Award of available spectrum: 10 GHz, 28 GHz, 32 GHz and 40 GHz

The BBC welcomes the opportunity to respond to this consultation. We see the allocation of this spectrum for future uses as a valuable addition to the spectrum market to overcome potential shortfalls in the spectrum available to a variety of technologies. In particular, the BBC believes that the 10GHz band could have a broadcasting use for wireless digital cameras and video links.

In the following paragraphs we set out the principles on which we feel the spectrum should be made available to the market, based on Ofcom's principles as set out in this consultation.

To make spectrum available to the market, the spectrum needs to be packaged in a way that facilitates efficient use. Therefore, the potential uses of the spectrum and the potential demand from bidders, however uncertain, need to be understood. Spectrum should be packaged in such a way as to enable potential users to obtain spectrum that is compatible with their commercial needs.

To achieve this, packaging options need to reflect likely demand for the spectrum and the most likely technologies or services to be deployed in each of the spectrum bands. Depending on the application for the spectrum, the bandwidth requirements of potential users may vary.

Ideally spectrum packages should not be so small that bidders are required to acquire more than one package in order to satisfy their minimum requirements. This would force bidders to face the risk of winning an inadequate amount of spectrum through the auction process and cause them to incur costs after the auction (i.e. purchasing additional spectrum from successful bidders) or be left with spectrum which they could not use. Similarly it would be preferable if spectrum packages were not so large that bidders acquired spectrum which was surplus to their requirements. This could have the effect of denying other potential bidders (some of whom are likely to be direct competitors) the opportunity to use the surplus spectrum. There are significant disadvantages in relying heavily on the secondary market (as opposed to the primary market): in the secondary market it is likely that competitors control access to spectrum, whereas in the primary market an independent body (OFCOM) does, and hence extreme care needs to be taken in primary allocation design.

The spectrum should be packaged in a way that maximises the chance of attracting serious bidders. It is desirable not to deter potential bidders by inappropriate spectrum packaging. This is important since the most efficient auction outcome is likely to be achieved where there is a degree of competition for the packages.

1). Do stakeholders agree with the proposals for the award of licences in the 10 GHz, 28 GHz and 32 GHz bands in 2007?

In general, the BBC agrees with Ofcom's proposals for the award of licences in the 10 GHz band in 2007. We have no comment on the proposals for the 28 GHz and 32 GHz bands.

We support the allocation of licences in the 10 GHz band as a UK-wide licence on a technology neutral basis. However, we have specific concerns about the proposed allocation in 10 GHz: namely the proposal to allocate it as a single lot of 2x100MHz:

- Although awarding the entire spectrum as one lot does substantially simplify the auction design and reduces the aggregation risk to some bidders, it does increase the risk to other potential bidders that their needs will not be met.

- Bidders requiring a single unpaired lot might face acquiring more spectrum than they require. In particular, this packaging could reduce the attractiveness to individual programme makers of participating in the auction because the amount of spectrum available in this allocation could significantly exceed the programme maker's requirement. This approach could particularly disadvantage smaller programme-making organisations.

- This packaging could reduce the attractiveness to programme makers of participating in the auction because they might have insufficient funds available for such a large allocation of spectrum.

- It is not yet clear that any programme maker would find a suitable market for secondary spectrum trading for future disposition of any excess spectrum.

- Bidders requiring a smaller, single, unpaired lot might need to co-ordinate their bidding with other parties. It is not clear that programme makers would be able to form a consortium to bid collectively for such a large allocation of spectrum or that they would be able to either share access to it or divide it after the auction.

- The BBC continues to have concerns that if this spectrum was allocated to a single licensee, then this licensee would become a monopoly supplier in the band and could thereby deny access to it for potential competitors. Therefore, the licensee could control access in a way that could preclude the band's availability for wireless digital cameras and video links, or could preclude its use by individual programme makers. Ofcom has said it has no reason to believe that any broadcaster is currently in a position of market power, such that there may be anti-competitive motives for acquiring the spectrum. However, because broadcasters have not yet been required to come forward to bid for spectrum for PMSE uses (JFMG currently manages access to such spectrum), we have no reason to believe that any broadcaster would not develop a position of market power, such that there could be anti-competitive motives for acquiring the spectrum. This could be a particular threat bearing in mind the long duration of the licence.

- We are not convinced by any argument that because alternative spectrum is available for video links and wireless cameras, this would inevitably meet the requirements of operators who do not obtain spectrum in this band. Although other spectrum continues to be available for wireless cameras, this is under threat and continues to reduce in availability. Although Ofcom has stated that the future availability of spectrum in other bands could mitigate against this situation, the availability of spectrum in other bands is no more secure for PMSE users than in this band. Ofcom's programme of releasing spectrum on a technology and application neutral basis includes other bands that we recognise could also be used for wireless cameras (e.g. 1452-1492 MHz, 2010-2025 MHz, 2290-2302 MHz and 2500-2690 MHz). However the demand for this spectrum is likely to be high which means that it is unlikely to be available for PMSE.

- It will take significant further R&D work to develop the technologies for wireless digital cameras to enable them to work successfully in the 10 GHz band and it would be unattractive to make further R&D investment if any monopoly supplier were able to control access to the spectrum for the long duration of the licence period. Until it has been proven that these technologies can be made to work in this band, any bid for spectrum would have to be on a speculative basis which could require a secondary trade with an uncertain market if the technology could not be made to work in this band.

PMSE links and radio cameras operate in one direction so the interests of any potential bidder for such use could be met by acquiring unpaired spectrum although paired spectrum could also be used by these applications. However, bidders wishing to acquire spectrum for Fixed Wireless Access and related applications will require paired spectrum.

The benefit of offering separate unpaired lots at 10 GHz is that in principle it might provide a better way of addressing both the needs of potential bidders interested in acquiring spectrum for PMSE and the needs of those interested in acquiring spectrum for Fixed Wireless Access and related applications. There might be a related benefit in terms of increased competition for the lots.

However, there would also be a significant disadvantage to this option for bidders interested in Fixed Wireless Access and related applications. This is that they would face the risk of not acquiring a paired lot, which would therefore be insufficient for their requirements. So these bidders would be exposed to an aggregation risk. The auction can be designed to address this risk by accommodating package bidding, but this, in turn, can create problems for single lot bidders competing against a package bidder for the same lot.

Packaging the spectrum as a single paired (2x100 MHz) lot reduces the aggregation risk for potential bidders interested in Fixed Wireless Access and related applications, but favouring this allocation approach might be seen as moving away from a technology neutral approach (as it might provide preferential support to technologies that require paired lots).

For all these reasons, we believe that the available spectrum in the 10 GHz band should be auctioned in smaller, multiple lots. These lots should be small enough to address the needs of all potential bidders. This would have the added advantage of increasing the flexibility in uses for this spectrum without needing to develop a secondary trading market. This may also increase competition for lots than if the band was allocated as a single lot.

In its analysis, Ofcom has only considered the merit of allocating the 10 GHz band as either two single 100MHz lots or as a single 2x100MHz paired lot. For the reasons we have set out above, we believe that both of the packaging options presented by Ofcom have certain drawbacks. Picking either of these may favour one technology over another and therefore not meet Ofcom's aim of technology neutrality.

Nevertheless we feel that there are other possibilities that merit further consideration. For example, it would still be possible to allocate as paired licences to meet the needs of FWA even if they were allocated in smaller than 100MHz lots (such as two lots of 2x50MHz or 5 lots of 2x20MHz). This option would meet the source of demand for paired spectrum without eliminating the possibility of those wanting unpaired spectrum meeting their own requirements.

In the end, we recognise that it is Ofcom's duty to select the optimal packaging approach leading into the auction of this band based on the best economic advice it has received from its consultants. Nevertheless the BBC has a suggestion for a method that could enable the market to decide on the optimal packaging approach.

Ofcom could consider allowing a pre-bid (or initial first round auction) phase for any lots in this 10 GHz band, allowing it to be packaged either in multiple 10 MHz, 20 MHz, 50 MHz paired or unpaired lots or a full 100 MHz paired or unpaired lot. At the end of this pre-bid phase, all possible packaging variants would then be considered, allowing for varied-size lots, and the variant achieving the highest economic value could be selected as the packaging option to take forward into the full auction. This pre-bid phase would overcome concerns about the complexity introduced to the auction by lots of different sizes.

To prevent the risk of speculative bidding realising a packaging variant that was not representative of the ultimate market need, it would be necessary for any bid in this pre-bid phase that resulted in the successful packaging variant to stand as a committed minimum bid from the bidder going into the main auction, that would result in an award unless it was subsequently outbid in subsequent rounds of the auction.

Any auction should be of simultaneous, multi-round type. This should mitigate aggregation risks for those bidders interested in Fixed Wireless Access and related applications as, by not auctioning lots sequentially and having multiple rounds, bidders can change their strategy part-way through the auction should it become clear that they are unlikely to win all the lots they need to mount a viable operation.

2). Do stakeholders agree with the proposal to include in the award of the 32 GHz band that portion of the band that has been open since 2003 for point-to-point applications?

The BBC has no comment on this proposal.

3). Do stakeholders agree with the proposal to defer the release of the 40 GHz band and review the position in two years' time?

The BBC has no comment on this proposal.

4). Do stakeholders have any other comments on the contents of this document?

The BBC has concerns over the future availability of spectrum for PMSE in general and wireless digital cameras in particular. We expect spectrum for PMSE to become more scarce (relative to demand) over the next 10 years, as some of the bands currently used by PMSE are expected to be reclaimed for other uses.

The reclamation of the 2.6GHz band from wireless digital cameras from the end of 2006 onwards causes significant concerns because this spectrum was very important to the support of this technology. The alternative allocation in the 2.1GHz band has insufficient capacity to support likely future use (it is already proving to be very congested) and it is subject to interference that causes significant operational and performance issues.

The BBC does have some concerns over the application of technology neutral licensing of spectrum. This can only be effective provided that there are clearly defined spectrum usage rights and that any interference is rigorously policed by the regulator, Ofcom, in the case of a dispute.

Co-existence between wireless cameras using the 2.1GHz band and high power UMTS services in adjacent bands (which the wireless camera receivers were never designed to cope with) has proved to be problematic. Portable equipment inevitably generates interference in adjacent channels and the best way to manage the problem is to ensure that all transmitters operating in a given band use the same basic coding and modulation and operate at similar power levels. If this cannot happen, care needs to be taken in defining the spectrum usage rights to allow for different usage patterns and there need to be sufficiently tightly defined spectrum masks at the band edges.

This is why JFMG specify DVB-T coding for the bands it manages and sets transmitted power limits. Previous arrangements with mixed operation of analogue and digital radio cameras at significantly different transmitted powers (20dB difference) caused problems. We are now starting to observe some new difficulties in the 2.1GHz band with some new BBC

English Regions 1W wireless cameras blocking reception of ITN's 100mW systems and it is not clear how compatibility will be ensured other than by industry collaboration.

Given that the protection ratios for 802.16 systems, UMTS, and DVB-T have not been characterised for typical receiver implementations, it is not clear that the technology neutral approach will work when considering compatibility between these services. This can only work effectively if Ofcom will investigate interference cases. Since Ofcom's research facility at Whyteleafe has now closed, it is unclear which organisation will be responsible for characterising typical performances of different systems and determining the relevant protection ratios that will be necessary to ensure effective spectrum usage rights and coexistence.

Ofcom's programme of releasing spectrum on a technology and application neutral basis includes other bands that could also be used for wireless cameras (e.g. 1452-1492 MHz, 2010-2025 MHz, 2290-2302 MHz and 2500-2690 MHz). However this is likely to be open to strong competition and correspondingly high auction prices and won't release sufficient and suitable spectrum for wireless cameras. Any potential use of wireless cameras in these bands would be very restricted in deployment because of the limited availability of spectrum.

Without sufficient spectrum for wireless digital cameras in the future (including a provision for the future needs of wireless digital HD cameras), it simply won't be possible to continue to make programmes in the way viewers have come to expect. Health and safety concerns over trailing cables are significant. Simply put, it won't be possible to gather newsworthy stories in confined areas without the use of these technologies.

The BBC does accept that changes to the availability and relative cost of satellite links over time may mean that these could provide an effective substitute for terrestrial links in some cases provided that existing restrictions can be overcome. But these do have significant issues in terms of operational difficulties caused by the link delay when making live programmes.

Satellite links are not suitable for wireless digital cameras because these cameras are typically used in confined spaces where line of sight communications with a satellite are not possible. There would also be significant issues with the power required to operate such a link and associated health and safety issues.