spectrum available for wireless data traffic by 2015. This should include a specific consideration of the bands already earmarked by the European Parliament and Council, i.e. the 700 MHz band, the 1.5 GHz band and the 2.3 GHz band. The RSPG should also assess the economic and social implications of the various options at macro level;
- Indicate to which extent shared spectrum access could also contribute to meet the demand for spectrum for wireless broadband by reducing the need for dedicated frequency bands. This aspect will require a close liaison with the other RSPG activities related to shared use of spectrum;

[1] 2009/978/EU: Commission Decision of 16 December 2009 amending Decision 2002/622/EC establishing a Radio Spectrum Policy Group.
[2] Article 5(3) of the Treaty on European Union and Article 5 of the Protocol 30 to the European Community Treaty.
[3] RSPG12-415 – Final: Request for an Opinion on Strategic Challenges facing Europe in addressing the Growing Spectrum Demand for Wireless Broadband.

- To come forward with guidance for a common "roadmap ahead" which would strengthen the single market for digital services, including options for future harmonisation, while noting the different situations existing in Member States.

The Commission Communication[4] on promoting the shared use of radio spectrum resources in the internal market noted that the RSPP (Article 6.7) also requested the Commission in cooperation with the Member States to assess the possibility of extending the allocation of unlicensed spectrum for wireless access systems.

With these objectives in mind, the RSPG has reviewed the current allocations of spectrum in Europe within the frequency range from 400 MHz to 6 GHz and identified the steps which need to be taken (the roadmap) to make particular frequency bands available for wireless broadband. An important element in developing the advice in this Opinion was the definition of the term 'wireless broadband' as this in turn determined which frequency bands and services would be of interest. A consequence of this is that 1701.5 MHz of spectrum can be identified as being already available for wireless broadband with a further 140 MHz identified with the potential to become available in the near term (by 2015) and 886 MHz having been identified as spectrum with potential to support broadband applications in the medium term (i.e. beyond 2015).

II. Background

In looking at future demand for wireless broadband in Europe there are three key developments which need to be taken into account, i.e. the objectives of the RSPP, developments at the global regulatory level in ITU and the work in CEPT for input to that ITU process.

The RSPP

The Radio Spectrum Policy Programme[5], adopted in March 2012, states in Article 3 that at least 1200 MHz of spectrum suitable for wireless data traffic (including frequencies already in use) should be identified by 2015. In order to find the 1200 MHz of spectrum, Article 9 provides for the establishment of an inventory of spectrum use in the frequency range between 400 MHz and 6 GHz. In an earlier Opinion[6] the RSPG advised the Commission, in the context of the RSPP, on the best processes for analysing spectrum demand and the elements that would need to be assessed in determining whether that spectrum is being used in an efficient way.

WRC

The agenda for the next World Radiocommunication Conference in 2015 (WRC-15) includes three items of relevance to wireless broadband:

- (Agenda item 1.1) "*to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory*

[4] COM(2012) 478 final.

[5] Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme.

[6] RSPG12-408 (Final): RSPG Opinion on Review of Spectrum Use

*provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC-12)**"*;

- (Agenda item 1.2) "*to examine the results of ITU-R studies, in accordance with Resolution **232 (WRC-12)**, on the use of the frequency band 694-790 MHz by the mobile, except aeronautical mobile, service in Region 1 and take the appropriate measures.*"

After WRC-15 the frequency band 694 – 790 MHz will be allocated on a co-primary basis to the mobile service and identified for IMT in Region 1. Technical studies to be completed prior to WRC-15 will determine the technical and regulatory conditions to be applied in these bands. The lower edge of the band may also be adjusted at WRC-15 depending on the results of these studies.

The ITU has formed Joint Task Group 4-5-6-7 to undertake these technical studies. The first meeting of this group took place in July 2012. In Resolution 232 (WRC-12), the ITU resolved that these technical studies would take account of the following:

1 the spectrum requirement for the mobile service and for the broadcasting service in this frequency band [694-790 MHz], in order to determine as early as possible the options for the lower edge [of the band];

2 the channelling arrangements for the mobile service, adapted to the frequency band below 790 MHz, taking into account:

– *the existing arrangements in Region 1 in the bands between 790 and 862 MHz and defined in the last version of Recommendation ITU-R M.1036, in order to ensure coexistence with the networks operated in the new allocation and the operational networks in the band 790-862 MHz,*

– *the desire for harmonization with arrangements across all Regions,*

– *the compatibility with other primary services to which the band is allocated, including in adjacent bands;*

3 to study coexistence between the different channelling arrangements which have been implemented in Region 1 above 790 MHz, as well as the possibility of further harmonization;

4 to study the compatibility between the mobile service and other services currently allocated in the frequency band 694-790 MHz and develop ITU-R Recommendations or Reports;

5 to study solutions for accommodating applications ancillary to broadcasting requirements;

6 to report, in time for WRC-15, the results of these studies,

The studies related to the channelling arrangements referred to in 2 and 3 above will be carried out in ITU-R Working Party 5D.

In the related Resolution 233 (WRC-12), the ITU resolved that these technical studies would take account of the following:

1 to study additional spectrum requirements, taking into account:

- *technical and operational characteristics of IMT systems, including the evolution of IMT through advances in technology and spectrally-efficient techniques, and their deployment;*
- *the bands currently identified for IMT, the technical conditions of their use, and the possibility of optimizing the use of these bands with a view to increasing spectrum efficiency;*
- *the evolving needs, including user demand for IMT and other terrestrial mobile broadband applications;*
- *the needs of developing countries;*
- *the time-frame in which spectrum would be needed;*

2 to study potential candidate frequency bands, taking into account the results of the studies under resolves 1, protection of existing services and the need for harmonization.

These technical studies are ongoing with input from European administrations coordinated via CEPT (see below).

The third item of relevance to wireless broadband to be considered by WRC-15 is Agenda Item 1.3 which will:

*review and revise Resolution **646 (Rev.WRC-12)** for broadband public protection and disaster relief (PPDR), in accordance with Resolution **648 (WRC-12)**.*

III. European Developments

CEPT launched preparatory studies in September 2012 to contribute to the ITU studies on AI 1.1 and 1.2 and to promote common positions in relevant Study Groups and in Joint Task Group 4-5-6-7. The CEPT Conference Preparatory Group (CPG) Project Team D will lead this activity and will be responsible for the above WRC-15 agenda items 1.1 and 1.2. The CPG work will be further developed in order to have a European Common Proposal adopted on these agenda items in time for WRC-15.

CEPT has also decided to harmonise the technical conditions for the use of the frequency band 1452-1492 MHz by wireless broadband supplemental downlink, while allowing the possibility for administrations to use part of this band for other usage such as broadcasting. It has also launched an initiative to develop an ECC Decision on implementation measures for Mobile/Fixed Communication Networks (MFCN) in the 2.3-2.4 GHz band and the need to review in particular how to reflect regulatory provisions for Licensed Shared Access (LSA) in the Decision including cross-border coordination. In addition, it can be noted that CEPT has already considered the possibility to migrate low capacity long range fixed links still operating in the region of 1400 MHz into frequency bands higher than 6 GHz.

Concerning cross-border coordination, a first assessment of the consequences on equitable access to spectrum, as defined in the GE06 Plan, of a new allocation to the mobile service below 790 MHz has been carried out. A proposed approach for

coordination of the broadcasting service within Europe in such a case has been addressed in the RSPG Report 13-154[7].

The spectrum requirements for broadband PPDR are being addressed by the RSPG working group examining strategic sectoral spectrum needs, the final report of which should be available towards the end of 2013. Also CEPT CPG Project Team A will be responsible for preparation of the European position onWRC-15 agenda item 1.3.

IV. Definition and Trends for Wireless Broadband

Broadband services play a major part in electronic communications and the wider economy today. They provide substantial benefits to EU citizens and consumers by improving and enabling a wide range of economic, social and cultural activities. The RSPG noted earlier that the notion of broadband is continually evolving and could best be described in qualitative terms[8]. Today, this is likely to mean the possibility of accessing a wide range of media rich services including web browsing, voice-over-IP, and video services.

Broadband services can be delivered through both wired and wireless infrastructure. Sometimes wireless and wireline technologies compete with each other, but, in other cases, they are complementary. Trends show explosive growth of the delivery of broadband services over these wired and wireless infrastructures and for wireless broadband in particular. This is clearly stated in the European Commission's Digital Agenda for Europe[9]. One of the key challenges highlighted in the Digital Agenda is that more needs to be done to ensure the roll-out and take-up of broadband for all, at increasing data rates, through both fixed and wireless technologies. The Digital Agenda states that wireless (terrestrial and satellite) broadband can play a key role in ensuring coverage of all areas, including remote and rural regions.

Wireless broadband can be described as high-speed wireless transmission of data and may be provided via either fixed, mobile or satellite platforms. A fixed wireless service provides wireless broadband to devices in permanent locations, such as homes and offices. A mobile broadband service provides connectivity to users who may be in temporary locations, such as coffee shops and train stations. Mobile broadband works through a variety of devices, including portable modems and mobile phones. Depending on the characteristics of the satellite network, satellite broadband can service either mobile or fixed broadband users or both.

In several Member States, mobile broadband services have already taken an important place in the overall provision of broadband access. First, because its cost effectiveness may exceed that of wired broadband, especially in areas with a low population density, and second, because of the distinct value offered by mobility and wireless connectivity in general.

[7] RSPG Report on proposed spectrum coordination approach for broadcasting in the case of a reallocation of the 700 MHz band.
[8] RSPG09-284 Final, RSPG Working Group on wireless broadband – Final position paper, 14 May 2009.
[9] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF

However, mobile communications is not the only means to provide wireless broadband. WiFi networks play an important role in delivering broadband services as an extension to wired broadband in geographical areas which can be limited in size and where no wide area mobility is required, e.g. in home and office environments, hotspots in cities.

Broadband via satellites is a solution that economically covers entire regions irrespective of their topography. It is thus a means towards achieving 100% geographical coverage including those areas that are remote or sparsely populated where there is no business case for other technologies.

The relative roles of wired, terrestrial wireless and satellite networks in extending coverage and quality is not straightforward and will depend on local circumstances. In short, there is no "one size fits all" solution to provide cost-effective broadband services to all.

When considering future demand for spectrum for wireless broadband and the potential frequency bands to meet the demand certain assumptions need to be drawn. Mobile broadband networks typically use a minimum bandwidth of 5 MHz for TDD or supplemental downlink networks and 2 x 5 MHz for FDD networks. The additional frequency bands should in principle also support multiple operators. For the TDD networks the recent studies in CEPT have shown that frequency bands limited to a maximum width of 20 MHz (e.g., 1900 – 1920 MHz and 2010 – 2025 MHz) are not attractive enough for manufacturers to develop equipment. Hence, where there is a requirement for additional spectrum to support TDD operation in mobile networks in the future larger bandwidths should be considered.

Trends in consumer behaviour and demand

The end-user expects similar services over the mobile/wireless broadband network to those provided over the fixed network. Additionally, mobile access enables new applications that take the mobility of the user into account, such as location-based services. The range of services that are delivered through the wireless broadband network is growing at a fast pace, and more and more data is being delivered to the user and is generated by the user.

Introduction of new services is enabled by new types of devices. A wide range of enhanced devices has entered the market. These new devices include smartphones, tablets, and other connected devices such as e-book readers and gaming consoles. Many of these devices are dual-mode (cellular and Wi-Fi). Many offer larger screens with higher resolution compared to an ordinary mobile telephone. This increases data consumption and encourages the use of media-rich broadband data services such as video. They also increase the use of media-rich social networking on mobile networks with such devices being used to upload rich media content, audio, images and video to the social network.

Video services may include both non-linear video services such as interactive TV, pay-per-view, catch-up TV or Video on Demand (VoD) and linear video services including scheduled broadcast programmes. In addition, the end-user expects improved quality in video services which explains the growth of advanced media/audiovisual services which need to be taken into account (HD, Ultra HD, 3D,

etc.). This raises questions about the level of asymmetry between the downlink and the uplink and about the most efficient way to deliver video services.

Draft ECC Report 188 notes that "*Measurements in today's mobile networks clearly confirm the asymmetrical nature of the data traffic with consumers downloading considerably more than they upload data and multimedia content. The downlink-to-uplink ratios seem likely to widen towards 10:1 in high-traffic areas, as the proportion of video traffic in networks grows*." On the other hand, the spectrum efficiency of the downlink is about 2 or 3 times higher than the spectrum efficiency in the uplink. The spectrum requirement for wireless broadband is being studied within the ITU and will provide a better understanding of the consequences of such trends in traffic asymmetry on the channelling arrangements for wireless broadband services.

Trends in wireless technology

To cater for the growing amount of data traffic in a mobile network there is not only a need for additional capacity but also a requirement to make the wireless connection as short as possible. Wireless connections over short distances are more spectrally efficient as it allows for greater re-use of spectrum. Short distances are also preferred because of the power limitations of the user equipment. This power limitation imposes a trade-off between the amount of data to be sent and the distance over which the data is transmitted; the higher the data rate, then ideally the shorter the connection will have to be for a given amount of available energy.

Smaller mobile network cell sizes are likely to be used to increase the capacity of the network. Femtocells are used to increase capacity over very short distances. They are typically used indoors whereby the backhaul is realised via a connection with the fixed broadband network (such as DSL, cable or fibre). Offloading of traffic to the fixed network can also be realised via WiFi networks or other licence-exempt spectrum. Many smartphones, tablets and other connected devices offer WiFi capabilities. However, a drawback is that mobile operators are not able to guarantee the Quality of Service over such licence-exempt spectrum.

In its recent communication COM(2012)478[10], the Commission notes that "*more than half of all smartphone traffic appears to be routed over Wi-Fi networks, and this nomadic traffic is growing 4-6 times faster than mobile traffic. Global sales of Wi-Fi-enabled equipment should have reached 3.5 billion units by 2014*[11]*. Mobile network operators are also relying on the same licence-exempt RLAN frequencies for data off-loading to increase network capacity, improve coverage in buildings and save costs*", which can be considered as an advantage. According to Analysys-Mason 2012, the proportion of data traffic attributable to Wi-Fi on handsets will rise from 55% to 61%, and on connected mid-screen devices will remain constant at around 82%.

Video is one of the drivers for the huge increase in broadband data. This encompasses not only video streaming and video download. The broadband network is also used to offer managed IPTV services, which may include live television programmes, Video On Demand (VOD) and time-shifted television. The possibility

[10] Promoting the shared use of radio spectrum resources in the internal market

[11] SCF 2012.

to offer managed IPTV services started on fixed broadband networks, but is now a growing feature on mobile broadband networks.

The broadband networks are evolving in order to deliver broadcasting services, non-linear video services and data services including social networking and cloud services to mobile devices which is driven by the development of smartphones and tablets. The impact on traffic volumes and asymmetry is under study in ITU, taking into account the overall mobile data traffic. In mobile networks asymmetry can be addressed with TDD technology or with the new Supplemental Downlink (SDL) feature within a mobile broadband system, which by means of base station transmitters in the network, is able to use unpaired spectrum to provide a supplemental downlink capacity to paired (FDD) spectrum. WiFi networks also play an increasing role in offloading data traffic, particularly nomadic traffic.

Increases in network capacity will also be influenced by technological developments in network elements. The improvements in technological efficiency of the radio interface (e. g. LTE, LTE advanced) leads to more efficient use of existing spectrum resources (bit/s/Hz/). It is unlikely however that the development of technologies that are more frequency-efficient will be enough to satisfy the growing demand for high bit-rate data services. Moreover, it is very likely that the migration to these new spectrum efficient technologies will be made very gradually. Mobile operators will need to accommodate users on older networks (like GSM) for the coming years.

In the next years technological progress will enable an increasing number of users to be satisfied by the same amount of spectrum as today, however, the anticipated growth in data traffic will still require additional spectrum to be made available to meet those needs.

V. Spectrum Policy and Regulatory Issues Regarding Wireless Broadband:

The need for wireless broadband access and the role spectrum will play in providing broadband access will depend on a number of things and will vary across the various Member States. This will have implications for the amount of spectrum and the type of spectrum needed by individual Member States. In some countries mobile will play an essential role to provide broadband access while in other countries mobile will be regarded as an extension providing additional capacity and additional services or be complementary to fixed networks. The role mobile services will play in the plans of Member States to provide broadband connectivity will depend on the roll-out of fixed broadband and to some extent also to the way in which broadcasting services are provided. In turn, these will depend on the geography of the country and the population density, i.e. the size of rural and urban areas noting that there are substantial differences between urban and rural areas in most parts of Europe.

In urban areas the demand for broadband services and consequent spectrum needs are very high, but in most cases fixed broadband is available with very high speeds, Wifi is widely available and mobile networks make use of higher frequencies (better frequency reuse and more bandwidth) where such a use is possible.

In rural areas there are fewer alternatives to wireless broadband; however, there are also fewer users and even if the individual need for spectrum per user were much

higher the overall need for spectrum will still be much lower than in urban areas (big cities).

Both technical and economic factors will have to be taken into account to determine the role of wireless communications in these areas. In rural areas it would be economically and technically beneficial to use lower frequencies to provide coverage with a minimum of base stations whereas in urban areas the distance between base stations will be much smaller and based on the capacity that is needed. Conversely, using higher frequencies in urban areas, which have a shorter re-use distance and greater capacity, is more efficient.

Bringing into use additional frequency bands has a cost for the operators who need to upgrade their networks and pay for spectrum. Increasing capacity through the higher density networks also has a considerable cost. Therefore, mobile operators in particular have an interest in offloading the traffic from their radio access networks by encouraging the use of alternative wireless technologies such as Wifi, while retaining the customer within the network.

On the other hand it will make economic sense to have harmonisation in the bands that are used for wireless broadband to reach economies of scale. A too fragmented approach could lead to a need for overly complex and costly user devices which may never be realised. However, given the differences in specific needs between Member States, there is a question of mandating harmonised spectrum in Member States where demand for wireless broadband can already be satisfied by some parts of the already harmonised frequency bands. Where there is evidence that spectrum harmonisation would lead to spectrum underutilisation on a temporary and/or geographical basis a more nuanced approach could be taken. One approach could be to allow those relevant Member States to use on a temporary and/or geographical basis the spectrum for services that fulfil national needs as long as they do not constrain the use of services in those Member States who have harmonised their spectrum for wireless broadband services (see the RSPG Report[12] on Improving Broadband Coverage).

As an example of a national plan for broadband provision, in Luxembourg the government has established a national strategy for very high-speed networks. The transition from traditional telecommunications networks to a broadband network has a positive socio-economic impact. This impact is expected to intensify with the transition to networks which, using the appropriate technologies, reach up to 1 Gbit/s for fixed networks. The overall target is 1 Gbit/s downstream and a minimum of 500 Mbit/s upstream for 100% coverage of the population by 2020 (high-speed broadband is considered to be within the scope of universal service). The added value of wireless networks consists mainly in their mobility, which makes them complementary to the fixed networks.

Why some spectrum is not used

The issue of under-utilisation of harmonised spectrum was addressed in the RSPG Report on Improving Broadband Coverage (2011). In addition to this work, the 2012 RSPG work programme contains a work item to draft an RSPG Opinion on 'Addressing situations resulting in underutilisation of spectrum'. This work will,

[12] Document RSPG11-393 available at http://rspg.ec.europa.eu/rspg_opinions/index_en.htm

among other things, conduct a more in depth analysis of the possible causes of under utilisation, assess how viable it would be to adopt targeted harmonisation and address how service development could be promoted in those Member States where demand is notably lower than would be expected.

In summary, the findings of the 2011 Report (RSPG11-393) concluded that there were several possible causes of harmonised spectrum not being fully exploited as follows:

- Technology: the anticipated technology is not available for use in the timeframe envisaged when the spectrum is acquired leading to delayed used of the band.

- Demand: it is possible that, in particular in cases where services are provided across a number of platforms, the anticipated demand for the service in the given band does not mature.

- Regulatory uncertainty: through attempts to be as flexible as possible, Regulators may inadvertently render the spectrum unusable as a result of the technical conditions not being prescriptive enough to provide certainty.

- The packaging of the spectrum bands and / or their size may be inappropriate for an economic case to be made.

- Co-existence arrangements with adjacent bands may be prohibitively restrictive.

The report goes on to cite the examples of the 3400-3600 MHz , the 3600-3800 MHz and part of 2.1 GHz bands (unpaired bands). It notes that in the 3400-3600 MHz and the 3600-3800 MHz band several operators, who were awarded licences, did not deploy networks or provide broadband services as anticipated as neither the technology nor demand developed as forecast. This resulted in operators returning licences, e.g. in Luxembourg where all the licences were returned in 2010. Several reasons were mooted for the lack of demand including price sensitivity from consumers compared to alternatives and the existence of legacy users in the band creating a restrictive environment. It should be noted that there were exceptions in some Member States, for example, Ireland saw significant deployment of services in this band. However, use of the band in those Member States has declined in recent years due to other alternatives including mobile broadband becoming available in other bands, e.g., in the paired 2.1 GHz bands,

In relation to the 2.1 GHz (unpaired bands 1900-1920 MHz and 2010-2025 MHz) band, there are, again, several possible interconnected reasons for the lack of use of the unpaired bands. These unpaired bands were packaged in 5 MHz channels suitable for TDD use. Post 2000, research and development clearly focussed on FDD technologies resulting in a relatively little development of TDD technologies. This, in conjunction with a lack of demand at 2010-2025 MHz, which is believed to be a result of complex co-existence issues with FDD at 1920 MHz, resulted in the unpaired bands being almost entirely unused.

These two examples alone demonstrate many of the potential reasons why some harmonised spectrum is unused or under-used. The following discussion addresses some of the reasons in detail:

- High fees / lack of competition
  In June 2011 the Latvian Public Utilities Commission (PUC) launched a renewed auction of 2 x 1.25 MHz channels in the 450 -457,5 MHz and 460-467.5MHz bands. The reserve was set at 35,000 lats, a significant reduction from the figure of 200,000 lats set for the previous auction in February of the same year when the spectrum failed to sell. After the failed auction comments were made by the only interested party about the high starting bid level. Given that there was only one materially interested party and the frequencies would need to be used in conjunction with others in the band to create higher network speeds (at significant roll out cost) there was a perception that the fee was set too high in the first instance, given the lack of competition. In this instance, this was recognised and remedied by a further auction with a lower reserve price, as mentioned above, and resulted in a successful outcome.

- Lack of demand
  In some instances spectrum harmonised for wireless services across the EU may go unused due to lack of demand. There are several possible reasons for this that could include:
    - the national market does not support the perceived requirement for the whole of the bandwidth that has been harmonised; or
    - services are already provided over other platforms (e.g., wired) and coverage is near universal, therefore further spectrum for this service is unnecessary.

  For example, in Ireland all of the 1800 MHz GSM band (2x75 MHz) was allocated to the Mobile service. However, up until November 2012 only 2 x 43.2 MHz of spectrum had actually been assigned to mobile network operators for delivery of second-generation mobile services as there was no demand for further frequency assignments. Furthermore, not all of the assigned spectrum was used in full throughout the country, usage of the band being predominantly focused on urban areas.

  It should be noted that the size of the market as well as the size of the country also plays a key role in the take-up of frequency bands.

- Restrictions due to legacy users in the band
  The band 3400–3800 MHz can again be used as an example of issues not directly attributable to the harmonisation measure resulting in underutilisation of spectrum. However, this could also result from the provision of the Commission Decision 2008/411/EC stating that Member States must implement the Decision in accordance with the parameters set out in the technical annex and also '*without prejudice to the protection and continued operation of other existing use in this band*' . In those countries where there is significant existing use with many satellite earth stations in the band this requirement could have added a further restriction, on the basis that sharing is

challenging and at times impracticable, and that may have provided a disincentive for other users.

- Restrictive regulatory obligations
  Occasionally it is the obligations and restrictions put in place by the regulatory authorities during the award process that can result in spectrum being unused. In the Spanish 'super auction' in July 2011 several blocks of prime spectrum in the 900 MHz and 2.6 GHz bands were unsold. The Spanish Ministry of Industry, Tourism and Communications (MITYC) pointed to the top three operators (Telefonica, Vodafone and Orange) reaching their spectrum caps as the reason why the frequencies failed to sell. In a subsequent auction, in November 2011, the caps were raised from 2x20 MHz per operator across the 800 MHz and 900 MHz bands and 115 MHz across the 1800 MHz, 2.1 and 2.6 GHz bands to 2 x 25 MHz in 800/900 MHz and 155 MHz in the 1800 MHz, 2.1 and 2.6.GHz bands respectively. Consequently, all of the spectrum was sold.

  In addition to the Spanish example there was a similar situation in the Dutch 2.6 GHz auction in 2010. Only the paired FDD spectrum was sold, leaving 50 MHz of TDD spectrum unsold. Suggestions were made that one of the reasons why not all the spectrum sold was the tight spectrum caps imposed on the three incumbent bidders who were limited to 20 MHz and 10 MHz respectively. It was mooted that if the caps had been looser, one or more bidders might have found the TDD spectrum a more attractive alternative.

  Defence and other public sector spectrum
  Spectrum may also not be used on a regular basis, or only in limited geographic areas due to its allocation for use by defence or other public sector applications, e.g. for use in national emergencies. This may raise the possibility for some of that spectrum to be made available for use by other users under carefully designed conditions, e.g., on a pre-emptive basis whereby the main user can retrieve control of the spectrum if necessary.

VI. The Role of Shared Spectrum Access and Licence Exempt Spectrum

Millions of persons today use licence exempt spectrum in the 2.45 GHz band to access broadband services in a very efficient way as the re-use of the spectrum is very high. This is also the case for the 5 GHz licence exempt bands, allowing higher capacities than in the 2.45 GHz band, as approximately 500 MHz of bandwidth is available in shared access with radar systems and the Earth exploration-satellite service.

To meet the growing demand for spectrum the industry and administrations are under pressure to introduce new technologies and regulatory mechanisms to optimise the use of the limited frequency resources. In this context, the promotion of the shared use of radio spectrum resources is a valuable means to offer additional spectrum access to broadband communications, for licence exempt but also licensed usage, which is a new paradigm referred to as Licensed Shared Access. The EC has

published a communication[13] on this matter which will be discussed in various fora. In particular, RSPG has already developed opinions on Collective Use of Spectrum and will develop a new opinion on Licensed Shared Access. In parallel, CEPT has initiated work on the general concept of Licensed Shared Access and implementation of the concept in the 2300-2400 MHz band.

VII. Impact of the Convergence of Services

Traditionally, broadcasting and broadband communication services have their own dedicated network infrastructure (high power / high tower versus dense networks). The convergence of services requires the study of the delivery of a range of content towards the end user in the most efficient way. It is recommended to study this issue at a European level, taking into account:

- The convergence of technologies (e.g., OFDM based systems such as LTE, DVB-T, etc.);
- Various situations in CEPT countries relating to content regulations or dependency on terrestrial TV platforms;
- Cross-border coordination issues between different network topologies;
- Various reception environments (e.g. indoor/outdoor, fixed, portable, etc.;
- Coexistence with PMSE-applications.

It is assumed that the results of those studies would be used in the necessary debate to define a long-term vision for the UHF-band in Europe.

VIII. Meeting Future Spectrum Demand for Wireless Broadband Services

The total amount of spectrum already available in Europe for wireless broadband services is nominally 1701.50 MHz comprised of 990 MHz for terrestrial applications, 173 MHz for satellite based broadband and importantly 538.50 MHz for WiFi-type applications. In order to meet the intermediate target in the RSPP to make at least 1200 MHz of spectrum available for wireless data traffic by 2015, taking the terrestrial component alone would require at least 210 MHz of additional spectrum to be re-allocated to wireless broadband. With that objective in mind, all of the frequency bands within the range 400 MHz to 6 GHz have been analysed as shown in **Annex 1** which identifies, in the case of each band, its potential for wireless broadband services on a harmonised basis, whether the band is already in use for wireless broadband and if not, the likely timeframe in which it could be made available. This resulted in the identification of a further 140 MHz with near future potential and 886 MHz potentially in the medium term (beyond 2015).

On the basis of that analysis the potential candidate bands for wireless broadband are then listed in **Annex 2**, indicating the pros and cons of each band, its potential for wireless broadband, the likely timeframe within which it could be made available and

[13] COM (2012)478 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Promoting the shared use of radio spectrum resources in the internal market.

actions to be taken to achieve that goal. This is in effect the roadmap for meeting the requirements of the RSPP on wireless broadband.

IX. Key Frequency Bands with Potential for Wireless Broadband

700 MHz

The 700 MHz band is used in Europe for terrestrial television and PMSE. The frequency band 694-790 MHz represents 30% of the total remaining UHF TV spectrum. The impact of a reallocation of this spectrum for broadband will therefore potentially be significantly more important for terrestrial broadcasting than in the case of the 800 MHz band which was used in some countries for other services (i.e., defence). In addition, such a reallocation, which would take place after analogue switchover, could not appear as a share of the digital dividend between the broadcasting and mobile services but rather as a reduction of the capacity for broadcasting, which would require in many countries the implementation of new technologies (DVB-T2/HEVC) and would impact further developments of DTT services, such as the introduction of higher definition video services. This reallocation could have a financial impact for DTT viewers as they may have to again buy new equipment with no clear benefit this time in terms of enhanced television reception.

The UHF band is also heavily used for Program Making and Special Event (PMSE) services, especially wireless microphones. PMSE services make use of the white spaces between the TV broadcasts. It is unlikely that such use can continue in the 700MHz sub-band if it is used for mobile broadband. The amount of spectrum available for PMSE services was already diminished when making the 800 MHz band available for mobile broadband. There is need to take account of the spectrum needs for PMSE services and to provide a solution for the continuation of PMSE services elsewhere in the UHF band or in other appropriate bands.

The issue of cross-border interference between the broadcasting and mobile services has been raised several times in the debate concerning the 800 MHz digital dividend. It is one of the reasons why the coordinated approach within EU was implemented. In this respect, it would be preferable to consider from the beginning the future of the 700 MHz band in a coordinated manner.

Bearing in mind that the decision to make IMT co-primary in the 700MHz band was already agreed at WRC-12 to take effect after WRC-15, it would be appropriate for Europe to develop a position in time for WRC-15 on the refinement of the lower band edge and on possible channelling arrangements for mobile services in the 700 MHz band.

It is important that Europe considers *resolves 4* of Resolution 232 (WRC-12) as the ITU studies (through JTG 4-5-6-7) have begun. Given that the decision to make IMT co-primary in the 700 MHz band will take effect after WRC-15, it may also be useful for Europe to take a longer-term view on the future use of the band from 470 to 790 MHz in order to develop a strategic view about the long-term future use of the band. This long-term view should, in particular, take account of the long-term developments of digital terrestrial television and their societal value, the possible benefit from convergent platforms in the future to deliver linear media/audiovisual services and

increasing audience demand for video and data to mobile devices (smartphones, tablets,etc.).

A detailed survey on the long-term spectrum requirements for television broadcasting in the European Union including the number of TV services, HDTV, interactive services, mobility requirements and the possible introduction of Ultra High Definition Television has been carried out with the following results:

a) Long term spectrum need for broadcasting, varies amongst European countries. However, several Member States are planning an increase of the number of programmes, a widespread expansion of HD, additional mobility and possible introduction of Ultra High Definition;
b) The relative penetration of each platform for TV delivery is highly country dependent. However, most Member States consider that these platforms complement each other and most countries have stressed the importance of terrestrial TV for free-to-air services, for secondary TV sets, and that viability of DTV requires access to sufficient spectrum resource;
c) Both broadcasting and mobile networks may complement each other in the provisions of linear and non-linear audiovisual contents to mobile terminals. However, for fixed reception, it is currently considered unlikely that mobile networks will evolve to deliver video content to mass audiences, primarily because of the increased demand for spectrum to support such a network capability, which many considered inefficient. Introduction of new technologies (DVB-T2, HEVC) will enable an increase of spectrum efficiency and the provision of improved TV services. However, scenarios and timing for transitioning to these technologies are critical and very much country-dependent.

The challenge for the development of an EU policy on the 700 MHz band will be to address the variety of national situations in terms of digital terrestrial television services and the need for additional wireless broadband services. In terms of timing, there is a relationship in each country with the duration of broadcasting licenses, the timeline for the introduction of the new services for broadcasting and the implementation of more efficient broadcasting technologies and the need to meet the targets set down nationally and at EU level in relation to delivery of broadband capacity. This has also to be considered in the context of potential cross-border frequency coordination difficulties, also taking into account the required time for cross-border coordination and modifications of the broadcasting assignments.

An EU strategy needs also to be discussed on the future use of the 700 MHz band taking into account all political, economical and technical elements. Elements which could be considered by the Commission in developing a coherent strategy include:

a) The Commission should take into account the timing issues described above;
b) The Commission should officially recognize that Member States may take measures relating to TV receivers to mandate more efficient technologies;
c) The Commission should invite a review of ETSI and CENELEC standards applicable to DVB-C and DVB-T reception in the 700 MHz band and below, in order to avoid harmful interference.

Bands 1350 – 1375, 1375 – 1400, 1427 – 1452 and 1492 – 1518 MHz

The frequency bands 1375 – 1400 MHz and 1427 – 1452 MHz are already allocated on a co-primary basis to the fixed and mobile services in Region 1 and a new ITU allocation for mobile service would only be necessary for Region 2 and 3 in the frequency band 1375-1400 MHz.

The frequency bands 1350 – 1375 MHz, 1492 – 1518 MHz are also already allocated on a co-primary basis to the fixed and mobile services, but limited to Region 1 for the band 1350-1375 MHz. The use of the frequency band 1492 – 1518 MHz would allow for a possible further extension of the band 1452 – 1492 MHz by a further 25 MHz.

The consideration of these frequency bands for WRC-15 and possible availability in longer term shall not delay the on-going harmonisation of 1452-1492 MHz in Europe (see below).

The bands1375 – 1400 MHz paired with 1427 – 1452 MHz as well as 1350 - 1375 MHz paired with 1492 - 1518 MHz are already subject to CEPT harmonisation for the Fixed Service (see Recommendation T/R 13-01 – Annex A and B). Low numbers of point-to-multipoint applications have been reported by CEPT Administrations in these frequency bands (see ECC report 173) although some new developments for low capacity, long range private links have been reported in some countries, in particular for public utilities. Therefore, the introduction of wireless broadband services in these frequency bands would imply the identification of higher frequency bands suitable for this kind of fixed links applications and consequent refarming measures at the national level. Of relevance here is that CEPT is currently assessing the technical possibility of introducing narrow channel spacing in several frequency bands between 6 and 10 GHz similar to that existing in Annex A and B of the Recommendation T/R 13-01 (1375-1400 MHz frequency band paired with 1427-1452 MHz and 1350 – 1375 MHz paired with 1492 – 1518 MHz). However, there may still be an ongoing requirement for long-range links in these bands, e.g for links to North Sea platforms.

In many countries the bands 1375 – 1400 MHz and 1427 – 1452 MHz as well as the bands 1350 – 1375 MHz and 1492 – 1518 MHz are also used for military purposes, including for radiolocation in the band 1350-1400 MHz and for tactical radio applications. However, some administrations see indications of very limited actual use in the bands. Making part of these bands available for ECS would in some countries realistically require preserving capacities for tactical radio applications in the same frequency range and reassignment of radiolocation stations below 1350 MHz/1375 MHz.

The NJFA (NATO Joint Civil/Military Frequency Agreement) with reference to the frequency range 1350-2690 MHz states that the "*essential military requirement for TRR, with harmonised bands of 90 MHz, with a total of 180 MHz for major exercises in some countries*", and recommends that "*in the long term (in particular post-2007) the harmonised sub-bands for TRR, in those countries having land borders, shall be 2025-2070 MHz and 2200-2245 MHz*". Therefore, the frequency range 1350-1518 MHz can be seen as an alternative to meeting the requirement in certain countries for TRR (tactical radio relay) spectrum which cannot be satisfied in the 90 MHz of spectrum harmonised for TRR in the 2 GHz frequency range.

Also, protection of adjacent band services is necessary and in particular, protection of the passive band (1400-1427 MHz) for both radioastronomy and the Earth Exploration-Satellite Service (EESS)[14]. Coexistence between certain types of Mobile service and the EESS (passive) was already considered at WRC-07 and led to relevant conditions being included in ITU-R Resolution 750. Protection of the passive services seems feasible but should be confirmed by sharing studies.

Adopting a frequency arrangement for mobile broadband in the 1375-1400 MHz (uplink) band paired with 1427-1452 MHz (downlink) may be a suitable approach and prove to be more compatible to sharing with other services. In that case the harmonised frequency arrangement for fixed services in the band 1350-1375 MHz / 1492-1518 MHz could be maintained for fixed links. CEPT is also considering the possibility of the band 1492-1518 MHz for PMSE applications but a decision has yet to be taken on this.

It is noted that the frequency band 1350-1375 MHz / 1492-1518 MHz may also be considered by WRC-15 for WBB applications.

1452-1492 MHz

This frequency band has been harmonised since WARC-92 for terrestrial and satellite sound broadcasting but with little development until now (although there are some initiatives recently taken by some countries for licensing terrestrial sound broadcasting in this band), thus attracting interest from other services.

After two years of an extensive review and studies of this band, CEPT decided in September 2012 to develop an ECC Decision designating the band for mobile/fixed communication networks (MFCN) supplemental downlink and defining the Least Restrictive Technical Conditions with a harmonised band plan based on 8 blocks of 5 MHz each. This new regulatory framework will provide for mobile supplemental downlink deployment and significant additional capacity for mobile networks. It should also allow individual countries to meet national requirements by, if necessary, using part of the band for terrestrial broadcasting and other terrestrial applications.

When developing Least Restrictive Technical Conditions in this band possible use of the adjacent bands for WBB applications should be taken into account.

2 GHz Mobile Satellite Service bands

The bands 1980-2010 and2170-2200 MHz were identified for mobile satellite services (MSS) in 1992 at WARC-92 as the satellite component of the new IMT-services, with the frequency bands 1920-1980 MHz and 2110-2170 MHz being allocated for the terrestrial component of IMT. The terrestrial component has now been in use for 3G services in Europe for more than 10 years, while the bands 1980-2010/2170-2200 MHz which were assigned to operators in 2009 by a European selection and authorisation process have yet to prove to be a commercial success.

[14] Noting that today there is interference to the ESA satellite SMOS from terrestrial radio services.

There is a Commission Decision[1] in force harmonising the 2 GHz MSS band in the EU for MSS (the 'Harmonisation Decision'). There is also a Co-Decision[2] of the Parliament and Council providing for selection and authorisation of MSS systems in the 2 GHz band. On 13 May 2009, the Commission selected Inmarsat Ventures Limited and Solaris Mobile Limited as the undertakings to provide MSS on a pan-European basis in the 2 GHz band in the EU.[3]

The allocation represents 2 x 30 MHz of particularly attractive, harmonised, spectrum and there have been calls for it to be re-allocated to terrestrial mobile broadband services. In the USA, the FCC has removed restrictions on MSS spectrum in the 2 GHz range in order to allow for future use by terrestrial wireless broadband services.

In 2011, the Commission adopted Decision 2011/667/EU[15] on modalities for coordinated application of the rules on enforcement to an authorised operator of mobile satellite systems (MSS) in the event of an alleged breach of the common conditions attached to its authorisation (launch of satellite, launch of commercial services, coverage, etc.). Subsequently, in late 2012 Germany sent a notification of lack of compliance with the licence conditions to both authorised MSS operators which launched the step-by-step procedure at EU level.

The RSPG acknowledges the interest in this band for alternative uses, especially given the economic and social value of this spectrum, and recognises the on-going process, led by the COCOM MSS Working Group, regarding the EC Decision on co-ordinated enforcement action. In light of this, the RSPG recommends that if future actions taken by Member States related to Decision 2011/667/EU result in the withdrawal of licences, the Commission should consider re-allocation of the bands to terrestrial mobile services

2300-2400 MHz

This frequency band is currently harmonised and used within CEPT for aeronautical telemetry (ERC/REC 62-02) and SAB/SAP (ERC/REC 25-10), e.g., as a core band for wireless cameras, and also used at a national level for various applications However, after its identification for IMT at WRC-07 this band has started to be used in other parts of the world for broadband mobile applications and equipment is available, thus attracting interest from several European administrations and leading to new activities in CEPT.

[1] Commission Decision of 14 February 2007 (2007/98/EC) on the harmonised use of radio spectrum in the 2
GHz frequency bands for the implementation of systems providing mobile satellite services

[2] Decision of the European Parliament and of the Council of 30 June 2008 (626/2008/EC) on the selection and
authorisation of systems providing mobile satellite services (MSS)

[3] Commission Decision of 13 May 2009 (2009/449/EC) on the selection of operators of pan-European systems
providing mobile satellite services (MSS)

15 Commission Decision of 10 October 2011 on modalities for coordinated application of the rules on enforcement with regard to mobile satellite services (MSS) pursuant to Article 9(3) of Decision No 626/2008/EC of the European Parliament and of the Council

In September 2012, CEPT set up a Project Team which was tasked with developing a draft ECC Decision aimed at harmonising implementation measures for MFCN in the band including the least restrictive technical conditions (LRTC) and the regulatory provisions based on LSA, while ensuring the long term incumbent use of the band in the territory of those administrations that wish to maintain such use. This project team will finalise its work in the first half of 2014.

Recognizing, in some countries, that strategic governmental usage in the band such as aeronautical telemetry or CCTV for security purposes, would need to maintain their primary allocation status, considerations have been given to the possibility to provide access to this band through an appropriate regulatory mechanism such as Licensed Shared Access (LSA), as described in RSPG Report 11-392. The LSA concept is being studied in more detail in another RSPG working group. Furthermore, the studies being carried out in CEPT will detail the technical basis for such a shared access, if shown feasible, and assess the interest for broadband industry and operators in the regulatory mechanisms (LSA) to be applied.

3800-4200 MHz

Initiatives at the EU-level have been taken in order to make the 3400-3800 MHz band available for wireless broadband applications such as LTE and LTE-A. The spectrum in the region of 4 GHz has useful properties in that it can support significant bandwidths suitable for broadband and it can provide a useful range in terms of area coverage. In that context, the question has been raised whether it is possible that the 3800-4200 MHz band may be a candidate for future wireless broadband systems.

In most European countries the 3800-4200 MHz band is mainly used for satellite Earth stations of the Fixed-Satellite Service (FSS) and terrestrial fixed links. There are approximately 160 geostationary-orbit satellites operating in the band 3400 – 4200 MHz providing essential services (mainly governmental and security services) to consumers (NGO and non-NGO and IGO) around the world, some 60 of which are providing coverage to all or part of Europe and interconnecting Europe with other regions of the world. Additional satellites using the C-band are under construction and new C-band Earth stations are being deployed all around the world.

C-band is also used for Galileo (GDDN), for satellite systems for the meteorological community, for EUMETCAST and GEONETCAST, for public sector emergency applications (e.g., see www.emergency.lu) as well as by embassies and diplomatic missions due to the very high robustness of these frequencies towards atmospheric conditions. There is also an ITU Resolution[16] addressing use of the band for aviation security and reliable distribution of meteorological information. The band is also used for feeder links for the GMDSS. Sharing conditions between satellite and terrestrial services are complex, and it has been demonstrated that there is no technical compatibility between the FSS and MS operation in the same geographical area and that required separation distances are large. The number of European FSS earth stations using the band 3800 – 4200 MHz is more than eight times the number of

[16] Resolution 154 (WRC-12): Consideration of technical and regulatory actions in order to support existing and future operation of fixed-satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1.

those using the band 3400 – 3800 MHz which is likely to limit the opportunities for terrestrial mobile applications in the band.

Nevertheless, the frequency range 3800-4200 MHz has the potential to play a role in the provision of electronic communications services to ensure that the future capacity needs especially in urban areas, are met. Therefore, studies should be carried out into the possibility of sharing in Europe between the FSS and terrestrial wireless broadband services.

X. The Opinion of the RSPG

Broadband services play a major part in electronic communications and the wider economy today. They provide substantial benefits to EU citizens and consumers by improving and enabling a wide range of economic, social and cultural activities.

Trends show a tremendous increase in the volume of data traffic which was not foreseen before WRC-07 for delivery of broadband services over both wired and wireless infrastructures at large and for wireless broadband in particular. This is clearly stated in the European Commission's Digital Agenda for Europe[17]. One of the key challenges highlighted in the Digital Agenda is that more needs to be done to ensure the roll-out and take-up of broadband for all, at increasing data rates, through both fixed and wireless technologies. The Digital Agenda states that wireless (terrestrial and satellite) broadband can play a key role in ensuring coverage of all areas, including remote and rural regions.

Wireless broadband can be described as high-speed wireless transmission of data and may be provided via either fixed, mobile or satellite platforms. The relative roles of wired, terrestrial wireless and satellite networks in extending broadband coverage and quality is not straightforward and will depend on local circumstances. There is no "one size fits all" solution to provide cost-effective broadband services to all.

The purpose of this Opinion is to provide guidance to the European Commission on the future demand for spectrum for wireless broadband in meeting the goals of the Digital Agenda. This Opinion focuses on the problems associated with the provisioning of wireless broadband in general and specifically with the spectrum requirements for terrestrial wireless broadband.

This has to be considered in the context of the inventory established under Article 9 of the RSPP and aims to identify frequency bands that could be allocated or reallocated for wireless broadband, taking into account spectrum efficiency, possibility of sharing and potential negative or positive impact of reallocation of such bands on existing users.

The RSPG notes that:

(a) broadband networks are evolving in order to deliver linear and non-linear video services and data services to mobile devices. The impact of the increasing mobile traffic asymmetry on channelling arrangements needs to be assessed;

[17] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF

(b) broadcasting networks are evolving in order to deliver high-definition and ultra high-definition programmes, to increase delivery to portable/mobile receivers and are envisaged for the delivery of linear and non-linear video services and data services to mobile devices;
(c) the actual use of bands for wireless broadband in Member States will vary, depending on the national requirements for broadband access and for other services;
(d) the frequency band 694-790 MHz represents 30% of the total remaining UHF TV spectrum. The impact of a reallocation of this spectrum for broadband will potentially be significantly more important for terrestrial broadcasting in some countries than in the case of the 800 MHz band;
(e) as sharing of the band between mobile services and DTT broadcasting will not be feasible, it is likely that they will compete for access to the 700MHz band. However, the situation for the digital terrestrial platform spectrum requirement varies amongst Member States;
(f) the reallocation of the 700 MHz band to mobile service would require in many countries the implementation of new technologies (e.g. DVB-T2/HEVC). Therefore, any EU-policy decision regarding the use of the 700 MHz band by wireless broadband has to be accompanied by a recognition that certain Member States may need to take measures to transition DTT receivers to more efficient technologies;
(g) there are merits in developing a common EU strategy on the whole UHF band 470-790 MHz, taking into account internal market and cross-border issues. However, this strategy has to reflect the variety of situations in Member States concerning the digital terrestrial platform and developments in terms of converged use of the spectrum;
(h) there is increasing pressure on the spectrum available for SAB/SAP (audio and video) applications;
(i) in the case of TDD networks, the recent studies[18] in CEPT have shown that frequency bands limited to a maximum width of 20 MHz (e.g., 1900 – 1920 MHz and 2010 – 2025 MHz) are not attractive enough for manufacturers to develop equipment;
(j) more than half of smartphone data traffic is routed over WiFi networks and this nomadic traffic is growing faster than mobile data traffic;
(k) Mobile operators are also relying on some licence exempt spectrum for offloading of traffic to increase network capacity, improve coverage in buildings and to save costs.

The RSPG recommends that:

1. On the basis of the analysis in Annex 1 and the roadmap for future broadband spectrum in Annex 2 of this Opinion a strategic plan should be developed by the Commission to make the necessary spectrum available to meet the future demand for wireless (terrestrial & satellite) broadband services in the time frame 2013-2020, including the intermediate target in the RSPP of at least 1200 MHz of spectrum by 2015.

[18] CEPT Report 39: Report from CEPT to the European Commission in response to the Mandate to develop least restrictive technical conditions for 2 GHz bands

2. The strategic plan should include: -
   i) a detailed analysis of the usage of all bands identified in Annex 2, including the 700 MHz, 1.5 GHz, 2.3 GHz and 3.8-4.2 GHz bands, in Member States and their potential for wireless broadband services on a harmonised basis, prioritising the bands in accordance with their potential and timeframe in which they are likely to be available;
   ii) further exploration of the economic and social implications of the various options at macro level;
   iii) the spectrum needs for SAB/SAP (both audio and video applications);
   iv) an analysis of the need for licence exempt spectrum for WBB.

3. In addition to the above, the RSPG recommends the development by the Commission, in cooperation with the Member States, of a long-term strategic policy on the future use of the UHF band (470-790 MHz), taking account of, in particular, the spectrum needs of the DTT platforms in the EU, the spectrum needs of PMSE, and the possible benefits arising from future convergent broadcasting-mobile platforms to deliver linear media/audiovisual services and high-audience video and data to mobile devices (smartphones, tablets, etc.).

4. In developing this strategic policy for the future use of the UHF Band the Commission should in the short-term, develop:
   a) a common European policy objective in time for WRC-15 on the refinement of the lower band edge and on possible channelling arrangements for mobile services in the 700 MHz band; and
   b) an EU-wide strategy to be discussed at political level on the future use of the 700 MHz band. This strategy should consider elements such as duration of broadcasting licenses, the necessity to transition to new technologies, the variety of digital terrestrial platforms in Member States and cross-border frequency coordination issues; and
   c) a clear policy to facilitate any migration which may ease making available the 700 MHz band to wireless broadband while allowing Member States to take measures relating to TV receivers in order to mandate more efficient technologies (e.g., DVB-T2, HEVC); and
   d) a review of ETSI and CENELEC standards applicable to DVB-C and DVB-T reception. This includes a need for a clear EU policy on improving spectrum efficiency, where it would be an essential requirement to construct TV receivers so as to avoid harmful interference;

5. For the band 1452-1492 MHz, noting that CEPT has established a project to develop harmonised implementation measures for SDL applications, the Commission should consider adopting complementary measures to further promote the use of this band for SDL, while preserving the possibility for Member States to use part of this band for other uses such as broadcasting.

6. In the case of the 2GHz bands identified for use by Mobile Satellite Services with Complementary Ground Component (1980-2010 MHz/2170-2200 MHz), if future actions taken by Member States in relation to Decision 2011/667/EU result in the withdrawal of licences, the Commission should consider re-allocation of the bands to terrestrial mobile services.

7. For the band 2300-2400 MHz, noting that CEPT has established a project to develop harmonised implementation measures for MFCN in the band, the Commission should consider adopting complementary measures to further promote shared and flexible use of the band between wireless broadband applications and other services, based on LSA regulatory provisions, facilitating the long-term incumbent use of the band in the territory of those Member States that wish to maintain such use.

8. The frequency range 3800-4200 MHz may play a role in the provision of ECS to enhance future capacity requirements especially in urban areas. The Commission should study the possibility of sharing in Europe between the FSS and terrestrial wireless broadband services in this frequency range, while recognizing that the situation within and outside Europe may differ, thus not enabling worldwide harmonisation for shared use of the band by wireless broadband services.

9. In considering the harmonisation of frequency bands for wireless broadband the Commission should take into account the fact that the actual use of bands for wireless broadband in Member States will vary, depending on the national requirements for broadband access and for other services.