# Technical coexistence issues for the 2.3 and 3.4 GHz award

## British Sky Broadcasting Group plc ('Sky') Response

1. Sky welcomes Ofcom's consultation on the coexistence issues associated with the 2.3 and 3.4 GHz spectrum release ("the Consultation"). Interference with existing applications, many of which currently deliver significant benefits to UK citizens, is a crucial aspect of this spectrum award and one which warrants Ofcom's careful consideration.

2. Ofcom is therefore right to have undertaken work aimed at quantifying its impact. But Sky has reservations regarding aspects of Ofcom's approach, specifically:

    - Ofcom's failure to undertake work which estimates the benefit currently delivered by Wi-Fi (and indeed other uses which may be impacted by coexistence). Without an indication as to the value that current uses deliver, Ofcom cannot sufficiently assess the scale of the impact and make a fully informed decision as to what mitigation steps are necessary.

    - the methodology used to predict levels of interference by LTE services at 2.3 GHz into Wi-Fi operating at 2.4 GHz. In particular, Sky (and, we understand, other operators) does not consider Ofcom is justified in applying a 10 dB correction factor in its central case modelling, and is of the view that the 'pessimistic case' should be used as the basis for Ofcom's current decisions and further testing.

3. Notwithstanding these issues, Sky continues to consider that even 'limited' interference from new LTE services to Wi-Fi operating at 2.4 GHz will further exacerbate the congestion which operators and consumers are already experiencing. An appropriate mitigation for these coexistence issues would be to fast-track the release of more 5 GHz spectrum for Wi-Fi use. Sky welcomes the progress Ofcom has made in this regard, but would continue to urge that a release be made at the earliest opportunity.

**Ofcom's consideration of the award requires a full assessment of all related impacts**

4. Ofcom suggests that in developing a framework for considering interference issues, it must strike a balance between two issues[1]. First, the principle that licence-exempt spectrum may not cause interference to other spectrum users and may expect no protection themselves from other users. Second, the duty to consider any potentially negative impact on citizens and consumers arising from the future use of the award bands for services such as LTE.

5. In fact, Ofcom misconstrues its duties in this regard. There is not a balance to be struck between these two issues – rather, one is a subset of the other. It is incumbent on Ofcom to further the interests of citizens and consumers in respect of communications markets. The principle relating to licence-exempt use may be one way to achieve this, but adherence to this principle is not to be 'balanced' against any negative impact on consumers. Rather, the overall

[1] The Consultation, paragraph 4.49

impact (both the loss of Wi-Fi and the benefits that licensed use might bring) should be assessed, with the net positive or negative outcome serving as a basis for regulatory decisions – such as whether and how to award, and what mitigating steps are required.

6. Ofcom states that the Consultation comprises an impact assessment, as required by its duties. Ofcom's own guidance on impact assessments indicates that an impact assessment will generally "*identify and, where possible, quantify the costs and benefits flowing from the impacts which each option would have*" (emphasis added)[2]. However, Ofcom has chosen not to quantify either the costs of the anticipated interference or the benefits associated with the release of spectrum at this time. Consequently, Sky does not consider that Ofcom's assessment of necessary mitigation is robust.

7. Sky has expanded at length in previous submissions[3] on the benefits that Wi-Fi brings, and maintains the view that a full cost benefit analysis is required to identify whether the erosion of these benefits is offset by the value that an award would bring, or indeed if the interference Ofcom identifies should be otherwise mitigated. While Ofcom correctly notes the extensive deployment and coverage of Wi-Fi, it fails to note the benefit that this widespread availability and use delivers. Indeed, the primary advantage Wi-Fi provides for consumers over other data transfer technologies is that it is frequently free at the point of use (or at least at a lower price than mobile data is commonly offered at). Similarly, the Wi-Fi capability of many millions of devices is a key strength of the technology.

8. Sky would also urge Ofcom to be cautious in its evaluation of the benefits, likely roll-out and usage of future mobile services operating on this spectrum. The Consultation details current and expected future use of LTE services in both the 2.3 GHz and 3.4 GHz bands. The implication is that significant and widespread international adoption of these services is to be expected. But extensive deployment of LTE services in these bands across other global regions is infrequent at best, and certainly limited within the rest of the EU. As the Consultation notes, only four countries have launched commercial LTE services using 2.3 GHz (often at the bottom of the band), and while trials are ongoing in several other territories, major consumer markets such as the USA are not amongst them. Similarly, the Consultation notes that there have been 'authorisations' of the 3.4 GHz band for wireless broadband in a number of countries, but to Sky's knowledge there are no current commercial deployments. Indeed, it is notable that the UK allocation in this band has remained largely unused since it was awarded over a decade ago.

9. Ofcom should take the relatively low usage of these frequencies for mobile use into account when assessing the likely benefit of releasing the spectrum. Given the limited international roll-out, it may be that the consumer value which is anticipated to arise does so only after a delay, as devices are released in line with wider adoption. The implications of this should be examined further, particularly given that Ofcom considers the market-led mitigation steps may also take time to be adopted on a widespread basis.

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2 http://stakeholders.ofcom.org.uk/binaries/consultations/better-policy-making/Better_Policy_Making.pdf

3 See previous Sky submissions to Ofcom, including: Mobile Data Strategy; Spectrum Management Strategy; the Future Role of Spectrum Sharing.
http://stakeholders.ofcom.org.uk/binaries/consultations/mobile-data-strategy/responses/Sky.pdf
http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum-management-strategy/responses/SKY.pdf
http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum-sharing/responses/BSkyB.pdf

**Ofcom should use an appropriate methodology for predicting interference, backed up by real-life tests**

10. Sky welcomes the work that Ofcom has undertaken in modelling interference from LTE services into other applications operating in adjacent bands. But we have misgivings regarding the methodology which Ofcom has adopted in modelling the likely level of interference.

11. The three metrics that Ofcom has used to quantify interference into Wi-Fi (onset of degradation; throughput dropping below 50%; and, throughput dropping below 1 Mbps) are based upon a series of assertions that do not appear to be supported by evidence of the consumer experience. For example, Ofcom states that the point at which the throughput drops below 50% is '*considered particularly useful when understanding the impact to client devices*'[4]. It is unclear in this instance whose consideration Ofcom is referring to, or what studies or research this statement is based on.

12. Sky accepts that there is likely to be a variation between consumers in what constitutes 'identifiable' performance degradation. But in the absence of any evidence suggesting that one metric may be more applicable than others, Ofcom should make further results of its modelling available (for example, by presenting the figures for the 'onset of degradation' for client devices).

13. Ofcom also does not appear to have an evidential basis for applying the 10 dB correction to its modelling in the 'base case' scenario presented in the Consultation. A 10 dB correction should only be used if the assumption is validated through 'real-life' deployments and tests (which would enable the proposed mitigation steps to be evaluated as well). Ofcom should work with operators to ensure that these tests are robust and reflective of the current real-life deployment of access points.

14. Unless additional tests provide substantive evidence to validate Ofcom's assumption, the 'pessimistic case' set out in the Consultation should be used as the basis for consideration of the award process and mitigating steps. Sky would note that the rise in interference (particularly in terms of outdoor networks) is significant.

**While the market may mitigate the potential interference Ofcom identifies, more spectrum is still required for Wi-Fi**

15. Ofcom concludes that the impact to Wi-Fi is low, and cites market-led developments as key mitigating factors for the interference which will occur. In particular, the Consultation states that many devices (including tablets and smartphones) have both Wi-Fi and mobile internet capability, and assumes that chipset manufacturers will ensure future equipment is developed to take account of both Wi-Fi and 2.3 GHz LTE.

16. However, as noted above, large-scale deployment of LTE services in this band has not yet occurred in major markets around the world. It is reasonable to assume a delay in the widespread introduction of more robust equipment, beyond the 18-24 month replacement cycles which Ofcom highlights.

17. Similarly, some equipment – in particular Wi-Fi routers – will have longer replacement cycles than the 18-24 month projection, with timescales in the region of 3 to 5 years. The projected

[4] The Consultation, paragraph 6.34

timetable will therefore result in additional expense for business and consumers, greater than Ofcom anticipates.

18. Other of Ofcom's mitigations fail to take into account that Wi-Fi use is continuing to grow at a significant rate. The evolutions that the Consultation highlights – in particular the increased inclusion of 5 GHz capability in devices – would have been expected to help manage this growth. Therefore even if the market works to overcome the interference which Ofcom anticipates, the increased levels of congestion at 5 GHz may still constitute a negative impact on UK citizens and consumers.

19. Ofcom should prioritise offsetting any loss through interference with additional Wi-Fi spectrum. Sky has highlighted before that it considers it 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, Sky is 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.

20. It is notable that the FCC, faced with a similar situation of potential deterioration of Wi-Fi services at 2.4 GHz (through the liberalisation of Globalstar's spectrum holdings) is seeking to maintain the benefits that Wi-Fi delivers by freeing up more licence-exempt spectrum at 5 GHz.

**Sky** **May 2014**