



**BBC response to Ofcom's consultation:  
*'Improving consumer access to mobile services at  
3.6 to 3.8 GHz'***

**1 December 2016**

## Overview

1. The BBC welcomes the opportunity to respond to Ofcom's consultation 'Improving consumer access to mobile services at 3.6 to 3.8 GHz'.
2. The BBC has a range of interests in this spectrum in order to serve its responsibilities under its Royal Charter and Agreement and meet the needs of the 97% of the UK public it serves weekly and the 320m people it serves globally. Our interests reflect the organisation's history and continued work in supporting the development of communications technologies. These interests include the use of 3.6 to 3.8 GHz by BBC Monitoring and our contribution to future mobile technologies which have the potential to deliver content to licence fee payers in new ways.

### *BBC Monitoring*

3. Our predominant interest in 3.6 to 3.8 GHz is in the continued operation of BBC Monitoring.<sup>1</sup> BBC Monitoring tracks open source media from around the world in multiple languages in order to understand and explain international news and views. This 24 hour a day, 7 days a week monitoring service follows TV, radio, press, internet and news agencies and is provided to the BBC, the UK government and a range of commercial clients, including media organisations, NGOs, universities in the UK and around the world.<sup>2</sup> As part of the News division, this monitoring service helps the BBC remain a world leader in covering global news and events, providing access to footage from TV channels around the world for the UK and global audiences. A recent Select Committee report confirms the work of BBC Monitoring is "of vital interest" to parts of Government.<sup>3</sup>
4. Interference-free C-band spectrum<sup>4</sup>, including 3.6 to 3.8 GHz, is crucial to this work and access across the entirety of C-band is required. BBC Monitoring has no control over the frequencies used by other broadcasters so the flexibility to access services across this range is essential in order to be able to receive the required national and international satellite television and radio broadcasts and to be able to adjust when they change. C-band is favoured by TV broadcasters in many regions including Africa, Russia, parts of the Middle East and Central/South America.
5. Roll out of mobile services in 3.6 to 3.8 GHz across London and the South East would mean monitoring operations in this band would need to cease, rely on alternative technologies or move to an alternative geographic location inside or outside the UK. For reasons set out in paragraph 34 we do not believe alternative technologies are suitable in these circumstances. Locating services outside the UK is not always possible for a variety of reasons including cost,

---

<sup>1</sup> The BBC holds grants of Recognised Spectrum Access (RSA) for Receive Only Earth Stations (ROES) which cover this band for our sites at Caversham and Crowsley Park.

<sup>2</sup> Provision of monitoring services to external parties generates commercial revenues. These revenues help keep the cost of providing this service as low as possible for licence fee payers.

<sup>3</sup> [http://www.publications.parliament.uk/pa/cm201617/cmselect/cmfa/732/73205.htm#\\_idTextAnchor009](http://www.publications.parliament.uk/pa/cm201617/cmselect/cmfa/732/73205.htm#_idTextAnchor009)

<sup>4</sup> In this response we refer to C-band as the spectrum from 3.6 to 4.2 GHz and extended C-band as 3.4 to 3.6 GHz.

The BBC's response to Ofcom's consultation:  
'Improving consumer access to mobile services at 3.6 to 3.8 GHz'

safety of personnel and lack of certainty in respect of spectrum access.<sup>5</sup> In particular, to invest and move collection of sources to alternative non UK locations carries the risk that these countries are not part of the same regulatory framework and therefore there would be little guarantee of long term access to support the move and the necessary investment.

*Additional World Service Group concerns*

6. Globally the BBC's World Service Group (WSG)<sup>6</sup>, with its weekly global audience of 320 million people, currently relies on spectrum elsewhere in C-band as well as Ku and Ka for the creation and distribution of its multi-media, multilingual content to audiences across the world. BBC Worldwide also uses C-band satellite services as part of its global distribution to customers. This global reach provides important value to the UK. These operations do not currently use 3.6 to 3.8 GHz but spectrum higher up in the band. However, these services may also be impacted as the reduction in the number of C-Band transponders available due to the loss of 3.6 to 3.8 GHz will put greater pressure on the remaining capacity available at 3.8 to 4.2 GHz.

*Consumption over mobile*

7. The BBC also has an interest in mobile distribution technologies. We are contributing to the development of mobile standards today so that mobile can more easily meet the growing needs of viewers to access the content they want, whenever they want, wherever they are. For example, we have ongoing engagement with 5GPP and other industry and international forums. We are also building partnerships with industry through trials (e.g. trials at the 2014 Commonwealth Games and 2014 World Cup).
8. We recognise the need for new spectrum to meet consumer demand for data, and we believe that if existing users of 3.6 to 3.8 GHz can coexist, this could be a useful band for meeting mobile demand.
9. However, we believe the two options set out in the consultation would not realise the best value for UK citizens and consumers as they would unnecessarily and severely constrain the operations of some incumbents. We therefore welcome Ofcom's suggestion that there is the potential for other solutions (paragraphs 1.8 and 9.3) and set out conditions which might mitigate the constraints on incumbents facilitate in answer to Ofcom's questions below. We recognise the complexity of this decision and the number of interdependencies. We would therefore stress in particular that we would like to work with Ofcom to understand the feasibility of alternative options such as geographic separation.

10. ✂

11. ✂

---

<sup>5</sup> We are not aware of licensing arrangements similar to RSA outside the UK.

<sup>6</sup> WSG includes World Service, BBC World News, bbc.com, BBC Media Action and BBC Monitoring.

## Answers to questions in Ofcom's consultation

*Question 1: Do you have any comments on the use of the 3.6 to 3.8 GHz band by existing services?*

12. The proposed changes are likely to have a material impact on BBC Monitoring operations. BBC monitoring of C-band and extended C-band has been carried out in the current locations since the early 1980s with considerable ongoing investment.<sup>7</sup> BBC Monitoring provides a vital service sourcing news and information from freely available media in 100 different languages from 150 different countries. This material is translated and analysed and fed into BBC news services, thus enriching the content available for UK citizens and consumers. The service is used and highly valued by the UK Government<sup>8</sup>. Some of the priority countries monitored by our teams make significant use of C-band spectrum and are investing in more C-band capacity.
13. BBC Monitoring services rely on access to a large range of often changing frequencies across C-band and Ku band - the satellite spectrum used by broadcasters around the world. Access across this range is required for gathering content, so whatever frequencies are being used can be received. We have no control over which frequencies are used by other broadcasters (not even the limited/indirect control referenced in paragraph 4.26) and flexibility is essential in order to be able to receive the required national and international satellite television and radio broadcasts and to be able to change when they change.
14. The receive-only nature of BBC Monitoring operations and the requirement for flexibility of use, means large antennas are required and, when used at low elevation angles,<sup>9</sup> are highly susceptible to interference from adjacent (in frequency and geography) signals. Past experience of operating in this band with other terrestrial users has shown that the desired signals are often impossible to receive due to interference. Spectrum and particular antenna elevations and azimuths are effectively rendered unusable which risks preventing access to vital sources.
15. This means the capabilities of monitoring could be materially impacted by taking away the ability to monitor between 3.6 to 3.8 GHz, especially when combined with the expected loss of service between 3.4 to 3.6 GHz. Removal of access will remove flexibility. When content, information or analysis is required from BBC Monitoring, BBC news editors and BBC Monitoring's clients expect it to be available without delay. This service is especially in demand where other communication channels, such as the Internet, may be deliberately blocked (for example during periods of political instability). In these cases receiving satellite signals is often the most effective way to monitor and verify developments – and to report events accurately to UK audiences. Without the use of satellite systems providing this service would be much more difficult, much slower, and much more costly.
16. The changes will also have an impact on the wider satellite community. In terms of satellite use and design, the 3.6 to 3.8 GHz band is part of the wider C-band and extended C-Band (with

---

<sup>7</sup> At Caversham since the early 1980s and at Crowsley Park since the early 1990s

<sup>8</sup> <http://www.parliament.uk/business/committees/committees-a-z/commons-select/foreign-affairs-committee/news-parliament-2015/bbc-monitoring-report-published-16-17/>

<sup>9</sup> Typically less than 15 degrees

The BBC's response to Ofcom's consultation:  
'Improving consumer access to mobile services at 3.6 to 3.8 GHz'

uplinks between 5.8 and 6.4 GHz, and downlinks between 3.4 and 4.2 GHz). These links are used for satellite services of a global nature and cross international boundaries. The continental coverage and reliability provided by the availability of this spectrum across the world for satellite services makes it essential to broadcasters for contribution, communications and distribution.

17. Ofcom has assumed light use in 3.6 to 3.8 GHz by the satellite service, but this does not account for the fact that these links are likely to be part of a broader service. For example, a UK based service might operate an uplink between 5.8 and 6.4 GHz with just a few downlinks between 3.6 and 3.8 GHz in the UK. However, there are also likely to be associated additional corresponding downlinks elsewhere in the world comprising a broader service.<sup>10</sup> The UK downlink is an essential part of this service and cannot, for technical and economic reasons, be placed elsewhere.<sup>11</sup> We have previously emphasised to Ofcom that without acknowledgement of both uplink and downlinks (inside or outside the UK) an incomplete picture of UK use is given.<sup>12</sup>

*Question 2: Do you agree with our identification of a trend towards the use of mobile in the 3.6 to 3.8 GHz band?*

18. We broadly agree with the trends Ofcom has set out, although we would urge caution in drawing conclusions beyond Europe and the US. This is because many countries near or within tropical or equatorial regions such as Africa, Latin America and parts of Asia rely on C-band to provide essential services. Indeed, after lengthy and difficult discussions under Agenda Item 1.1 at WRC-15, there was no consensus on changes to the Radio Regulations between 3.6 to 3.8 GHz in any of the three ITU regions. The characteristics of C-band, as noted in paragraph 4.17 of this consultation, are a fundamental reason why it may be problematic to assume that a solution suitable for the UK or Europe will gain global support.

*Question 3: Do you agree with our high level proposal to make 116 MHz within the 3.6 to 3.8 GHz band available for mobile and 5G services, bearing in mind our statutory duties and the high level trends we have identified?*

19. We believe that Ofcom should consider alternative solutions to the 'retain' and 'remove' options set out in the consultation. Such alternative solutions deserve to be fully explored as they would allow existing services to continue to operate in this spectrum without providing a practical constraint to the widespread availability of 5G to people across the UK.

---

<sup>10</sup> An example above 3.8 GHz is BBC World Service Africa distribution which is uplinked from the UK, monitored by the operator and the BBC via two UK downlinks, and also downlinked for onward distribution in around 300 sites across Africa.

<sup>11</sup> The uplink operator requires the ability to monitor the off-air downlink from the satellite in order to check that the service being uplinked is available without errors to the distant users and most permanent uplinks (particularly in areas where rain is common) require the ability to monitor the downlink power level in order to adjust the uplink power (this is all automatic) in order to maintain the link. In the BBC's case full bandwidth off-air monitoring of its international distribution allows us to feed content back to operational and production teams. The further this is located away from these teams in London the more costly and expensive this is to do.

<sup>12</sup> [BBC response](#) to Ofcom's Call For Input on the 3.8 GHz to 4.2 GHz band

20. Options for coexistence in 3.6 to 3.8 GHz might be helpfully considered alongside recommendations about the future use for satellite services between 3.8 to 4.2 GHz. This is because uncertainty has been introduced about the future of satellite services in this band following Ofcom's call for input earlier this year about the potential for satellite services sharing 3.8 to 4.2 GHz with other users. Any future coexistence options which required further investment to retain services between 3.6 and 3.8 GHz should therefore be linked to certainty around future availability of satellite spectrum between 3.8 and 4.2 GHz as well.

*Question 4: Do you agree with our general approach regarding spectrum currently licensed to UK Broadband?*

21. There is currently a co-ordination agreement between BBC Monitoring and UK Broadband on spectrum use between 3605 and 3689 MHz. Therefore, any changes to UK Broadband's licence conditions will have an impact on BBC Monitoring. We would urge that any changes to UK Broadband's licence to facilitate other mobile services in the band will only take place when they become necessary. For example, immediately before the launch of new mobile services in 3.6 to 3.8 GHz, rather than several months or years prior to roll out.

*Question 5: Do you agree with our assumptions, methodology, and conclusions with regards to potential coexistence between mobile and existing fixed links and satellite earth stations? Please refer to annex 5 for further details.*

22. The BBC appreciates the significant work that has gone into studying the potential for coexistence in this band, from the commissioning of the Transfinite report to the more detailed Ofcom study; the conclusions of which we see in this consultation.

23. We do, however, have two main concerns with the coexistence work and conclusions:

- **There is a need for further work on out-of-band emissions to be carried out:**  
The Transfinite report covered the wider range 3.6 to 4.2 GHz and only provided preliminary studies on out-of band interference. As Annex 5 notes, further studies are needed. This is especially important as no consideration was made of what a split at 3.8 GHz would do, or the fact that in current Fixed Satellite Service deployments there is no adjacent channel selectivity at 3.8 GHz.
- **Filtering and shielding would not be viable mitigations for BBC Monitoring:**  
The conclusions and recommendations of both studies are based on the assumption that filtering and site shielding can be used as a mitigation. Filtering is not always appropriate with respect to ROES like Caversham and Crowsley Park which monitor across a large range of frequencies. This is because filters limit the facility to monitor across the spectrum range<sup>13</sup>. This requirement means these sites are very susceptible to out of

<sup>13</sup> See BBC response to Ofcom's call for input: 3.8 GHz to 4.2 GHz band: Opportunities for Innovation - "Filters are only suitable as a mitigation to allow sharing where a fixed frequency is used at a fixed location. Filters are not a suitable mitigation for frequency-agile applications such those of BBC Monitoring where a wide range of frequencies will need to be accessed on a dynamic basis across this band". (para 12)

The BBC's response to Ofcom's consultation:  
'Improving consumer access to mobile services at 3.6 to 3.8 GHz'

band interference. For the same reason, site shielding is often not possible because it can reduce the available satellite arc. In the case of the BBC's sites, the monitoring operation must be flexible and have the facility to monitor whatever frequencies are being used. Access to the full extent of the satellite arc is essential. In addition, there are also local conditions which may inhibit shielding.

24. We would also welcome the opportunity to discuss in detail the specific studies which Ofcom has modelled on our site at Crowsley Park. The detail set out in Ofcom's Annex does not address the specifics used in the modelling and we would welcome visibility of the detail as it pertains to our site.

*Question 6: Do you have a view on any of the two options we identified?*

25. Our primary concern when considering the two options is the continuation of BBC Monitoring operations. We therefore welcome the suggestion (in paragraphs 1.8 and 9.3) that Ofcom is open to hearing about "other possible solutions" that might allow availability for 5G mobile use "across the UK while maintaining sufficient certainty for at least some existing users to continue to invest and utilise the band." Exploring other solutions is our preferred option.
26. In particular, we believe the potential for geographic separation between existing users and new mobile services should be explored as a possible solution. This is the only option that would enable BBC Monitoring to maintain its current operational capabilities in the UK. To explore the potential for such coexistence we believe Ofcom should fully examine the time frames in which 100% geographic coverage for mobile networks in 3.6 to 3.8 GHz is likely to occur. Based on existing mobile networks, even for those with coverage obligations, roll out is under 100% geographic coverage.<sup>14</sup> Depending on the expected timescales and predicted extent of mobile roll out, it might be possible for the BBC, Ofcom and other stakeholders working together, to identify locations that (i) fit the operational requirements for passive reception earth stations; and (ii) are in areas that are unlikely to attract roll out of 5G services. For example, unpopulated and remote areas where protecting ongoing ROES operation would not constrain the widespread availability of 5G to the UK population. As set out in paragraphs 38 to 40 this would be an option the BBC might consider in order to ensure continued operation, if Ofcom was able to provide security of tenure and fee level guarantees to support an investment case.
27. The BBC believes it is essential that Ofcom consider alternative options such as geographic separation because both options set out in the consultation would have a material impact on BBC Monitoring operations.

*Retain option*

28. The retain option carries risks for BBC Monitoring in respect of the approaches to coordination. The BBC considers the technical metrics set out in the existing RSA would provide an

---

<sup>14</sup> In 2015 Ofcom varied licences for the four mobile network operators in order to achieve coverage over 90% of the UK's land mass by end 2017. Source: <https://www.ofcom.org.uk/about-ofcom/latest/media/media-releases/2015/mno-variations>

acceptable level of protection to its satellite operations in C band. However, in the event the existing protections were changed we would have concerns about the exclusion/restriction zone approach if this allowed mobile operation any closer to BBC Monitoring sites.

29. For ROES the BBC prefers that an interference limit be imposed on the mobile service at the location of a protected Satellite Earth station across the range of protected frequencies. This is because it is likely that such a limit would give the minimum possible separation distance and thus the maximum opportunity for sharing between the mobile service and the earth station deployment and would take into account any local terrain shielding or clutter losses.
30. If the interference limit approach were adopted we believe BBC Monitoring operations in 3.6 to 3.8 GHz would be impacted as any increase in current interference levels and likely raising of the noise floor, will restrict access to existing low carrier to noise reception. However, we recognise that this would also result in reduced coverage for consumers in this highly populated area.
31. We also note that this option would be likely to result in significantly higher fees to reflect the extent to which mobile deployments would be denied access to the band. These fees, if set high enough, could result in BBC Monitoring having to relinquish its RSAs if the fees could not be met due to budget constraints or value for money concerns.

#### *Remove option*

32. We have the most serious concerns about the impact of the remove option. This option would remove a third of the spectrum available for C-band operations in the UK which would have a material impact on BBC Monitoring operations. It would remove the flexibility required for BBC Monitoring to receive sources wherever they broadcast between 3.6 to 3.8 GHz. This comes on top of the forthcoming release of spectrum between 3.4 and 3.6 GHz which will already reduce BBC Monitoring's operational capabilities.

#### *Suitability of mitigations for BBC Monitoring*

33. The ability of BBC Monitoring to go where the sources are is a fundamental part of the operation, and one that means that installing filters is not a feasible mitigation. This is because a filter removes the ability to pick up sources if they move outside of the filter's passband.
34. Gathering sources available over IP networks is also unlikely to be suitable. This is because:
  - (i) Many sources are unlikely to be available over IP
  - (ii) Accessing sources via IP over the internet is often very unreliable, frequent dropped connections and buffering are commonplace
  - (iii) Sources that are available offer inferior quality e.g. the picture quality will not be good enough to use footage on a national news broadcasts or for detailed video analysis.
  - (iv) Relying on IP delivery introduces gatekeepers, allowing governments and regimes to block access. For example, foreign governments can restrict access to IP simulcasts based on geo-locating IP addresses. It is much more difficult to completely restrict access to all satellite broadcasts.



35. In addition, replicating existing monitoring capabilities by locating earth stations outside the UK would also pose problems. In some countries sufficient bandwidth (i.e. to connect back to the UK) is just not available and even if connectivity is available this option would result in considerable additional expense backhauling content to the UK. It is also more difficult to form a compelling investment case for operations outside the UK where regulatory environments offer less protection. For example, very few countries offer RSAs for passive monitoring.
36. This option also means revoking grants of RSA for ROES. BBC Monitoring have invested in grants of RSA for ROES across 3.6 to 4.2 GHz since November 2012. We have done so on the basis that our use would be considered in the future planning in the band. This is in line with Ofcom's consultation on the introduction of RSAs for ROES which said, "[t]he introduction of RSA in these bands will allow operators of receive-only earth stations to continue to provide valuable services with enhanced confidence about the levels of interference they can expect to receive."<sup>15</sup> We would expect that any material change to the terms of the RSA or revocation would come with sufficient notice of at least 5 years as indicated in Ofcom's 2011 statement<sup>16</sup>.
37. We do want to emphasise to Ofcom that it would not be possible for BBC Monitoring to continue to operate "on a licence-exempt basis" if mobile services were rolled out in the band.<sup>17</sup> It would not be possible to "adjust to an expectation of much lower spectrum quality" as Ofcom suggest. The lower spectrum quality in the band which would accompany mobile roll out would render ongoing monitoring operations in 3.6 to 3.8 GHz (and potentially above 3.8 GHz) no longer possible due to interference.

*Question 8: Do you have any other suggestions that would allow widespread 5G availability using the 3.6 to 3.8 GHz band across the UK while allowing certainty for at least some existing users to continue to provide the benefits currently provided by use of the 3.6 to 3.8 GHz band?*

38. The BBC believes a solution based on geographic separation might offer the opportunity for incumbents to retain operational capabilities without constraining the roll-out of 5G in populated areas. This would be particularly suitable for operations such as monitoring which cannot simply move operations above 3.8 GHz.
39. A geographic separation option might involve Ofcom issuing new RSAs for operation in unpopulated, or remote parts of the UK as replacements for those currently issued for highly populated areas such as the south east where there is likely to be demand for 5G. These new RSAs would then give incumbents the opportunity to relocate to areas where demand for 5G in 3.6 to 3.8 GHz is unlikely to materialise (e.g. in unpopulated or remote areas). We believe this is an option worth fully evaluating. As noted in para 5.9 "5G technology is at an early stage of

<sup>15</sup> Paragraph 1.9 Ofcom consultation, 'RSA for ROES in the Bands 1690-1710 MHz, 3600-4200 MHz and 7750-7850 MHz' July 2010

<sup>16</sup> Paragraph 4.42 Ofcom statement, 'RSA for ROES in the Bands 1690-1710 MHz, 3600-4200 MHz and 7750-7850 MHz' May 2011

<sup>17</sup> As suggested in paragraph 9.12 (ii)

development" and it is still unclear whether ubiquitous roll-out of 5G across the UK would be practical or commercially viable.

40. If a suitable site was identified, there would then need to be a very strong case that such a move represented value for money in the long term for the BBC to consider such a move. Relocating the BBC earth station sites could represent a significant investment with annual licence fee costs added to that. The life cycle of large C-band antennas for example is estimated to be 20-25 years - although some antennas installed in late 1980s and early 1990s are still in use.

41. With such a 25+ year investment, the case for such a move would need to include assurances around:

- **Security of tenure and access to usable spectrum** (i.e. spectrum free from harmful interference) over the investment period. In the BBC's case consideration of any relocation would involve assessment of spectrum quality and availability not just for 3.6 to 3.8 GHz, but for the ability to receive signals across the wider C-band and extended C-band and also across Ku-band. In short, the ability to recreate current operational capabilities which provide flexibility to deal with changes in the source landscape.
- **Future fee levels over the timescales in which the investment would be recouped.** It would not be possible to build a business case on current fee levels if there was a risk that these would rise significantly within a matter of years. To this end we note one of Ofcom's AIP principles is to use the 'relevant timeframe' to assess future spectrum demand – that relevant timeframe being the 'typical economic lifetime of existing users' radio equipment'.<sup>18</sup> We also note Ofcom's recent consultation on fee levels for satellite users, including holders of RSA for ROES which suggested Ofcom would consider implementing geographic pricing – essentially discounting fees in areas of low spectrum demand.<sup>19</sup> In any case, predictability is what matters in order to anticipate the expected full cost of relocating.

42. However, it would be necessary for Ofcom to confirm the potential for a geographic separation option in a statement prior to the BBC considering the feasibility of moving operations from existing sites. We would welcome the opportunity to explore this option more fully with Ofcom.

ENDS.

---

<sup>18</sup> Ofcom statement, '[SRSP: The revised framework for spectrum pricing](#)', December 2010.

<sup>19</sup> Cf Paragraph 2.12, Ofcom consultation, '[Review of spectrum fees for fixed links and satellite services](#)', May 2015.