



Spectrum management strategy – Ofcom’s approach to and priorities for spectrum management over the next ten years

British Sky Broadcasting Group plc (‘Sky’) Response

Introduction

1. Sky welcomes the opportunity to respond to Ofcom’s consultation on its future spectrum management (“the Consultation”)
2. Sky is a heavy spectrum user, with activities ranging across many frequency bands. We use spectrum to deliver our services (via satellite, DTT, Wi-Fi and mobile), to create our content (using wireless microphones and cameras) and to connect our customers (through in-home and public Wi-Fi).
3. Our varied use of spectrum makes us well placed to appreciate the tensions between competing applications which make use of scarce spectrum, and the challenges that policymakers may face when considering approaches to spectrum management in the medium- to long-term.
4. Sky strongly supports any move that ensures more efficient use of spectrum, through (for example) the use of newer more advanced and efficient technologies, the application of market forces wherever practical and innovative approaches to allocation and access such as spectrum sharing.
5. Such an approach is consistent with Ofcom’s general duties as set out in statute, including securing the optimal use of the spectrum and encouraging investment and innovation. Ofcom recognises that, in performing its role of determining the future use of spectrum (in both the short and long term), it needs to balance competing demands for this scarce resource, and act in a manner that is consistent with its regulatory duties. It is right, therefore, that Ofcom seeks to take a strategic approach to spectrum management.
6. Sky is also a member of the Dynamic Spectrum Alliance, and supports the submission made by that organisation in response to the Consultation. This response is made in addition to the submission from the DSA.

Market mechanisms remain the most appropriate way to allocate and manage spectrum

7. The Consultation notes that Ofcom’s previous strategic spectrum exercise, undertaken in 2005, focused on the introduction and extension of market mechanisms as the most effective manner of delivering optimal spectrum use. But the Consultation goes on to highlight a change in Ofcom’s strategy, with more emphasis now being placed on a ‘command and control’ approach in various bands. Ofcom states that ‘there can be an important and complementary role for us to play in addressing situations where market mechanisms alone

are unlikely to deliver the greatest value to society from spectrum use'. The Consultation goes on to identify a number of market failures which might necessitate regulatory intervention.

8. Sky considers that commercial operators remain best placed to identify and implement changes in spectrum allocation and usage, and that regulators should only act where there are demonstrable market failures. While Ofcom may be correct in its assertion that regulatory action could be required in a number of areas over the next 10 years, this situation is primarily a product of Ofcom's failure to implement its market-led approach in a substantial manner.
9. As the Consultation highlights, 'block-assigned' spectrum (i.e. bands within which licensees who acquired the spectrum as a result of market mechanisms manage their own deployment with a high degree of flexibility) accounts for only 12% of weighted spectrum, in contrast to the 53% of spectrum which remains 'Ofcom band-managed' and the same percentage which is managed by the Crown¹. Similarly, Ofcom's suggestion that '84% of relevant spectrum is now tradable' rests upon the definition of what constitutes 'relevant' spectrum, and the extent of any restrictions on licences which are tradable (e.g. whether or not they are technology neutral).
10. In short, the market failures which Ofcom cite as justification for a greater reliance on regulatory interventions are not *inherent* limitations of a market-led approach - instead, they are in many cases the product of a spectrum allocation framework which has not been sufficiently liberalised to allow market mechanisms to be effective.
11. It is also apparent that in instances where Ofcom has intervened extensively, such as digital switchover and subsequent clearance programme, these interventions have frequently resulted in missed opportunities and spectrally inefficient outcomes. Even post-DSO, DTT in the UK still predominantly makes use of MPEG2/DVB-T for standard definition broadcasts, while most of the EU is using the more efficient MPEG4/DVB-T2 technologies. Were the 5 existing multiplexes switched to MPEG4/DVB-T2 this would create a further 75 Mbits of capacity (the equivalent of two new multiplexes) without any increase in bandwidth allocation for DTT. This would effectively remove the need for the two interim HD multiplexes Ofcom has licensed, and at the same time potentially reduce the costs of DTT SD capacity significantly. Instead, a regulator-led process has seriously disadvantaged the UK in as much as it has increased the amount of bandwidth for DTT without imposing any efficiency savings on existing users - all at a time when others led by the US and Germany are looking at reducing the amount of bandwidth used for DTT.
12. Ofcom should therefore ensure that it continues to place importance on the introduction and expansion of market mechanisms for spectrum allocation. This will ensure that, in the future, the requirement for regulatory interventions in managing spectrum will diminish and Ofcom's duties will be more effectively fulfilled.

Ofcom seriously underestimates the significant role that Wi-Fi will play in meeting future spectrum challenges, and should actively seek to secure and enhance the benefits it brings

13. The Consultation seeks to examine the key consumer and technological developments that will drive spectrum demand and supply over the next ten years. But the position of Wi-Fi within this framework is unclear. Ofcom's consideration of 'mobile and wireless data' in section 3 does not appear to include Wi-Fi, with the technology instead being considered

¹ Not accounting for overlaps

under the 'licence-exempt' heading. This is despite Wi-Fi accounting for the vast majority of wireless data transfer currently (and with this role being predicted to increase). While Wi-Fi is subsequently included in section 6 under the 'mobile and wireless data' priority, it is mentioned only briefly as a more minor aspect of Ofcom's proposed work programme.

14. In fact, the evidence suggests that facilitating the expansion of Wi-Fi – both in terms of coverage and capacity – should be a key priority for Ofcom.
15. We have outlined our views on the future levels of demand for wireless data transfer, and the crucial role that Wi-Fi plays and will likely play in meeting this demand, in many of Sky's previous responses to Ofcom. But this evidence bears repeating given the impact that Ofcom's spectrum management decisions will have in the coming years.
16. Wi-Fi plays a fundamental role in the wireless data ecosystem as the primary technology which consumers use for data transfer. In the case of smartphones and tablets, Wi-Fi carries 69% of total traffic generated. For traditional PCs and laptops, Wi-Fi is responsible for carrying 57% of total traffic, greater than the share of Ethernet connections and 3G data combined². Typically, Wi-Fi is provided to consumers for little or no charge, which may in part account for its usage being higher than more costly mobile services.
17. This role is only anticipated to increase as Wi-Fi helps meet the growing demand for wireless data, and in doing so increases the value of applications which make use of Wi-Fi significantly. For example, Ofcom acknowledges that half of the predicted increase in wireless data demand can be expected to be served by offloading mobile data onto fixed networks, including Wi-Fi networks³.
18. Indeed, Wi-Fi should be recognised as a significant wireless technology in itself, not merely as an additional method to connect cellular devices. Globally there are expected to be over 3 billion Wi-Fi devices sold in 2013, and it is worth noting that many consumer devices do not have cellular capability, including a significant amount of tablets sold (up to 90%) which are Wi-Fi-only devices.
19. Sky operates both in-home and enterprise Wi-Fi. Our 5 million plus broadband subscribers extensively use Sky's wireless routers to access the internet via portable devices. And as a Wi-Fi hot-spot service provider via The Cloud, Sky is acutely aware of the importance of Wi-Fi in catering for consumers' mobile data demands out-of-home.
20. Ofcom studies have suggested that congestion and interference are already adversely affecting Wi-Fi performance. Sky would concur with this view, having experienced an increase in congestion in our enterprise Wi-Fi as demand has risen. We anticipate that this will be mirrored in our in-home Wi-Fi, with more and more content being transferred in-home as customers seek greater flexibility, driven through product innovations such as Sky Go.
21. There are a number of anticipated technological developments (some of which the Consultation acknowledges, such as Passpoint) which will serve to enhance the user experience of Wi-Fi and in some instances make more efficient use of the spectrum Wi-Fi

² See the report by Richard Thanki "The Economic Significance of Licence- Exempt Spectrum to the Future of the Internet", June 2012.

³ Paragraphs 1.8, 1.10, 'Securing long-term benefits from scarce spectrum resources', Ofcom, March 2012. Available at:
<http://stakeholders.ofcom.org.uk/binaries/consultations/uhfstrategy/summary/spectrum-condoc.pdf>

uses. But these developments will only advance the consumer experience so far. More licence-exempt spectrum for use by Wi-Fi is still undoubtedly needed.

22. There is, for example, urgency in ensuring a greater amount of 5 GHz is allocated to licence-exempt use. Data from The Cloud demonstrates that 5 GHz is increasingly being used to carry significant levels of data. We expect this trend to continue as consumer devices which are built for the US market become more prevalent in Europe.
23. This urgency is even greater given the anticipated interference to 2.4 GHz that will occur as a result of the award of the 2.3 GHz band to mobile services, expected in 2015/16. With Ofcom's earliest indications suggesting that (for example) up to a quarter of outdoor public networks could be affected, more spectrum will be needed even to simply maintain the current level of consumer benefit, let alone to meet expected future demand.
24. It is therefore imperative that Ofcom takes steps toward ensuring greater spectrum availability by extending the 5 GHz spectrum availability to licence free use by adding 5350-5470 MHz (120 MHz) and 5850-5925 (75 MHz) at the earliest opportunity. Ofcom should also look to adopt a dynamic spectrum access approach in these bands, rather than the dynamic frequency selection (DFS) mechanism which hinders 5 GHz deployment (in contrast to the relative freedom afforded at 2.4 GHz). Furthermore, we are of the view that limiting the allowed channel bandwidth to a maximum of 40 MHz would ensure more efficient spectrum use and minimise co-channel interference in locations where spectrum is highly utilised.
25. The Consultation notes that Ofcom will set out its position on this issue in CEPT and WRC working groups, following a detailed study of coexistence. Given the evidence and urgency of the situation, Ofcom must take steps to accelerate this process and advocate far more forcefully for such an allocation. Indeed, the consumer benefits that Wi-Fi delivers are so high as to merit a delay in the award of the MoD spectrum until such time as this mitigation has been agreed.
26. Even this measure may not be sufficient to meet expected demand. A recent report by Real Wireless estimated that the UK will face a serious spectrum shortage by the end of this decade if 350 MHz of Wi-Fi spectrum is not made available⁴. Ofcom should therefore also examine other bands which may be suitable for licence exempt designation.
27. This evidence suggests that, regardless of whether Ofcom considers Wi-Fi as part of its 'mobile and wireless data' or 'licence exempt' category, the importance should be rated as 'high' for both impact and urgency. An expansion of Wi-Fi spectrum is clearly needed, and the associated consumer benefits are evidently high.

Spectrum shared on licensed, licence-exempt and a dynamic access basis can play an important role in opening up access to greater amounts of spectrum and supporting innovation.

28. Sky welcomes the inclusion of spectrum sharing as one of Ofcom's key 'cross-cutting' priorities. In Sky's view, this method of spectrum access will become increasingly prevalent (and indeed necessary) as demand for spectrum increases from competing applications and technological developments facilitate more efficient usage.

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See report summary available at http://www.telecoms.com/202191/uk-spectrum-crunch-likely-to-lead-to-contentious-solutions/?utm_source=rss

29. Sky is strongly of the view that the introduction of white space devices will be of great benefit to the UK – not just in the under-utilised UHF spectrum occupied by DTT, but across many other spectrum bands in the future. Ofcom has an opportunity to make the UK a world leader in this area, influencing the viability of technology on a global scale and becoming the country that others look to as an example of progressive, market-led regulation.
30. Ofcom's steps to enable unlicensed access to TV white spaces are an important first step in realising the benefits of dynamic spectrum access. Sky looks forward to working closely with Ofcom as it finalises this work ahead of implementation. In particular, we would stress the importance of the starting conditions being permissive and not unnecessarily onerous. Significant over-protection of other spectrum uses based on the cascading of worst case protection elements should be avoided, when it is clear that doing so would unnecessarily hinder the launch of this dynamic innovation.
31. The TV white spaces project should be seen as only the start of the process. As methods for dynamic spectrum access improve, this type of allocation and access can play an increasingly important role in facilitating efficient use of spectrum and realising the full potential of services.
32. More intensive dynamic spectrum sharing should be a key regulatory objective, allowing regulators to accommodate the varying demands of different uses of spectrum. Dynamic spectrum access should be extended in future to other frequencies – starting with those where there is a prospect of international harmonisation in the near future. Indeed, over time, spectrum sharing should become the default policy for spectrum allocation, with a move away from the more traditional practice of allocating particular bands to specific uses.
33. The evidence from pilots that have been conducted and deployment in other countries indicates that dynamic spectrum access by white space devices across a multitude of bands is workable and comes with significant associated benefits. The use of geolocation databases and, in time, the development of cost-effective sensing technologies will enable co-existence issues to be managed, and mitigate the risk of a 'tragedy of the commons' emerging.

Greater spectrum efficiency should be incentivised and required in other sectors

34. Sky notes and concurs with the inclusion of PMSE, DTT and equipment standards as three of Ofcom's key priorities. It is crucial that in each of these areas (and others), Ofcom takes steps to deliver the greatest possible level of spectrum efficiency, in line with Ofcom's duties.
35. In the broadcasting sector, for example, there are a number of steps policymakers and industry could take in order to free-up more valuable UHF spectrum. Spectrum sharing on a geographic basis is already being examined and progressed by Ofcom. But technological developments can provide further efficiencies, be they existing standards used to some extent within DTT such as DVB-T2 MPEG 4, or new delivery mechanisms such as eMBMS that can efficiently deliver content on mobile networks. Similarly, more innovative approaches to network planning such as Single Frequency Networks could be explored as another way of increasing the amount of spectrum available for other purposes. Ofcom should also look to fulfil its duties by incentivising greater efficiency via the prices it sets for DTT spectrum – we note that the current proposals of cost recovery patently do not achieve this.

36. Similarly, in light of squeezes on spectrum that increased demand will bring (and specific Ofcom policies such as the UHF spectrum strategy and MoD spectrum release), Sky considers that in the medium- to long-term more efficient PMSE approaches will need to be developed. There will need to be improvements in the latency and power consumption of digital equipment to allow existing analogue inventories to be replaced by more efficient equipment. In the longer-term, development of cognitive sensing and geo-location technology may facilitate a move towards PMSE being treated as another class of white space device.
37. Sky also notes Ofcom's consideration of spectrum used for DTH satellite. The Consultation states that 'demand for spectrum for DTH TV could grow in future with the development of HD and UHD TV services', and also states that 'more advanced video compression technologies and smaller beam technologies could be developed to increase the spectral efficiency of HD and UHD TV'.
38. Whilst it is true that any deployment of UHD TV services could benefit from more advanced video compression, HD services will not benefit because the technology to receive them is already well established in the market. Thus the spectrum required for new services such as UHD TV is incremental to that being used for other services. We therefore believe that, in order not to stifle development of new services such as UHD TV, Ofcom should revise upwards its assessment of demand for end user services in the space segment and look again at measures it could undertake to support the consideration at WRC-15 for an extra 2 x 250 MHz in the Ku band.