

BBC Response to Ofcom Consultation:

Award of available spectrum: 2500-2690 MHz, 2010-2025 MHz

The BBC welcomes the opportunity to respond to this consultation. The proposed award's effect on the future availability of spectrum for wireless video cameras (wireless cameras) is an issue of considerable concern to us.

Please note that we have not yet had the opportunity to review the further two documents by ERA Technology Ltd relevant to this award that Ofcom published today. We may therefore be submitting comments on these documents at a later date.

We would like to reiterate our concerns with regards to the future availability of spectrum for wireless cameras, before responding to the questions in Ofcom's consultation document. We are aware that we have set out these concerns in our responses to several previous Ofcom consultations; nevertheless they are repeated here given the importance of this issue to us.

We would also like to comment on Ofcom's consultants' conclusions regarding the level of adjacent channel interference and how this should be addressed.

The Threat to the Availability of Spectrum for Wireless Cameras

Wireless cameras are essential in gathering news and covering events of major cultural or sporting significance, precisely because they do not need to be cabled: they allow real-time, up-close coverage, including from hard-to-access areas and emergency situations. Recently they were used extensively to provide picture footage of the floods; before that they were used to provide coverage of the Formula One British Grand Prix and the Tour de France. They are also key in helping the UK win the right to host important cultural or sporting events, as the coverage they permit helps to maximise sponsorship and advertising revenues accruing from such events.

There are currently no other ways of providing reliably this sort of footage, nor are there likely to be in the near future. New IP or 3G-based technologies (which share networks) are very prone to falling over when demand is high, such as during emergencies and at major cultural or sporting events. On 11 September 2001 mobile phone networks were initially shut-down for security reasons; they were then unable to cope with the level of demand.

Assessing likely future availability of spectrum for wireless cameras is currently difficult, in part because Ofcom is consulting separately on the relevant bands. Indeed, it requires at least:

- assessing the implications of the award that is the subject of this consultation; and
- assessing Ofcom's proposals with regards to 3.4 – 3.8 GHz spectrum and developments at WRC-07.

The spectrum that is the subject of this consultation, 2010 – 2025 MHz and 2500 – 2690 MHz, seems highly likely to be sought after by providers of new wireless services, and hence can be expected to command a high price at auction.

Ofcom has also just consulted on UK Broadband's application to operate higher power and mobile services in the 3.4 – 3.6 GHz band. In our response dated 24 August, the BBC stated that our calculations suggest that UK Broadband's proposals, if implemented, would increase significantly interference in this band, and hence reduce the amount of spectrum that can be used by wireless cameras by up to one-third. The BBC also notes that Ofcom has stated that it will be supporting an assignment of 3.4 – 3.8 GHz to 3G at WRC-07, which suggests that there are likely to be further changes to the availability of spectrum for wireless cameras in this band in the near future.

The BBC believes that the cumulative effect of Ofcom's proposals as they currently stand could be, from as early as the beginning of next year, a severe reduction in (if not, over time, an end to) the UK's ability to cover news and events of major cultural or sporting significance in the way it does currently. The main results of this are likely to be:

- a severe reduction in the UK's ability to provide picture coverage (particularly in real-time) of emergency situations;
- a consequent reputational threat to UK broadcasters, as they fall technically behind US news organisations for example;
- a severe reduction in the UK's ability to win the right to stage key cultural or sporting events, because (unlike other countries) it is unable to provide quality coverage, and hence generate sufficient sponsorship/advertising revenues;
- an inability of the UK to meet the commitments it made to the International Olympic Committee with regards to access to spectrum in its bid for the London Games, particularly commitments 15.8 and 15.9.

The BBC does not understand how Ofcom has come to the conclusion, stated several times in its consultation document, that there will be sufficient spectrum available for wireless cameras in future. Ofcom does not show how it has reached this conclusion, and only Ofcom has access to much of the data needed to reach a view: only Ofcom has access to JFMG's booking database, for example.

The BBC therefore welcomes Ofcom's agreement, at a meeting with representatives from the Spectrum for Programme-Makers Forum on 12 September, to set up monthly meetings between Ofcom and the Forum to examine both the future supply of and demand for spectrum for wireless cameras, with a view to ascertaining whether or not sufficient spectrum can be found for wireless camera use. We look forward to the first of these meetings taking place in the week commencing 15 October. We believe it will be very important to come to a common understanding of whether or not sufficient spectrum can be found for wireless camera use, prior to a substantial amount of the spectrum currently used being put up for auction.

We also welcome further discussion with Ofcom regarding transitional arrangements in these meetings. The BBC would urge Ofcom once again, similar to what Ofcom has done with regards to other bands awarded which were already in use, to allow users of wireless cameras to continue to use any awarded spectrum until such time as the new services deployed in them are ready to be "switched on".

Of course, significantly more spectrum than that typically used to cover news and special events may be needed for the 2012 London Games. The BBC therefore does not understand why Ofcom appears to have ruled out including a specific clause in licences which requires licence holders to make spectrum available during the Games should it be needed – particularly in the light of the commitments the UK has made to the IOC.

Adjacent Channel Interference

Until a decision is taken on whether or not sufficient spectrum can be found, every channel currently used by wireless cameras is important. We are therefore very concerned by the fact that, even though Ofcom recognises (in paragraph 3.102) that interference from services provided by auction winners to adjacent channels used by wireless cameras is possible and indeed it could extend into the two immediately adjacent 10 MHz wireless camera channels, Ofcom does not propose to take measures to minimise such interference.

One of the reasons for Ofcom's view appears to be that Ofcom believes that wireless cameras will be able to take steps to "avoid" the interference caused by adjacent users. As discussed in more detail in our response to Question 2 below, we do not share this view: the measures Ofcom suggests are either not viable, because wireless camera users can control neither where news breaks/ major events are held nor the location of use of WiMax or IMT-2000 handsets, or they are already in use.

We also believe that Ofcom's consultants have underestimated the level of interference that new services will impose on adjacent channel users. The main reason for this appears to be that, despite the fact that the interference caused by new services to adjacent channel wireless camera use can already be measured in practice (adjacent to 2110 MHz, given existing 3G base stations), ERA obtained their estimates of interference using simulated signals from a laboratory generator. These signals will tend to generate much less interference than a real transmitter, in part because the latter will be designed to just meet relevant spectrum masks in practice.

The BBC understands that ITN recently compared the performance of a link adjacent to 2110 MHz with one at 2075 MHz. ITN first set up a link between the roof of the ITN building and LWT in London, and found that the sensitivity of the receiver was reduced by 28dB at 2105 MHz compared to 2075 MHz. This used only the tracking YIG filters in the receiver. ITN then set up a very short link (50m) across the roof of the ITN building, and found that this gave a sensitivity reduction of 19dB at 2105 MHz compared to 2075 MHz. This link had a 3G notch filter and a 2 to 2.3G bandpass filter on its receiver input.

This suggests that new services deployed by auction winners will cause significant interference to 2035 MHz and 2495 MHz (as well as to 2285 MHz and 2275 MHz if 2290 – 2300 MHz is auctioned). If the new services are TDD, then there will be both base stations (downlink) and handsets (uplink) causing interference to these channels: there will be interference up to 50 metres from handsets and up to 2 kilometres from base stations. If the new services are FDD uplinks (in the case of spectrum adjacent to 2495 MHz), there will be interference up to 50 metres from handsets. The BBC therefore does not agree with Ofcom's statement that "... the risks of interference occurring in practice are sufficiently low."

Nor do we agree with Ofcom's statement "We also note that PMSE users make use of channels directly adjacent to spectrum used for 3G services (downlink/ base station transmit, above 2110 MHz), including in dense urban areas". The BBC has attempted to use 2095 MHz, but had to abandon this due to the substantial levels of interference experienced. The BBC understands that ITN similarly attempted to use 2105 MHz, but abandoned this for similar reasons.

In the light of the above, the BBC believes that the technical restrictions proposed by Ofcom to manage interference between new services and adjacent wireless camera use at the 2025 MHz and 2500 MHz boundaries are insufficient. The BBC would urge Ofcom to ensure that a guard band of at least 5 MHz exists at these boundaries (and that no use of this guard band is permitted). We note that in its most recent consultation on the L Band award, Ofcom has proposed that a guard band of two channels be imposed between high and low power uses, in order to minimise adjacent channel interference and hence reduce uncertainty for potential bidders in the auction.

The technical sub-group of the Spectrum for Programme Makers Forum made these points to Ofcom in a meeting on 20 September. We welcome Ofcom's agreement at this meeting to set up further meetings between Ofcom and the Forum to discuss these issues further, with a view to coming to a consensus on the impact of new services on adjacent spectrum users. The BBC assumes that this is further to Ofcom's statement in paragraph 1.9 of its consultation document that "Ofcom plans to consider this assessment with JFMG... and interested PMSE users during the consultation period". We look forward to a date being set for the first of these meetings.

2290 – 2300 MHz

The BBC welcomes the fact that Ofcom has decided to exclude 2290-2300 MHz from this auction and, for the reasons given in our response to the previous consultation on this award, we would urge Ofcom to consider setting aside this frequency block for PMSE by allocating it to JFMG.

For the reasons given in our response to the previous Ofcom consultation on this award, and because of our ongoing concerns about potential interference to existing PMSE users as detailed above, we would continue to urge that Ofcom sets aside the 2010-2025 MHz frequency block for PMSE by allocating it to JFMG.

Responses to the Consultation Questions

Question 1: *Do stakeholders agree with Ofcom's assessment of the blocking effect and of its implications for spectrum packaging?*

The BBC does not have any comment to make on Ofcom's assessment of the blocking effect or of its implications for spectrum packaging.

Question 2: *Do stakeholders agree with Ofcom's analysis of interference conditions that are relevant to the use of generic lots?*

The BBC does not have any comment to make on Ofcom's analysis of interference conditions that are relevant to the use of generic lots. We do, however, wish to comment further on Ofcom's analysis of the interference caused to wireless camera use of spectrum adjacent to that being awarded – in particular, the strategies Ofcom proposes in paragraph 3.103 wireless camera users adopt in order to mitigate the interference experienced in adjacent channels.

a) *separating mobile devices from PMSE usage by at least line-of-sight.* This is unlikely to be practicable for most likely uses of wireless cameras. Wireless cameras are typically either used at sporting events (where large numbers of IMT-2000 handsets are likely to be present and switched on) or for news stories (where it will be almost impossible to exclude WiMax or IMT-2000 handsets).

b) *taking advantage of directionality of PMSE equipment.* This is already done where possible and to maximise the performance of the link. However it must be remembered that the PMSE equipment needs to roam, be mobile and address the receiving aerial whatever the orientation of the camera so this puts operational constraints on what is possible.

c) *lowering the modulation of the PMSE transmission.* Picture quality is already an issue when concatenated with the rest of the production chain. It would be a very poor offering to the viewer and difficult for production values if the wireless camera link impaired the quality much below that of static cabled cameras. Picture quality and the bandwidth of the link become even more important with the move to HD.

d) *consider the deployment of diversity receivers.* This technique is already used where available and viable.

e) *use other channels.* As stated above, the BBC is already concerned about the impact of the potential loss of the channels that are the subject of the award. We would therefore be concerned if, in addition, adjacent channels are effectively rendered unusable.

f) *use receiver filters.* These are already heavily in use.

All these techniques are therefore either being used already or are not viable methods of "avoiding" interference. The fact that wireless camera users already suffer interference from existing IMT-2000 handsets working in existing IMT bands confirms that these measures are not effective.

The BBC therefore cannot agree with Ofcom's assertion that the probability and impact of interference from new uses in adjacent channels currently used by wireless cameras will be small, and hence we believe that the technical restrictions proposed to manage interference will be insufficient. As stated above, we would urge Ofcom to ensure that a guard band of at least 5 MHz exists at these boundaries (and that no use of this guard band is permitted).

Question 3: *Do stakeholders agree with Ofcom's updated proposals for technical conditions or have views on the possibility of*

- *extending the out-of-block masks out to an offset of +/-20 MHz from assigned blocks;*
- *placing additional restrictions on the use of restricted blocks between the FDD uplink and TDD; or*
- *a reduction in mobile station in-band power to 18dBm/ MHz EIRP?*

The BBC does not have any further evidence in relation to Ofcom's updated proposals for technical conditions of the benefits (or disadvantages) of :-

- extending the out-of-block masks out to an offset of +/-20 MHz from assigned blocks;
- placing additional restrictions on the use of restricted blocks between the FDD uplink and TDD; or
- a reduction in mobile station in-band power to 18dBm/ MHz EIRP.

Question 4: *Do stakeholders agree with the proposed changes to the auction design set out in the December 2006 consultation?*

The BBC has no comment to make on the changes Ofcom is proposing to make to the auction design set out in its December 2006 consultation.

28 September 2007