EUROPEAN COMMISSION
Information Society and Media Directorate-General

Electronic Communications Policy
Radio Spectrum Policy Group
RSPG Secretariat

Brussels, 1 June 2012
DG INFSO/B4/RSPG Secretariat

RSPG12-425

RADIO SPECTRUM POLICY GROUP

Commission services' discussion paper on the future use of the 700 MHz band in the European Union

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COMMISSION SERVICES' DISCUSSION PAPER ON THE FUTURE USE OF THE 700 MHZ BAND IN THE EUROPEAN UNION

1. SETTING THE SCENE

The agreement at the 2012 World Radiocommunication Conference (WRC-12) to allocate the 700 MHz band[1] to wireless broadband (WBB) alongside broadcast services in ITU Region 1 with immediate effect after WRC-15 creates a number of challenges for EU spectrum policy. While it represents an early opportunity to add high quality spectrum to the total amount potentially available for wireless broadband, in support of EU targets, at the same time it would impose significant constraints on the spectrum available for terrestrial broadcasting at a time of transition to advanced formats such as high definition or 3D television.

The 700 MHz band is already available for use by wireless broadband in large parts of the world[2], but in the EU it is primarily used for terrestrial television. It has excellent physical characteristics that facilitate wide coverage as well as penetration in buildings, and offers significant bandwidth. This makes it a highly desirable asset for the wireless communications industry, which is confronted with the challenge to meet capacity and ubiquity requirements for rapidly growing wireless traffic. But it is equally attractive to broadcasters, and a significant number[3] of digital television channels have been deployed in the 700 MHz band following the switch-off of analogue television and the migration of broadcast transmission services away from the 800 MHz band. In addition, the white spaces (locally unused broadcast channels) are a viable spectrum resource for current and potential users ranging from the PMSE sector, machine-to-machine communication, emergency services or fixed wireless broadband access providers.

Any decision on the future use of the 700 MHz band in the EU must take these different interests into account and ensure that EU policy objectives are supported. Finding a balance between these different interests and objectives will be difficult, and if it is to be successful will require a strategic shift in thinking that acknowledges the implications of technological change and the likelihood of convergence.

With that objective, this paper from the Commission services sets out some of the policy considerations and possible options from an EU perspective in order to launch a strategic discussion with the Member States in the RSPG. As an informal discussion paper, it does not represent the official view of the European Commission and is without prejudice to any future decisions or policy initiatives that might be taken.

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1 The 700 MHz band is assumed to include the range 694-790 MHz, whereby the lower edge is subject to refinement at WRC-15 based on committed ITU-R studies in the period 2012-2015.

2 Albeit with differences in the frequency range and band plan, 700 MHz allocations exist in the USA, Canada, some African countries, Latin America, Japan, South-East Asia, Australia and New Zealand.

3 See MAVISE database of the European Audiovisual Observatory: http://mavise.obs.coe.int/

2. EU POLICY CONSIDERATIONS

- EU broadband targets

The Digital Agenda for Europe (DAE) sets ambitious targets for broadband access coverage and take-up, which may be achieved only through a technology mix including wireless broadband, in particular for rural areas or in response to the trend for fixed-to-mobile convergence. The availability of sufficient sub-1GHz frequencies within an EU harmonised spectrum portfolio is essential to meet these targets ensuring the deployment of low-cost WBB networks with ubiquitous coverage and high capacity.

- Internal market dimension

EU Member States' views regarding the future use of the 700 MHz band will be strongly influenced by the different legacy situation of national spectrum allocations and the state of development and take-up of other platforms. There is a risk to the internal market if this translates into contradictory decisions being taken in different Member States.

The prospect of having sub-1GHz spectrum available at global level under largely harmonised technical conditions creates great potential in terms of economies of scale and socio-economic benefits, including interoperability and roaming. Therefore, without prejudice to decisions taken within the EU, it is important that Member States contribute in a coherent manner within CEPT and ITU to the development of harmonised technical conditions for WBB in the 700 MHz band and for coordination with terrestrial television.

- Broadband-Broadcasting convergence

Convergence between the broadcasting and mobile domain is increasingly discussed as a possible long-term solution. Converged networks, which combine both broadcast and broadband functionality on the same platform, may follow the topology of mobile networks with low-power signal transmission, high density of antenna sites, and single-frequency use. Convergence would allow broadcasters to respond to the increasing consumer demand for interactive multimedia services and non-linear content alongside "live" broadcasting. Modern mobile standards already include broadcast/multicast functionality[4] or spectrum arrangements for supplemental downlink. Therefore, the 700 MHz band may open the opportunity to drive innovation and convergence between the WBB and broadcasting sectors towards a single wireless platform for the delivery of heterogeneous services. This implies that a number of technical, regulatory and commercial issues need to be addressed.

- Inventory

In light of the inventory process established by the Radio Spectrum Policy Programme (RSPP) and the objective to identify at least 1200 MHz for wireless broadband by 2015, opportunities are being studied to allocate additional spectrum for WBB based on balancing spectrum supply and demand and an evaluation of whether efficiency gains can be envisaged (via re-allocation, re-farming, sharing etc.). While contributing to the RSPP target for WBB spectrum, an early and isolated decision on the co-allocation of the 700 MHz band as of 2015 in the EU could potentially detract from the more comprehensive and coherent inventory process, which also takes into account spectrum needs in

[4] Such as IMB (UMTS TDD) and eMBMS (4G/LTE)

support of other relevant Union policies such as the terrestrial provision of innovative audio-visual media services or the production and provision of access to cultural content using PMSE equipment[5].

- Shared use of spectrum

In light of the RSPP, the Commission is also engaged in formulating a policy approach to the shared use of spectrum, which can significantly contribute to providing additional spectrum resources for broadband and making spectrum use more efficient. In this regard, the options of licence-exempt or licensed shared access (LSA) between WBB and broadcasting services in the 700 MHz band could be considered. In this context, the 700 MHz band offers an opportunity to put innovation into practice and realise beneficial sharing arrangements.

3. POSSIBLE OPTIONS FOR THE 700 MHZ BAND

- Basic scenarios

There are several possibilities for use of the 700 MHz band following its co-allocation to terrestrial broadcasting and WBB after WRC-15. Any policy decision in the EU needs to examine what is best in the long-term for Europe and take full account of technological and societal developments. Therefore, the following scenarios should be examined:

(1) Maintenance of the primary use for terrestrial television: the WRC decision will not oblige EU Member States to shift usage, but will simply allocate WBB on a co-primary status with broadcasting. Deciding not to avail of such an allocation would consolidate the position of broadcasting following the completion of the digital switchover and allows for the development of more high definition and the introduction of 3D and interactive television services.

(2) Exclusive spectrum use for WBB: incumbent broadcasters would migrate away from the band which would then be used exclusively by WBB operators – this is a similar scenario to the release of the digital dividend (800 MHz) band.

(3) Shared spectrum use: incumbent broadcasters and WBB operators would share the spectrum according to pre-defined harmonised technical conditions and, certainly in the early years after 2015, according to strict geographical separation.

(4) Convergence and spectrum pooling: broadcasting and mobile would converge to a single platform so that converged terrestrial operators can ultimately utilise the whole UHF broadcasting spectrum (470-862 MHz) to carry both wireless broadband traffic and broadcast media content.

Scenario (1) would clearly comfort the broadcast industry after a period of significant investment in the 700 MHz band, but is likely to act as a disincentive to moves toward even more spectrum-efficient compression and transmission technologies, which could lead to significant further spectrum savings in the longer term.

Scenario (2) would be beneficial assuming that consumer demand for terrestrial broadcasting would decrease in the long-term even if innovative more spectrum-hungry TV formats are largely deployed. In case consumer demand were to remain stable or even increase, and broadcasters maintain current "high-power" multi-frequency networks (MFNs) as their

[5] Articles 7 and 8 of the RSPP

preferred business model, they would have to resort to more spectrum-efficient technologies in the remaining UHF spectrum below 700 MHz such as DVB-T2 (for signal transmission) and MPEG-4 (for video compression) in order to compensate for the loss of available spectrum of nearly 30% represented by the 700 MHz band.

Scenario (3) offers mutual advantages, under a beneficial spectrum sharing arrangement, since it would not imply major spectrum loss for broadcasters in those countries where there is still significant reliance on terrestrial reception, and would not force them to invest quickly in more spectrum-efficient digital technologies (contrary to scenario (2)), while they are planning to offer spectrum-hungry services such as HDTV. However, a beneficial spectrum sharing arrangement between a low-power mobile network and a high-power broadcast network – other than splitting the 700 MHz band into two non-overlapping portions, one for each service – may be difficult to find because of the risk of interference, and would rely on strict geographical separation. Otherwise, a beneficial sharing arrangement is likely to be found if the broadcast network is deployed as a low-power single-frequency network, which minimizes interference to mobile networks, and/or if mobile operations are restricted to downlink-only (or TDD in general).

Scenario (4) is a long-term one and deployments are not realistic until well after 2015, and still with technical and economic uncertainties ahead. However, through progressive restructuring of the broadcast landscape, it may offer the long-term solution for all stakeholders – content providers, users of spectrum (such as network operators) and consumers – by integrating the provision of different services onto a single platform and boosting user experience and economies of scale. While this scenario may be applied to virtually all UHF broadcast spectrum used by future converged operators, the 700 MHz band could be used as a pilot band to start with.

- Paradigm shift: single-frequency broadcast networks

The concept of single-frequency networks (SFNs) has been incorporated in digital broadcast transmission standards (DVB-T/DVB-T2) and is also inherent to UMTS or LTE mobile networks. Broadcast SFNs allow more efficient spectrum use, in particular with a denser low-power network topology. However, the SFN concept, while costly for broadcast network operators, offers a long-term migration path towards better spectrum utilisation, the inclusion of interactive/non-linear multimedia services, and finally the opportunity of convergence between the mobile and broadcasting sectors.

SFNs are desirable under all scenarios above and may drastically reduce broadcasters' spectrum needs. It must be noted that SFNs would cause disappearance of white spaces, however the achieved overall spectrum savings may be translated into equivalent spectrum made available to white space applications and other uses.

- Infrastructure sharing

The potential transition of broadcast networks to SFN topology could create favourable conditions for reducing migration cost for broadcast network operators through regulated *passive* infrastructure sharing with mobile network operators. In this case, broadcast network operators and mobile operators could share network sites and masts allowing an overlaid dense broadcast network. Since passive infrastructure costs are estimated to constitute the bulk of investment in such a sharing model, infrastructure sharing may result in huge CAPEX savings for broadcasters. Furthermore, *active* backhaul infrastructure such as fibre or microwave links connecting shared sites with the wide-area network could also be shared to further reduce investment expenditure for broadcasters. Yet, it must be noted that broadcast network operators would normally have little or no prior experience with constructing dense low-power networks.

4. MORE CHALLENGES AHEAD

- Avoiding fragmentation in the internal market

In the meantime, taking account of the fact that the co-allocation of the 700 MHz band will be effective from 2015, and given the different situations in Member States, it is necessary to avoid fragmentation in the internal market. Without prejudice to whether any future decision might be taken on a possible mandatory approach at EU level, therefore, early consideration needs to be given to harmonised technical conditions for application in any Member State that decides to move ahead and introduce WBB services after 2015. These would also contribute to effective coordination with neighbouring MS that continue to use the band for broadcasting and other services.

- Compensation for spectrum re-allocation

A re-farming of the 700 MHz band to allow its use for WBB calls for upfront compensation of costs for the affected sectors – in the first place broadcasting and possibly other spectrum users. The need for public funding (possibly financed through fees for spectrum assignment to WBB operators) to mitigate potential interference (e.g. to cable TV) or to facilitate migration, sharing or innovation must be duly considered by the Member States in line with the provisions of the RSPP[6] and within the framework of EU competition rules.

- Cross-border coordination

The introduction of WBB services in the 700 MHz band – if confirmed by the inventory process and the necessary political decisions are taken – is likely to happen at different speeds across the EU. Therefore, Member States would need to negotiate agreements for coordinating their active (high-power) broadcast networks, subject to the Geneva 2006 broadcasting plan, and new 700 MHz WBB networks in order to avoid harmful interference and quality-of-service degradation in border regions. Such coordination will need to be based on a transparent, long-term EU strategy for the 700 MHz band and an effective mechanism to resolve conflicts, including the good offices of the RSPG.

Depending on the regulatory and technical approach agreed for the 700 MHz band at EU level, the question of whether a revision of the Geneva 2006 agreement is required will have to be examined, at least for the EU footprint within the GE-06 broadcasting plan.

5. CONCLUSION

The final decision on the future use of the 700 MHz band, following developments after WRC-12 and in light of EU policy objectives, should come from a common long-term vision and be based on broad stakeholder involvement. It must take into account developments in technology – including the convergence of communications services and platforms both in the broadband and audio-visual domains – as well as the trends of user demand and consumer behaviour, towards a sustainable EU internal market.

The Commission services invite RSPG Members to share their views on the future use of the 700 MHz band and the possible political and regulatory options at EU level.

[6] Article 6(5) of the RSPP