



Digital dividend:
band manager award
Second consultation on detailed award design

	Consultation
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Section 1

Executive summary

- 1.1 In 2003, before Ofcom came into existence, the Government decided to release a digital dividend when digital switchover (DSO) was complete. Our Digital Dividend Review considered how we should approach the award of this spectrum (UHF Bands IV and V, 470-854 MHz) in light of the various different users affected, both existing and potential. One of the key users of interleaved spectrum – the capacity available on a geographically fragmented basis within the spectrum that will be retained to carry the six digital terrestrial television (DTT) multiplexes after DSO – was identified as being the programme making and special events (PMSE) sector.
- 1.2 The PMSE sector contributes significantly to the cultural well-being of the UK. It is a diverse community, spanning theatres, broadcasters, major event organisers, community users and others. As such, PMSE is a key use of spectrum – whether for wireless microphones in West End theatres or for wireless cameras at major news events.
- 1.3 As new and innovative uses of spectrum have appeared so the demand for spectrum has increased. This means that there may be competing uses for the same frequencies and, where this is the case, their opportunity cost – the cost of denying their use to other, potentially more valuable uses – will tend to rise.
- 1.4 Historically, fees for licensed PMSE use have, at most, met the administrative costs of issuing licences. This was a satisfactory arrangement when there was no other competing use for the spectrum that PMSE had access to. However, it meant that the sector was faced with relatively low licence fees and little incentive to use spectrum more efficiently. As new uses of spectrum have developed over recent years, it has become clear that there is or will increasingly be competing demand for the spectrum most heavily used by PMSE.
- 1.5 As a result, we considered that measures should be put in place which would promote more efficient PMSE use of spectrum, in line with our duty under the Communications Act 2003 to secure optimal use to further the interests of citizens and consumers.¹ We set out initial proposals on 19 December 2006 in our consultation document on our approach to awarding the digital dividend.² In the light of responses, we published a further, PMSE-specific consultation document on 20 June 2007.³ We initially focussed on PMSE use of interleaved spectrum and channel 69, primarily for wireless microphones.
- 1.6 On 13 December 2007, we published a statement (the December 2007 statement) setting out our high level decisions on how we would award the digital dividend.⁴ These included awarding a single package of interleaved spectrum and channel 69 via a beauty contest to a band manager with obligations toward PMSE users. To help PMSE users make the transition to a market-based approach to spectrum access, we would use criteria designed to ensure the band manager's interests were aligned with those of PMSE users. The band manager would pay a charge for the spectrum to reflect its opportunity cost and would be able to earn revenue by charging its

¹ www.opsi.gov.uk/acts/acts2003/pdf/ukpga_20030021_en.pdf.

² www.ofcom.org.uk/consult/condocs/ddr/ddrmain.pdf.

³ www.ofcom.org.uk/consult/condocs/pmse/pmse.pdf.

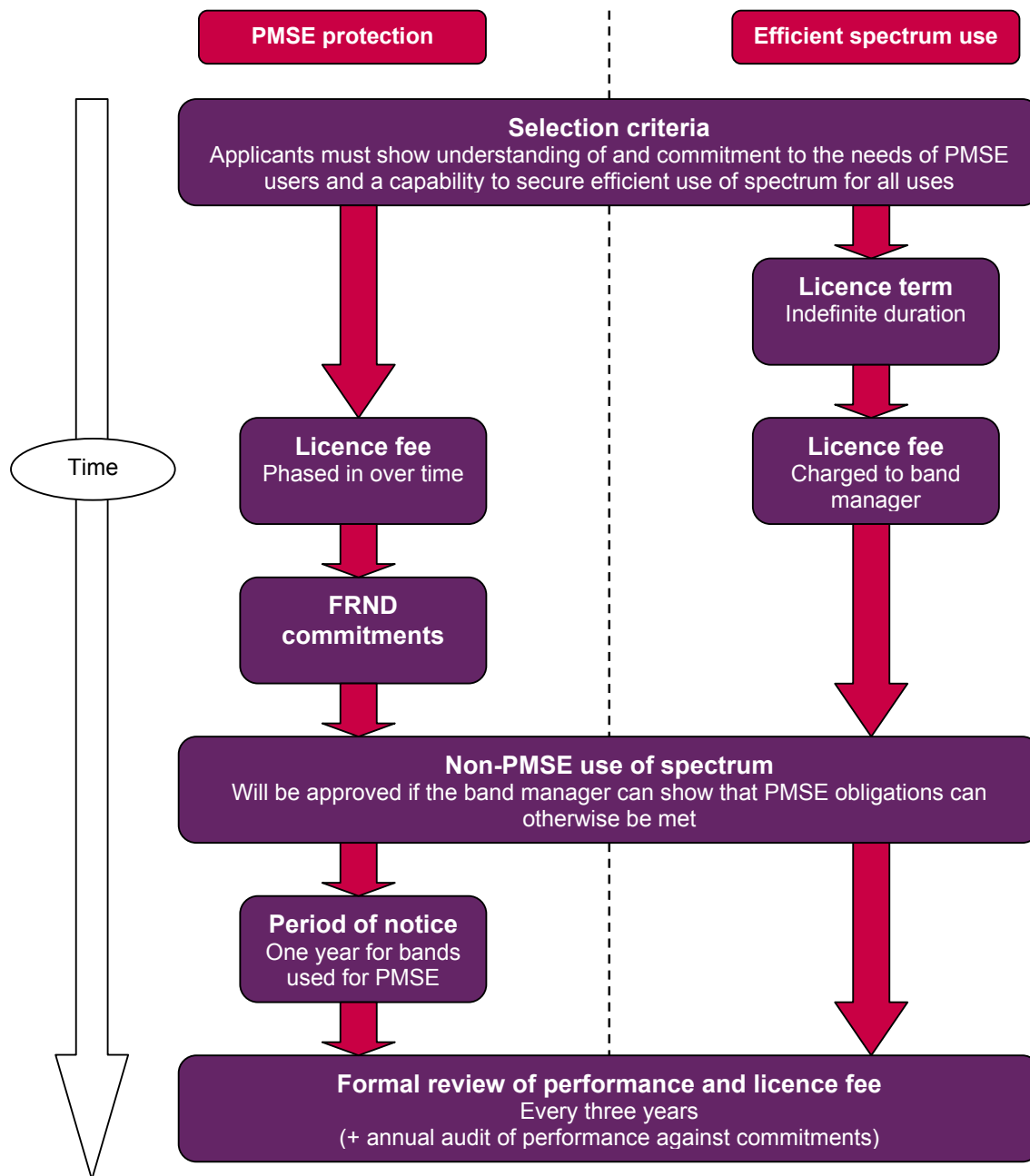
⁴ www.ofcom.org.uk/consult/condocs/ddr/statement/statement.pdf.

customers for access. But regulation would ensure it had to meet reasonable demand from PMSE users on fair, reasonable and non-discriminatory (FRND) terms. So long as these obligations were met, the band manager would be able to allow the spectrum awarded to it to be used for other purposes.

- 1.7 We published a first consultation document on the detailed design of the band manager award on 31 July 2008 (the July 2008 consultation document).⁵ That document considered key issues including whether we should award spectrum outside the digital dividend, the selection criteria we should apply in the beauty contest and how we should ensure reasonable PMSE demand is met on FRND terms.
- 1.8 This second consultation document makes further detailed proposals for how we expect the band manager to behave toward PMSE users and what this is likely to mean for them. In particular it addresses:
- the licence fee we will charge the band manager and how we will introduce this in a way that does not cause PMSE users disruption which would adversely affect their ability to continue providing a service to their customers;
 - how, in meeting our selection criteria, applicants to the band manager award will need to offer commitments in relation to making spectrum available to PMSE users on FRND terms and conditions; and
 - the rigorous scrutiny to which we will subject any request by the band manager to allow non-PMSE use of spectrum awarded to it.
- 1.9 It also outlines our proposed approach to defining the technical licence conditions (TLCs) for the spectrum which we are proposing to award to the band manager and sets out those proposed TLCs.
- 1.10 We believe that the proposals contained in this consultation document, taken with those published in July 2008, should give PMSE users confidence that they will be able to continue to operate without significant disruption during the transition to a market-based approach to spectrum access. A summary of how we are proposing to achieve this is illustrated in figure 1 below.

⁵ www.ofcom.org.uk/consult/condocs/bandmngnr/condoc.pdf.

Figure 1. Effect of proposals for detailed design of the band manager award



1.11 We do not underestimate the importance that PMSE stakeholders place on our proposals and ultimate decisions. We also recognise the concern felt by many in the sector. For that reason we have engaged very closely with individual PMSE users and representative bodies throughout our policy making process, ensuring that their legitimate concerns are reflected appropriately and that we meet all of our key objectives for the band manager award.

Next steps

1.12 We welcome all views from stakeholders on the questions raised in this consultation document. Responses are due by 7 September 2009. We will hold seminars on our

proposals – one open to all stakeholders, others aimed specifically at PMSE users and parties interested in applying to be the band manager respectively – during the consultation period.

- 1.13 We welcome continued discussion with stakeholders about what our proposals will mean in practice as we move toward publishing a statement of our decisions later this year and start the award process itself.

Section 2

Introduction

Background

- 2.1 In our December 2007 statement we set out our high level decisions on how we would award the digital dividend – the spectrum freed up by DSO. That document, amongst other things, built upon two previous consultations that had addressed future access to spectrum by the PMSE sector. It set out at a high level what form that future access would take: via a band manager whose interests would be aligned with those of PMSE users but who would face incentives to secure efficient use of the spectrum awarded to it for both PMSE and other uses.
- 2.2 Our proposals and decisions have been guided by four key objectives that recognise the large benefits to be had from enabling PMSE users to participate effectively in a market-based approach to spectrum access, not least so that they are able to express their demand for spectrum efficiently and have stronger incentives to invest and innovate in new technologies, as well as the difficulties that they face in making this move. These objectives are:
- avoiding disruption to PMSE users that adversely affects their ability to provide a wide range of services to citizens, consumers and business customers;
 - facilitating participation of the PMSE sector in a market-based approach to spectrum;
 - promoting the optimal use of spectrum in relation to all potential uses and users over time; and
 - avoiding the risks of regulatory and market failure.
- 2.3 We set out a number of detailed proposals for the design of the band manager award in July 2008. One of our central proposals was to award spectrum to a band manager who would have special obligations to the PMSE sector. This was a departure from our current approach to PMSE whereby spectrum is administratively assigned.

We proposed selection criteria for the beauty contest

- 2.4 We proposed that we would base the selection of the band manager on:
- the extent of each applicant's ability to secure efficient use of the spectrum in the award for both PMSE and other uses;
 - the extent to which each applicant demonstrated an understanding of, and a commitment to, the needs of PMSE users; and
 - the financial, managerial and technical ability of each applicant to establish and maintain efficient systems and procedures to secure efficient use of the spectrum to be awarded for both PMSE and for other uses.
- 2.5 We considered these criteria would ensure PMSE access to spectrum was protected in the long term, whilst securing more efficient use of the spectrum to be awarded.

We proposed that we would include most of the spectrum currently allocated for PMSE use in the award

- 2.6 We considered that this proposal met our key objectives in that it would ensure that all disparate PMSE groups would have their access to spectrum protected and would thereby avoid disruption which would adversely harm their ability to continue providing a service to customers, whilst giving the band manager the ability to move users between bands where this represented an efficient use of its spectrum.

We proposed that the licence term should be of indefinite duration

- 2.7 This proposal was in keeping with our objective to promote optimal use of spectrum, as well as other relevant duties, including promoting competition.
- 2.8 We also considered that awarding a licence with an indefinite duration would reduce the need for regulatory intervention to reassign spectrum at the end of the licence term. This could lead to a period during which spectrum would remain unused while we reassigned those rights.
- 2.9 There is also the risk that the incentive to invest toward the end of the licence term would be significantly reduced. Electronic communications networks generally require continual investment and any reduction in this investment could lead to detriment for citizens and consumers.

We proposed that we should have the right to vary or revoke the band manager's licence on spectrum management grounds for bands currently used by PMSE on one year's notice, and for other bands on five years' notice

- 2.10 In making this proposal we were careful to balance competing objectives. We recognised that the band manager would need to have sufficient business certainty to develop strategies that could lead to more efficient use of spectrum. However we also recognised that PMSE users would need to receive sufficient protection against the possibility that the band manager did not meet its obligations, which would mean we would not have met our objectives for this award.
- 2.11 We concluded the latter consideration outweighed all others in this case. As a result, we proposed that for spectrum where there was existing PMSE use, we should set a relatively short notice period of one year after which we could intervene on spectrum management grounds if the band manager failed to meet its obligations. For spectrum where there was no existing PMSE use, we considered five years' notice – in common with our approach to other tradable licences – would give the band manager sufficient time to develop the spectrum for innovative PMSE or other use.

We proposed that the band manager's licence fee should be subject to administered incentive pricing based on the economic value of that spectrum and that the fee should be calculated on a band by band basis

- 2.12 This proposal was central to meeting our objective of securing optimal use of spectrum. Administered incentive pricing (AIP) is an established method of incentivising efficiency by moving users towards paying the value of that spectrum. This is determined by the level that alternative users would be prepared to pay for access to that spectrum and is particularly appropriate in cases where spectrum supply would otherwise be insufficient to meet the demand from all interested parties.

- 2.13 However, we were also mindful of our objective of avoiding disruption to PMSE users. In particular, we were concerned that any significant rises in the fees that some users paid to access spectrum could impair their ability to continue providing a service. We therefore proposed that we would phase in AIP over a period of time which would allow these users to respond to any such increases.

We proposed that the band manager should make specific commitments to PMSE users which would give them protection

- 2.14 One of the consequences of our decision to license a single band manager is that PMSE users will, in the short term at least, be accessing spectrum through a single supplier. We were aware that this increased the risk that the band manager could behave in a way that would harm the interests of PMSE users. This would be against our objective to avoid disruption which would adversely affect their ability to continue providing a service to customers.
- 2.15 In order to mitigate this risk, we set out a number of areas where we proposed that applicants to be the band manager should make commitments to PMSE users. The specifics of these commitments would then be enshrined in licence conditions. The areas in which we stated that those proposed commitments should be made were:
- pricing policy in light of our stated policy prices to PMSE users should be FRND;
 - allowing PMSE users to access spectrum for which they are willing to pay and giving them priority over other non-PMSE use;
 - service levels that PMSE users will receive; and
 - dispute resolution, covering both internal processes and the use of alternative dispute resolution (ADR) where internal processes do not satisfy PMSE users.
- 2.16 We expect that, in order to meet our selection criteria for the band manager award, applicants will need to offer commitments in relation to the areas identified above. The exact form of those commitments will, however, be a matter for each applicant to determine when structuring their applications for the award. We will then consider which of those commitments are most likely to satisfy our objectives.

We proposed that we would define the technical licence conditions for the spectrum in the award in the form of block edge masks

- 2.17 We made this proposal in light of the applicability of block edge masks (BEMs) to low density use, such as PMSE, and the ease with which it would be understood by the band manager and end users.
- 2.18 In deciding to set BEMs we balanced our objectives to avoid disruption to PMSE users which would adversely affect their ability to continue providing a service to customers, with promoting optimal use of spectrum. To achieve this, we stated that we would, in the first instance, base BEMs on existing PMSE use thereby making it less likely that non-PMSE use would be able to access spectrum being awarded to the band manager. However, where the band manager identified alternative non-PMSE use it could apply to have those BEMs changed. We stated that we would consider such requests favourably providing the band manager had met its obligations to PMSE users effectively and its proposals were consistent with our objectives for future PMSE spectrum access.

We proposed that we would restrict ownership in relation to use of interleaved spectrum to operate DTT multiplexes and facilitate technical interoperability between any new DTT services using interleaved spectrum and existing DTT services

2.19 This proposal reflected the similar regime under the Broadcasting Act 1990⁶ as amended. It is consistent with our objective to promote optimal use of spectrum. This would be relevant to the band manager if it sought to introduce DTT services in the spectrum in the award.

We need to consult on further proposals

2.20 Our July 2008 consultation document signalled that we would need to consult separately on detailed TLCs and the levels of AIP that the band manager will pay. We subsequently considered that we should also consult on our approach to assessing the application of FRND terms and conditions in the event that there is a dispute between the band manager and PMSE users.

2.21 This consultation document, therefore, makes detailed proposals in all of these areas. Annex 6 addresses those responses to our July 2008 consultation document which are directly material here. We will return to all other responses in our statement on the detailed design of the band manager award later this year.

2.22 We also stated in our July 2008 consultation document we would propose new ways for the band manager to authorise PMSE and other use of its spectrum. These will differ from the present PMSE licensing arrangement through JFMG, which has powers to grant wireless telegraphy licences on our behalf under a Contracting Out Order.⁷ We will set out those proposals shortly, which may be relevant also to other licensees interested in allowing third-party use of their spectrum.

Structure of this document

2.23 Section 3 set outs in further detail what our proposed protection measures for PMSE users would mean in practice;

2.24 Section 4 sets out in further detail a benchmark approach to FRND terms and conditions;

2.25 Section 5 explains our objectives and approach in applying AIP principles to the licence fee payable by the band manager;

2.26 Section 6 sets out our opportunity cost estimates for the spectrum to be awarded to the band manager and our proposals for the band manager's licence fee;

2.27 Section 7 sets out our what our proposals might mean for PMSE users' future costs to access spectrum in practice;

2.28 Section 8 outlines our proposed approach to defining the TLCs for the spectrum to be awarded to the band manager and sets out those proposed TLCs; and

2.29 Section 9 sets out the next steps for this award.

⁶ www.opsi.gov.uk/acts/acts1990/ukpga_19900042_en_1.

⁷ www.opsi.gov.uk/si/si1996/uksi_19962290_en_1.htm.

Section 3

Protecting PMSE users

Introduction

- 3.1 When we set out our initial proposals for future PMSE access to spectrum, we were conscious that we would need to introduce measures that would provide specific protection to users in the sector. In particular, we recognised the magnitude of the transition the sector needed to make to access spectrum through market mechanisms. We therefore decided that transitional protection was needed to avoid unduly disrupting PMSE users, in line with one of our key objectives for the band manager award.
- 3.2 We set out in our July 2008 consultation document a number of proposals for protecting PMSE users. At their core was the proposition that the band manager should meet demand from PMSE users on FRND terms and conditions, with priority over any competing non-PMSE use.
- 3.3 Responses to these proposals, as summarised in annex 6, were generally favourable, although there was some caution pending further detail about the factors we would anticipate applicants taking into account when making commitments to PMSE users. For example, the British Entertainment Industry Radio Group (BEIRG) expressed some concern that FRND conditions should take into account the specific needs of PMSE users and how they need to access spectrum.
- 3.4 In this section we set out in further detail what our proposed protection measures for PMSE users would mean in practice. We propose a benchmark approach for how FRND could be implemented in practice in section 4.

How we propose to protect PMSE users

- 3.5 PMSE is a well established sector and an important user of spectrum. It has for many years operated under arrangements whereby users pay, at most, for the administrative costs of issuing their licences. In other words, PMSE licence fees have not been structured to reflect the economic value of the spectrum.
- 3.6 We considered it right that this sector should begin to face fees for access to spectrum that are in line with its value. This would enable PMSE users to make better informed decisions about how they use spectrum in the future and, where relevant, encourage them to use the spectrum available to them more efficiently. This more efficient use should, in turn, lead to some of the spectrum being made available to other users who place a higher value on its use.
- 3.7 However, there are barriers to a functional market for PMSE spectrum access, notably the very low level of current fees, the absence of enduring rights of use, the lack of information flows between participants in the PMSE value chain and the likelihood of disproportionately high transaction costs if the large number of PMSE licensees all had to secure access individually.
- 3.8 Setting up a single band manager, favoured by the majority of responses to our June 2007 consultation document, would create a dominant provider of spectrum to PMSE users. As a result, we have been mindful of the need to ensure that the band manager does not abuse any position of market power. It is, of course, possible that

in the longer term, developments in the market for spectrum will lead to some frequencies being made available to PMSE users from alternative suppliers of spectrum than the band manager.

- 3.9 PMSE users have also come to expect particular established service levels that reflect their needs. For instance, it is established practice that licences are often sought a very short period before they are actually needed. Again, we have been concerned that any changes to such practices in the short term could impact on PMSE users' ability to meet the needs of their customers.
- 3.10 As a result, we made a number of proposals in our July 2008 consultation document that, taken as a whole, would meet our key objective of avoiding disruption to PMSE users that adversely affects their ability to provide a wide range of services to citizens, consumers and business customers. The key proposals that we set out in this respect were:
- the band manager should demonstrate an understanding of, and a commitment to, the needs of PMSE users;
 - the band manager should allow PMSE users to access the spectrum awarded to it and for which they are prepared to pay FRND prices until 2018;
 - the band manager should establish both internal and external dispute resolution procedures;
 - TLCs should be based, in the first place, on existing PMSE use and only changed where there the band manager can show that it is meeting his obligations to PMSE users; and
 - we should be able to revoke the band manager's licence on one year's notice for bands where there is existing PMSE use.
- 3.11 The precise nature of any FRND conditions would depend on commitments made by applicants to the band manager award. In order to provide some guidance on what those conditions could look like, we set out in this consultation document our thoughts on a benchmark approach which could be used. It is precisely because we are aware this is a novel approach to spectrum access for all involved that we consider our initial focus in the FRND approach set out here should be on protecting PMSE users.
- 3.12 However, it is important to allow flexibility in the specification of the conditions as the band manager needs to have the flexibility to run a commercially viable business and sufficient incentives to secure efficient use of spectrum. Some of the key incentives open to the band manager under the approach we set out are:
- the ability to charge prices to non-PMSE users that are not subject to FRND obligations;
 - the ability to make a reasonable rate of return on PMSE use of the spectrum to be awarded; and
 - scope for keeping any efficiency gains that it realises for a period.
- 3.13 We have proposed to review AIP levels three years after the band manager begins operating, when we have further market information. We also consider that we

should review our approach to FRND commitments that the band manager has entered into at the same time to assess whether they are successfully achieving our objectives for future PMSE spectrum access. Where we conclude that these objectives are not being met, we could decide to amend the FRND guidance so that it is better suited to meeting our objectives.

- 3.14 Our proposals in this consultation document focus on the arrangements in the initial period before the first AIP review. During this initial period we are particularly mindful of the importance of avoiding significant disruption to PMSE users. As a result, our initial proposals place some limitations on the band manager. Subject to the outcome of the three-yearly review, we may permit a greater degree of flexibility in how FRND is interpreted, as long as this is still consistent with achieving our objectives.
- 3.15 If we do not align a first FRND review with our first review of AIP, there is a risk that we could create unwanted tensions given that AIP is an important element in determining price levels on a band by band basis whilst our FRND guidance will influence how individual fee levels are set.

Question 1. Do you agree with our proposal that we should review our approach to FRND obligations at the same time that we initiate our first review of AIP levels, three years after the band manager starts operating?

- 3.16 In this section, we provide a summary of our benchmark approach to FRND terms and conditions as they could apply to the band manager. A fuller description of this approach can be found in section 4 which discusses various options and outlines our preferred approach to FRND. It is important that our approach is clear as we consider it should form a benchmark against which applicants can decide what commitments to offer. We recognise, however, that applicants may have their own approaches to making FRND commitments for the purposes of meeting our selection criteria and we remain open to those possibilities.

Introduction to the benchmark approach to FRND terms and conditions

- 3.17 Commonly, the underlying purpose of FRND principles is to help create an outcome which would most closely reflect the outcome that would be expected in a competitive market⁸. In the case of the band manager with PMSE obligations, our principal concern is to ensure that fees set to end users will not be excessive in light of how much the band manager itself is charged for its licence and the costs it incurs to run this business. Our proposed approach to FRND is also designed to ensure that the service received by PMSE users in the future will meet their specific needs.
- 3.18 There are a number of objectives that we are seeking to meet through FRND terms and conditions in this case:
- terms and conditions, including prices, should be similar to those which should be expected in a competitive market;

⁸ In the UK communications sector, the principle of FRND has been applied in two circumstances. Sky is required to provide access to technical platform services under FRND terms and conditions. See www.ofcom.org.uk/consult/condocs/tpsguidelines/statement/statement.pdf for the guidelines and explanatory statement which sets out how we would normally interpret this requirement. In the case of the Arqiva/NL merger, the Competition Commission accepted Arqiva's undertakings which included the options for some contracts related to broadcast transmission services to be determined on FRND terms. See www.ofcom.org.uk/consult/condocs/arqiva/arqiva.pdf for the guidance provided by us to the Adjudicator responsible for ensuring compliance with these undertakings.

- there should be incentives for the band manager to make efficiency gains in running its business and managing spectrum; and
 - there should be no discrimination toward specific users.
- 3.19 These are broad objectives that are easy to understand. Our benchmark approach sets out the principles that we believe capable of delivering these objectives taking into account the specific context and features of the PMSE sector. These principles reflect what we believe would be the most appropriate approach in the present situation to enforcing any FRND commitments the band manager enters into, namely a case-by-case approach.
- 3.20 By setting out clearly our FRND objectives and principles we intend to provide as much guidance as possible to help interested parties prepare their applications, set prices and determine service levels in a manner that enables them to meet the selection criteria. We do not seek to be prescriptive about how applicants should express the commitments they are prepared to make. We will select the band manager based on commitments that best meet our selection criteria, reflecting our FRND objectives and principles.
- 3.21 If we need to assess whether the band manager has breached its FRND obligations, we will revert to the commitments it made at the time of applying. We will have access to the relevant information and be able to make a judgement based on the precise circumstances. If it is not entirely clear how we should assess some aspects, we will rely on the FRND objectives we will set out in the statement following this consultation document and determine whether the band manager has made decisions that reflect what we are seeking to achieve.

Question 2. Do you agree with the objectives that we are seeking to achieve through our application of FRND to the band manager?

FRND pricing under the benchmark approach

- 3.22 FRND pricing means, in its broadest terms that the band manager should not price excessively and that the price which the end user pays should reflect that which would be paid if there was competition in the market. In the context of the band manager award, FRND terms will only be applied to spectrum which is included in the award and which is being used by PMSE. As a result FRND will not apply to:
- any spectrum which the band manager has authorised for non-PMSE use; and
 - any spectrum not included in this award, but which the band manager has acquired rights to use through other routes (which include auctions, trading, other beauty contests and first come-first served licences granted by us).
- 3.23 In order to determine whether a price charged is consistent with the FRND principles in our benchmark approach it is necessary to consider the costs that form the basis of the prices, how these have been allocated by the band manager to the end user and what rate of return it has charged for its service. The guidance in section 4 sets out in more detail what we consider to be allowable costs and reasonable returns under our benchmark approach whilst setting out our cost allocation principles.
- 3.24 Where the rate of return associated with an assignment is found to be excessive, we would conclude that FRND pricing obligations had not been met. However, it is also possible that any dispute-resolution procedure will decide that the band manager has

priced within the provisions of its FRND commitments and is therefore not in breach of its obligations.

- 3.25 Under the benchmark approach the band manager would be allowed a significant degree of flexibility in how it structures its prices. However, applicants will need to present to us plans for what that structure will be at the application stage. Under the approach the proposed pricing structure would need to have regard to the outlined FRND principles, although we consider that we do not need to make this an absolute prerequisite for applications.
- 3.26 The successful applicant will need to publish its pricing plans, including individual fee levels, to PMSE users in advance of its beginning operation.
- 3.27 There is a risk that the band manager will propose a pricing structure that is in accordance with its FRND obligations but still leads to significant price increases to certain classes of PMSE users. This could happen where a change in the way that licences are *structured* leads to significant increases in fees to these classes of users.
- 3.28 If this were to happen, we could reduce the impact on those classes of users (e.g. by requiring the band manager to provide a phasing in period), the effect of which would be that the price increases would be more gradual. We would seek to ensure that the band manager was not financially disadvantaged in these circumstances (e.g. by a reduction in its licence fee offsetting any revenue foregone).
- 3.29 We would address this issue, should it occur, at the time of the selection process when the applicants submit their applications.

Provision of information by applicants

- 3.30 Under our benchmark approach to FRND, we would require applicants to provide information about how they intend to allocate their costs on a band by band basis and about which costs will form the pricing basis, including forecasts for key aggregate cost categories. This will assist us in any subsequent assessment of whether prices are in accordance with the FRND principles set out in the benchmark approach. Only applicants that provide this information in an acceptable way will be considered for selection.
- 3.31 There is significant uncertainty as to how the market for PMSE spectrum access will then develop. As a result, the band manager may have to depart from the level of costs that it forecast allocating to individual bands after it has begun operating. Where this happens, we will accept such changes in the event of a dispute as long as the band manager can demonstrate strong and compelling evidence for making them.
- 3.32 We also believe that the band manager should be held to the cost allocation methodology that it outlined at the time of application unless there is strong and compelling evidence for these to change.
- 3.33 Further details of this can be found in paragraphs 4.141-4.146.

Dealing with PMSE spectrum congestion

- 3.34 Although we will expect the band manager to indicate in advance how it will structure fees to PMSE users, we also are aware that the band manager may encounter

situations of congestion between PMSE users in a particular band – in other words, where there is more demand for PMSE use than supply of spectrum available to the band manager from this award at a particular time. Whilst significant spectrum congestion between PMSE users is relatively unusual, the band manager may be faced with deciding how it authorises access among competing PMSE users where alternative spectrum is not available and therefore some users may lose out.

- 3.35 We have identified two broad approaches to how the band manager could deal with PMSE spectrum congestion under our benchmark approach to FRND:
- **option 1** – via ad hoc pricing; that is, by increasing fees to PMSE users above those set out in the published pricing plans (see paragraph 3.30) to the point where excess demand is removed; or
 - **option 2** – via a non-pricing mechanism: that is, by using rationing rules which do not rely on prices.

Option 1 – via pricing

- 3.36 This approach is one efficient way of allocating resources where demand exceeds supply; it generates a “scarcity rent”. A scarcity rent can be defined as an increase in price not driven by an increase in the supplier’s own costs, but where the objective is to ration excess demand (that is, to align demand with a supply that is scarce).
- 3.37 We are concerned that such price increase (beyond the level caused by the supplier’s own costs) may hide an inefficient monopoly rent, that is, an excessive element in addition to that acting as a scarcity premium. We are also concerned about how such an ad hoc approach to pricing would affect PMSE users who could not afford the increased fee as this may be against our objective to avoid disruption to PMSE users which would adversely affect their ability to continue providing a service to customers. Finally, this would distort the pricing objectives we set out in our AIP phasing proposals.

Option 2 – via a non-pricing mechanism

- 3.38 With this option, we would expect the band manager to ration spectrum where there is excess demand in a fair manner, taking into account the needs of PMSE users more widely. This would mean, in practice, that the band manager would seek to authorise spectrum access in a way that enables most PMSE users to deliver their services at a reasonable quality level and, in the worst cases, avoids (as far as possible given that there is excess demand) a significant number of PMSE users being unable to access spectrum. It could do so in various ways, such as a first come first served approach, or one where decisions on authorisation are proportional to requests.
- 3.39 Such an approach is comparable to JFMG’s current practice of taking account of the needs of all PMSE users when deciding how to assign spectrum where demand exceeds supply.
- 3.40 Any administrative cost generated by managing congestion in this way would be dealt with as any other administrative costs. Under the benchmark approach the

expected costs should be described as part of the application and taken into account when setting fees to PMSE users. Our proposals in section 5 address these costs.⁹

- 3.41 This approach to rationing demand by means of a non-pricing mechanism would be more in keeping with our general approach of ensuring that prices to PMSE users are set at a conservative level to reduce the risk of regulatory failure.

We favour non-pricing mechanisms

- 3.42 We consider that a non-pricing approach to rationing excess PMSE demand meets our objectives better than a pricing approach. Hence, we have included this approach in our benchmark. Whilst both approaches could work effectively, the non-pricing option is better aligned with our objective to avoid disruption to PMSE users. It would mean that the band manager could not recover revenues which exceeded its costs (including a reasonable rate of return). It would also enable authorisation decisions to be made based on criteria other than ability to pay.
- 3.43 We would be interested to hear from stakeholders what they consider to be fair criteria for authorising spectrum access where there is excess PMSE demand for spectrum.

Question 3. Do you agree with our proposal that under the benchmark approach excess PMSE demand for spectrum should be dealt with by the band manager using non-pricing methods?

Question 4. Do you have any views on how best to deal with excess PMSE demand using non-pricing methods?

Discriminating between PMSE users

- 3.44 Although the benchmark approach allows the band manager a degree of flexibility in how it structures its fees, we also consider that it must adhere to the non-discrimination principles that underlie FRND obligations.
- 3.45 It is efficient for prices to reflect the costs caused by supplying services. We therefore expect that the prices charged to PMSE users by the band manager will reflect, to a great extent, differences in factors influencing and causing costs, whether spectrum opportunity costs or spectrum management costs. Likely examples of when and where this may occur include the following types of differences:
- geographical (rural against urban location);
 - temporal (times of low demand against times of peak demand);
 - different durations of access;
 - indoor or outdoor access; and/or
 - automated or manual handling of requests.

⁹ In paragraph 4.93, we set out the potential for a different approach whereby any increase in the band manager's cost of authorising spectrum access to PMSE users is driven by the introduction of non-PMSE uses.

- 3.46 The factors set out above are by no means exhaustive. We expect that there may be other scenarios where changes in costs driven by differences in the nature of the service provided lead to the band manager applying different prices to different PMSE users.
- 3.47 We accept there may also be occasions when it is commercially efficient for the band manager to differentiate prices between PMSE users to reflect willingness to pay. However, our preference is for price differences to be driven only by differences in cost factors and/or by cost causation. We therefore propose that the band manager may not charge different prices to different PMSE users on the basis of demand factors.
- 3.48 Under the benchmark approach, in the event of a dispute, if the band manager has an *objective justification* for setting different prices it would not be in breach of its FRND obligations.

Question 5. Do you agree with our benchmark approach to assessing whether the band manager is pricing in a discriminatory way?

Ensuring the band manager benefits from any efficiency savings it makes

- 3.49 Under the benchmark approach any prices that the band manager charges to PMSE users should reflect the costs involved in managing that spectrum and where relevant the value of the unmanaged spectrum (as reflected in the AIP based licence fee charged to the band manager). Applicants will be expected to indicate how they would allocate costs at a band level at the application stage of the award.
- 3.50 However, in the event that the band manager manages to reduce its costs by realising efficiencies, our benchmark FRND approach would not expect that the benefits of those efficiencies should be immediately passed on to PMSE users. We want the band manager to have an incentive to run its business efficiently as this will benefit it through increased profits and potentially its customers through a better standard of service. We expect that PMSE users will benefit in time from these efficiencies, such as through revisions to the pricing arrangements in the first AIP review.
- 3.51 Therefore where any complaints are brought against the band manager over pricing levels, our benchmark FRND approach would make an assessment against the band manager's cost forecasts to determine whether its FRND obligations had been breached.

FRND service levels under the benchmark approach

- 3.52 The arrangements for PMSE access to spectrum have been stable and consistent for a number of years. For example, there is an established practice amongst many users that licences can be booked at short notice before they are actually needed. Another key element of the service that PMSE users receive is the existence of particular *types* of licence which help to facilitate flexible use of equipment (for example, the licence for shared frequencies in channel 69 currently used for wireless microphones).
- 3.53 Many of these service expectations are enshrined in our current contractual agreement with JFMG.

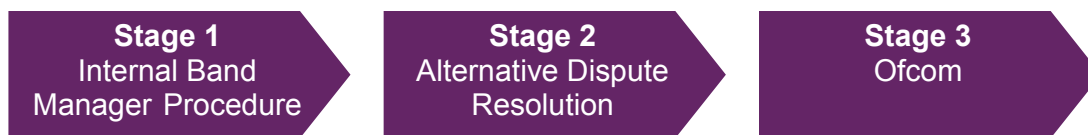
- 3.54 In line with our objective to avoid disruption to PMSE users, we consider that it would not be desirable for the licensing service they enjoy at present to change radically in a short period of time. For example, we think it would be in the best interests of the sector to be able to book assignments on days and at times that do not differ to any great degree than at present. Therefore under our benchmark approach to FRND the service levels that the band manager offers to PMSE users should be similar in substance to – and certainly no worse overall than – those which are set out in the current JFMG contract.
- 3.55 Accordingly, we will make the relevant parts of our contract with JFMG public in advance of inviting applications for the role of band manager. This will indicate aspects of the service that PMSE users can currently expect to receive, such as hours of service, stipulated lead times, key performance indicators (KPIs) and other service levels. We would expect any applicant for the band manager role to have some reference to these service levels.
- 3.56 We also expect that any applicant would offer commitments that showed an appreciation of particular features of how PMSE users currently operate. For example:
- at present, only short term licences are made available in certain frequencies. This reflects the nature of PMSE demand, which is often for a limited duration, and helps those PMSE users to pay only for the spectrum when they need it;
 - in other frequencies, licences are made available to meet the needs of PMSE users who need access to spectrum for longer periods and would face increased transactional costs if they were constantly renewing their licences during that period; and
 - some “shared frequencies” are currently made available to PMSE users in recognition of the importance that this facility has for wireless microphone users who need a certain level of flexibility to use their equipment at different times and at different locations.

Question 6. Do you agree with our benchmark approach to ensuring that service levels are met in an FRND way?

Our role in enforcing FRND

- 3.57 Despite the protections we have proposed for PMSE users, including the band manager’s obligation to meet reasonable demand on FRND terms, there may be occasions where the band manager and a PMSE user find themselves in disagreement. This disagreement may centre on the fee that the PMSE user has been charged or on a particular aspect of the service it has received.
- 3.58 In our July 2008 consultation document, we proposed a three stage process that we considered would be appropriate to deal with these individual disputes. We suggested that, in the first instance, disputes should be dealt with through an internal disputes procedure. In the event that this did not resolve the dispute to the satisfaction of both parties, then the PMSE user could have the option to go to an independent ADR process. We would be the final body of appeal, only after these other two avenues had been exhausted and a satisfactory outcome was still not reached.
- 3.59 This process is summarised in figure 2 below.

Figure 2. Proposed stages in dispute resolution



- 3.60 Any FRND commitments that the band manager has entered into should be interpreted in the same consistent way throughout such a process. The guidance outlined in section 4 of this consultation document should therefore be applied equally by the band manager at stage 1, the ADR body at stage 2 and us at stage 3.
- 3.61 In terms of individual disputes, we would not investigate whether the band manager had met its obligations unless there had been a dispute between it and a PMSE user which has gone through the first two stages of the dispute resolution process. Throughout any ongoing process we would expect the band manager to provide sufficient information and reasoning to allow an informed judgement as to whether its decisions were consistent with those obligations.
- 3.62 We also expect that, while a dispute is being considered, the band manager should continue to allow that spectrum to be used by the PMSE user in question until a resolution has been reached.
- 3.63 We proposed in our July 2008 consultation document that there should be an annual audit of the band manager's performance which, among other things, would look at whether there was evidence that the band manager was making above-normal profits from PMSE users and whether service levels had been so poor that PMSE users' ability to operate had been significantly impaired. Our benchmark FRND approach considers indicators of profitability and suggests how we would approach this aspect in the event of a dispute. This proposal ensures that we will be able to determine whether FRND obligations to PMSE users as a whole have been met.
- 3.64 We favour a flexible *ex post* enforcement approach (i.e. we become involved only at the point of a dispute reaching stage 3 as set out in figure 2 above) for two important reasons. First we cannot know now the specifics of the business models which will be part of the applications for the band manager role and how the PMSE sector will evolve. As a consequence it would be difficult for us to set out exactly what levels of pricing will be acceptable under any FRND conditions the band manager enters into. Second we cannot predict all possible scenarios which may occur and hence we could not reasonably state in advance the precise analytical exercise that would have to be carried out in each situation.

Non-PMSE use of spectrum in the award will need our prior permission

- 3.65 In our July 2008 consultation document, we proposed that the band manager should meet its obligations to PMSE users before it allowed any non-PMSE use of the spectrum awarded to it. At that time, we stated that we thought that this obligation should be reflected in the band manager's TLCs. These would be based on existing PMSE use and could only be changed where the band manager applied to us for a variation. Part of any approval process would include the band manager demonstrating that it could otherwise meet its obligations to PMSE users. Our proposals in this respect remain unchanged.
- 3.66 However, it is technically possible for non-PMSE services to operate under the TLCs proposed later in this consultation document. Although our proposals are clear on

what obligations the band manager will have towards PMSE users, we wish to avoid uncertainty among PMSE users as to their robustness.

- 3.67 We therefore propose to establish a further protection whereby the band manager will have to seek approval from us for all proposed non-PMSE use of the spectrum awarded to it, whether this use fits within the terms of the TLCs or not.
- 3.68 This provision would be of particular importance in the early stages of the band manager's operation. This is because our approach to phasing in the band manager's AIP based licence fee may mean that alternative users of the spectrum awarded to it will be prepared to pay a significantly higher price for access than PMSE users are being charged in the initial stages. This could, in turn, lead to increased incentives on the band manager to allow this alternative use. This proposal would provide added protection to PMSE users in the face of any moves to introduce alternative use of the band manager's spectrum which may impact upon the band manager's obligations to PMSE users.
- 3.69 We consider that such an approach would provide welcome clarity to meeting our objective to avoid disruption to PMSE users. We nonetheless reiterate that where the band manager could show its ability to meet its obligations to PMSE users, we would look favourably on any request to allow non-PMSE use of the spectrum awarded to it.

Question 7. Do you agree with our proposed approach that any proposal by the band manager to allow non-PMSE use of the spectrum in this award should be first approved by us?

London 2012 Olympic Games and Paralympic Games

- 3.70 We noted in our July 2008 consultation document that we considered it certain we would need access to some of the spectrum to be awarded to the band manager to meet the requirements of the London Games for audio links and video links. We proposed to secure this by incorporating a suitable condition in the licence awarded to the successful applicant to make it clear we might use our power under paragraph 8(5) of schedule 1 to the Wireless Telegraphy Act 2006¹⁰ to vary the terms of the licence at any time if it appeared to us to be necessary or expedient to do so for the purpose of securing compliance with any international agreement or arrangements relating to the London Games to which the UK was a party.
- 3.71 We subsequently published a consultation document on 27 May 2009 with our proposals for making spectrum available for wireless communications for the London Games.¹¹ We proposed establishing special licensing arrangements for users covered by the Government's guarantees on spectrum to the International Olympic Committee but noted that non-guaranteed users seeking spectrum would have to do so through the market and our existing assignment processes.
- 3.72 We also noted in that consultation document that some of the spectrum identified in the draft spectrum plan would be shared with non-Games users and that, in the run-up to and during the London Games, it might be necessary to coordinate some of this use with the requirements of the Games. In performing this task, we would seek to strike an appropriate balance between ensuring the success of the Games and minimising their impact on other spectrum users. We are currently examining how

¹⁰ www.opsi.gov.uk/acts/acts2006/pdf/ukpga_20060036_en.pdf.

¹¹ www.ofcom.gov.uk/consult/condocs/london2012/london2012.pdf.

best to ensure efficient coordination between shared Games and non-Games use of the same spectrum.

- 3.73 Our planning for the London Games assumes that Ofcom rather than the band manager will make the assignments for any use of the spectrum to be awarded to the band manager by those covered by the Government's spectrum guarantees. We therefore expect the band manager's licence will restrict its operations in and around competition venues during the Games and at some test events. We expect to set out further details of these arrangements in the Information memorandum (IM) and subsequent coordination guidelines.
- 3.74 We will need to work very closely with the band manager during the London Games to ensure that efficient coordination. We will have to develop effective ways to exchange high quality information about both parties' desired and actual use of spectrum in or adjacent to bands that will be used for the Games. Consequently, we expect to require the band manager to provide detailed information on its use of spectrum. Again, we expect to set out further details of these requirements in the IM.
- 3.75 Similar considerations may apply in respect of the Glasgow 2014 Commonwealth Games, the arrangements for which we will consult on separately in due course.
- 3.76 We encourage PMSE users and potential applicants in the band manager award to respond to both this consultation document and our consultation document on the London Games to help us best achieve efficient sharing and coordination between Games and non-Games spectrum use.

Question 8. Do you have any comments on how efficient sharing and coordination between Games and non-Games use of spectrum to be awarded to the band manager can best be achieved?

Section 4

Benchmark approach to FRND terms and conditions

Introduction

- 4.1 In this section, we set out in further detail the benchmark approach to FRND terms and conditions.
- 4.2 In our December 2007 statement, we set out why, based on our objectives, we considered that establishing a single band manager for PMSE spectrum access would be the best way to safeguard users' interests. We also recognised that one of the implications of our decision was that we would essentially, in the first instance, be creating a dominant supplier of spectrum for PMSE users. As with any supplier in this position, the band manager might not feel constrained to offer a service to PMSE users comparable to what would be expected in a competitive market. Therefore, the overall aim of our FRND approach is to respond to this situation in a way which minimises the risk that the band manager could abuse its dominant position, thereby detracting from the welfare of citizens and consumers.
- 4.3 In deciding how to best achieve this we have taken into account our objectives for this award as set out in section 2. We recognise that there are trade-offs between some of these objectives, in particular our objective to avoid disruption to PMSE users when set against our objectives of facilitating their participation in a market based approach to spectrum and promoting optimal spectrum use in relation to all potential uses and users. We think our overall approach to the band manager award addresses this trade off as follows:
- **protecting PMSE users** through a package of measures, including FRND terms and conditions and the phasing in of AIP. The phasing in of AIP is an important measure for protecting PMSE users. This is because the opportunity cost of some spectrum bands may be significantly higher than the current fee levels paid to JFMG. This could cause an initial discrepancy between what PMSE users would be *willing* to pay (given the value their use of spectrum generates) and what they are *able* to pay (given their current funding arrangements). Therefore, a period of adjustment should be allowed to avoid disruption; and
 - **promoting optimal spectrum use** through establishing a band manager with commercial incentives and exposure to spectrum pricing, which over time will reflect the opportunity cost of the spectrum. If the value PMSE users place on spectrum (i.e. the price they are willing to pay) is less than the value other users could generate from the spectrum (the opportunity cost), those other users should gain access. Therefore, moving towards prices which better reflect opportunity cost should facilitate such efficient outcomes.
- 4.4 We consider the protection of PMSE users to be of particular importance during the initial phase of the transition towards a market based approach to spectrum. Therefore, our benchmark FRND approach will principally refer and give priority to our objective of avoiding disruption during this phase although we still seek to make proposals which will secure efficient use of spectrum. However, as we discuss further below, we suggest that the benchmark approach is reviewed at the same time as the

first AIP review. At that point, depending upon how the transition has progressed, it may be appropriate to strike a different balance between our objectives of avoiding disruption to PMSE users and promoting optimal spectrum use.

- 4.5 The purpose of the FRND benchmark is to set out an approach to FRND obligations which would ensure that the actions of the band manager as a dominant spectrum supplier to PMSE users are consistent with the desired trade-off between efficiency and PMSE protection. This approach focuses on three areas:
- ensuring that terms and conditions, including prices to PMSE users, are similar to those which would be expected to emerge in a competitive market (after taking into account the other protections PMSE users are to be offered during the transition period);
 - ensuring that there are incentives for the band manager to make efficiency gains in running its business of managing spectrum; and
 - avoiding discrimination between specific PMSE users.
- 4.6 In this section we set out how our benchmark approach would achieve these aims. As part of this approach we are taking into account the balance between:
- the need for a clear steer and early certainty both on what FRND means in this context and on how we may interpret it in case of a dispute; and
 - the scope for flexibility at a later stage – after the band manager award and in case of a dispute – to reflect greater knowledge of the specifics of the band manager's business and the circumstances of the dispute.
- 4.7 We also consider the role this benchmark will play in assessing any commitments applicants enter into at the time of the award, such that:
- it should be easy for all parties to understand;
 - it should be clear what would be expected from the band manager under the benchmark approach, including transparency on what evidence and information it will be expected to provide; and
 - it should clarify the link between the approach and the enforcement process (i.e. when and how the approach would be likely to play a role).
- 4.8 As discussed in section 3, this guidance is an illustrative benchmark for how the band manager may structure its business model to be able to offer commitments on FRND terms and conditions. This benchmark approach does not preclude applicants from suggesting alternative conditions, and we would judge any such suggestions impartially based on the evidence and reasoning put forward by the applicant.

Background to our benchmark approach

- 4.9 The executive summary sets out how we have developed our policy on future PMSE spectrum access. Previous documents leading up to, and including, our December 2007 statement explained why we considered that PMSE could best secure its access to spectrum over the long term by moving toward a market based approach. Since then we have been assessing and proposing elements to best reach that goal.

- 4.10 We have developed our understanding of the PMSE sector in order to inform our proposals. In doing so, we have been particularly keen to understand the terms and conditions for spectrum access that the PMSE sector enjoys at present so we can assess whether, and to what extent, they can be modified over time to converge with those that would be observed in a competitive market.
- 4.11 We have also taken into account the responses we received to our July 2008 consultation document. Those relevant to FRND terms and conditions are summarised in annex 6. We are particularly mindful of representations made in relation to pricing in light of our objective to avoid disruption to PMSE users. This benchmark approach takes into account the impact of price uncertainty, the basis for setting prices and the method by which spectrum will be accessed. At the same time, there must be sufficient commercial incentive for the band manager to make a reasonable return. Finally, we think it important for us to be able to monitor the band manager's performance, both financial and non-financial.
- 4.12 The analysis which underpins our FRND benchmark approach is informed, in part, by knowledge of current industry practices, in particular:
- JFMG, the body which currently grants licences for PMSE spectrum use;
 - existing pricing terms and conditions;
 - existing non-pricing terms and conditions; and
 - existing ways of meeting spectrum demand.
- 4.13 JFMG grants licences to PMSE users on the basis of a fixed cost contract with us. The new approach will see us select a band manager through a beauty contest. This band manager will differ from the current licensing body in that it will be able to recover its costs *and* earn a reasonable rate of return from the revenue it collects from its customers. As such, risks are being transferred from us to the band manager, which will be recognised in the return earned and will give the band manager incentives to efficiently manage spectrum for PMSE and other users.
- 4.14 PMSE users currently pay fees set by us to, at most, recover the administrative costs only of licensing their use of spectrum. As a result, the levels of PMSE fees are low when compared to equivalent fees in other sectors. Their level and distribution across users result mainly from historical considerations and has given little incentive to PMSE users to improve spectrum efficiency. We plan to introduce spectrum pricing based on AIP and charge the band manager a licence fee which will signal the opportunity cost of the spectrum awarded to it. The licence fee will also take into account the band manager's spectrum management costs.
- 4.15 At the same time, we intend that fees charged to PMSE users for spectrum access will reflect both the opportunity costs of that spectrum and the management costs incurred by the band manager. Our intention is that these fees should, as accurately as possible, guide PMSE users toward efficient spectrum use.
- 4.16 It is likely that this approach to spectrum pricing may involve changes in both fee levels and the way that fees are structured. We are not in a position to second-guess detailed pricing proposals made by applicants in the award process. However, we do intend to ensure that during the initial period after the band manager begins operating any increases in annual fee totals per band from existing levels will be

bearable by PMSE users. At the same time, we will also need to ensure that the fees paid by PMSE users converge over time with market rates.

- 4.17 Our contract with JFMG describes the services it provides to PMSE users on our behalf. It includes the types of available licence, service levels and KPIs. It also contains other information relating to pricing (specific details of fee levels are contained in the current fees regulations¹²) and directions on how excess demand should be dealt with. Information on fees is available on the JFMG website.¹³ Under our benchmark approach, the band manager would initially offer terms and conditions that reflect the service levels that PMSE users currently enjoy. However, these provisions may change over time if the band manager seeks to move to arrangements that would emerge under competitive market conditions. We anticipate that these terms and conditions would be equally clearly set out and made easily and widely available on a timely basis.
- 4.18 The key issue of how the band manager will meet spectrum demand from PMSE users could be viewed as one which relates to both our pricing and non-pricing guidance. This is particularly the case when PMSE demand for spectrum exceeds available supply. At present, JFMG deals with spectrum requests on a first come first served basis. The exception to this is when handling priority requests or where a large number of assignment requests need to be considered simultaneously.
- 4.19 In its efforts to meet as many requests as possible, JFMG seeks to offer suitable alternatives when there is excess PMSE demand for spectrum. Evidence from the PMSE licensing database and informing our AIP proposals in this consultation document suggest that excess PMSE demand is generally limited to some special events and, to a lesser extent, major news events (where demand for spectrum for wireless cameras can outstrip supply). We believe that excess PMSE demand could be dealt with by the band manager in an equivalent way to JFMG's current approach – that is, without relying on price increases as a rationing mechanism.
- 4.20 Our PMSE protection proposals are designed to effectively respond to PMSE users' concerns. The FRND benchmark approach sets out our preferred approach to how PMSE users could be charged for spectrum access, including how the band manager could deal with excess demand from PMSE users. It also establishes how other terms and conditions could meet our FRND principles. This, in turn, determines the information that needs to be provided during the award process, at the time of annual audits of the band manager's performance, and in resolving disputes.

Overarching questions for stakeholders

- 4.21 We are asking stakeholders for their views as to whether the approach outlined in this benchmark is sufficient for applicant band managers to understand how they could demonstrate commitments to PMSE users based on FRND principles. These commitments will need to be given at the application stage of the award. If stakeholders consider that this benchmark approach is insufficient, we request that they put forward their views on what further information would be needed.
- 4.22 We also ask for views on whether the benchmark approach strikes the correct balance between protecting PMSE users and giving the band manager enough flexibility to operate an efficient and viable business.

¹² www.opsi.gov.uk/si/si2005/uksi_20051378_en.pdf and www.opsi.gov.uk/si/si2007/pdf/uksi_20072326_en.pdf.

¹³ www.jfmg.co.uk.

Question 9. Does our FRND benchmark approach provide sufficient information for applicant band managers to make commitments to PMSE users based on our FRND principles and objectives?

Question 10. Does our FRND benchmark approach strike an appropriate balance between giving applicant band managers sufficient certainty to plan their business and giving sufficient flexibility to determine whether FRND obligations have been breached?

Our FRND benchmark approach

- 4.23 In the rest of this section we set out our benchmark approach to FRND obligations, namely:
- our approach to reviewing our FRND benchmark approach;
 - our benchmark approach to FRND pricing issues such as cost, rationing and rate of return;
 - our benchmark approach to FRND non-pricing issues such as amount supplied and service levels;
 - our overarching approach to enforcing FRND obligations; and
 - our benchmark approach to information provision.

Approach to reviewing our FRND benchmark approach

- 4.24 Our proposed FRND benchmark approach is based on all the information currently available to us. However, we recognise there is some risk that the band manager's business may evolve in a way that the benchmark approach did not envisage. If this means that our FRND objectives are not met satisfactorily or could be met more effectively, it would be appropriate for us to review the benchmark approach.
- 4.25 In particular, our proposals reflect a balance between our key objectives for future PMSE access to spectrum which gives particular weight to the protection of PMSE users. We believe that this is the right balance to strike in the initial phase of the transition to a market led approach as the scale of the potential changes in prices and other conditions may otherwise be too great. However, as we move out of this initial phase developments in the PMSE sector and in the market for spectrum access may call for a revision of the balance between our objectives. Most notably, they may cause us to give greater weight to our objective to promote optimal spectrum use. We would like to be in a position to adjust the benchmark approach in the light of those developments and any impact they have on our wider objectives.

Question 11. Do you agree it may be appropriate for us to review the FRND benchmark approach?

- 4.26 An important aspect of reviewing the FRND benchmark approach is the frequency with which it should be reviewed and/or what can trigger a review, not least because the timing of a review can affect its quality and its effectiveness.
- 4.27 We have identified the following options:
- on demand;

- at the same time as AIP reviews (the first one being after three years); and/or
 - at another set time.
- 4.28 We propose that an initial review of the FRND benchmark approach should be carried out in parallel with that of opportunity costs and the band manager's licence fee. This would take place three years after the band manager started operating. Several aspects of our approach to FRND terms and conditions are linked to our proposals on AIP and opportunity costs. As a result, an approach which does not align an initial review of our FRND benchmark approach with that of our initial AIP review may create tensions between the two. AIP is an important element of what constitutes an FRND price because cost information needs to be submitted in order to derive a licence fee, and the licence fee is needed in order to derive the band manager's pricing proposals for PMSE users.
- 4.29 Aligning the two reviews could also minimise the burden on all parties involved by maximising the scope to collect and analyse information common to both.
- 4.30 We do not address the timing of FRND reviews after the initial three year review and will make decisions on this in light of developments at the time.

Question 12. Do you agree with our proposal to hold an initial review of the FRND benchmark approach in parallel with the initial AIP review, three years after the band manager starts operating?

What we expect of the band manager during the review

- 4.31 We will expect the band manager to take an active part in the review of the FRND benchmark approach. This will include providing any information we require for the purposes of the review and facilitating our analysis of the effectiveness of the benchmark approach where appropriate.

Benchmark approach to FRND pricing issues

- 4.32 One of the important features of our approach to FRND pricing is the goal that the band manager should charge prices to PMSE users which would be observed in a competitive market (taking into account the impact of our other protection measures). This approach must also allow for the band manager to benefit from, and so have an incentive to pursue, efficiency gains.
- 4.33 As set out in more detail in the following paragraphs, one way to achieve this is by:
- ensuring prices are cost oriented (allowing for an acceptable rate of return); and
 - judging the cost orientation of prices against forecasts of costs made before efficiency gains are taken into account.
- 4.34 As a result, our benchmark approach to pricing is guided by two factors: our approach to costs, and our approach to the band manager's rate of return (including how this can make allowances for efficiency gains).
- 4.35 Prices can serve different purposes:
- they are a mechanism for recovering the costs of providing a service; and

- in some situations, they can also be used to ration demand to match supply. In these cases, prices may be higher than would be justified by cost recovery alone.
- 4.36 We focus first on cost recovery, then go on to discuss whether the band manager should also be able to use prices when there is excess demand in order to ration demand to match supply. We then consider our approach to the band manager's rate of return.

Benchmark approach to cost recovery

- 4.37 The key categories of cost we expect the band manager to incur are:
- incremental administrative costs. These are operational and business costs that arise only as a result of providing a service. They can be observed at the band level as well as the individual fee level. For example, authorising access to an additional band will generate additional costs and will be viewed as incremental to authorising access to other bands. Similarly, at the individual fee level, the cost of authorising access (for example, co-ordinating authorisations and writing out terms and conditions) will be incremental to each authorisation made;
 - AIP-based licence fees. We are proposing a licence fee for the band manager that will reflect the underlying opportunity costs of spectrum in different bands on an annual, UK-wide basis. While the fee is comprised of constituent elements that are incremental (and potentially avoidable) by band, their level is fixed by us and common to users within a band. A full discussion of our approach to setting AIP can be found in section 6; and
 - common administrative costs. These costs are operational and business costs which arise as a result of a group of services being provided by the band manager, but which are not incremental to a single service. Costs can be common to a limited set of services or to the whole range of services provided by a firm. For example, the band manager will require skilled staff and systems to manage its spectrum efficiently. Much of this administrative cost is likely to be common to all PMSE users.
- 4.38 The band manager should be able to recover all of these categories of cost, as long as they are reasonably and efficiently incurred. In a competitive market, a firm trying to recover more than reasonably and efficiently incurred costs would be undercut by rival firms until it was forced to either cut its prices or exit the market. These concepts can be described as follows:
- a reasonably incurred cost is the cost associated with an input that is required for the provision of a product or service. In the context of the band manager, this would include those costs relevant to administering the process which authorises PMSE users to use spectrum or developing and managing its business to the benefit of PMSE users; and
 - an efficiently incurred cost is the lowest achievable cost associated with a reasonable input (e.g. the use of a technology which delivers the required quality and the minimum cost). In the context of the band manager, efficiently incurred costs are those resulting from cost minimisation.
- 4.39 There are two key approaches which the band manager could use to set prices in order to recover these costs. The first involves setting prices which are cost driven – i.e. the amount each user pays is directly related to the cost of providing the service

to that particular user. These are called cost oriented prices. The second approach involves using value in order to drive cost recovery. In this case the amount individual users pay will reflect their willingness to pay for the service, rather than the underlying cost of providing the service to that user.

- 4.40 In principle the band manager could use either of these approaches, or even a combination of both, in order to set prices which allow it to recover its costs.
- 4.41 Setting prices on the basis of willingness to pay has some efficiency advantages. This approach to pricing, which is sometime called Ramsey pricing¹⁴, can allow costs to be recovered from users in a way which results in a higher overall volume of use. This is particularly the case where there are significant common costs, and where value based pricing would allow these to be recovered more extensively from those users who are willing to pay a higher price, with less being recovered from those who value the service less. This allows more users to access the spectrum than would otherwise be the case (as under cost driven pricing some lower value users may have decided not to consume the service).
- 4.42 However, we believe that by setting prices on the basis of cost alone i.e. cost orientated prices, when this is combined with the pricing signals we will provide to the band manager through AIP based license fees, will strike an appropriate balance between our objectives to avoid disruption to PMSE users and promote optimal spectrum use. This is because cost driven prices will result in more predictable price changes for PMSE users while, the introduction of AIP, and the reflection of this in prices, allows for some efficiency incentives to be retained.
- 4.43 Where prices are based on cost, we will be able to influence the prices PMSE users face through changing the opportunity cost based fee charged to the band manager (which will be a major component of its costs). Pricing based on willingness to pay would not have this link, and so we would be less able to control the transition for PMSE users under this pricing approach. PMSE users could potentially be charged much higher prices than they currently face from the outset where this reflected the value that the band manager perceives that they place upon the spectrum they use. This may not give them sufficient opportunity to adjust to changes in pricing to avoid disruption. However, over the longer term, as the transition towards a market based approach progresses, it may be appropriate to give the band manager the ability to also use value base pricing, given the potential efficiency benefits of this approach. In addition, if we were to prevent value based pricing in the longer term this could distort competition in the spectrum market if other band managers emerge who are not faced with these constraints.
- 4.44 Under our benchmark approach, demand (i.e. the value a user derives from using spectrum) should only be taken into account in cost allocation during the initial phase to the extent that this actually affects the costs of the band manager. However, given the potential efficiency benefits of value driven cost recovery, if the band manager could provide compelling arguments in favour of pricing on the basis of other factors when determining its method of allocating costs, we would consider the merits of these arguments.

¹⁴ Under Ramsey pricing the elasticity of demand – a measure of how users react to a change in prices – is used to allocate common costs. Users with higher elasticities of demand (and hence who are more sensitive to price) pay relatively less than users with lower demand elasticities. In the case of the band manager, as the services it provides are an intermediate input into the provision of different end services, the elasticity of demand which is relevant is a combination of the elasticity of demand for spectrum and for the end use the spectrum is used to support.

- 4.45 A further advantage of a cost oriented approach to pricing is that this would also make it easier to identify cases of discriminatory pricing. This approach to pricing implies that the prices of identical access to spectrum will only vary if there are differences in the costs of authorising the access. This is a particularly important issue if the band manager is an active user of its own spectrum for PMSE. For example, the band manager may have an incentive to offer favourable terms of access (including prices) to its downstream arm. This could be detrimental to competition in the PMSE market.
- 4.46 Therefore, our benchmark approach to setting prices is based on cost orientation. Cost orientation would broadly imply the price charged for spectrum access is related to the cost of authorising that access. However, it should be noted there is no standard definition of cost orientation, so no previous definition should be viewed as binding in the case of the band manager, and the interpretation of this term here does not preclude a different interpretation being employed in other circumstances.
- 4.47 Cost orientation is often taken to be a fair and reasonable basis for pricing. For example, in our guidance to the Adjudicator for Broadcast Transmission Services on the Arqiva undertakings¹⁵, fair and reasonable pricing was discussed with reference to cost orientation.
- 4.48 We have an existing set of principles for analysing cost recovery issues which have been successfully employed in the past¹⁶. Our benchmark approach to cost allocation is guided by these cost recovery principles:
- cost causation. Costs should be recovered from those parties whose actions cause the costs to be incurred at the margin;
 - cost minimisation. The mechanism for cost recovery should ensure that there are strong incentives to minimise costs;
 - distribution of benefits. Costs should be recovered from beneficiaries, especially where there are externalities;
 - effect on competition. The mechanism for cost recovery should not undermine or weaken the pressures for effective competition;
 - reciprocity. Where services are provided reciprocally (i.e. where parties buy and sell goods and/or services from each other) charges should also be reciprocal; and
 - practicability. The mechanism for cost recovery needs to be practicable and relatively easy to implement.
- 4.49 We now briefly explain how each of these principles would apply to cost orientated prices in the case of the band manager.
- 4.50 It is standard for **cost causation** to be given greater weight than the other cost recovery principles, as economic efficiency is increased by requiring parties to pay for those costs which they directly cause. We consider that this should also be the case here as this provides the main drive towards cost orientated prices.

¹⁵ www.ofcom.org.uk/consult/condocs/arqiva/statement/statement.pdf.

¹⁶ See for example www.ofcom.org.uk/static/archive/oftel/publications/numbering/2002/nupo1202.pdf.

- 4.51 Where costs can be identified as being caused solely by an additional user, the principle of cost causation is generally recognised as appropriate. This is because it promotes an economically efficient allocation of resources by ensuring that each user of a service pays for the additional costs of providing that service to it.
- 4.52 Using this principle, the costs of authorising use of spectrum should relate to the AIP for the relevant band and the incremental cost of authorising that use. Hence a pure cost causation approach would imply prices set based on long run incremental cost (LRIC) alone (i.e. at the price floor in the discussion above). However, some provision must also be made for recovering common costs since, although these are not clearly caused by any individual user, the individual user contributes to the need to incur these costs (i.e. through the need for a band manager to operate).
- 4.53 The cost recovery mechanism should ensure that the band manager has strong incentives to **minimise costs**. As we stated in our July 2008 consultation document, we do not intend to penalise the band manager for increasing its profits as a result of efficiency gains. Our benchmark approach preserves the band manager's incentive to reduce his operating costs by not compelling him to immediately pass on cost savings to PMSE users in the form of lower prices. This could be implemented through a process of cost forecasts and cost forecast revisions, which are likely to be aligned with revisions of opportunity cost and AIP.
- 4.54 When incurring costs leads to a **distribution of benefits** to many, the cost recovery mechanism should ensure that those who benefit contribute to those costs. Thus, if authorising spectrum access by a PMSE user results in external benefits or disbenefits to other users (in other words, if there are externalities), it may be justifiable to depart from strict application of the cost causation principle. For example, if authorising spectrum access by a particular user conferred benefits on other users, it would be efficient for part of the cost of that authorisation to be recovered from those other users.
- 4.55 An example of this within our benchmark approach would be where the band manager moved PMSE users to a different band so the spectrum they originally accessed could be used by non-PMSE services. This may create costs (e.g. by creating congestion in the band to which PMSE users are relocated). In this situation, it may be reasonable for the band manager to recover these additional costs from the non-PMSE users, as they ultimately benefit from the cost being incurred.
- 4.56 The cost recovery mechanism should not distort **competition** between PMSE users. This might be a particular concern if the band manager was also active in the downstream market and a user of spectrum for PMSE. In this situation, the band manager may have an incentive to discriminate between spectrum access provided to its own downstream PMSE operations and those provided to its rivals. However, in any case, even without this specific incentive, the cost recovery mechanism should avoid threatening effective competition in downstream markets.
- 4.57 The principle of **reciprocity** is irrelevant in this context as we consider it highly unlikely the band manager will be assigning spectrum reciprocally with PMSE users.
- 4.58 The cost recovery mechanism must be **practical** and relatively easy for the band manager to implement (i.e. it must not place a disproportionate burden on the band manager to collate information and produce complex pricing models).

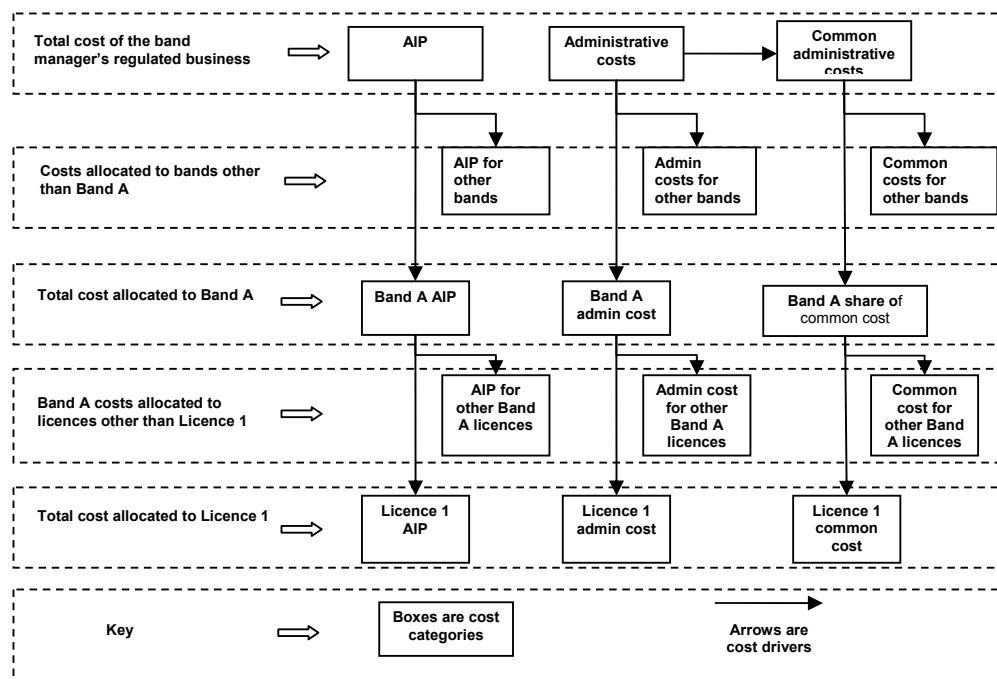
Cost standards and allocation mechanisms

- 4.59 In general, a cost oriented price is sometimes viewed as a price which falls somewhere between LRIC and the standalone cost¹⁷. An explanation of these terms is given below:
- LRIC is the cost incurred by producing an additional given increment of a good or service. The "long run" is the time horizon over which all costs are variable. At the extreme, if the price of a band was based on LRIC, the price would only reflect the band level incremental costs including those comprised within the total band manager fee; and
 - standalone cost is the cost incurred by producing a good or service if it is assumed it is the only good or service produced. In the case of the band manager, if the price of a band was based on the standalone cost, the price would cover all of the band specific incremental costs for that band, the entire AIP fee relevant to that band and all of the common costs that are unavoidable with services using that band.
- 4.60 As such, our benchmark approach suggests there is some flexibility for how the band manager determines prices when following a cost oriented approach, which mainly comes from the way in which he chooses to allocate costs across services¹⁸.
- 4.61 However, following FRND principles would suggest that prices should not fall at either of these extremes. In addition, in circumstances where there is entrenched or substantial market power – which we expect to be the case here – a more restrictive interpretation of cost oriented charges is generally appropriate: LRIC plus an allowance for recovery of a proportion of the common costs.
- 4.62 In the case of the band manager we think a fully allocated cost approach may be suitable for deriving such cost oriented charges, if the basis of cost allocation accords with the approach discussed below and the principles set out above.
- 4.63 The application of our cost recovery principles, in particular cost causality, within our benchmark approach to setting FRND prices suggests that the band manager should begin by determining his total costs. These could then be broken down on a band-by-band basis. From here, band level costs could be assigned to individual assignments in that band. This approach is outlined in figure 3 below.

¹⁷ Prices should also satisfy "combinatorial tests". That is, the revenue from any two services provided by the band manager should fall between the combined LRIC and the standalone cost of those services. See for example www.ofcom.org.uk/consult/condocs/lcc/leasedlines.pdf and www.ofcom.org.uk/static/archive/oftel/publications/broadcasting/2002/cagu1002.pdf.

¹⁸ We have given guidance on how costs should be allocated in a number of other contexts. For example, in a number of situations, we have set out that price should reflect LRIC with some mark up to allow for common costs and a reasonable rate of return (see for example, our guidance on the Arqiva undertakings given in footnote 8).

Figure 3. High level methodology for moving from total to band level cost allocation



- 4.64 Following our benchmark approach to determine the cost of a given authorisation (for example, Licence 1 in band A), the band manager would begin by determining his total costs across all bands which, as set out above, can be divided into three categories – AIP, incremental administrative costs and common administrative costs. The band manager would then determine, based on a methodology guided by the cost recovery principles set out above, what proportion of these costs should be assigned to band A. From the total cost allocated to band A, the band manager would then determine, again based on set methodology guided by the cost recovery principles, what proportion of this cost should be allocated to Licence 1 as opposed to other licences in band A.
- 4.65 Therefore, a band manager following our benchmark approach would determine which cost drivers it considers to be most relevant in each of the different categories of costs, first at band level and then at the level of individual authorisations within a band. This would be the basis of his methodology for allocating costs.
- 4.66 Strictly applying this formula could not satisfactorily allocate common costs, as by definition these costs are not driven by the allocation of a single band or authorisation. As set out in paragraphs 4.47-4.38, cost recovery must make allowance for some proportion of common costs. In our benchmark approach the band manager would allocate common costs in proportion to the cost allocation of incremental costs (i.e. using an equi-proportional mark-up).
- 4.67 This would result in the recovery of common costs to be spread fairly across authorisations. All authorisations which benefit from the band manager incurring these costs should bear some of the burden of them.
- 4.68 Another consideration is allocating one-off costs, i.e. costs that yield a benefit beyond the year in which they are incurred. Capital costs associated with investment are an example of one-off costs. In our benchmark approach we allow for the recovery of one-off costs over a suitable period of time, such as through depreciation or

amortisation, rather than expecting all such costs to be recovered solely in the period when they are incurred. A suitable period may be the timeframe during which users derive benefits from the cost. This is necessary to avoid very high per-user costs in the years when the costs are actually incurred. As with common costs, the band manager would spread the recovery of one-off costs across all users who derive benefit from the cost. As a result, prices are likely to be close to fully allocated costs.

- 4.69 As set out in paragraph 4.37, we have identified the band manager's licence fee as a separate category. There are a number of ways the fee could be recovered from PMSE users within our benchmark approach. One approach could be to charge more for assignments which create congestion. (A fuller discussion of the role of congestion as a cost driver is included in paragraphs 4.81-4.90.) Another approach could be to assign the band-specific component of the total fee proportionally to all users in the band concerned (for example, by the duration of authorisations) on the basis that users should pay for the amount of the band they actually use. We are open to any suggestion by the band manager which results in a transparent and proportionate allocation of AIP across bands and assignments.

Question 13. Do you have any suggestions as to how the band manager can transparently and proportionately allocate its fixed costs across bands and authorisations?

- 4.70 It is possible the band manager business will be only one part of a larger firm's operations. Some costs may be common to the band manager arm of the firm (e.g. hardware and software for authorising spectrum access), while others will be common to all of this firm's operations (e.g. the cost of running and maintaining the business's premises). In figure 3 above, this would be a separate category, a portion of which would feed into the total cost of the band manager's regulated business with the rest allocated to the parent company's other areas of operation. Under our benchmark approach, we would expect the band manager to have a transparent method for assigning a fair proportion of those costs which are common to all of its operations to its band manager arm. We would expect this allocation, as with the allocation of other types of cost, to be driven by cost causation considerations.
- 4.71 A separate issue is the allocation of costs within a band that hosts both PMSE and non-PMSE users. For example, in figure 3 above, "other Band A licenses" could be further divided into "other Band A licenses for PMSE use" and "other Band A licenses for non-PMSE use". If a band manager followed our benchmark approach, we would expect it to have a transparent method of dividing costs common to Band A (that is, Band A common administrative costs and Band A AIP) between the PMSE and non-PMSE use it authorises within Band A. We would expect this methodology, as with that for allocating other types of costs, to be driven by cost causation considerations.
- 4.72 Given that we expect a band manager following our benchmark approach to set out the allocation of costs to PMSE users, by definition we would be able to observe the level of costs which will be borne by non-PMSE users in aggregate. However, we would not expect the band manager to set out its allocation of these costs between non-PMSE users, as these users are not subject to FRND obligations. Also, the issue of allocating costs between PMSE and non-PMSE users will not arise when applying for the band manager role, since the entire spectrum awarded to the band manager will, at least initially, be licensed for PMSE use only. Any proposed non-PMSE use of the spectrum will be subject to our approval after the initial selection procedure (as set out in section 3).

- 4.73 PMSE users currently pay fees which are relatively low and reflect historical considerations rather than the value of the spectrum they use. A move to cost oriented pricing, combined with the introduction of AIP fees, would therefore be likely to lead to changes in prices from those observed now. Keeping in mind our key objective of avoiding disruption to PMSE users, the question arises of when and how fast we would want this change to happen. There are two identified plausible options:
- from the outset of the band manager operating; or
 - after allowing a phasing period in addition to that already allowed for in our consideration of AIP (see section 5).
- 4.74 We consider that the first option would be generally preferable within our illustrative approach. As explained in section 5 we are proposing to phase in the introduction of the band manager's fee over a period of time to ensure that PMSE users are protected from immediate disruptive changes in prices. We consider that further protection through additional levels of phasing of price changes would not be warranted or effective, and would merely delay PMSE users from starting to take account of the costs of their use of spectrum.
- 4.75 However, in order to minimise any negative effect price changes may have on PMSE users, under our benchmark approach the band manager should make available a list of prices it expects to charge for different uses of its spectrum before it begins operating. This will allow PMSE users more time to react to price changes before they are actually subject to them. If the overall effect of such price changes was still likely to be significantly damaging to specific classes of PMSE users because of changes to the pricing structure, we would consider phasing in some price changes if it was necessary to protect those classes of PMSE users, as suggested in paragraphs 3.27-3.29.
- 4.76 If and when PMSE users switch bands in response to price signals, the band manager may have to revise its pricing to ensure that it remains cost oriented (for example, to reflect any congestion this causes).
- 4.77 When the number of users in a band changes, some of the costs may change (for example, the administration cost element) but others may stay the same (e.g. potentially the licence fee element). Overall prices may increase as well as decrease. It should be borne in mind that, at present, a significant number of PMSE users hold licences to use more than one band. It is likely that, while the prices for some of these would increase, the price of some others would decrease. The overall effect will vary between users, but we expect that the overall aggregated fee level that many users would be charged absent additional phasing of price changes would not significantly impair their ability to continue provide a service to their customers.

What the band manager would do under our benchmark approach to cost recovery

- 4.78 The band manager would set out the methodology by which it intended to assign costs to bands and then to individual authorisations. As discussed in paragraphs 3.30-3.32, we would expect this to be made available in its application.
- 4.79 When determining the prices it would charge to PMSE users, the band manager would ensure prices were cost oriented. In doing this, it would be guided by the cost recovery principles, with particular regard to cost causation.

- 4.80 The band manager would set out its forecasts of overall costs, band-level costs and costs (and prices) for individual authorisations in its application. These could be revised as information becomes available which makes it clear that it is necessary and proportionate to do so.

Benchmark approach to excess demand for spectrum

- 4.81 It is possible during the initial transition period there may be excess demand for spectrum. This is partly because of our intention that PMSE users should not initially be charged the full opportunity cost of all the spectrum they use.
- 4.82 Where such excess demand arises, there will need to be some mechanism for authorising access. This mechanism must be consistent with achieving our aims as set out in paragraph 2.2 and our objective to avoid disruption to PMSE users.
- 4.83 There are two distinct types of excess demand in this context:
- excess demand caused by PMSE users; and
 - excess demand caused by non-PMSE users.
- 4.84 Evidence from the PMSE licensing database indicates that there are relatively few cases of own use congestion (when excess demand comes from PMSE users), and these are generally restricted to major events at specific locations and a small number of major news events.
- 4.85 When determining the appropriate response to congestion for our benchmark approach, we note that congestion could be a legitimate driver of costs in all cost categories. For example:
- the relevant component of the band manager's fee may be higher for bands where there is excess demand;
 - incremental administration costs may be higher in congested bands as greater labour input may be required to authorise access compared to sparsely populated bands where access can be authorised mechanically; and
 - we expect the allocation of common administration costs to be in proportion to the cost allocation of incremental costs. Therefore, a higher amount of common costs may be allocated to bands with excess demand for this reason.
- 4.86 In some bands these price signals may be enough to allow PMSE demand to be met, for example, when the differences in cost are sufficient to encourage PMSE users to switch to non-congested bands where possible in order to benefit from lower prices and this eliminates potential congestion.
- 4.87 However, where there are high levels of excess PMSE demand (such that all PMSE requests for spectrum access cannot be satisfied), these price differences may not be great enough to clear the excess demand concerned.
- 4.88 In these circumstances price increases are often used to ration demand. For the reasons set out in section 3, we do not believe that this approach would be appropriate during the initial phase of the transition to a market based approach. However, after the initial period it may be appropriate to review this, as pricing approaches to rationing have efficiency benefits (as also set out in section 3). Hence,

if at the first review point, three years after the band manager starts operating, we identify that the transition has progressed to a point where it would be appropriate for us to give greater weight to our objective to promote optimal spectrum use, it may be appropriate to allow price based approaches to rationing at that point.

4.89 Therefore, some non-price rationing mechanism may be needed for resolving cases of PMSE congestion at least during the initial phase. There are several quantity rationing mechanisms which can be considered which would be consistent with our FRND obligations, such as:

- first come, first served – spectrum access is authorised to the user who requests it first;
- proportional – users are authorised a suitable proportion of the access they request such that they can still fulfil their needs, but not necessarily as extensively as they wish; and/or
- case by case – the authorisation of spectrum access is determined based on the merits of individual cases.

4.90 At this stage, we have no preference for any particular non-price rationing mechanism. Within our benchmark approach, we would prefer that the rationing mechanism is as transparent and proportionate as possible. If the decision were to be questioned (either through a dispute or an informal dialogue between the band manager and PMSE users), the band manager should be able to demonstrate that the decision was made impartially and was in the interests of the wider PMSE sector. Authorisations should also be shown to minimise distortions to downstream competition. The mechanism should not cause or allow harmful discrimination between PMSE users.

4.91 We have already indicated in paragraphs 3.65-3.69 that when there is demand from non-PMSE users, we have proposed that the band manager will have to follow a specific procedure, which includes obtaining our approval to allow these users access to the spectrum to be awarded. This procedure partly aims at ensuring that the interests of PMSE users in accessing spectrum are taken into account when addressing access requests from non-PMSE users.

4.92 We consult in section 3 on the principle of whether we should subject band manager requests to allow non-PMSE use of the spectrum in this award to our approval. If we decide to adopt this proposal, we will provide details of how this would work in practice in our statement on the band manager award later this year.

4.93 We are aware that authorising spectrum access to non-PMSE users may require relocating PMSE users to other suitable bands. There is a further possibility that this will lead to increased fees to use those bands if excess demand for that spectrum is increased by the relocation. This relocation and increased levels of excess demand may, in turn, generate costs, such as the need for new equipment or more effort to avoid harmful interference. Under our benchmark approach, we would be open to the idea of applying the “distribution of benefits” principle to allocate these costs in part or in total to the non-PMSE users who would benefit from accessing the freed spectrum and would to some extent be the source of these new costs.

What the band manager would do under our benchmark approach to rationing in the case of excess demand

- 4.94 In its application, the band manager would put forward its non-price approach to dealing with excess demand, possibly with a separate mechanism for major events if it feels this is warranted. The band manager would demonstrate that this approach is in line with the needs of PMSE users and would minimise the disruption and discrimination which could potentially be caused by the need to ration spectrum.
- 4.95 The band manager would then implement this rationing approach where excess demand from PMSE users occurs, demonstrating that it is acting in the interests of the wider PMSE sector when doing so. Any deviation from this mechanism would be justified on the basis that the deviation resulted in a demonstrably better outcome for PMSE users. It would be beneficial if the band manager could enter into a dialogue with PMSE users where excess demand occurs to explain why it cannot exactly meet the requests submitted and what action it is taking to limit the effect of this.

Benchmark approach to rate of return

- 4.96 Our approach to the band manager's rate of return seeks to balance two objectives:
- enabling the band manager to earn a margin that makes it worthwhile being in business and investing in efficiency; and
 - preventing the band manager from setting excessive prices.
- 4.97 As a regulator, we frequently have to assess the profitability of the businesses we regulate. When we undertake reviews of prices in other contexts, for example when we set charge controls on BT's wholesale network charges or on mobile network operators' termination charges, we tend to use return on capital employed (ROCE) as the appropriate measure of profitability. When using ROCE to inform an assessment of profitability, any activity which earns a ROCE less than the level that would be required by an investor in order to compensate it for the risk incurred in investing in that activity, i.e. below the weighted average cost of capital, would be considered unprofitable.
- 4.98 However using ROCE is not appropriate in all circumstances. This is particularly the case for activities which inherently require a low level of fixed assets, because the ROCE indicator then loses its relevance. This is likely to apply to the band manager because the activity of managing and authorising spectrum use for PMSE is unlikely to require a large quantity of fixed assets. This is the case of the main fixed assets used both by JFMG and by us in carrying out spectrum management activities. The fixed assets of both organisations primarily comprise computers, furniture, office equipment, some vehicles and various spectrum monitoring equipment.
- 4.99 We have therefore reviewed the different approaches to assessing profitability.¹⁹ In particular, we looked into return on sales (ROS), which is defined as operating income before interest and tax divided by turnover. This is because this profitability indicator tends to be used by competition authorities in situations where fixed assets

¹⁹ The Office of Fair Trading provides guidance on excessive pricing and profit. For a review of different approaches to assessing rates of return, see www.offt.gov.uk/shared_offt/reports/comp_policy/oft657.pdf. Alternative measures of profitability include (truncated) internal rate of return, net present value, return on sale, gross margins and market valuations.

are low and intangible assets are high, where historical data is limited, and/or where capital and cost allocation between lines of business is difficult.²⁰

- 4.100 In the case of the band manager, we consider ROS to be the most appropriate measure of profitability. The main reason is that we view the band manager's business as knowledge-based and expect it to require few fixed assets against which ROCE can be a useful measure. An additional reason is the limited amount of historical data, like market valuation or internal rate of return, to inform other potential measures of profitability. We therefore frame our illustrative approach to rate of return in terms of ROS.
- 4.101 Since there is no fixed theoretical benchmark for a reasonable ROS, it is standard to compare returns against the ROS of other firms sharing similar features. In order to inform our view on what an appropriate ROS might be for the band manager within our illustrative approach, we commissioned Analysys Mason to research suitable benchmarks. Its report is published alongside this consultation document.²¹
- 4.102 Analysys Mason concentrated its benchmarking analysis on firms with similar characteristics to a band manager business. This is because it determined that there was little data publicly available about firms which are directly comparable to the band manager (e.g. spectrum band managers in other countries). The relevant characteristics identified for benchmarking were:
- low to very low capital expenditure;
 - high volumes of sales and low unit costs;
 - involvement in the technology, communications or media sectors; and
 - a reasonably competitive industry (for the purposes of establishing the competitive rate of return).
- 4.103 Analysys Mason ranked the benchmarking companies according to how closely their relevant properties matched those of the band manager: the highest rank reflected the best fit. It used capital intensity as the leading criterion.
- 4.104 By looking at the results of this study, we observe that the range of average ROS tends to increase as the quality of the fit decreases: 3-5% for the top four firms, 3-7% for the top six firms and 3-12% for the top 10-16 firms.²² However, the overall average ROS (across firms over a three-year period) appears to vary little: 4.25% (top four), 5% (top six), 5.8% (top 10) and 5.3% (top 16). This clustering of results could be interpreted as indicating the relative robustness of the conclusions. However, it is important to consider that these firms are not directly comparable to the band manager as they do not perform exactly the same function. This is why we are open to take into account other profitability indicators, which we consider could usefully supplement the initial analysis based on ROS. Therefore, while the above findings would inform our consideration of rate of return, it should not necessarily be viewed as a fixed target.

²⁰ Cases in which ROS has been used in the communication sector include the Monopolies and Mergers Commission's decision to use a rate of return on turnover of 1.5% for BT's call business (see www.competition-commission.org.uk/rep_pub/reports/1999/421cellnet.htm#full) and our decision to use an ROS of 1.5% for BT's Network Charge Change Notice 500 (see www.ofcom.org.uk/bulletins/comp_bull_index/comp_bull_ccases/closed_all/cw_823/NCCN_500.pdf).

²¹ <http://www.ofcom.org.uk/consult/condocs/bandmanager09/report1.pdf>.

²² Firms 17 and 18 are not taken into account because their level of competitiveness is too low.

- 4.105 When potential band managers submit their applications during the award, they will need to specify and justify the rate of return they believe it reasonable for them to earn. Our assessment of applications will include consideration of whether rates are reasonable. In addition, at the time of a dispute as well as in assessing whether the return earned has been in line with this rate, we would also consider whether there are any efficiency factors which might suggest that a higher return was reasonable.
- 4.106 For example, as set out in paragraphs 3.50-3.51, in our benchmark approach the band manager's returns would be evaluated against its cost forecasts rather than its actual costs over the period in question. However, we also want the band manager to improve efficiency by increasing the number of authorisations it makes in a given band. Therefore, when setting out its cost per authorisation, the band manager would set out the predicted volumes on which it is basing this forecast. In the event of a dispute, we would use the forecast cost for each authorisation of that type as the cost benchmark for FRND prices (and if we needed to calculate a cost for a set of types of authorisation, we would multiply the relevant forecast costs per authorisation by the actual volumes). Strong, compelling evidence would be required to justify increasing the cost per authorisation above the forecast level.
- 4.107 Following this approach it would be necessary to ensure that the band manager did not inflate its cost forecasts. To some extent, this risk should be mitigated by competition between applicants in the award.

Question 14. Do you agree that ROS is most appropriate measure of profitability? Do you agree the indicative ROS figures set out are reasonable? Are there any more appropriate benchmarks?

What the band manager would do under our benchmark approach to rate of return

- 4.108 In its application, the band manager would set out the rate of return it expects to receive, with some indication of why it considers this rate to be fair and reasonable.

Benchmark approach to FRND non-pricing issues

- 4.109 FRND obligations also cover those non-pricing terms and conditions which will govern the transactions between the band manager and PMSE users for the spectrum to be awarded. Our benchmark approach to non-pricing considerations needs to balance our wider objectives as set out in paragraph 2.2.
- 4.110 There are two distinct features of non-pricing terms and conditions which fall under the band manager's FRND obligations:
- how spectrum is supplied; and
 - service levels.

How spectrum is supplied

- 4.111 At issue here are the types and categories of PMSE spectrum access which are authorised by the band manager. At present an assignment will stipulate a number of constraints, including:
- the equipment permitted for use;
 - the band where transmission is allowed;

- the permitted maximum power level;
 - the permitted maximum bandwidth;
 - the location where transmission is allowed to take place;
 - the allowed duration of transmission; and
 - whether the assignment is for outdoor or indoor use
- 4.112 There are three possible options for how the band manager could provide spectrum access to PMSE users in future:
- in the same way as today;
 - in a way that secures continuity with the existing arrangements, but adjusts in response to changing conditions and PMSE needs; or
 - in any way it wants.
- 4.113 In our benchmark approach, we consider that the band manager should offer access to the spectrum in a way which is responsive to PMSE needs during the entire transition period. It is likely that this will mean avoiding disruption to PMSE users in line with that objective for PMSE access to spectrum. This may mean that the band manager would ensure that many of the existing assignment types and categories would be made available during an initial period.
- 4.114 However, changes to assignments may also be beneficial for PMSE users. We consider it likely that the introduction of an AIP based licence fee for the band manager will lead to a different pricing structure for spectrum access than at present. In the same way, we expect that there may also be a reassessment of how the mechanics of authorising spectrum access by PMSE users will best meet their needs. For example, the introduction of AIP charging may lead to a revision of prices whereby they become more proportional to the duration and geographic coverage of the authorisation. As a result those PMSE users who currently have annual licences may, in future, be able to access spectrum for a duration which more closely matches their needs. A result of this may be that they are charged in a manner that reflects their effective spectrum occupation.
- 4.115 We consider that it would fit our objectives for optimal spectrum use for assignments to change if these changes contribute to improving the efficient use of spectrum. Therefore, we would support the introduction of new types and classes of access where this would be the outcome.
- 4.116 Similarly, it may be reasonable to withdraw some existing assignment categories and types provided that their removal is organised in a manner that enables PMSE users to adjust to this change. In order to meet our objectives, the portfolio of remaining available types and categories of spectrum access would have to meet PMSE needs.
- 4.117 In order to avoid disruption to PMSE users, under our benchmark approach they and the band manager may enter into a dialogue about how the provision of spectrum access would best meet their needs, taking into account the wider changes that we are proposing for future PMSE access to spectrum.

- 4.118 Overall, we consider it would meet our objectives for PMSE access to spectrum if the band manager provided spectrum to PMSE users in a way that secures continuity with the existing arrangements, but adjusts in response to changing conditions and PMSE needs. We therefore choose this option as our benchmark approach.
- 4.119 In supplying spectrum access using this approach, we would expect the band manager to make available certain information which we consider would help PMSE users to make informed decisions about their spectrum use. This is set out in more detail in paragraphs 4.149-4.151.

Question 15. Does securing continuity with existing arrangements for spectrum access but adjusting in response to changing conditions and PMSE needs provide the best trade-off between avoiding disruption to PMSE users and promoting efficient use of spectrum?

Question 16. What are the key types and categories of PMSE spectrum access that should be kept to secure continuity? What types and categories would you be interested in seeing emerging?

Amount which is supplied

- 4.120 We have proposed that the band manager should not withhold spectrum access from PMSE users who are prepared to pay FRND prices for it. We have also stated that no PMSE user or group of PMSE users should be discriminated against in their ability to access spectrum under FRND terms and conditions.
- 4.121 One interpretation of the band manager's non-discrimination obligations could be that PMSE users who express a demand for identical spectrum access should have it supplied in the same manner. The obligations could also mean that similar access should be made available to similar groups of users under normal circumstances provided these users are willing to pay the FRND price. As a result, we would be concerned if certain types of access to a given frequency were available in one area and not in another without any objectively justifiable reason.
- 4.122 There may be occasions where the band manager has legitimate reasons for offering access which differs in some respect to the details of the request from the PMSE user. For example, there may be excess demand that the band manager has to deal with in a fair way and which may involve his offering alternative (though suitable) spectrum access to the user. This case is explicitly covered by our contract with JFMG and is not viewed as withholding spectrum access. Under our benchmark approach this would also apply for the band manager.
- 4.123 There may also be circumstances in which the band manager considers it efficient to revise its spectrum planning to accommodate more users or in response to problems of harmful interference. This could lead to the band manager cancelling, modifying or suspending existing authorisations. This would be consistent with our benchmark approach to supplying spectrum access as long as PMSE users were given reasonable notice of these changes and offered suitable alternative authorisations.
- 4.124 If there is excess PMSE demand at FRND prices, the band manager will be considered to have met its reasonable supply obligations by relying on the non-pricing rationing mechanism proposed as part of its application (as discussed in section 3). This will be the case as long as it deals with rationing in a manner that enables most PMSE users to deliver reasonable quality services.

4.125 Similar provisions are often part of FRND conditions. In the case of the band manager, we are proposing to go beyond these provisions in order to better meet our objective of protecting PMSE users as set out in paragraph 2.2. Specifically, we consider that the band manager should prioritise PMSE users' demands for the spectrum to be awarded at FRND prices above those of non-PMSE users in order to meet our objective to avoid disruption to PMSE users. In other words, if a PMSE user is willing to pay the designated FRND price to access spectrum, it must be allowed to access that spectrum before the competing interests of a non-PMSE user. Details of these proposals for further protecting PMSE can be found in paragraphs 3.65-3.68.

Question 17. Does our interpretation of how the band manager should meet PMSE demand on FRND conditions provide adequate protection for PMSE users?

What the band manager would do under our benchmark approach to amount supplied

4.126 The band manager would offer types of spectrum access which meet the needs of PMSE users. As set out in paragraphs 4.113-4.118 above, we consider this would best be achieved in our benchmark approach by the band manager providing some continuity of assignment classes while introducing changes in response to changes in the market or the needs of PMSE users.

4.127 We would expect the band manager to make reasonable access available, both to PMSE users in aggregate (and the market more generally), and to individual PMSE users. In addition, we expect the band manager to prioritise the needs of PMSE users over non-PMSE demands for the spectrum to be awarded.

Benchmark approach to service levels

4.128 Under our benchmark approach, the band manager would meet service levels set out in its application (and potentially also agreed with PMSE users). We are mindful that our efforts to achieve our objectives and implement FRND obligations (relating to both pricing and non-pricing issues) could be undermined if adequate service levels are not met for PMSE users.

4.129 As with our other FRND provisions, we will judge the band manager's service levels based on the extent to which it meets our objectives, particularly in avoiding disruption to PMSE users and facilitating participation of the PMSE sector in a market-based approach to spectrum.

4.130 Our current contract with JFMG includes a detailed service level agreement. This covers, among other things, the following:

- hours of operation – office and out-of-office hours, as well as conditions applying to out-of-hours operations;
- accepted format for receiving applications for assignments, including reference to phone, written, and Internet application procedures;
- speed of handling applications with some KPIs;
- general rules for dealing with applications (typically on a first-come first-served basis. Unless several users apply for the same spectrum, there is a limit as to how far in advance an application can be submitted); and

- rules for payment of licence fees.

4.131 This service level agreement is practical, fair, reasonable and non-discriminatory. The conditions make the service accessible to all PMSE users, respecting the diversity of their needs without showing preference for any in particular. At the same time, they encourage the services to be reasonably efficient by stating KPIs which clarify to PMSE users the quality of service they can expect to receive.

What the band manager would do under our benchmark approach to service levels

4.132 The band manager would indicate, as part of its application, what service levels it is committing to and then implement these. They would include details of KPIs to allow PMSE users to judge the quality of service they are receiving. As we set out immediately above, under our benchmark approach this would be informed by the existing JFMG contract. This might be improved upon by the band manager as part of an overall strategy to better meet the aims and objectives of PMSE protection and spectrum efficiency.

Question 18. Do you agree that service levels are an inherent part of the terms and conditions for PMSE spectrum access and should be subject to FRND obligations?

Our overarching approach to enforcing FRND obligations

4.133 We consider that there should be a consistent approach for determining whether FRND obligations have been met at each of the three stages of the dispute resolution procedure (internal band manager process, ADR and Ofcom) outlined in figure 2. There are two options for how to approach this:

- *ex ante* – specifying in advance exactly what compliance would mean (for example through price caps or setting an allowable rate of return); or
- *ex post* – investigating, in the event of a dispute, whether FRND obligations had been met (for example, whether the price charged is considered to be FRND, including whether the returns earned by the band manager are reasonable).

4.134 We recognise that *ex ante* regulation may have the potential benefit of certainty, in that it prevents harm to PMSE users in advance, as opposed to correcting harm once it has occurred. However, we consider that an *ex post* approach is more desirable under these particular circumstances for the following reasons:

- we currently do not have enough information about the band manager's business or exactly what PMSE users will require in the future to be effectively protected for us to set adequately robust provisions. For example, we do not have enough information to determine what a band manager's costs (including rate of return) would be such that we could set price caps with sufficient confidence; and
- there are likely to be significant changes within the market (e.g. to fee structures for spectrum access) after the band manager begins operating. Many of these will be in response to the signals we are trying to introduce, such as price signals to encourage more efficient use of the spectrum. The introduction of *ex ante* regulation such as a price cap carries a significant risk of undermining the emergence of such signals.

- 4.135 Both of these points increase the risk of regulatory failure from *ex ante* regulation, which is contrary to one of our objectives for future PMSE access to spectrum.
- 4.136 We are, therefore, faced with a choice between a prescriptive approach to *ex post* regulation or a case by case approach. A prescriptive approach would set out exactly what would be considered in the event of a dispute. Alternatively a case by case approach would allow a greater degree of flexibility in determining exactly what should be taken into account in each dispute
- 4.137 We recognise that a prescriptive approach would give greater certainty to both the band manager and PMSE users over what would be considered in the event of a dispute. However, we believe that this approach would not achieve the correct trade-off between the issues highlighted above in paragraph 4.134, as it also precludes us from taking into account other information which may be relevant in particular cases.
- 4.138 A case by case approach allows greater flexibility in determining whether FRND obligations have been breached. In addition, this approach would better deal with the significant and inherent uncertainty about the exact details of each dispute. Given that these are the major reasons for adopting an *ex post* approach, we feel at this time that a case by case approach to *ex post* regulation would be most suitable.
- 4.139 We consider that this approach to meeting FRND obligations would be best implemented as follows:
- we set out the objectives and high level principles for what FRND means and how it could be enforced, including an illustrative benchmark approach which would fulfil these principles;
 - we set out the criteria for the band manager award in the light of these objectives;
 - all applicants in the award set out the commitments they are willing to enter into in relation to meeting our criteria (to be judged against our benchmark approach and the extent to which they therefore are consistent with our FRND objectives and principles). Those commitments will form the basis for certain conditions to be included in the licence;
 - we select the winner of the award based on which application best meets all of our criteria; and
 - where there is a dispute with a PMSE user, the band manager is investigated with reference to the commitments made at the time of bidding, now enshrined as obligations through licence conditions. If there is uncertainty over whether the commitments have been met, we will return to the objectives to guide the analysis and subsequent decision.

Question 19. Do you agree with our overarching approach to enforcing FRND obligations?

Benchmark approach to information provision

- 4.140 In order to monitor the band manager's actions and evaluate how far these meet its FRND obligations, we will require certain information. We set out below the information we consider the band manager will need to make available to demonstrate its compliance with those obligations.

Information provided at the time of the award

- 4.141 At the time of the award, we would expect an applicant following our benchmark approach to have forecast its total costs up until the first review of AIP, three years after the band manager starts operating, in order to have determined that it would have a viable business. We would also expect it to have considered how it expects these costs to be spread across the different bands it will manage in the course of developing its business model. Therefore, an applicant could provide a forecast of both overall and band-by-band costs and its methodology for assigning costs to band level in its application.
- 4.142 We would also expect applicants to submit a proposed methodology for allocating these costs from the band level to individual fees. In addition, since we expect the band manager to publish its prices in advance of beginning operation (although not necessarily at the time of application), it would need to have forecasted the costs it expects to incur in making individual authorisations. Therefore applicants could also provide a forecast of costs to the authorisation level, and a methodology for assigning costs from band level to authorisations.
- 4.143 In order to allow us to assess whether the band manager's return should allow for efficiency gains as a result of its facilitating higher volumes of PMSE use, applicants should also provide the volume forecasts which underlie their cost forecasts.
- 4.144 We understand that at this stage the band manager would not yet be an operational business and so there would still be a degree of uncertainty in its costs. Therefore, if the band manager could provide compelling evidence that circumstances were significantly different to those which it expected when it made its application, we would consider deviations from the cost forecasts.
- 4.145 However, the band manager would be tied to its proposed method of allocating costs to the band and fee levels unless there are exceptional circumstances which would make this methodology unworkable.
- 4.146 In addition, we set out in paragraphs 4.128-4.131 the importance of service levels and the role KPIs play in ensuring they are met. The band manager would therefore clarify, as part of its application, which service levels it is committing to, and what KPIs it would refer to and make public to prove it is complying with them.

Information provided on an annual basis or in the course of the band manager's operations

- 4.147 In following our benchmark approach, we would expect the band manager to provide a set of independently audited annual accounts of its business, including details of accounting, attribution and valuation and how this fits with its cost allocation methodologies. This would help us to identify trend changes in costs, prices and profits which would aid us in assessing disputes.
- 4.148 In addition, we would expect the band manager to provide details of its performance against KPIs on an annual basis so PMSE users can observe how far it is meeting service levels.
- 4.149 It is reasonable to expect that the band manager will keep PMSE users updated on developments in its own business and with the market in general. This is particularly the case as the changes associated with the sector's transition to a market based approach to spectrum may cause some concern amongst some users. At present,

our contract with JFMG requires it to make certain information available in order to assist PMSE users in applying for the spectrum access they need in an efficient manner and to deal with any enquiry or complaint they may have. It does this by publishing the following on its website:

- frequencies available;
- details of permitted equipment;
- licences available;
- pricing information (price lists and fee calculator);
- special information for specific categories of use or users (e.g. for major events and community users);
- service levels;
- news and developments affecting the sector; and
- contact details.

4.150 A band manager that is responsive to the interests of PMSE users may choose to provide at least as much information as JFMG currently does. Indeed, there is a case that it should provide more information where it identifies that this could improve efficiency and/or avoid disruption for PMSE users.

4.151 We would therefore expect a band manager following our benchmark approach to set out in its application the information it plans to make available to PMSE users and how it plans to do this.

Question 20. Do you agree that a minimum set of information needs to be published by the band manager in order to ensure that PMSE users can seek spectrum access in a manner that meets their needs and the reassurance that their request will be dealt with on FRND terms and conditions?

Question 21. What minimum set of information should the band manager publish? What additional information would PMSE users benefit from it publish?

Information provided at the time of the FRND review

4.152 At the FRND review, we anticipate that the band manager would actively contribute to the process of revising the FRND benchmark approach by providing appropriate information. This information should be in a quantity, format, and variety that makes the revision processes as effective and constructive as possible.

4.153 In addition, the parallel licence fee review would involve the band manager projecting future incremental administrative costs, common administrative costs, and drivers of underlying opportunity costs including expected PMSE and non-PMSE demand for different bands. Our FRND review would consider which costs would be reasonably and efficiently incurred. This would be necessary to ensure that the band manager has an on-going incentive to make efficiency improvements, and to ensure that efficiency gains are eventually passed on to PMSE users.

Information provided at the time of a dispute

- 4.154 Under our benchmark approach, in the event of a dispute the band manager would provide evidence on the allocation of costs to individual fees and to demonstrate that this is consistent with its proposed methodology. This would be the case except, as stated in paragraph 3.32, in exceptional circumstances where this methodology can be shown by the band manager to no longer be feasible.
- 4.155 If the band manager believes that a deviation from the cost forecasts it submitted in its application is necessary, we would expect it to make available evidence to justify this. The forecasts would be considered when evaluating any dispute. This is largely to ensure that the band manager has an incentive to seek efficiency gains. We would consider deviations from this if justified by strong and compelling evidence.
- 4.156 Depending on the nature of the dispute, we may also require the band manager to provide information on the prices, terms and conditions of other fees similar to those which are the subject of the dispute. The information which will be required will be likely to vary on a case by case basis.

Question 22. Do you think that it is reasonable to expect the band manager to provide this information at the time of a dispute?

What the band manager would do under our benchmark approach to information provision

- 4.157 We would expect the band manager to set out the information it would make available to demonstrate compliance with its FRND commitments. In the case of our benchmark approach, it could achieve this by setting out in its application:
- detailed methodology for allocating costs across bands and individual fees, including which cost drivers will direct the allocation;
 - forecasts of its total costs, which would also be broken down on a band-by-band and authorisation-by-authorisation basis. (This breakdown should be produced according to the methodology set out in paragraph 4.63.) These should include forecasts of the volume of authorisations it expects to make. The authorisation-level cost forecasts should then be converted into a proposed price schedule;
 - details of the information it will commit to provide to assist PMSE users make informed and efficient requests for spectrum; and
 - details of the KPIs it plans to use to demonstrate it is meeting its service levels.
- 4.158 We would expect the band manager to meet these commitments, which will be enshrined as licence conditions. Where it must deviate from one of these commitments, it would have to provide compelling evidence to prove that this is unavoidable and justified.
- 4.159 The band manager will also be required to provide appropriate information to demonstrate compliance with its licence obligations at the time of each annual audit.

Question 23. Do you agree that the provision of information by the band manager as proposed is an integral part of assessing the extent to which the terms and conditions it offers to PMSE users are FRND?

Section 5

Our objectives and approach in applying AIP

Introduction and background

- 5.1 This section explains our objectives and approach in applying AIP principles to the licence fee payable by the band manager.
- 5.2 We have a duty under the Communications Act to secure the optimal use of spectrum to further the interests of citizens and consumers. It is therefore essential that the regulatory regime for spectrum access is able to respond to changes in demand for and use of spectrum in the UK.
- 5.3 Our strategy for meeting this objective was set out in the Spectrum Framework Review (SFR)²³, which was published in November 2004. We stated in the SFR that the most effective way of managing spectrum is generally through a market based approach. We consider that this will:
- promote efficient use of spectrum by allowing it to be transferred to other users who value it more highly; and
 - promote competition by increasing the availability of spectrum for use by the most valuable services.
- 5.4 The SFR outlined our vision of how market mechanisms would play an increasingly central role in determining how spectrum should be most effectively used. One of the key policy levers that we use to introduce market-like signals for users is AIP. AIP is designed to create incentives for users of spectrum to take decisions about their use which will contribute to efficient spectrum use. Many users of spectrum already pay AIP-based fees.
- 5.5 We set out in our December 2007 statement and in our July 2008 consultation document our intention to charge the band manager a licence fee based on AIP. By recouping its costs, including the AIP fee, from PMSE users, we considered that we would be exposing the PMSE sector to the value of the spectrum it uses. This in turn would lead to PMSE users making decisions which will result in a more efficient use of spectrum.
- 5.6 This consultation document considers PMSE use of a wide range of frequencies between 47 MHz and 48 GHz. In setting out our pricing proposals for the band manager, we make careful consideration of specific features of this sector. In particular, we have taken note of the ability of PMSE users to adjust to any increases in licence fees that are likely to occur as a result of our proposals. As part of this and previous consultation documents, we have engaged with the sector to guide us in developing our proposals. We will continue to consult closely with PMSE users during the consultation period to further understand the likely impacts of these proposed changes.

²³ www.ofcom.org.uk/consult/condocs/sfr/sfr2/.

Legislative framework for spectrum pricing

- 5.7 Under section 13(2) of the Wireless Telegraphy Act, we may, if we think it fit in the light of our duties under section 3, prescribe fees which would be greater than those that would be necessary for the purposes of recovering the costs we incur in connection with our spectrum management functions. In particular pursuant to section 3(2), we may have regard to the desirability of promoting:
- the efficient management and use of the part of the electromagnetic spectrum available for wireless telegraphy;
 - the economic and other benefits that may arise from the use of wireless telegraphy;
 - the development of innovative services; and
 - competition in the provision of electronic communications services.
- 5.8 The above-mentioned enabling powers are exercisable by statutory instrument under section 12 of the Wireless Telegraphy Act.
- 5.9 The practice of setting fees at levels higher than required to recoup administrative cost in order to stimulate the efficient use of spectrum has become known as AIP. Licence fees must be prescribed in regulations. AIP has been progressively rolled out since 1998 in a series of such regulations and now covers the great majority of licence classes.

Previous approaches to spectrum pricing

- 5.10 Spectrum is a finite resource and transmission by more than one user in the same part of the spectrum will often result in harmful interference. Therefore, use of the spectrum for one purpose will often impose costs on other users.
- 5.11 Where users require exclusive access to spectrum in order to avoid harmful interference, there is an opportunity cost attached to that use of spectrum, namely the other services that have been precluded from accessing it. As a result, it is important that decisions about the use of spectrum fully take into account those opportunity costs.
- 5.12 Under our spectrum management framework, which is intended to enable decisions about spectrum use to be taken increasingly by users in the market rather than by us, it follows that such decisions are more likely to be socially optimal if users and potential users take the opportunity cost of spectrum into account.
- 5.13 One way that we ensure that the opportunity costs of spectrum are taken into account is to reflect their level in the prices charged to access the spectrum. This underpins our approach to setting AIP.
- 5.14 In the case of licences awarded at auction the price paid by the licence holder is considered to reflect the opportunity cost as no alternative user was prepared to pay more for the licence.
- 5.15 In other cases, where spectrum is obtained by means other than at auction, we generally charge AIP based on opportunity cost to ensure that the licence holder faces its opportunity cost. We seek to ensure that the opportunity costs of holding

spectrum are reflected in all decisions which could affect that spectrum's future use. These could include decisions about how much spectrum to hold or whether to hold spectrum at different frequencies, and related decisions, such as on investment in research and development to develop more spectrally efficient technology or other related expenditure on spectrum and other business costs.

- 5.16 AIP was first introduced for public wireless networks and private business radio and introduced in steps from 1998 to 2002. In 1999 it was extended to fixed links and other mobile uses and by 2003 most licence class fees had been set to take account of spectrum management objectives using AIP rather than administrative cost. One notable exception to this was licence fees charged to PMSE users.
- 5.17 We stated our intention to apply AIP to spectrum used by existing DTT and radio broadcasting multiplexes from 2014 in 2007²⁴. We are currently discussing with the Government and other stakeholders responses to our July 2008 consultation document on the principles of applying AIP-based fees in the aeronautical and maritime sectors. We expect to publish an update on our thinking, with proposals, this summer.

The Smith NERA approach

- 5.18 Our initial approach to valuing spectrum followed a model provided in 1996 by Smith Systems and NERA (Smith NERA).²⁵ The Smith NERA approach used estimates of opportunity cost as proxies for the marginal value of spectrum to a representative spectrum user in those bands where AIP fees were to be charged.
- 5.19 The opportunity cost represents the benefits foregone from assigning spectrum to one user instead of another. The rationale for adopting this as the basis of the licence fees is that spectrum will thereby be directed into the optimal use. In order to estimate opportunity cost, we take the cost of the least cost alternative to using the spectrum concerned that would enable the same output to be produced. This could be achieved via an alternative technology, such as by moving to a less congested spectrum band or, in the case of wireless microphones, using wired alternatives.
- 5.20 Setting AIP fees equal to the cost of the least cost alternative means of delivery of the same output provides incentives for more efficient spectrum use within each band where the demand for spectrum is greater than the supply. Only those current users for whom spectrum is worth more than the least cost alternative will want spectrum at that price. The other current users would have an incentive to hand spectrum back to the regulator or trade it in the market and switch to the least cost alternative. Spectrum could then be redistributed to those users who valued it most.
- 5.21 This approach considers only the value of the spectrum in the current use.
- 5.22 Smith NERA also referred briefly to setting AIP for PMSE use of spectrum, suggesting that spectrum under 1 GHz should be set the mobile spectrum tariff unit (STU). It went on to propose that PMSE spectrum above 1 GHz should be aligned with the fixed links STU.

²⁴ www.ofcom.org.uk/consult/condocs/futurepricing/statement/statement.pdf.

²⁵ www.ofcom.org.uk/static/archive/ra/topics/spectrum-price/documents/spec_rev/ha129.doc.

2002 Cave Review

5.23 Initially fees tended to be 50% of opportunity cost values derived by the Smith NERA approach. The Government then commissioned an independent review of spectrum management, which was undertaken by Professor Martin Cave and reported on 6 March 2002.²⁶ This report recommended that there should be a greater use of auctions and pricing, with key recommendations being:

- AIP should be applied at more realistic levels and more comprehensively across spectrum uses; and
- where AIP had already been implemented and there was, nevertheless, continuing evidence of spectrum shortages, prices should be set at full opportunity cost levels.

5.24 The Government published its response in October 2002²⁷, broadly agreeing with the recommendations in the report, including the recommendation that the methodology for valuing spectrum and setting fees should be reviewed. We have recently launched a Strategic Review of Spectrum Pricing (SRSP) which will consider these points among others²⁸.

Indepen report 2004

5.25 A further study was commissioned in 2003 which took the work of Smith NERA forward in light of the recommendations in Professor Cave's review. This work was carried out by a consortium led by Indepen and including Aegis and Warwick Business School. The report was published in 2004.²⁹

5.26 The Indepen team was asked to address the following key issues in its report:

- review and make recommendations about the methodology used to determine AIP;
- provide illustrations of how the methodology could be applied; and
- comment on the wider use of pricing.

5.27 Indepen's report confirmed the valuation approach set out by Smith NERA. However, it widened the opportunity cost methodology by recommending that alternative uses of spectrum should also be reflected in its assessed value. It further recommended that AIP should be applied to a greater range of spectrum uses.

Cave Audit 2005

5.28 The Government commissioned a second review from Professor Martin Cave in 2004.³⁰ This review focused on the potential to release the maximum amount of spectrum to the market and increase opportunities for the development of innovative new services. The key recommendations to come from the report were:

²⁶ www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf.

²⁷ www.ofcom.org.uk/static/archive/ra/spectrum-review/govresponsetoreview/indpreviewgovtresponsefinal.doc.

²⁸ www.ofcom.org.uk/radiocomms/ifi/srsp/.

²⁹ www.ofcom.org.uk/research/radiocomms/reports/independent_review/spectrum_pricing.pdf.

³⁰ www.spectrumaudit.org.uk/pdf/20051118%20Final%20Formatted%20v9.pdf.

- the introduction of market mechanisms into spectrum management in the public sector;
- changes to the scope of AIP as applied to the public sector, with previously uncharged bands used by the Ministry of Defence (MOD), for example, being included in that scope; and
- changes to the structure of AIP so that the charges are more consistent and better reflect the value of use.

5.29 The Government responded to the report on 22 March 2006³¹ and supported its key proposals. It set out high level plans for the migration of public bodies to an AIP based licence fee arrangement which was later expanded upon in its *Forward Look* document of 2007.³²

Indepen Report 2007

5.30 In June 2006 we commissioned a report from Indepen and Aegis to consider how AIP should be applied to the aeronautical and maritime sectors. The approach followed by Indepen and Aegis broadly followed that set out in Indepen's 2004 report, in that the recommendation was that AIP fees should be set with reference to both the marginal value of the existing use of the spectrum and the marginal value of the best alternative use.

Scope of this review

5.31 We set out details of the spectrum that we proposed to award to the band manager in our July 2008 consultation document. Since that document was published developments at a European level have changed some of our plans. We outline full details of those developments in our consultation document on clearing the 800 MHz band, published on 2 February 2009.³³ In terms of the impact on the band manager, we proposed in that document to award it the following if we decided to clear the band:

- access rights to channel 36 on 12 months' notice to cease and to the rest of the cleared spectrum (channels 31-35, 37 and 61-69) until DSO is completed in the UK in late 2012 (or possibly until the end of 2013);
- channel 38 on the same terms as would have applied to channel 69; and
- the interleaved spectrum that would be available in channels 39 and 40 as a result of moving DTT there from channels 61 and 62

5.32 An updated list of spectrum that we propose to award to the band user is shown in section 8 where we set out the TLCs for each band in the award. Our review of AIP has considered all of these bands.

³¹ www.spectrumbaudit.org.uk/pdf/governmentresponse.pdf.

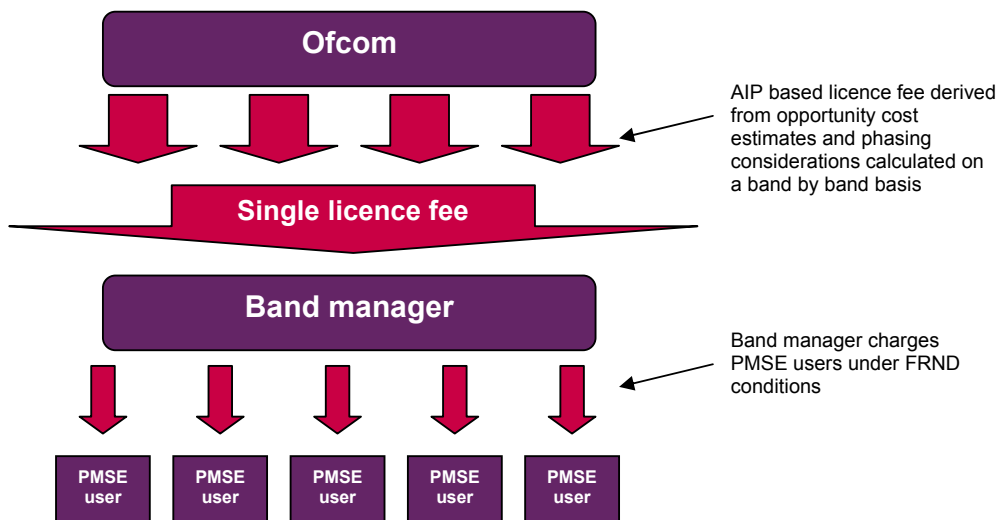
³² www.mod.uk/NR/rdonlyres/733C18ED-A59B-4282-BA66-98693FF0D29E/0/spectrum2008_2027.pdf

³³ www.ofcom.gov.uk/consult/condocs/800mhz/800mhz.pdf.

Why we propose setting AIP for spectrum used by the PMSE sector

- 5.33 In our December 2007 statement and our July 2008 consultation document we set out our vision for future PMSE access to spectrum. We considered that PMSE users needed to move away from a command and control mechanism for spectrum access towards a more market based approach. One of the key elements underpinning this approach was our intention that PMSE users move away from the current situation where they pay licence fees based at most on administrative cost only and started paying licence fees based on AIP.
- 5.34 The purpose of applying an AIP-based licence fee to PMSE users is to promote efficiency in their use of spectrum. It is our aim that, subject to the wider protections that we have put in place for PMSE users, those who value spectrum the most should be able to access it. Conversely, those who value spectrum less will be incentivised to exploit alternative and less valuable spectrum which otherwise meets their needs.
- 5.35 Since we are proposing to set up a commercial band manager, the AIP-based licence fee will be charged to it and be recovered from end users in the form of fees. As shown in section 3, one condition of the band manager's licence would be that the price charged to PMSE users would have to be FRND. In other words there will be measures in place, based on commitments that the band manager makes in the course of the beauty contest, to ensure that PMSE users are not charged an excessive fee for their spectrum access.
- 5.36 Figure 4 below shows the relationship between the band manager and PMSE users with regards to setting AIP.

Figure 4. The band manager, PMSE users and AIP



- 5.37 We considered that these proposals were the most appropriate way of meeting our objectives for the award as they would enable PMSE users to recognise the true value of the spectrum that they use and, as a consequence, make better informed decisions on the way that they use it. In practice, this may mean that some PMSE users would be incentivised to use spectrum more efficiently, potentially allowing other users (either PMSE or non-PMSE) to access the spectrum freed up as a result of this more efficient use.

- 5.38 Responses to both our June 2007 and July 2008 consultation documents indicated that many PMSE stakeholders had significant concerns over the level of AIP that would be applied to the spectrum being awarded to the band manager. A number stressed that if the AIP levels were significantly higher than current licence fees and introduced too quickly then PMSE users would no longer be able to afford access to spectrum. Even with FRND obligations in place, some PMSE users were concerned that the cost borne by the band manager would lead to fees being charged in excess of what they could afford.
- 5.39 In developing our proposals on AIP we have been mindful of these concerns. We recognise that PMSE users face particular challenges in moving to a market based approach to spectrum access. We also recognise the difficulties that the sector faces in aggregating the demand of its many diverse users.
- 5.40 This does not affect all PMSE users equally. But we believe it right to calibrate our proposals to those who face the greatest challenges and are therefore most likely to experience disruption that adversely affects their ability to provide a wide range of services to citizens, consumers and business customers if price increases are introduced too quickly. As a result, we have adopted the same approach to protecting PMSE users across all bands that we are proposing to award to the band manager.
- 5.41 Our July 2008 consultation document set out a number of ways in which we would avoid disruption to PMSE users:
- we would, in line with the recommendations of Professor Cave and Indepen/Aegis, set AIP with reference to a lower end estimate of the spectrum's opportunity cost;
 - we would phase in the AIP-based fee over a period of time where we considered that significant rises would cause disruption to PMSE users; and
 - we proposed that we would review our initial AIP figures after a period of three years, and review them afterwards no more frequently than every three years. We considered that this period struck an appropriate balance between giving the band manager a level of certainty for developing a business plan, whilst allowing us to make any changes to AIP figures in reasonable time where our initial proposals were clearly in need of amendment.
- 5.42 As well as ensuring that our proposals achieve a balance between promoting the optimal use of spectrum and ensuring that any changes do not significantly disrupt PMSE users, we are also mindful of the needs of any potential band manager to be able to develop a viable business model. We therefore need to set the fee at a level whereby a band manager can recoup this and its other costs and be able to make reasonable returns. If we set the fee at too high a level we run the risk not only of major disruption to PMSE users, but also to undermining the band manager's ability to effectively run a business. This, in turn, could risk some spectrum being left unused.
- 5.43 We therefore have particular regard in our proposals to setting the level of the AIP-based fee, so that we have sufficient confidence that a band manager will be able to recoup it from end users.

Question 24. Do you agree with our objectives and approach in applying AIP principles to the licence fee payable by the band manager?

Section 6

Our pricing proposals for the band manager

Introduction

6.1 In setting the fee that the band manager will pay, we have borne in mind the following objectives:

- that the fee level should reflect the opportunity cost of the spectrum to be awarded. This, in turn, should be reflected in prices to end users, signalling to them the value of the spectrum that they are using;
- that the fee level should enable the band manager, subject to the protections described in section 3, to set prices for users that broadly reflect the value of those different bands;
- that, over time, PMSE users move towards paying fees to access this spectrum that reflect the opportunity cost of that access. Over time, this will enable PMSE users to make decisions about their spectrum and equipment requirements that are likely to lead to the best use being made of spectrum. This could lead, in time, to PMSE users choosing to pay market rates for spectrum which sits outside of the band manager award; and
- that the timing of implementing changes to fees should not cause disruption to PMSE users

6.2 This section sets out our estimates of the opportunity cost of the spectrum being awarded to the band manager and our proposals for how we will set the band manager's licence fee. It addresses the following:

- our approach to and methodology for setting AIP for the spectrum to be awarded;
- our proposals for the level of AIP for each band;
- our approach to how we will phase in AIP;
- our proposals for the phasing in period for those bands where we believe this is a necessary step; and
- options for translating these phased in opportunity cost figures into a licence fee to the band manager.

Our approach to setting AIP for spectrum awarded to the band manager

6.3 We commissioned Analysys Mason to assess the opportunity costs of the spectrum being awarded to the band manager, and how we should set the band manager's

licence fee for this spectrum. We have published its report alongside this consultation document.³⁴

- 6.4 This work raised some novel issues because of the nature of spectrum used by PMSE. As mentioned above, when developing our approach to setting AIP for the spectrum to be awarded to the band manager, we had to be mindful of the specific features of the PMSE sector. In particular we were aware that there is some uncertainty as to PMSE users' ability to absorb significant increases in fees for spectrum access over a short timeframe. Therefore, as part of its report, Analysys Mason engaged with a cross section of PMSE users to understand the likely impact of any changes in those fees.
- 6.5 We are grateful for the contribution made by those stakeholders and for the time they gave to our consultants.

Methodology for assessing AIP for spectrum awarded to the band manager

- 6.6 We consider the Smith NERA approach to setting AIP for spectrum used by PMSE (that is, aligning spectrum below 1 GHz with the mobile STU and that above 1 GHz with the fixed links STU) to be overly simplistic and unlikely to accurately reflect the true value of spectrum in most cases.
- 6.7 Instead, Analysys Mason set out a three stage approach which would more accurately reflect the opportunity costs of the spectrum to be awarded to the band manager both to PMSE and to alternative users. This analytical framework, consistent with previous approaches, consisted of:
- an assessment as to whether there is congestion amongst PMSE users;
 - an assessment as to whether there is a viable alternative user of the spectrum; and
 - where there is likely to be congestion amongst PMSE users and/or with a viable alternative use, a calculation of the value of the spectrum to the PMSE user and/or alternative user to derive the opportunity cost.
- 6.8 We then carried out an assessment of any opportunity cost identified in each band to determine whether a phasing in period would be appropriate and, if so, over what duration, given the band manager's potential response in how it allocates its costs to PMSE users in the light of its FRND obligations.

Applying AIP on a band by band basis

- 6.9 The level of AIP is based on the opportunity cost of the spectrum being used. Therefore, where there is no competing demand for the spectrum being used, either by an alternative or by an existing user, the opportunity cost would be zero. We would therefore not apply an AIP figure to the band manager's licence fee in respect of that band.

Identifying competing alternative users of spectrum

- 6.10 With the exception of channel 69 and a small number of frequencies in UHF 1, PMSE uses spectrum which has been made available to it on a secondary basis. This

³⁴ <http://www.ofcom.org.uk/consult/condocs/bandmanager09/report2.pdf>

means that there is a primary service using that spectrum and PMSE users are allowed to share it so long as they do not cause harmful interference to that primary service. Conversely, PMSE has historically had to accept any harmful interference from that primary user.

- 6.11 In practice, this usually means that PMSE users must either transmit at low power levels or observe geographical restrictions when using the spectrum available to them. These restrictions often make the spectrum unattractive to other alternative users or services. For example, a mobile operator would be unlikely to want to deploy a network in spectrum that did not offer UK-wide coverage (although it might want to use geographically specific spectrum to augment a UK-wide network, an option recognised in our geographic interleaved awards). Another example would be a fixed link service being unable to roll out a network in spectrum that is subject to significant power constraints to avoid harmful interference to the primary service.
- 6.12 We consider that it is appropriate to assess the viability of alternative users and services in light of PMSE users' secondary access to the spectrum that it uses where relevant. This will give an accurate reflection of the value that is placed on that spectrum, in light of the constraints inherent in PMSE use of that spectrum.

Question 25. Do you agree with our proposal to assess viability of alternative use of spectrum based on the secondary nature of PMSE access where applicable?

Identifying competing PMSE users of spectrum

- 6.13 Even if there are no alternative uses for spectrum, there may still be an opportunity cost to its use where there is congestion amongst PMSE users. However, spectrum congestion in the context of PMSE differs from most other types of spectrum congestion. The reason for this is that PMSE use of spectrum tends to be sporadic and focused on a small area for a short period of time. Therefore a particular frequency may be available for use most of the time and in the vast majority of locations within the UK, but still be congested at a time when it is actually needed by PMSE users.
- 6.14 Examples of this include major outdoor sporting or cultural events, such as the British Grand Prix or the annual music festival at Glastonbury. At these locations, there is extremely high PMSE demand for spectrum for one weekend each year. However, at nearly every other time of the year there is close to zero PMSE demand for spectrum in these particular locations.
- 6.15 Therefore our approach has been to consider whether a band has *sufficient* excess demand from existing PMSE use for it to have an opportunity cost applied to it as opposed to making a judgement that the spectrum is either definitively congested or not congested.
- 6.16 In assessing whether a band has excess demand from existing PMSE use, we have used an approach which looks at the effect of reducing the amount of spectrum in the band available to PMSE by a *marginal decrement* and assessing whether there is likely to be any equipment which is rendered unusable as a consequence. A marginal decrement is defined as the minimum amount of spectrum that is likely to be of use to current users (for example, it would be 200 kHz in most of the interleaved spectrum because this is the bandwidth needed by the relevant PMSE use – wireless microphones).

- 6.17 This allows to us to assess the amount that existing PMSE users would be willing to pay to retain access to the band, or other PMSE users would be willing to pay to gain access to it. The opportunity cost based on own use excess demand is derived from this value.
- 6.18 The most important measure of this value is represented by the additional costs – primarily equipment costs – which PMSE users would need to incur if they lost access to the decrement of spectrum concerned. If equipment can be reused in alternative spectrum to deliver the same output with no additional costs, the opportunity cost of the spectrum in the decrement can be judged to be zero. If instead the equipment would be stranded in existing use – and new equipment costs incurred to sustain the same output – then the value of the spectrum in the decrement can be judged to be more than zero. In this latter case, we would then consider that the band has sufficient excess demand for us to be able to apply an opportunity cost figure to it.
- 6.19 Hence, in assessing the materiality of own-use opportunity costs in a particular band, we have adopted a guideline that if no PMSE equipment is stranded by a reduction of a marginal decrement of spectrum, then there are insufficient levels of excess demand for that band for us to ascribe a positive opportunity cost to it.

Question 26. Do you agree with our approach to assessing whether there is an opportunity cost of spectrum based on competing PMSE use?

How spectrum that is heavily used for PMSE can be deemed to have zero opportunity cost

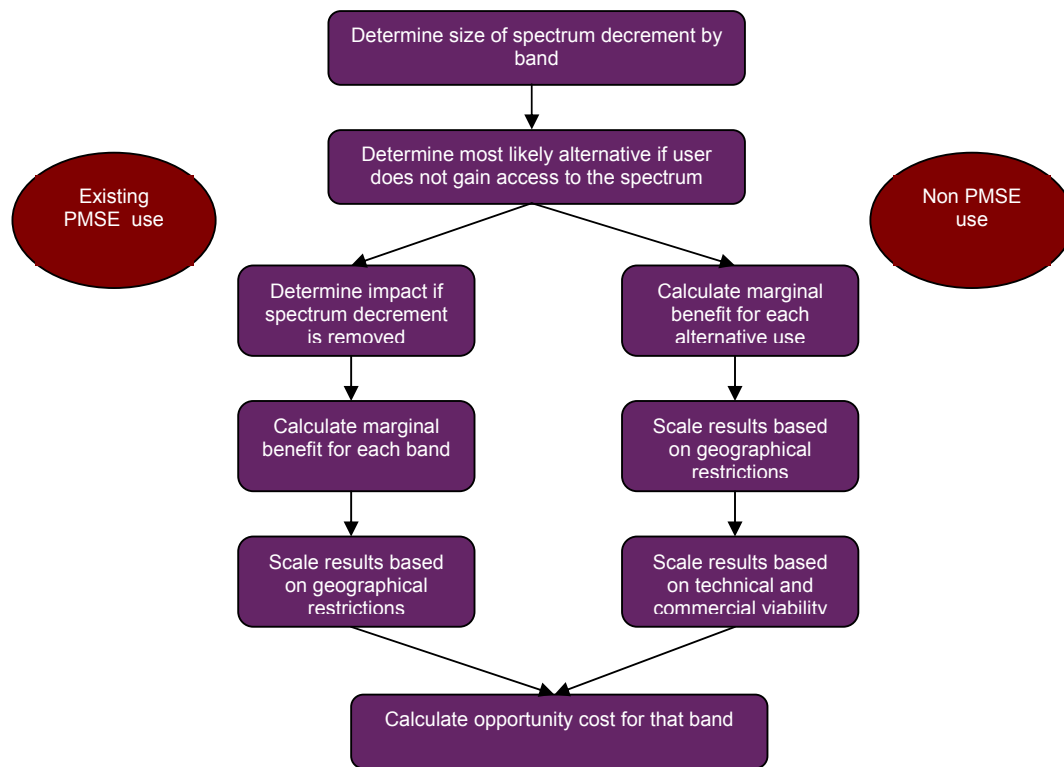
- 6.20 It is important to note that although we may state that some bands do not have sufficient own use PMSE congestion for us to ascribe a positive opportunity cost to them, this does not preclude the possibility that, at times, that same spectrum may be heavily used for PMSE.
- 6.21 For example, our assessment shows that there is insufficient PMSE congestion in interleaved spectrum, for an own use opportunity cost to be applied. However, at major sporting events or for large theatre productions, some interleaved spectrum will be very heavily used. This apparent contradiction is caused by the specific way that spectrum is used for PMSE and how this drives our definition of own use PMSE congestion.
- 6.22 In this case, although there is high PMSE demand for interleaved spectrum on occasions, this still only accounts for relatively short periods of time at specific locations. This would contrast with other services such as business radio (which is in demand for much longer periods of time) or for mobile communications (which is in demand for longer periods of time and over much wider locations, usually UK-wide).
- 6.23 As a result, whilst we accept that PMSE congestion *can* occur in some spectrum that will be awarded to the band manager, the temporal and geographical nature of that congestion may often lead us to ascribing an opportunity cost of zero to that same spectrum.

Calculations of opportunity cost on a band by band basis

- 6.24 Where we have identified either alternative demand for spectrum or congestion caused by excess PMSE demand, we have estimated an opportunity cost for that band. A detailed description of the 5 step approach used in our analysis for this

purpose can be found in Analysys Mason’s report. An overview is shown in figure 5 below.

Figure 5. Approach to estimating opportunity cost



We have accounted for uncertainty in our opportunity cost calculations

6.25 Figure 5 above illustrates some of our considerations in coming to estimates which fairly reflect the opportunity cost of each band. We have sought to maintain a consistent approach to that set out by Professor Cave and Indepen/Aegis, which is reflected in our wider spectrum pricing policy. In particular, we have had specific regard to the recommendation that any proposed level of opportunity cost should be set at a conservative level to reflect some of the uncertainties over any alternative service being viable in reality.

6.26 In terms of applying this approach to the spectrum to be awarded to the band manager, we have noted a number of areas where we consider there to be uncertainties that should be reflected in our pricing proposals, namely:

- **technical uncertainty.** We identified whether, and if so where, there was potential competing use to the current service in each band. However, we weighted our opportunity cost calculations where we felt that there was doubt as to whether the spectrum is now, or would in the future be, technically suitable to meet the needs of the identified alternative service;
- **commercial uncertainty.** We weighted our opportunity cost calculations where we identified an alternative use but considered that there was doubt as to whether there would be a commercial case for deploying it. It is worth noting that the levels of commercial uncertainty and technical uncertainty are interlinked, in

that a strong commercial case for a service may lead to increased investment to make use of the spectrum more technically viable; and

- **nature of terms of access with primary user.** Unlike most other spectrum users, PMSE licensees do not have long term secured access enshrined in licence terms and conditions. Their security has instead been derived from the nature of their sharing arrangements with the primary users of that spectrum. For example, PMSE has been the most suitable service (low power, low density use) to share interleaved spectrum with a well established primary user – analogue terrestrial television. We have started to auction some packages of the spectrum that will be interleaved with DTT after DSO in a manner suitable for local television but have proposed to award an indefinite licence for the remaining interleaved spectrum to the band manager. We believe this implies relatively secure access to this spectrum for the PMSE users concerned. However, in the case of MOD spectrum at 3.5 GHz, we can only offer the band manager some temporary security of access in the period until the MOD has been issued with recognised spectrum access (RSA). The band manager will have to negotiate any subsequent access with the MOD, which has already indicated that this particular band will be released in due course. We would consider this to constitute low security of tenure for PMSE users and ensure that this uncertainty is reflected in the opportunity cost calculations underpinning any AIP licence fees payable by the band manager for that band.

Our opportunity cost calculations

- 6.27 We set out below our detailed proposals for AIP fees based on opportunity cost for the spectrum to be awarded to the band manager, based on the work done by Analysys Mason. In our July 2008 consultation document, we discussed the relative importance of certain bands for PMSE users, stated that some were key to the sector and recognised that we would need to be particularly mindful of when making proposals that might affect their use or availability to PMSE users.
- 6.28 We expect that, although there will be PMSE users with an interest in all bands awarded to the band manager, there will be a particularly significant level of interest in the following bands as a result of the current magnitude of their use for PMSE:
- UHF 1 and 2 (425-470 MHz);
 - interleaved spectrum (470-550 MHz and 614-790 MHz);³⁵
 - channel 38 (606-614 MHz) and channel 69 (854-862 MHz);
 - 2 GHz (2025-2110 MHz, 2200-2300 MHz and 2390-2500 MHz); and
 - 7 GHz (7100-7250 MHz and 7300-7440 MHz).
- 6.29 We describe below the opportunity costs we have estimated for these specific bands.

UHF 1 and 2

- 6.30 The primary PMSE use of this spectrum is talkback equipment, which is typically deployed by production and broadcasting users. In our July 2008 consultation document we suggested that, based on business mobile radio being a potential

³⁵ Consistent with our proposals to clear the 800 MHz band.

alternative use of this spectrum, a lower bound of the opportunity costs would be around £280k per year for UHF 1 and £750k per year for UHF 2.

- 6.31 Our further work on this spectrum has confirmed our initial assessment of business radio being the potential alternative use. In the case of UHF 1, this would be subject to some geographic restrictions, whilst with UHF 2 the limitations on business radio use would consist of a small number of power constraints. Business radio equipment able to use this spectrum is already available, and business radio users are themselves currently using other heavily-congested bands. As a result we consider business radio use to be a very strong technical and commercial alternative to talkback use in UHF 1 and 2.
- 6.32 Analysys Mason's more detailed analysis of business radio users' potential willingness to pay to use this spectrum has resulted in our estimating opportunity costs to be higher than suggested in our July 2008 consultation document, at £359k per year for UHF 1 and £1.21m per year for UHF 2. The latest revenue figures from the PMSE licensing database show that PMSE users currently pay in the region of £88k per year for licences in UHF 1 and £466k per year for licences in UHF 2. As a result we would expect fees for spectrum access which reflected full opportunity costs to cause significant difficulties to PMSE users if implemented too quickly. We discuss this further in the discussion of phasing below.

Question 27. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity costs of UHF 1 and UHF 2?

Interleaved spectrum

- 6.33 Interleaved spectrum is currently used for PMSE primarily by wireless microphone and in-ear monitor users, although there is some use by talkback and high power audio links. Interest in future access to this spectrum has been high among PMSE users because of the importance that they attach to these uses.
- 6.34 We suggested in our July 2008 consultation document that a lower bound of the opportunity cost for this spectrum would be in the region of £900k per year. This was based on low power business mobile radio being the highest-value alternative user, although we noted that further assessment might identify other alternative uses.
- 6.35 We have since looked at the current plausible alternative users of this spectrum, namely:
- business radio;
 - mobile television;
 - DTT on a local, regional or sub-UK basis; and/or
 - local or regional wireless broadband and WiMAX.
- 6.36 Our assessment of the technical and commercial viability of these services suggests that one or more of them could potentially make use of interleaved spectrum in the future. However, it is unclear from the information we have at present whether demand for this spectrum from these or any other services will materialise over the next three years. In particular:

- a more detailed assessment has found that although there has been some evidence of interest to use interleaved spectrum for business radio, this interest was on a UK-wide basis and the technical constraints inherent in using geographically restricted spectrum would pose significant technical challenges;
- mobile television could make use of interleaved spectrum because of the wider tuning range that handsets have. However, we consider that the evidence of actual demand from this service for this spectrum – particularly in light of potentially more suitable spectrum which is already on the market – is insufficiently strong for us to apply an opportunity cost figure based on this service; and
- DTT is a technically suitable alternative use of interleaved spectrum. However, we are separately awarding the most suitable interleaved spectrum to provide these services – compatible (“in group”) with existing aerials – on a service and technology neutral basis in areas of likely demand. Whilst we explicitly do not rule out the use of the interleaved spectrum to be awarded to the band manager for DTT, we consider that the evidence of demand at this stage is not clear enough for us to derive an opportunity cost figure based on this service.

6.37 As a result of these assessments, we believe that a conservative estimate of the opportunity cost of interleaved spectrum is currently zero and that PMSE users should, at present, only be faced with the band manager’s administrative costs of managing this spectrum.

6.38 However, we will monitor this situation closely in advance of the initial three year review of the band manager’s AIP. We are aware that there are already some formative expressions of interest from other services, such as WiMAX, which may materialise after the spectrum has been awarded to the band manager. If this or any other demand for interleaved spectrum becomes clearer then the level of AIP is likely to change as a result at review to reflect the subsequent increase in the value of the spectrum.

Question 28. Do you agree with our estimate, based on Analysys Mason’s report, of the opportunity cost of interleaved spectrum?

Channels 69 and 38

6.39 In our July 2008 consultation document, we suggested a lower bound of the opportunity cost of channel 69 of £2.8m per year based on the STU for mobile cellular use at 900 MHz. We emphasised that this estimate was likely to be at the low end of the potential range of opportunity costs, given developments at a European level, which had led to an increased likelihood of this channel being part of a harmonised band for mobile communications services.

6.40 Our subsequent work has now confirmed that, with an increasing number of other European countries identifying the 800 MHz band (including channel 69) as suitable for mobile communications, a more accurate opportunity cost estimate for channel 69 could be in the region of £24m a year. In contrast, PMSE users currently pay licence fees amounting to £102k a year for this spectrum. Therefore, even with extensive phasing-in arrangements, we do not think it likely that the band manager could recoup AIP fees from PMSE users that reflected the full opportunity cost of this channel. Conscious of the importance that PMSE users place on this channel, we stated in that consultation document that the likely proposed levels of AIP would not be consistent with our stated objective to avoid disruption to PMSE users.

- 6.41 In our consultation document on clearing the 800 MHz band, we proposed to clear PMSE from channel 69 to enable us to align part of the UK's digital dividend with the decisions being taken by other European countries. We identified channel 38 as the best alternative to channel 69 and proposed awarding it to the band manager on the same terms as would have applied to channel 69. We suggested that its opportunity cost was in the region of £122k per year.
- 6.42 We based this assessment on the potential for this spectrum to be used for DTT services in Wales and Northern Ireland. Based on our approach to assessing whether there would be unusable equipment where we removed a marginal decrement of spectrum, we concluded that there would not be PMSE excess demand in channel 38 given the ability for users to use the same equipment in adjacent frequencies to sustain output.
- 6.43 After further consideration, we have confirmed £122k a year as being the estimated opportunity cost for channel 38. We discuss the implications for phasing in AIP licence fees for this channel below.

Question 29. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity costs of channel 69 and channel 38?

2 GHz

- 6.44 The 295 MHz of available spectrum for PMSE in bands between 2 and 3 GHz is heavily used for wireless cameras (primarily by broadcasters and production companies). Much of this spectrum is managed by the MOD and shared with PMSE use on a no interference, no protection basis. The remaining spectrum is shared with satellite services and with industrial, scientific and medical spectrum users at the higher frequencies.
- 6.45 In our July 2008 consultation document, we cited a lower bound of the opportunity cost for this spectrum of approximately £150k per year for the 210 MHz of spectrum identified as being congested as a result of existing PMSE use. At that time, we did not identify a suitable alternative service that would be able to share with the primary users for this spectrum, given the geographical and technical constraints inherent with sharing.
- 6.46 Our further analysis has indicated there is, in fact, no likely excess PMSE demand based on our approach of assessing how much equipment would be rendered unusable by the removal of a decrement of spectrum. We consider that the tuning range of wireless cameras would enable their continued use to sustain output in the event that we removed 8 MHz of spectrum from PMSE use. As a consequence, there is a zero opportunity cost for most of this band. With one exception, we still consider that there is currently no suitable alternative use for this band.
- 6.47 The one exception to the above is spectrum at 2390-2400 MHz, which was identified for possible future harmonised wireless telecommunications use at the World Radiocommunication Conference in 2007. This spectrum is managed and used by the MOD and we have already stated that the band manager will have to negotiate new terms of access after the MOD has been granted RSA for each band and put in place new management arrangements. Therefore, whilst the value of this band for wireless communications may be significant, there is also some uncertainty relating to the tenure that the band manager will enjoy in this spectrum. The MOD has said that it expects there to be keen interest in continued PMSE use of its spectrum and

proposed to continue to allow this use for as long as possible. It also said that it will take the longer-term use of its holdings by PMSE into consideration.

- 6.48 The MOD has given PMSE users an assurance that access to its spectrum will be addressed as soon as practicable. This requires RSA to be established and the MOD to put in place new arrangements for the management of the spectrum that it uses. The MOD has not yet asked us to make the regulations needed to grant RSA for spectrum in the 2310-2450 MHz band, but expects to do so by March 2012.
- 6.49 The Defence demand study³⁶ has identified that existing defence use of this band makes it unlikely that spectrum could be released without altering defence demand and current use and that it could not be released UK-wide.
- 6.50 We have reflected these uncertainties in our opportunity cost calculations. Our conservative estimate of the value of this band, based on the potential for future harmonisation of 2390-2400 MHz, is therefore £216k per year.
- 6.51 This figure contrasts with the latest JFMG receipts for wireless cameras using the whole 2-3 GHz band, which were £290k for 2008/09.

Question 30. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity cost of spectrum at 2-3 GHz?

7 GHz

- 6.52 The 7110-7250 MHz and 7300-7425 MHz bands are currently used for PMSE for fixed programme links but are becoming increasingly important for wireless camera users. This is because peak spectrum demand by wireless camera users can exceed the available supply at 2-3 GHz without the 2500-2690 MHz band which is due for award for new uses in the very near term.³⁷
- 6.53 We have discussed possible complements to these bands with PMSE users, who have expressed an interest in the spectrum at 7 GHz identified for award to the band manager. They have been trialling its use to assess its general suitability, against the backdrop of existing use for wireless cameras both in the UK and abroad.
- 6.54 This spectrum may be key for wireless camera use in the future and we are mindful that we do not create any barriers to this occurring. We have identified one alternative use of this spectrum – that of fixed links which we believe to be both technically and commercially plausible. We have not identified PMSE own use congestion. We therefore have calculated an opportunity cost based on the likelihood of non-PMSE fixed link deployment of £23.6k per year for both bands.
- 6.55 This contrasts with the level of fees collected by JFMG in 2008 of £40k.

Question 31. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity cost of spectrum at 7 GHz?

³⁶ www.mod.uk/NR/rdonlyres/733C18ED-A59B-4282-BA66-98693FF0D29E/0/spectrum2008_2027.pdf.

³⁷ www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_2010.

Our proposals for phasing in AIP

- 6.56 We will only introduce AIP when the band manager begins operating, which we expect to be in the second half of 2010. Until that time, PMSE users will continue to have access to spectrum at existing fee levels based on administrative costs.
- 6.57 Our December 2007 statement and July 2008 consultation document both made clear our objectives of helping PMSE users move toward a market based approach to spectrum while avoiding disruption to their ability to provide services to citizens, consumers and business customers. Both also made clear that a central way of achieving this would be to phase in the band manager's AIP based licence fee where not to do so would result in a significant increase in the costs faced by PMSE users. We remain convinced that this is the right thing to do.
- 6.58 Analysys Mason spoke to a selection of PMSE users to gain an understanding of the likely impact on them of rises in fees to access spectrum. In its report, Analysys Mason noted that it was difficult to estimate with confidence how sensitive PMSE users would be to price rises and that, as result, the levels of AIP faced by the band manager should initially be set conservatively and reassessed at the first formal review when there were data to judge reactions to changes in those fees. This was particularly important bearing in mind the band manager's need to develop a business plan which included the effective management of the commercial risks of being unable to recoup its AIP fee from end users.
- 6.59 We agree with Analysys Mason that, given the current structure and level of licence fees paid by PMSE users, it is difficult to know with much certainty what immediate impact initial increases in PMSE users' fees will have. As a result we also agree that we should err on the side of caution.

Options for how to phase in AIP

- 6.60 We have considered two possible approaches to phasing in our opportunity cost based licence fee:
- phasing in the total of all opportunity costs across all bands, averaging different PMSE users' ability to adjust to price changes in different bands; or
 - phasing in on a band by band basis to reflect different types of PMSE user and different levels of current fees compared with opportunity costs.
- 6.61 The first of these two options has the advantage of being simple to understand but the disadvantage of removing the clear link between the opportunity cost of spectrum on a band by band basis and the price that would consequently be set to PMSE users in each band. In addition, an average rate of increase charged to the band manager could also lead to increases in some bands that would be unacceptably disruptive to those users.
- 6.62 The second option has the significant advantage of maintaining a strong link between each band's opportunity cost and the current circumstances of users in that band . It also gives clearer signals to distinct groups of PMSE users about the value of the spectrum they are using. This, in turn, will more effectively bring them to a position where they are faced with paying a market rate for their access to spectrum, in line with our objective to facilitate a market based approach to spectrum. Finally – but significantly – this option also allows for less aggressive rates of increase for bands facing the largest changes.

- 6.63 As a result, where a full opportunity cost-based fee would represent a significant increase on existing fees, we propose to set the initial level of AIP on a band by band basis at a proportion of the full opportunity cost estimate and then increase this proportion over time. This will continue until the AIP reflects our prevailing conservative estimate of the full opportunity cost of the spectrum. The phasing proposals for specific bands, and in particular the period of time over which full opportunity costs are reached in each band, will reflect our objectives for the award.
- 6.64 We could in principle phase in all changes over all bands over the same period. This would have the advantage of clarity and simplicity in approach.
- 6.65 However this approach does not recognise that PMSE users in different bands will be facing different fee changes and will have different abilities to respond to these changes. A single phasing-in period would therefore risk being either too short for some users and fail to avoid disruption or too long for others and delay their transition to a market based approach to spectrum access.
- 6.66 We therefore consider that the best approach is to determine a specific phasing in period and gradient for each band based on the specific circumstances of the fee increases and PMSE user circumstances in each case.

Question 32. Do you agree with our proposal to phase in AIP on a band by band basis?

How we derived our phasing in proposals

- 6.67 We have identified four spectrum ranges whose opportunity cost is greater than the revenue that is currently derived by JFMG from licensing their use. As a result, PMSE users of those ranges may be expected to bear a greater burden of the band manager's costs than they currently pay. The ranges in question are:
- UHF 1;
 - UHF 2;
 - channel 38; and
 - 1.5 GHz low.
- 6.68 PMSE users of spectrum in these ranges vary from band to band but, in general, represent broadly similar constituencies and groups. While some users are larger companies such as broadcasters, many are small businesses who either use or hire out wireless microphones and/or talkback equipment as part of their core activity.
- 6.69 Most PMSE licensees do not file accounts at Companies House, indicating that they have annual turnovers of less than £2.8m. Evidence from stakeholders themselves suggests that most of these users have a far lower turnover than even that figure. We are also aware that a number of charities use spectrum for PMSE.
- 6.70 Analysys Mason looked at the issue of future charges for PMSE spectrum access as part of its report for us. It asked PMSE users for their own assessment of the levels of increase that they could bear without there being a real risk of disruption. All respondents urged caution, with several citing the difficulties that PMSE users have in passing on fee increases to their customers – not least because it was perceived to give a competitive advantage to those users operating illegally without a licence.

- 6.71 However, we are also conscious that PMSE licence fees are for historic reasons set at a low rate when compared both to other spectrum users and to the value of the spectrum. We need to strike a balance when setting our pricing proposals between ensuring that PMSE users do not face disruption in adjusting to new fee levels and bringing them to paying a market level for their spectrum use as soon as is practicable so that they can make efficient future decisions on how they use spectrum in light of their understanding of its value.
- 6.72 We are also mindful of the need for PMSE users to move towards paying a market rate for spectrum in advance of 2018, when we have proposed to remove the FRND protections that we are putting in place.
- 6.73 There is little precedent to draw upon in deciding on an acceptable level of fees for the band manager that will be appropriate to these considerations. However, we note that in respect of the business radio sector in January 2007, we decided it was appropriate to set some new licence fees that represented an immediate increase of 100% (in the case of some technically assigned licences). We consider that some PMSE users share similarities with some business radio licensees in that they can also be smaller businesses with relatively low turnovers. However, in recognition of the particular emphasis we are putting on avoiding disruption to PMSE users, we propose to phase in AIP to the band manager at a lower rate of increase than this.
- 6.74 We also note that in each of 2005 and 2007 licence fees for PMSE users rose by a total of 20%. After these increases, there was an *increase* in the total number of licences issued – indicating that current PMSE ability to pay is likely to be more than would be represented by a further 20% increase.
- 6.75 As a result of this we consider that it is likely that PMSE users could be in a position to bear an increase of 20-100% in their fees for spectrum access without this causing disruption. The evidence of the 2005 and 2007 increases suggests that we can look at a maximum increase of more than 20% from current fee levels in the first year that the band manager is operating. Mindful of our objective to move PMSE users toward a market based approach to spectrum, we have chosen 40% as the lower end fee level rise in the three options for phasing in AIP considered below.
- 6.76 In our subsequent assessment of the phasing which should be applied to the relevant bands, we have looked at the impact of three scenarios. These consider the increase in PMSE user fees in each band when compared with current levels of licence fees collected by JFMG.
- **Option 1:** where PMSE user fees cannot increase in any one year of the minimum phasing period by more than 40% of current JFMG receipts;
 - **Option 2:** where PMSE user fees cannot increase in any one year of the minimum phasing period by more than 60% of current JFMG receipts; or
 - **Option 3:** where PMSE user fees cannot increase in any one year of the minimum phasing period by more than 80% of current JFMG receipts.
- 6.77 At the end of this three year period, we are proposing to review the AIP levels and phasing duration in light of the information that we will have at that time.

Our phasing in proposals for PMSE

- 6.78 We have looked at the impact of phasing in AIP over durations from one to eight years (the latter being the period between the expected date of the band manager starting operation in 2010 and the proposed date when FRND protections will end in 2018). In each case we have identified the minimum duration which will deliver less than 40%, 60% and 80% increases in PMSE user fees in the first year when compared to current JFMG receipts. We have taken 2008/09 licensing figures as our base point. Details of these calculations are found in annex 5.
- 6.79 Our proposals assume increases in PMSE user fees result only from increases in the AIP faced by the band manager. This can, by definition, be only a proxy for how the band manager will charge its AIP fees on to individual PMSE users in practice. Subject to the FRND obligations placed upon the band manager, there may be changes in the structure of prices faced by PMSE users which see differing impacts on different groups of users in different bands. For example, the band manager may decide to change the way it approaches pricing differentials between short term and annual licences, or it may introduce geographical price differentials.
- 6.80 We intend to allow the band manager as much flexibility in this as possible as long as it meets its FRND obligations. In the meantime PMSE users should note that an increase in the AIP level in a particular band from the current administrative fee levels does not necessarily mean that the charge to the PMSE user will exactly reflect that level of increase. Conversely, where there is a low or zero opportunity cost against a particular band, the band manager may, subject to its FRND obligations, charge a fee to PMSE users of that band based on its costs of managing that spectrum or on their known willingness to pay.
- 6.81 We discuss this in more depth in section 7, which looks at what our proposals may mean in practice for PMSE users.
- 6.82 Table 1 below outlines the impact of our three phasing in options on the four bands that we have identified as potentially requiring phasing in periods.

Table 1. Impact of phasing in options

	Option 1 ≤40% increase	Option 2 ≤60% increase	Option 3 ≤80% increase
UHF 1	8 year phase in	6 year phase in	4 year phase in
UHF 2	5 year phase in	3 year phase in	2 year phase in
Channel 38	No phase in	No phase in	No phase in
1.5 GHz low	3 year phase in	2 year phase in	2 year phase in

Why we propose option 1 in all cases

- 6.83 We are aware even the most conservative approach to phasing – option 1, with a 40% maximum increase over current receipts in the first year – would constitute a significant challenge to the band manager and PMSE users.
- 6.84 Table 2 below shows the aggregated difference in the level of phased AIP fees that would have to be recovered from PMSE users based on the three options.

Table 2. AIP levels based on phasing in options

	Option 1 ≤40% increase	Option 2 ≤60% increase	Option 3 ≤80% increase
Year 1 total fees	£0.88m	£0.99m	£1.14m
Year 3 total fees	£1.25m	£1.56m	£1.65m

- 6.85 The AIP fees that the band manager would have to recover from PMSE users is markedly different between the three options. For instance, under option 3, the phased AIP (most of which would be accounted for by the two highest value bands, UHF 1 and UHF 2) would be some £400k greater than under option 1. Option 2 would also see a significantly higher level of licence fee to be recouped from PMSE users than option 1, in this case more than £300k.
- 6.86 The magnitude of these differences is significant. Total licence receipts from PMSE users in 2008/09 were £1.97m. An additional £300-£400k burden by year 3, on top of the rises under option 1, would not be consistent with our stated objective of avoiding disruption to PMSE users. As a result, we consider that we should propose the option 1 approach to phasing in AIP licence fees based on opportunity cost.
- 6.87 This approach is the most consistent with our other proposals to introduce AIP in a conservative way. Setting a 40% maximum annual increase in fees over the first year is a challenging path in its own right for PMSE users, and the proposals as set out would enable us to bring them to face market prices before FRND protection expires, as proposed, in 2018.
- 6.88 Our proposal to review the band manager's AIP levels after three years will enable us to adjust them to better reflect the value of each band in light of the information we will have at that time. Meanwhile, with the levels of uncertainty inherent in our assessment of the opportunity cost of each band to be awarded, it is prudent to set the phasing in period at the longest plausible duration consistent with our aim of facilitating participation of the PMSE sector in a market-based approach to spectrum.

Question 33. Do you agree with our proposal to phase in the band manager's AIP based licence fee such that no band increases by more than 40% in the first year that it is operating compared to 2008/09 licensing receipts?

Summary of our phasing in proposals

- 6.89 Table 3 below summarises our proposals for bands where we have identified a potential need to set the band manager's licence fee at a level based on a phased in AIP figure.

Table 3. Summary of phasing in proposals

Band	Opportunity cost	Phasing in period
UHF 1	£359k	8 years
UHF 2	£1.21m	5 years
Channel 38	£122k	No phase in
1.5 GHz low	£14k	3 years

Consistency with other AIP arrangements

- 6.90 In developing our proposals for setting the band manager's licence fee, we have been mindful that we should where possible try to secure consistent outcomes for end users compared with other sectors that are also faced with paying licence fees

based on AIP. This is particularly the case where PMSE uses spectrum very similar in nature to alternative users but where the actual fee charged by the band manager to PMSE users may differ from that being charged to those alternative users.

- 6.91 A case in point is that of business radio use of spectrum in UHF 1 and UHF 2. The technical characteristics of spectrum used by PMSE and business radio are similar in that it can support the use of either mobile radios (in the case of business radio) or talkback devices (in the case of PMSE). Either service could make use of the spectrum used by the other. Yet, our proposals for phasing in AIP could see end users paying different fees for their use of spectrum during the relevant phasing period.
- 6.92 The reason that disparities such as this will occur is primarily because of the phasing in periods that we will apply to PMSE use in those particular bands. In determining those phasing periods we have had regard to current fees charged for PMSE use. In the case of UHF 1 and UHF 2, where current PMSE fees are lower than fees for business radio licences, if we chose not to apply a phasing in period to PMSE users then there is a likelihood that they would end up paying broadly equivalent fees to business radio from 2010 – representing a significant increase from current PMSE licence fees for this spectrum.
- 6.93 However, bearing in mind the difficulties that PMSE talkback users would likely have in adjusting to such an immediate increase from current fees, we consider that this approach would be against our stated objective of avoiding disruption to PMSE users.
- 6.94 The purpose of our phasing proposals is to bring PMSE users to a market based approach to accessing spectrum by the time the protections that they will receive come to an end as proposed in 2018 while ensuring that during the interim period they are able to adjust to any increases in the cost of spectrum access. This means that the band manager's licence fee will increasingly reflect the market rate for the spectrum which is awarded to it. Eventually, we expect that there will be broadly equivalent access fees for all users.
- 6.95 We will take stock of the AIP arrangements that are in place for other relevant users in our first review, three years after the band manager starts operating. The review will be subsequent to our SRSP, and so will take the results of that exercise into account where relevant. This will ensure that the subsequent AIP levels charged to the band manager will reflect an increasing consistency across all relevant sectors. Any future developments in sectoral AIP arrangements will be reflected in the AIP charged to the band manager after that first review.

Summary of AIP proposals

- 6.96 Table 4 below sets out our proposals for introducing AIP for bands to be awarded to the band manager. For ease of reference we have grouped the 67 bands into 20 broader ranges of spectrum. Each range was identified by Analysys Mason as containing sufficiently similar bands (in terms of type of PMSE use, technical characteristics and potential for alternative use) for them to be grouped together.
- 6.97 It is important to reflect that where a band is shown as having a zero opportunity cost, this does not mean that PMSE users will not be charged for access to that spectrum. Those PMSE users will still have to pay a fee that covers the band manager's administration costs (including a reasonable return).

- 6.98 In the case of 2 GHz, we have shown the three distinct ranges identified by Analysys Mason as a single range. We have also presented our further analysis in this section on that basis. The reason for this is that whilst there is only one 10 MHz channel (which is the bandwidth required for the PMSE use of this spectrum, wireless cameras) which has an opportunity cost figure applied to it, the importance to PMSE users of maintaining each individual channel may be great enough that the cost of using this channel could plausibly be spread amongst all of those users. The total opportunity cost for the entire 2 GHz range is still lower than licensees' current payments to JFMG.

Table 4. Summary of AIP proposals

Range	Frequencies (MHz) ³⁸	Annual opportunity cost	Proposed phasing in period	Phased AIP in year 1	2008/09 licensing receipts ³⁹
Band I	47-62.75	0	None	None	£47k
Low band	67.75-86.84	0	None	None	£10k
Mid band	139.54-148.74	£2.85k	None	£2.85k	£41k
Band III	175.15-210.1	0	None	None	£84k
UHF 1	425.31-447.51	£359k	8 years	£122k	£88k
UHF 2	454.99-455.48	£1.21m	5 years	£615k	£466k
Interleaved	470-790	0	None	None	£691k
Channel 38	606-614	£122k	None	£122k	£102k ⁴⁰
1.5 GHz low	1517-1518	£28.6k	3 years	£19k	£14k
1.5 GHz high	1518-1525	0	None	None	£13k
1.7 GHz	1785-1800	0	None	None	0
2 GHz low	2025-2300	0	None	None	£290k
2 GHz mid	2390-2400	£216k	None	£216k	
2 GHz high	2400-2500	0	None	None	
3.5 GHz	3400-3580	0	None	None	£7k
5 GHz low	5472-5875.5	0	None	None	£13k
5 GHz high	5875.5-5905	0	None	None	0
7 GHz	7110-7250	£23.6k	None	None	£40k
8-12 GHz	8460-12500	£35.5k	None	None	£51k
24-48 GHz	24250-48400	0	None	None	£4k
Totals		£2.03m			£1.97m

Question 34. Do you have any comments on any other aspects of our proposals to introduce AIP for the spectrum to be awarded to the band manager?

- 6.99 We discuss what these figures are likely to mean for PMSE users, including whether there are likely to be any significant changes in fees for spectrum access for specific groups, in section 7.

Temporary access to cleared spectrum

- 6.100 In our consultation document on clearing the 800 MHz band we proposed to maintain PMSE access to channel 36 on 12 months' notice to cease and to the rest of the spectrum that would be cleared of its existing use (channels 31-35, 37 and 61-69) until DSO is completed in the UK in late 2012. This followed suggestions from likely bidders in the cleared award that they would not roll out new services in the cleared

³⁸ PMSE users do not have access to all the spectrum within the ranges quoted. For a detailed list of all the bands to be awarded to the band manager, see section 8.

³⁹ We include in these figures licensed use in 2007 from outside the range in question but which is likely to be accommodated within that range after its award to the band manager.

⁴⁰ Relates to receipts for channel 69, for which we have proposed channel 38 as a replacement.

spectrum until it was available across the UK. The one possible exception to this was channel 36, which will be cleared of use by aeronautical radar during 2009 and so available for new use across the UK from the point of its award.

- 6.101 We also suggested that there may be benefits in allowing wireless microphones to continue to access at least some of the 800 MHz band until the end of 2013 given that channels 61 and 62 are unlikely to be cleared of DTT and available for new uses until then.
- 6.102 In anticipation of any decision that this spectrum could be made available to the band manager for PMSE use on such a basis, we asked Analysys Mason to calculate an opportunity cost figure for these bands. This calculation was made in the context of any alternative use also only having two to three years' worth of access to the spectrum. As a result of this limited duration access, we considered that the scope for alternative use was effectively removed as it would not be able to recoup up front investments in such a short period of time. We also considered that there would likely be a very limited amount of own use congestion between wireless microphone users for this period.
- 6.103 Table 5 below shows that, as a consequence, we believe the opportunity cost figures to be zero.

Table 5. Opportunity cost for temporary PMSE access to cleared spectrum

Range	Frequencies (MHz) ⁴¹	Annual opportunity cost	Proposed phasing in period	Proposed AIP in year 1	2008/09 licensing receipts ⁴²
Lower cleared	550-606	0	None	None	£57k ⁴³
Upper cleared	790-862	0	None	None	£330k ⁴³

Question 35. Do you agree with our estimates of the opportunity cost of temporary PMSE access to cleared spectrum?

How the band manager will recoup its own costs

- 6.104 Our discussion in this section has so far centred on the licence fee that will be charged to the band manager to reflect the longer term underlying economic value of the spectrum being awarded to it. However, there are other costs that the band manager will incur: those of operating its business. The band manager will not only have to recoup its AIP based licence fee, but it will also need to recoup its other costs (including a fair return for investments made and risks taken).
- 6.105 We need to decide how best to set the band manager's licence fee so that the combined effect of recouping the licence fee and operating costs results in prices to PMSE users at levels which deliver our objectives. In particular, they should not be higher than the level that users are able to pay as this would risk spectrum being left unused.
- 6.106 As a general principle, we consider that it is right that end users should be faced with the opportunity cost of spectrum, including the cost of managing it to create value to

⁴¹ PMSE users do not have access to all the spectrum within the ranges quoted. For a detailed list of all the bands to be awarded to the band manager, see section 8.

⁴² We include in these figures licensed use in 2008 from outside the range in question but which is likely to be accommodated within that range after its award to the band manager.

⁴³ These figures are included in the figure shown for interleaved licensing receipts in table 4.

citizens and consumers. An example of the latter is the administrative cost involved in coordinating spectrum access, giving added value to the end user of that spectrum. However, there is a complexity in the spectrum being awarded to the band manager in that the costs of managing the spectrum are reflected differently in the original opportunity cost calculations.

- **Bands with an opportunity cost greater than zero.** The values for these bands have been derived by assessing what value other users place on using spectrum in different configurations *which are already managed*. That is, the valuation implicitly already covers the costs of spectrum management. Therefore, adding administrative costs on top of the opportunity cost valuation would lead to fees higher than the estimated opportunity cost at the end of the phasing period. Because we expect the band manager to recoup its operating costs as well as the fee paid to us from prices charged to PMSE users, we propose that the band manager's licence fee should be set at a level below opportunity cost. We propose to set the net fee to the band manager by subtracting an amount, equal to reasonable operating costs associated with those bands in PMSE use, from the estimated total opportunity cost of those bands.
- **Bands with an zero opportunity cost.** Unlike the spectrum referred to above, the assessment of the value of these bands does not include the value of spectrum management to PMSE users when in PMSE use. At present PMSE users are willing to pay for this value even though there is no excess demand for the spectrum concerned. As a result, we consider that the effect of the band manager recovering its operating costs in the prices charged to PMSE users of these bands would not result in prices being too high in comparison with the overall value of providing access to these bands, although there may be scope further to improve spectrum use (e.g. through lower prices) by more efficient spectrum management and cost recovery arrangements.

6.107 This approach also reflects that, as the band manager will be managing the spectrum awarded to it on a day to day basis, it would not be sensible to set its fee to include costs of a service which we do not provide to the band manager.

6.108 Where the band manager's allocated efficient operating costs for a band is higher than the estimated opportunity cost, we would expect end users to face fees that reflect those operating costs.

6.109 We explore below the most appropriate way of ensuring that this proposed approach is achieved when setting the band manager's licence fee.

Options for setting the band manager's licence fee

6.110 We have identified two plausible approaches to ensuring that the licence fee charged to the band manager is reduced to reflect spectrum management costs which will be incurred. These two options are the *aggregated approach* and the *disaggregated approach*.

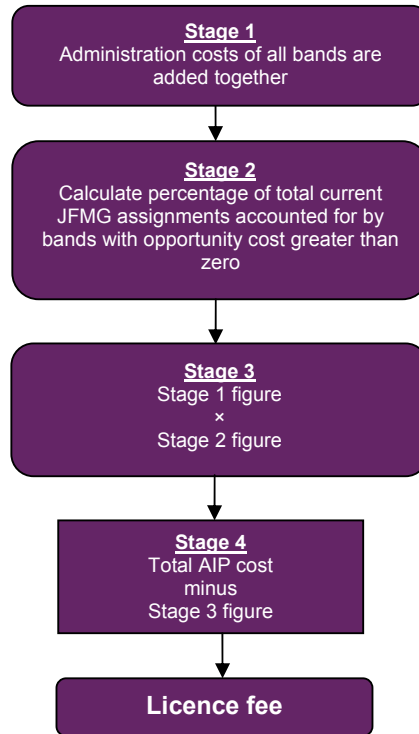
6.111 The two options are outlined below with a brief summary of the advantages and disadvantages of each in light of our four key objectives for future PMSE access to spectrum.

Option 1: the aggregated approach

6.112 This is a relatively straightforward approach to identifying costs that should not be charged to the band manager in the licence fee. As outlined above, its starting point is that the licence fee for bands with an opportunity cost of greater than zero should be reduced by an amount that reflects reasonable operating costs. This reflects that the calculation of the positive opportunity cost includes costs of management.

6.113 To arrive at the relevant figure, the process set out in figure 6 below is followed.

Figure 6. Process under the aggregated approach



6.114 The licence fee will increase for as long as the phasing period is ongoing, as the individual bands' phased-in AIP figures will be increasing and altering the aggregate figure at stage 3.

Option 2: the disaggregated approach

6.115 The disaggregated approach to identifying where the band manager's fee should be reduced from the opportunity cost estimate to reflect operating costs involves a slightly more complicated process. However, it does create a more transparent link between the licence fee and the opportunity costs of each band being awarded to the band manager.

6.116 The key difference between this approach and the aggregated approach is that we distinguish between band specific and common administration costs. The principle behind this option is that we will in any event need to ask each applicant for the band manager role to indicate in advance which of its costs are likely to be specific to each band and which are common across bands in order to provide PMSE users with an indication of likely future prices. This information will then also be used to finalise a consistent fee for the band manager as follows:

- for bands where the opportunity cost of the spectrum is already above the band specific management cost of that spectrum we will reduce the band manager’s licence fee by the estimated band specific costs concerned (so PMSE users would not then be expected to pay more than total phased AIP costs on average in those bands in each year); and
- we will also reduce the band manager’s licence fee by its indicated common costs (so that these too will not result in PMSE users paying above AIP costs), except where some of these common costs are already recouped from zero opportunity cost bands. This approach ensures that PMSE users of those bands will continue to make their current level of contribution to the common management costs of spectrum for PMSE use and avoids other users having to increase their contributions.

6.117 The first effect of the approach as outlined above is that the band manager will be able to set prices for PMSE users that reflect, on a band by band basis, the higher of the opportunity cost or the administrative cost of the spectrum they are using. This is consistent with our general approach to setting AIP fees direct to end users in other sectors where a contribution to our administration costs constitutes an effective floor to fees payable.

6.118 The second effect is that we will not “over-discount” the band manager’s licence fee. That is, where revenue from those zero opportunity cost bands, based on latest JFMG revenue figures, makes a contribution to the common costs of administration, it will continue to do so without price levels being raised in these or other bands for the purpose.

Advantages and disadvantages of these two options

6.119 Table 6 below sets out our assessment of the key advantages and disadvantages of each option for setting the band manager’s licence fee . These are set against our four key objectives for future PMSE access to spectrum.

Table 6. Assessment of the options for setting the band manager’s licence fee

Objective	Aggregated approach		Disaggregated approach	
	Advantages	Disadvantages	Advantages	Disadvantages
Avoiding disruption to PMSE users		Averages PMSE users’ ability to adjust to price changes	Band-specific price changes can be linked to PMSE users in a more transparent way	
Facilitating participation in a market-based approach	Simpler	Could blunt pricing signals to PMSE users		Potentially more difficult for PMSE users to understand
Promoting the optimal use of spectrum		Less specific pricing signal	More specific	
Avoiding the risks of regulatory and market failure	Simpler Avoids prior assumptions on band specific costs	Assumes uniform administrative cost per authorisation		More scope for error due to assumptions on common costs

- 6.120 Adopting the disaggregated approach will involve each applicant providing cost projections to us at a more detailed (fee class by fee class) level at the point of submitting their applications. The aggregated approach leaves scope for higher level provision of information, which could then be refined to fee class level before the band manager begins operation.
- 6.121 We consider, however, that both of these options could work in practice. We therefore do not recommend one over the other and instead invite comments from stakeholders as to whether they have a preference.

Question 36. Do you have any views as to whether the aggregated or disaggregated approach to setting the band manager's licence fee is the best one?

We propose to initially review AIP after three years

- 6.122 We proposed in our July 2008 consultation document that we would set the band manager's licence fee initially for a period of three years and then conduct a detailed review of the opportunity cost estimates and associated licence fee levels for all the spectrum to be awarded after those three years. This review would take into account:
- our general spectrum pricing framework at the time;
 - specific market information on spectrum values that will become available following the digital dividend and other relevant awards and secondary trading activity, and following market developments in the PMSE and other sectors using spectrum; and
 - broader market experience in the relevant bands and in the PMSE sector.
- 6.123 We went on to propose that we would review the licence fee periodically but no more frequently than every three years. This would provide a degree of stability and regulatory certainty for the band manager and its customers and so reduce transaction costs.
- 6.124 This remains our favoured approach to reviewing AIP and we continue to propose that we proceed on this basis.

Question 37. In light of our further proposals, do you agree that we should first review the AIP charged to the band manager after three years?

Section 7

Impact of our proposals on PMSE fees

Introduction

- 7.1 In section 3, we set out what protections we propose to put in place to ensure the band manager does not set fees or put in place conditions that will disrupt PMSE users. Our proposals in section 5 are designed to signal to prospective band managers the value of the spectrum to be awarded so they will be able to start to construct a business plan including how they would charge fees to PMSE users.
- 7.2 Those same PMSE users want early understanding of what these proposals are likely to actually mean for them. In particular they want to have some idea as to what level their fees are likely to be and what constraints there will be in practice to ensure that any future material changes to those fees does not cause them disruption.
- 7.3 This section sets out our what our proposals might mean for PMSE users' future costs to access spectrum in practice.

We will give the band manager flexibility in the way it sets its fees

- 7.4 In translating our wider proposals for PMSE users, we must emphasise that we intend to give the band manager as much flexibility as possible in how it sets its fees for spectrum access. Whilst this flexibility will be within the constraints set out in the principles of our FRND guidance, we expect that the band manager will wish to make some changes to the structure of the current fees arrangements.
- 7.5 This makes it difficult for us to give a clear signal to PMSE users what level of fee they can expect to pay for access to spectrum after the band manager begins operation. We will, however, expect the band manager to have published details of its pricing plans before it starts operating.
- 7.6 A key part of the selection process will be to allow all interested stakeholders to comment on each applicant's proposals during a consultation period. We fully expect the issue of fees to be of particular interest to PMSE users. Details of how this process will work in practice will be published in our statement later this year.
- 7.7 At present, PMSE users pay an administrative fee for access to spectrum, primarily based on which specific frequencies they wish to use. In other words, the levels of fees do not usually vary depending on other factors such as the following:
- where spectrum access is being authorised (for example, a busy urban environment or a remote rural location);
 - when spectrum access is being authorised (for example, at a time of day when there is likely to be more demand for use of that spectrum);
 - whether spectrum access is being sold in "bulk" or as a single assignment;
 - whether spectrum access is sold in advance or as a last minute purchase;

- whether the duration of access reflects the true demand that the user has for it as opposed to the current system where the choice is often limited to either a short term or an annual licence; and/or
 - whether spectrum access is being sold as part of a larger package of services (such as specific band manager consultancy work for the user).
- 7.8 The above list is by no means exhaustive and reflects the potential flexibility that the band manager may have in setting out its fee proposals. Subject to the band manager adhering to its FRND obligations, we would encourage it to set out a pricing structure that reflects the specific needs of PMSE users. As a result the spectrum access that will be available to PMSE users after the band manager begins operating is likely differ from what is available now.
- 7.9 However, the FRND and AIP obligations would set some limitations on what the band manager could do. We have devised these limitations deliberately so that no PMSE user will find itself in a position where it is being denied use of spectrum by unfair pricing, terms and/or conditions.
- 7.10 As set out in section 4, under our benchmark approach to FRND the band manager will not be allowed to set prices to PMSE users that are excessive when its reasonable costs are taken into account. In that section, we also explained that under the benchmark approach the band manager would not be able to load all of its costs onto a single set of PMSE users so that they took on an unfair burden on behalf of PMSE users as a whole. Finally the band manager would not be able to make excessive profits as a whole from PMSE users.
- 7.11 PMSE users will have the added protection of the nature of the TLCs that will be set for the spectrum being awarded to the band manager. As set out in section 8, we propose that any attempt by the band manager to allow other, more lucrative, users to gain access to the spectrum to be awarded would need to be approved by us in advance. This would require the band manager to demonstrate to us that its plans would not adversely impact its ability to meet its obligations to PMSE users – in particular, its obligation to meet reasonable PMSE demand.
- 7.12 Finally, we emphasise that the successful applicant must reflect our objective to avoid significant disruption to PMSE users. As a result, we fully expect applicants to have due regard to the principle of ensuring that where PMSE users are prepared to pay FRND prices for access to spectrum, they should be allowed to have access to that spectrum in preference to competing non-PMSE use.

What our proposals mean for different groups of PMSE users

- 7.13 We consider below what our benchmark FRND approach might mean in the context of the band manager's pricing proposals. In order to give clarity to specific groups of PMSE users, we set out this assessment based on different types of PMSE use:
- low frequency audio/fixed links;
 - talkback;
 - wireless microphones/in ear monitors;
 - wireless cameras; and

- high frequency fixed links.

7.14 The assessment in the following paragraphs assumes that the current costs of spectrum administration, on a band by band basis, are broadly equivalent to current JFMG licence fee receipts. Where the band manager allocates its costs to bands in a way that significantly differs from current licence fees, changes in PMSE users' fees may be different from what is indicated below.

Low frequency audio/fixed link users

7.15 For the purposes of this section, we define "low frequency" as spectrum at 210.2 MHz and below. (Spectrum available for PMSE use above this is in the UHF band.) There is a significant amount of high power audio and broadcasting fixed link use in this spectrum. (There is also some talkback use which we address below.)

7.16 Our AIP proposals suggest that, with the exception of one band at 139-148 MHz, we do not believe there is currently either an alternative use for this spectrum or significant PMSE congestion that justify a positive opportunity cost figure. Furthermore the opportunity cost of the 139-148 MHz band is relatively low and actually likely to be lower than the cost of the administration of the spectrum.

7.17 As a result, PMSE users of this spectrum as a whole are likely to be faced with fees to access spectrum that are of a similar magnitude to those that they are currently paying. There may be some variations to specific fees within this group of users, depending on the type of fees structure that the band manager introduces. However, under our benchmark FRND approach any increase in fees would need to be related to the costs of managing that spectrum.

7.18 We therefore consider that there is unlikely to be anything within the new band manager's pricing plans that should cause concern to this group of users.

Talkback users

7.19 The use of talkback equipment accounts for a significant proportion of total PMSE licensing activity. Talkback use is a major input to the production of theatrical, broadcasting and sporting events. We are therefore sensitive to any proposals we make that would disrupt PMSE users' ability to continue using this service.

7.20 This is particularly the case for the key talkback bands in UHF 1 and UHF 2. 37% of all PMSE activity is accounted for by talkback use of these bands and more than 80% of all talkback use is found in this spectrum.⁴⁴ Our calculations of the opportunity cost of these bands in section 6 show that their value is significantly higher than the level of licence revenue currently being collected by JFMG. This suggests that PMSE users of this spectrum may have to bear a greater burden of the band manager's costs than they are currently charged.

7.21 As a result, we are keen that any increase in fees by the band manager does not lead to talkback users facing increases in their prices that they will be unable to bear.

7.22 As also set out in section 6, we have proposed that the level of licence fee related to these bands that the band manager will need to collect from PMSE users will be phased in over a period of time. This will ensure that in the first year of the band manager's operation the amount of AIP specific revenue that will be borne by these

⁴⁴ Measured by numbers of licences issued in 2008

users will not exceed a 40% increase from current administrative fee levels. Subsequent increases in the first three years, and until the first formal review of AIP levels, will be no higher in absolute terms (and smaller in percentage terms).

- 7.23 This does *not* mean, by extension, that all PMSE users of UHF 1 and UHF 2 will automatically see their fees for spectrum access increase by 40%. This increase would be at the band, not individual fee, level. We propose that the band manager will have considerable flexibility into how it will structure its fees and may choose to restructure authorisation arrangements compared to the current system. This means that some fees for access to UHF 1 and UHF 2 may not increase by 40% to cover AIP. On the other hand the band manager may adopt a broadly similar licensing structure to the present one, which would mean that users would be more likely to face a rise in their fees similar to the rise in the level of AIP.
- 7.24 Under our benchmark FRND approach any rise in fees for access to spectrum above the 40% increase required to cover AIP will only be possible by reference to an increase in the administrative costs of providing PMSE users with access to spectrum. Given the challenging impact that a 40% rise would have on PMSE users, we consider that the band manager would need to have a compelling reason for proposing a fee rise to talkback users that is above this level.
- 7.25 While there are likely to be rises in fees for access to UHF 1 and UHF 2, we also note most licensees who use these bands also use bands where the opportunity cost of spectrum is very close to current levels of licence receipts, in particular low frequency bands and interleaved spectrum. This has two important effects:
- it means that the increase in the total costs of accessing spectrum that these users will face is likely to be significantly lower than the 40% signal that we have given for UHF 1 and UHF 2 alone; and
 - it could give an opportunity for users to make use of alternative spectrum where their equipment allows them to retune across different bands. For example, standard talkback equipment tunes across 20-30 MHz and we therefore expect that equipment could migrate from UHF 2 (450-470 MHz) to the lower channels of interleaved spectrum (470 MHz and above).

Wireless microphone and in-ear monitor users

- 7.26 Wireless microphone and in-ear monitor users have been at the forefront of working with and engaging robustly with us since our first proposals for the future of PMSE access to interleaved spectrum, which they use in the greatest numbers, were published in our December 2006 consultation document. We are aware one of their key concerns about their future access to spectrum has been fee levels.
- 7.27 Our assessment of the opportunity cost of interleaved spectrum has led us to consider that, at present, there is limited evidence of commercially and technically viable alternative use. As there is also not significant own use PMSE congestion to warrant there being a positive opportunity cost, we have calculated this at zero. For channel 38, we have calculated that the opportunity cost is of the same magnitude as the amount of licence revenue being collected by JFMG for channel 69. We therefore consider that it could be introduced immediately and without any need for phasing.
- 7.28 These proposals would mean that wireless microphone and in-ear monitor users in this spectrum are likely to pay fees for their access to spectrum broadly of the same level that they are paying for licences at present.

- 7.29 This is, as with other spectrum, subject to the way that the band manager chooses to structure its fees. However, under our benchmark FRND approach and with our current understanding of the opportunity costs of both interleaved spectrum and channel 38, we consider that wireless microphone and in-ear monitor users who currently use spectrum in UHF Bands IV and V are unlikely to face significant rises in fees for their access to spectrum. This is with the caveat, as set out in paragraph 7.14, that we are assuming that the band manager will allocate its costs to this band at a level broadly similar to current JFMG licence fee receipts.
- 7.30 This, of course, may change when we revisit AIP levels at our initial review after three years. We will be monitoring future demand carefully in the meantime to see whether there is any evidence of other services' ability to use this spectrum. Where this evidence materialises, it will be picked up in that review.

Wireless camera users

- 7.31 Users of wireless cameras primarily exploit spectrum in the band at 2.1-2.5 GHz. This recognises the suitable bandwidth available and favourable propagation characteristics of that spectrum for wireless camera technology.
- 7.32 As with the wireless microphone community, wireless camera users have expressed concerns that significant rises in fee levels for access to spectrum would have an impact on their ability to pay for such access. They further argued that such an impact would cause disruption to their overall ability to provide a service to their customers, given the importance that they place on wireless technology.
- 7.33 Our estimate of the total opportunity cost of spectrum at 2 GHz shows that all bands have a total value of £216k, based on the potential alternative use of 2390-2400 MHz. This is less than the current level of receipts collected by JFMG, which was approximately £290k in 2008/09. As a result, the band manager would be expected to charge fees to PMSE users that reflected the administrative costs of managing this spectrum. If we assume that this will be of a similar magnitude to current charges, we would expect the resultant fees to be broadly similar to current charges.
- 7.34 Again this does not take into account any changes that the band manager will make to the structure of charges. However, under our benchmark FRND approach, we would not expect fees for spectrum access for these users to increase to a significant extent and consider that new fee levels will not cause disruption to PMSE users.

High frequency fixed links users

- 7.35 There is a relatively small (by the standards of other PMSE uses), but significant use of spectrum at 5 GHz and above. This use is primarily for programme and video links and is key to the continuing operation of PMSE services. We are therefore mindful that our proposals do not create any disruption to these uses.
- 7.36 Our estimates suggest the opportunity costs of the higher frequency bands are relatively modest. We estimated the spectrum at 5 GHz and above 12 GHz to have a zero opportunity cost. As a result, PMSE users who use this spectrum will face the band manager's administrative costs only in their fees (which if similar to current licensing charges would lead to similar fee levels). This is with the general caveat that the band manager may introduce different fees structures and that the fees will be dependent on these changes subject to the band manager's FRND obligations.

- 7.37 We therefore do not anticipate users of spectrum at 5 GHz and above 12 GHz will face any significant increases in their fees for access to spectrum from current levels.
- 7.38 There are two bands, at 7 GHz and 8-12 GHz, where we have estimated positive opportunity costs. However, both bands had higher licence fee receipts from JFMG in 2008/09. As a result, we would expect any increase in fees should not be at a level whereby PMSE users would be unable to continue to gain access to that spectrum.

Section 8

Technical licence conditions

Introduction

8.1 This section outlines our proposed approach to defining the TLCs for the spectrum which we are proposing to award to the band manager and sets out those proposed TLCs. It follows on from our July 2008 consultation document where we made proposals on the best approach to determining how equipment should be allowed to use the spectrum being awarded to the band manager.

What we have already proposed

8.2 We proposed in our July 2008 consultation document the following in relation to TLCs:

- that we use the BEM approach to determine the TLCs relevant to the band manager award; and
- that we should base these BEMs broadly on existing emission masks for PMSE equipment.

8.3 We based this proposal on BEMs being more appropriate to the way spectrum is used for PMSE than the alternative approach of spectrum usage rights (SURs). The key benefits identified were:

- BEMs would be more readily understood by stakeholders compared to SURs;
- it is easier to determine whether equipment is compliant with BEMs than with SURs; and
- compliance with BEMs would result in lower transaction costs for the band manager because of their relative simplicity.

8.4 We considered that the alternative approach of SURs for defining the TLCs would not be appropriate for the spectrum being awarded to the band manager. SURs are designed for stable networks and the transient nature of PMSE use would make it difficult to apply this methodology in measuring whether the band manager was correctly adhering to SURs.

8.5 We also proposed that the BEMs would be based broadly on existing arrangements for PMSE access. We stated that the band manager could seek to vary its licence in favour of more flexible, SUR-based TLCs in respect of certain bands. This would happen where the band manager could show that it was meeting its obligations to PMSE users and its proposals were consistent with our key objectives for PMSE access.

8.6 As part of the process for agreeing a variation to the band manager's licence, we stated that we would want to assess the potential impact on users and/or consult before agreeing to them.

8.7 Although we have not concluded definitively on this issue yet, responses to the July 2008 consultation document indicated that stakeholders are in favour of this

proposed approach to setting the TLCs for the spectrum being awarded to the band manager.

How we will define the block edge masks

- 8.8 Our proposal to base the BEMs on existing PMSE use of spectrum mean that we have to fully understand the specific nature of PMSE use in each band that will be awarded to the band manager. Unlike the arrangements that are in place for other licensees and services, PMSE services do not usually have formalised agreements in place that define the limits of how equipment can be deployed.
- 8.9 The arrangements that are in place are more informal in nature, and have evolved over time through a series of bilateral agreements with the primary user of the spectrum or with the spectrum regulator – whether us or one of our predecessors. These arrangements have been collated into a register that is kept by us and JFMG. JFMG makes assignments to PMSE users within the parameters set out within that register.
- 8.10 We have used this register as the basis for defining the existing PMSE use of spectrum. Typically, on a band by band basis, the register sets out the technical restrictions on the use of spectrum based on the type of equipment in question. For example the maximum power level allowed in the 2290-2300 MHz band is 1 W ERP in recognition of this being the optimal power level of hand-held wireless cameras.
- 8.11 In terms of how we derive the appropriate emission masks for each band, we have referred to the relevant technical standard as set out by European Telecommunications Standards Institute (ETSI). ETSI is officially recognised by the European Commission as the standards organisation for communications devices. Equipment used by PMSE is designed to the technical specifications outlined in each relevant standard. As a result we have proposed the emission mask from the ETSI standard as the BEM for each band.
- 8.12 Where there is a band where more than one PMSE use is allowed (for example, some lower frequency bands which allow the deployment of either talkback or audio links) we have adapted the ETSI standards and proposed a mask which is sufficiently non-restrictive technically to allow both uses to continue.

Our proposed TLCs

- 8.13 Table 7 below sets out our detailed TLC proposals for each individual band we are proposing to award to the band manager. It also describes any restrictions which apply to those bands, whether geographical, temporal or operational.

Table 7. Proposed TLCs

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
1	47.55-48.8	39 dBm/ 4 kHz	8	On a non-interference basis to continental broadcasting.	
2	52-52.95	39 dBm/ 4 kHz	8	On a non-interference basis to continental broadcasting.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
3	53.75-55.75	32 dBm/ 4 kHz	9	On a non-interference basis to continental broadcasting. Within 55-55.75 MHz, subject to alternative use by non-PMSE on a case by case basis.	
4	60.75-62.75	32 dBm/ 4 kHz	9	On a non-interference basis to continental broadcasting. Use for audio distribution services is subject to non-interference to PMSE use and no protection from PMSE use.	
5	67.75-67.8375	39 dBm/ 4 kHz	1		
6	69.15625-69.18125	39 dBm/ 4 kHz	1	Two channels: 69.16250 and 69.17500 MHz duplex with 82.66250 and 82.67500 MHz.	
7	74.68125-74.71875	39 dBm/ 4 kHz	1		
8	75.2625-75.3	39 dBm/ 4 kHz	1		
9	75.2625-75.3	32 dBm/ 4 kHz	3	Airborne use until equipment reaches the end of its current life, Maximum altitude permitted 2,000 feet above ground level. These transmissions on a non-interference and unprotected basis.	Yes
10	76.80625-76.84375	39 dBm/ 4 kHz	1		
11	78.18375-78.25875	39 dBm/ 4 kHz	11	No transmissions allowed within the bands 78.18375-78.19625 MHz in West Wales and 78.51875-78.53125 MHz in the Outer Hebrides.	
12	82.65625-82.68125	39 dBm/ 4 kHz	1	Two channels: 82.66250 and 82.67500 MHz duplex with 69.16250 and 69.17500 MHz.	
13	86.66875-86.68125	39 dBm/ 4 kHz	1	Use only in Wales and west England.	
14	86.80625-86.84375	39 dBm/ 4 kHz	1		
15	86.80625-86.81875	32 dBm/ 4 kHz	3	Not available over eastern Kent (greater than 100 km from Charing Cross within the southeast quadrant). Maximum altitude 2,000 feet above ground level. Subject to review.	Yes
16	139.54375-139.55625	35 dBm/ 4 kHz	2	Guernsey only.	
17	139.56875-139.58125	35 dBm/ 4 kHz	2	Jersey only.	
18	139.64375-139.66875	35 dBm/ 4 kHz	2	Use only in the Channel Islands.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
19	140.9875-141	39 dBm/ 4 kHz	1	Use in London area only. Base transmitter sites Kent House and NTL Croydon.	
20	141-141.4875	39 dBm/ 4 kHz	11	The bands 141-141.0125, 141.0875-141.1125 and 141.2625-141.2875 MHz are not available except in Northern Ireland and north of a line from Troon (NS 330 280) to Dunbar (NT 710 770). This band cannot be used in the Channel Islands.	
21	141-141.4875	32 dBm/ 4 kHz	12	No transmissions in the bands 141-141.0125, 141.0875-141.1125 and 141.2625-141.2875 MHz. Maximum altitude 2,000 feet above ground level. This band cannot be used in the Channel Islands.	Yes
22	148.5625-148.5875	32 dBm/ 4 kHz	5	Use only in the Channel Islands.	
23	148.7125-148.7375	32 dBm/ 4 kHz	5	Use only in the Channel Islands.	
24	175.15-175.35	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK except in Northern Ireland on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
25	175.425-175.625	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK except in Northern Ireland on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
26	176.3-176.5	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK except in Northern Ireland on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
27	176.5-176.7	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK except in Northern Ireland on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
28	176.7-176.9	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
29	176.9-177.1	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK except in Northern Ireland on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
30	181.69375-181.80625	39 dBm/ 4 kHz	1	On a non-interference basis to broadcasting.	
31	184.5-185.2	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK on a non-interference basis to broadcasting.	
32	189.69375-189.80625	39 dBm/ 4 kHz	1	On a non-interference basis to broadcasting.	
33	191.6-191.8	30 dBm/ 200 kHz	6	Links – on a non-interference basis to broadcasting. Emissions must be vertically polarised.	
34	191.8-192	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
35	192-193.2	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK. May be subject to interference from continental broadcasting.	
36	199.6-200.2	30 dBm/ 200 kHz	6	The maximum ERP is 1 W except in the southeast corner of England and the Channel Islands, where it is 100 mW. Transmissions must be vertically polarised. On a non-interference basis to/from broadcasting.	
37	200.2-201.2	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	
38	207.6-210.2	17 dBm/ 200 kHz	14	These frequencies may be used anywhere within the UK on a non-interference basis to broadcasting. May be subject to interference from continental broadcasting.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
39	425.3125-425.5625	33 dBm/4 kHz	7	Five contiguous 50 kHz channels are available in this band, centred on 425.3375, 425.3875, 425.4375, 425.4875 and 425.5375 MHz. For use in the following locations only: Bristol, Bournemouth, Dorchester, Newport (Isle of Wight), Portsmouth, Southampton and Weymouth. A maximum of two channels may be used at each of these locations. On a non-interference basis to MOD use within 50 km of Aberporth (SN 247 518) and Hebrides (NF 781 406).	
40	427.7625-428.0125	39 dBm/4 kHz	10	Available UK wide except within 50 km of Aberporth (SN 247 518).	
41	442.2625-442.5125	39 dBm/4 kHz	10	No transmissions within 30 km of Northolt (TQ 099 846) in the band 442.36875-442.38125 MHz.	
42	446.425-446.5125	32 dBm/4 kHz (39 dBm/4 kHz – see restrictions)	13	32.04 dBm/4 kHz available throughout the UK. 39.03 dBm/4 kHz within M25. On a non-interference basis to 12.5 kHz base station of Babcock Support Services Ltd on 446.45 MHz located at SU 622 660.	
43	446.5125-447.5125	39 dBm/4 kHz	10	Available throughout the UK except within 30 km of TQ 295 794, SO 915 223, TA 005 845 and SS 215 500 in the band 446.60625-446.61875 MHz and within 30 km of SD 385 365 in the band 446.7125-446.7375 MHz. This band is preemptible by the MOD at two weeks' notice.	
44	454.9875-455.4625	39 dBm/4 kHz	1		
45	454.9875-455.4625	32 dBm/4 kHz	13	Airborne use is restricted to a maximum height of 2,000 feet above ground level.	Yes
46	457.25-457.475	39 dBm/4 kHz	1	Power commensurate with minimum operational requirements.	
47	457.25-457.475	15 dBm/4 kHz	4	Power commensurate with minimum operational requirements. Airborne use is restricted to a maximum height of 2,000 feet above ground level.	Yes

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
48	461.23125-461.25625	39 dBm/ 4 kHz	1	Power commensurate with minimum operational requirements.	
49	461.23125-461.25625	32 dBm/ 4 kHz	3	Power commensurate with the minimum operational requirements. Airborne use is restricted to a maximum height of 2,000 feet above ground level.	Yes
50	462.75-463	39 dBm/ 4 kHz	1	Power commensurate with minimum operational requirements.	
51	462.75-463	15 dBm/ 4 kHz	4	Power commensurate with minimum operational requirements. Airborne use is restricted to a maximum height of 2,000 feet above ground level.	Yes
52	467.2625-469.875	39 dBm/ 4 kHz	10	On a non-interference basis to terrestrial television in channel 21. Power commensurate with minimum operational requirements. No transmissions within 16 km of the coast in the band 467.5125-467.5875 MHz.	
53	467.2625-469.875	15 dBm/ 4 kHz	4	On a non-interference basis to terrestrial television in channel 21. Power commensurate with minimum operational requirements. Airborne use is restricted to a maximum height of 2,000 feet above ground level. Transmissions in the band 467.5125-467.5875 MHz are on a non-interference basis to the marine service and cannot be used within 16 km of the coast.	Yes
54	470-550	32 dBm/ 4 kHz	3	On a non-interference basis to broadcasting.	
55	550-582	32 dBm/ 4 kHz	3	On a non-interference basis to broadcasting. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
56	582-590	39 dBm/ 4 kHz	1	On a non-interference basis to broadcasting. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
57	590-598	17 dBm/ 200 kHz	14	On a non-interference basis to broadcasting. Indoor use may be allowed except within the radius of the Ordnance Survey National Grid References given below, provided all primary transmissions are contained within the bands: ST 595 799 (Filton), radius 13 km and CI 854 241 (Jersey), radius 13 km. Outdoor use may be allowed except within the radius of the Ordnance Survey National Grid References given below: ST 595 799 (Filton), radius 40 km and CI 854 241 (Jersey), radius 40 km. Subject to the outcome of the digital-dividend awards.	
58	598-606	32 dBm/ 4 kHz	3	On a non-interference basis to broadcasting. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/13.	
59	606-614	17 dBm/ 200 kHz	14	On a non-interference basis to UK radioastronomy until 1 January 2012. Wireless microphone use allowed except within specified protection areas around TL 395 545 (Cambridge) and SJ 797 714 (Jodrell Bank). Details of these areas will be confirmed shortly. Available on UK-wide basis after 1 January 2012.	
60	614-790	32 dBm/ 4 kHz	3	On a non-interference basis to broadcasting.	
61	790-854	32 dBm/ 4 kHz	3	On a non-interference basis to broadcasting. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
62	854-856	39 dBm/ 4 kHz	1	On a non-interference basis to terrestrial television in channels 68, 64 and 60. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
63	854-856	17 dBm/ 200 kHz	14	On a non-interference basis to terrestrial television in channels 68, 64 and 60. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/13.	Yes

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
64	856-858.75	20 dBm/ 4 kHz	21	On a non-interference basis to broadcasting and in-band military services. Frequencies may be used anywhere within the UK, provided that all primary transmissions are contained within the band. For audio links directional antennas to be used with a maximum gain of 7 dB. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
65	858.75-859.75	17 dBm/ 200 kHz	14	On a non-interference basis to broadcasting and in-band military services. Frequencies may be used anywhere within the UK, provided that all primary transmissions are contained within the band. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
66	859.75-862	39 dBm/ 4 kHz	8	On a non-interference basis to terrestrial television in channels 68, 64 and 60. Subject to the outcome of the digital-dividend awards. Band available on a temporary basis until 2012/2013.	
67	1517-1525	29 dBm/ 4 kHz	19	Antenna restrictions apply: 1517.25 MHz (horizontal polarisation), 1517.75 MHz (vertical polarisation). The band 1518-1525 MHz is available until further notice by agreement with Ofcom.	
68	1785-1800	-5 dBm/ 4 kHz	20	Not to be used in Northern Ireland. On a secondary basis to Home Office links at 1790-1798 MHz.	
69	2025-2070	10 dBW/ MHz	15	Available UK wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594).	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
70	2025-2070	3 dBW/MHz	15	Available UK-wide for airborne use at 13 dBW ERP except (i) in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of Bude (SS 255 116) and Menwith Hill (SE 205 594) or (ii) within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). No protection from, or interference to, tactical radio relay.	Yes
71	2070-2110	10 dBW/MHz	15	Available UK wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594).	
72	2070-2110	3 dBW/MHz	15	Available UK-wide for airborne use at 13 dBW ERP except (i) in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of Bude (SS 255 116) and Menwith Hill (SE 205 594) or (ii) within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594).	Yes
73	2200-2290	10 dBW/MHz	15	Available UK-wide except within an exclusion zone of 8 km radius of Oakhanger (SU 815 345) and Harrogate (SE 203 577). There is a 16 km coordination zone around Oakhanger (SU 815 345). Subject to non-interference basis to space science services.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
74	2200-2290	3 dBW/MHz	15	Available UK-wide for airborne use at 13 dBW ERP except (i) in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of Bude (SS 255 116) and Menwith Hill (SE 205 594), (ii) within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) or (iii) within an exclusion zone of 64 km/1000 feet above ground level around Aberporth (SN 247 518), Hebrides (NF 781 406) and St Kilda (NF 094 987). Restrictions at Oakhanger to be confirmed shortly.	Yes
75	2290-2300	-10 dBW/MHz	15	Available UK-wide on a temporary basis.	
76	2390-2410	27 dBW/MHz	16	Available UK wide except within an exclusion zone of 5 km radius around Bude (SS 205 126), Menwith Hill (SE 209 561), Manorbier (SS 074 967) and Hebrides (NF 781 406).	
77	2410-2450	27 dBW/MHz	16	Available UK wide except within an exclusion zone of 5 km radius around Bude (SS 205 126), Menwith Hill (SE 209 561), Aberporth (SN 247 518), Shoeburyness (TQ 949 857), Eskmeals (SD 070 930), Pendine Sands (SN 252 087), Fort Halstead (TQ 497 600), Farnborough (SU 850 544), Hurn (SZ 083 982), Chertsey (TQ 497 166) and Copehill Down (Salisbury Plain) (SU 065 455).	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
78	2410-2450	7 dBW/MHz	16	Available UK-wide for airborne use at 13 dBW ERP except (i) in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of Bude (SS 255 116) and Menwith Hill (SE 205 594), (ii) within 5 km of Bude (SS 255 116), Menwith Hill (SE 205 594), Copehill Down (Salisbury Plain) (SU 065 455), Eskmeals (SD 070 930), Pendine Sands (SN 252 087), Fort Halstead (TQ 497 600), Farnborough (SU 850 544), Hurn (SZ 083 982) and Chertsey (TQ 497 166) or (iii) within an exclusion zone of 64 km/1,000 feet above ground level from Aberporth (SN 247 518) and Shoeburyness (TQ 949 857).	Yes
79	2450-2470	27 dBW/MHz	16	Not to be used within a 5 km radius of Bude (SS 205 126) and Menwith Hill (SE 209 561). Maximum power for digital links is 7 dBW/MHz.	
80	2450-2470	10 dBW/MHz (0 dBW/MHz – see note)	16	Maximum power for digital links is 7 dBW/MHz. Available UK-wide for airborne use at 10 dBW/MHz ERP except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) and in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of these two sites. Airborne use is restricted to a maximum height of 5,000 feet above ground level. Airborne use not to exceed 0 dBW/MHz when directed towards and within 150 km of France, Belgium, the Netherlands and Ireland.	Yes
81	2470-2490	27 dBW/MHz	16	Not to be used within a 5 km radius of Bude (SS 205 126) and Menwith Hill (SE 209 561). Maximum power for digital links is 7 dBW/MHz.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
82	2470-2490	10 dBW/MHz	16	Available UK-wide for airborne use at 23 dBW ERP except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) and in the airspace volume described by $\pm 1^\circ$ of elevation from the geostationary arc (for elevation of 4° or more) of an earth station within 5 km radius of these two sites. Maximum power for digital links is 7dBW/MHz. Airborne use is restricted to a maximum height of 5,000 feet above ground level.	Yes
83	2490-2500	27 dBW/MHz	16	Not to be used within a 5 km radius of Bude (SS 205 126) and Menwith Hill (SE 209 561). Maximum power for digital links is 7 dBW/MHz.	
84	3400-3420	0 dBW/MHz	16	Available UK-wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). Occasional interference may be encountered during operation near Boscombe Down, Defford, Malvern, Portland and Skipness. Use allowed without restrictions listed above providing operation is at < -3 dBW/MHz and using directional antennas at the following racecourses: Catterick, Cheltenham, Pontefract, Ripon, Stratford, Thirsk, Worcester and York.	
85	3400-3420	0 dBW/MHz	16	Available UK-wide for airborne use except within 48 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) plus an additional 64 km for each 1,000 feet of altitude around these two sites. Occasional interference may be encountered during operation near Boscombe Down, Defford, Malvern, Portland and Skipness.	Yes
86	3420-3440	20 dBW/MHz	15	Available UK-wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). Occasional interference may be encountered during operations near Boscombe Down, Defford, Malvern, Portland and Skipness.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
87	3420-3440	20 dBW/ MHz	15	Available UK-wide for airborne use except within 48 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) plus an additional 64 km for each 1,000 feet of altitude around these two sites. Occasional interference may be encountered during operation near Boscombe Down, Defford Malvern, Portland and Skipness.	Yes
88	3500-3520	27 dBW/ MHz	16	Available UK-wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). Occasional interference may be encountered during operations near Boscombe Down, Defford, Malvern, Portland and Skipness. Use allowed without restrictions listed above providing operation is at <-3 dBW/MHz and using directional antennas at the following racecourses: Catterick, Cheltenham, Pontefract, Ripon, Stratford, Thirsk, Worcester and York.	
89	3500-3520	27 dBW/ MHz	16	Available UK-wide for airborne use except within 48 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) plus an additional 64 km for each 1,000 feet of altitude around these two sites. Occasional interference may be encountered during operations near: Boscombe Down, Defford, Malvern, Portland and Skipness.	Yes
90	3520-3560	27 dBW/ MHz	16	Available UK-wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). Occasional interference may be encountered during operation near Boscombe Down, Defford, Malvern, Portland and Skipness. Use allowed without restrictions listed above providing operation is at <-3 dBW/MHz and using directional antennas at the following racecourses: Catterick, Cheltenham, Pontefract, Ripon, Stratford, Thirsk, Worcester and York.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
91	3520-3560	27 dBW/ MHz	16	Available UK-wide for airborne use except within 48 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) plus an additional 64 km for each 1,000 feet of altitude around these two sites. Occasional interference may be encountered during operation near Boscombe Down, Defford, Malvern, Portland and Skipness.	Yes
92	3560-3580	27 dBW/ MHz	16	Available UK-wide except within 5 km of Bude (SS 255 116) and Menwith Hill (SE 205 594). Occasional interference may be encountered during operations near Boscombe Down, Defford, Malvern, Portland and Skipness. Use allowed without restrictions listed above providing operation is at <-3 dBW/MHz and using directional antennas at the following racecourses: Catterick, Cheltenham, Pontefract, Ripon, Stratford, Thirsk, Worcester and York.	
93	3560-3580	27 dBW/ MHz	16	Available UK-wide for airborne use except within 48 km of Bude (SS 255 116) and Menwith Hill (SE 205 594) plus an additional 64 km for each 1,000 feet of altitude around these two sites. Occasional interference may be encountered during operations near Boscombe Down, Defford, Malvern, Portland and Skipness.	Yes
94	5472-5588	27 dBW/ MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518) and Benbecula (NF 800 400).	
95	5682.5-5702.5	27 dBW/ MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518) and Benbecula (NF 800 400).	
96	5682.5-5702.5	10 dBW/ MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518) and Benbecula (NF 800 400). Airborne use is restricted to a maximum height of 2,500 feet above ground level. On non-interference basis to the MOD.	Yes

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
97	5705-5725	27 dBW/MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518).	
98	5732.5-5752.5	27 dBW/MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518). On a non-protected basis from the fixed wireless access service.	
99	5770-5790	27 dBW/MHz	16	Power commensurate with minimum operational requirements. Available UK-wide except within 35 km of Aberporth (SN 247 518). On a non-interference basis to the MOD. On a non-protected basis from the fixed wireless access service.	
100	5770-5790	10 dBW/MHz	16	Power commensurate with minimum operational requirements. Airborne use is restricted to a maximum height of 2,500 feet above ground level. Available UK-wide except within 35 km of Aberporth (SN 247 518). On a non-interference basis to the MOD. On a non-protected basis from the fixed wireless access service.	Yes
101	5795-5815	27 dBW/MHz	16	Power commensurate with minimum operational requirements. Available UK-wide except within 35 km of Aberporth (SN 247 518) and Benbecula (NF 800 400). On a non-interference basis to the MOD.	
102	5795-5815	10 dBW/MHz	16	Power commensurate with the minimum operational requirements. Airborne use is restricted to a maximum height of 2,500 feet above ground level. Available UK-wide except within 35 km of Aberporth (SN 247 518) and Benbecula (NF 800 400). On a non-interference basis to the MOD.	Yes
103	5850-5925	27 dBW/MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518) and Hebrides (NF 800 400).	
104	5850-5925	0 dBW/MHz	16	Available UK-wide except within 35 km of Aberporth (SN 247 518) and Hebrides (NF 800 400). Airborne use is restricted to a maximum height of 2,500 feet above ground level.	Yes

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
105	7110-7250	27 dBW/ MHz	16	Power commensurate with minimum operational requirements. Future advanced coordination may be required for higher power use (to be confirmed shortly).	
106	7110-7250	17 dBW/ MHz	16	Power commensurate with minimum operational requirements. Airborne use: minimum height 500 feet above ground structures and buildings; maximum height 2,500 feet above ground level. Future advanced coordination may be required for higher power use (to be confirmed shortly).	Yes
107	7300-7425	27 dBW/ MHz	16	Advance coordination is required in the 7386-7425 MHz band.	
108	8460-8500	27 dBW/ MHz	16	Available UK-wide except within 5 km of Fort Halstead (TQ 497 600), Aberporth (SN 247 518), Lark Hill (SU 14 1445), the Hebrides range (NF 093 001 AND NF 781 406), the Firth of Clyde and Northern Ireland.	
109	10300- 10360	27 dBW/ MHz	16	Available UK-wide except within 20 km of Marham (TF 720 090), Waddington (SK 980 960), Pendine (SN 260 079), Shoeburyness (TQ 961 877), Larkhill (SU 104 482), West Freugh (NX 212 554), Hebrides (NF 779 404), Aberporth (SN 242 523) Kirkudbright (NX 724 469) and Eskmeals (SD 080 927). Operations must not exceed -10 dBW/MHz at Ascot, Bath, Newbury, Salisbury and Wincanton.	

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
110	1030010360	27 dBW/MHz	16	Available UK-wide except within 20 km of Marham (TF 720 090), Waddington (SK 980 960), Pendine (SN 260 079), Shoeburyness (TQ 961 877), Larkhill (SU 104 482), West Freugh (NX 212 554), Hebrides (NF 779 404), Aberporth (SN 242 523), Kirkudbright (NX 724 469) and Eskmeals (SD 080 927). Airborne use at a maximum height of 1,000 feet above ground level and not within 64 km of the above sites. Operations must not exceed -10 dBW/MHz at Ascot, Bath, Epsom, Goodwood, Kempton Park, Newbury, Salisbury, Sandown Park, Wincanton and Windsor.	Yes
111	12200-12225	27 dBW/MHz	17	On a non-interference basis to Direct Broadcast Satellite services.	
112	12225-12250	27 dBW/MHz	17		
113	12250-12275	40 dBW; 27 dBW/MHz	17	On a non-interference basis to Belgian Direct Broadcast Satellite services. Maximum power when Direct Broadcast Satellite to Belgium is operational of -4 dBW/MHz ERP towards Belgium when within 150 km of Belgian coastline.	
114	12275-12325	27 dBW/MHz	17		
115	12325-12375	27 dBW/MHz	17	On a non-interference basis to Belgian Direct Broadcast Satellite. Maximum power when Direct Broadcast Satellite to Belgium is operational of -4 dBW/MHz ERP towards Belgium when within 150 km of Belgian coastline.	
116	12375-12400	27 dBW/MHz	17		
117	12400-12425	27 dBW/MHz	17	On a non-interference basis to Belgian Direct Broadcast Satellite. Maximum power when Direct Broadcast Satellite to Belgium is operational of -3 dBW/MHz ERP towards Belgium when within 150 km of Belgian coastline.	
118	12425-12450	27 dBW/MHz	17		

Band	Frequency (MHz)	Maximum in-band power (ERP)	BEM	Apparatus/restrictions	Airborne
119	12450-12475	27 dBW/MHz	17	On a non-interference basis to Belgian Direct Broadcast Satellite. Maximum power when Direct Broadcast Satellite to Belgium is operational of -3 dBW/MHz ERP towards Belgium when within 150 km of Belgian coastline.	
120	12475-12500	27 dBW/MHz	17		
121	24250-24500	27 dBW/MHz	17	This band has been allocated in anticipation of the expansion of satellite broadcasting in the 11700-12500 MHz band.	
122	48000-48400	17 dBW/MHz	18	Until further notice by agreement with us.	

8.14 Table 8 below sets out the BEMs referenced in column four of table 7 above.

Table 8. Block edge masks

BEM	Δf from band edge (kHz except where stated differently)	Maximum PSD for out of band emissions (dBm/4 kHz)
1	0-2	$9.03 - (15 \times \Delta f)$
	2-14	$-19.30 - (0.833 \times \Delta f)$
	14-31.25	-30.97
2	0-2	$5.05 - (15 \times \Delta f)$
	2-14	$-23.28 - (0.833 \times \Delta f)$
	14-31.25	-34.95
3	0-2	$2.04 - (15 \times \Delta f)$
	2-14	$-26.29 - (0.833 \times \Delta f)$
	14-31.25	-37.96
4	0-2	$-13.45 - (14.25 \times \Delta f)$
	2-31.25	-41.95^{45}
5	0-4.5	$2.04 - (6.667 \times \Delta f)$
	4.5-29.5	$-26.16 - (0.4 \times \Delta f)$
	29.5-62.5	-37.96
6	0-100	$-46.99 - (0.2 \times \Delta f)$
	100-900	$-65.74 - (0.0125 \times \Delta f)$
7	0-25	$-26.99 - (0.8 \times \Delta f)$
	25-975	$-46.73 - (0.01 \times \Delta f)$
8	0-2	$9.03 - (15 \times \Delta f)$
	2-31.25	$-20.56 - (0.204 \times \Delta f)$
9	0-2	$2.04 - (15 \times \Delta f)$
	2-31.25	$-27.55 - (0.204 \times \Delta f)$
10	0-2	$9.03 - (15 \times \Delta f)$
	2-3.847	$-19.30 - (0.834 \times \Delta f)$
	3.847-25	$-20.97 - (0.4 \times \Delta f)$

⁴⁵ Limited to -41.95 dBm/4 kHz due to limit in standard that states out of band emissions do not need to be below -37 dBm (in 12.5 kHz).

BEM	Δf from band edge (kHz except where stated differently)	Maximum PSD for out of band emissions (dBm/4 kHz)
	25-31.25	-30.97
11	0-2	$9.03 - (15 \times \Delta f)$
	2-5.667	$-19.26 - (0.855 \times \Delta f)$
	5.667-18.75	$-21.09 - (0.527 \times \Delta f)$
	18.75-31.25	-30.97
12	0-2	$2.04 - (15 \times \Delta f)$
	2-5.667	$-26.25 - (0.855 \times \Delta f)$
	5.667-18.75	$-28.08 - (0.527 \times \Delta f)$
	18.75-31.25	-37.96
13	0-2	$2.04 - (15 \times \Delta f)$
	2-14	$-26.29 - (0.833 \times \Delta f)$
	14-31.25	-37.96
14	0-250	$-30 - (0.2^* \Delta f)$
	250-900	$-76.15 - (0.0154^* \Delta f)$
15	0 – 10 MHz	-45.21
	10 – 25 MHz	-51.21
16	0-20 MHz	-45.21
	20-50 MHz	-51.21
17	0-25 MHz	-45.21
	25-62.5 MHz	-51.21
18	0-100 MHz	-45.21
	100-250 MHz	-51.21
19	0-75	$20 - (0.22 \times \Delta f)$
	75-200	4
	200-550	$15.43 - (0.06 \times \Delta f)$
	550-1000	-16
20	0-300	$-44.8 - (0.067 \times \Delta f)$
	300-700	-64.8
21	100-900	$-40 - (0.2 \times \Delta f)$
	0-100	$-58.75 - (0.0125 \times \Delta f)$

Question 38. Do you agree with our proposed TLCs?

Section 10

Next steps

- 9.1 We invite responses to the questions raised in this consultation document by 7 September 2009. See annex 1 for details of how to respond.
- 9.2 We will shortly consult separately on the means by which the band manager will authorise PMSE and other users to access its spectrum. These proposals will be relevant to all licensees interested in allowing third-party use of their spectrum.
- 9.3 We expect to publish a statement on the band manager award in the autumn setting out our decisions in the light of responses to both this and our July 2008 consultation document.
- 9.4 Table 9 sets out our current timetable for holding the band manager award.

Table 9. Timetable for the band manager award

Autumn 2009	Statement; IM and draft regulations; make regulations
Winter 2009	Regulations come into force; invitation to apply
Spring 2010	Deadlines for applications; consult on applications; make decision
Summer/autumn 2010	Band manager starts operating

Crown Dependencies

- 9.5 We are responsible for managing spectrum in Guernsey, the Isle of Man and Jersey subject to the special constitutional position of the islands as self-governing Crown Dependencies. The Wireless Telegraphy Act has been extended there with local variations by Orders in Council.⁴⁶
- 9.6 The island administrations have each confirmed that they continue to wish to be included in the band manager arrangements for PMSE.

Interest from potential band managers

- 9.7 This consultation sets out in detail a significant amount of information to parties that may be thinking of applying to become the band manager. We would therefore be interested to know, at this stage, whether there is any confirmed interest in applying for the role. We will keep such interests confidential to the extent permitted by our legal obligations.

Question 39. Based on the information contained in this and our July 2008 consultation document, are you interested in applying to become the band manager with obligations to PMSE users?

Question 40. Is there any further information that you would need to assist you in making a decision as to whether to apply to become the band manager?

⁴⁶ www.opsi.gov.uk/si/si2006/uksi_20063325_en.pdf, www.opsi.gov.uk/si/si2007/pdf/uksi_20070278_en.pdf and www.opsi.gov.uk/si/si2006/uksi_20063324_en.pdf

Annex 1

Responding to this consultation

How to respond

- A1.1 We invite written views and comments on the issues raised in this document, to be made by 5 p.m. on 7 September 2009.
- A1.2 We strongly prefer to receive responses using the online web form at www.ofcom.org.uk/consult/condocs/bandmanager09/howtorespond/form as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see annex 3) to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web-form questionnaire.
- A1.3 For larger consultation responses – particularly those with supporting charts, tables or other data – please email DDRBandManager@ofcom.org.uk, attaching your response in Microsoft Word format, together with a consultation-response cover sheet.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation.
- Band Manager Project Team
Spectrum Policy Group
Third Floor
Riverside House
2a Southwark Bridge Road
London SE1 9HA
- A1.5 Note that we do not need a hard copy in addition to an electronic version. We will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.
- A1.6 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together in annex 3. It would also help if you can explain why you hold your views and how our proposals would impact on you.

Further information

- A1.7 If you want to discuss the issues and questions raised in this consultation or need advice on the appropriate form of response, please contact John Canavan on 020 7981 3172.

Confidentiality

- A1.8 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your response should be kept confidential, please specify what part and why. Please also place such parts in a separate annex.

- A1.9 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.10 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to us to use. Our approach on intellectual property rights is explained further on our website at www.ofcom.org.uk/about/accoun/disclaimer.

Next steps

- A1.11 Following the end of the consultation period, we intend to publish a statement on the band manager award in the autumn setting out our decisions in the light of responses to both this and our July 2008 consultation document.
- A1.12 Please note that you can register to receive free mail updates alerting you to the publications of relevant Ofcom documents. For more details, please see www.ofcom.org.uk/static/subscribe/select_list.htm.

Our consultation processes

- A1.13 We seek to ensure that responding to a consultation is as easy as possible. For more information, please see our consultation principles in annex 2.
- A1.14 If you have any comments or suggestions on how we conduct our consultations, please call our consultation helpdesk on 020 7981 3003 or email us at consult@ofcom.org.uk. We would particularly welcome thoughts on how we could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumer, who are less likely to give their opinions through a formal consultation.
- A1.15 If you would like to discuss these issues or our consultation processes more generally, you can alternatively contact Vicki Nash, Director Scotland, who is our consultation champion.

Vicki Nash
Ofcom
Sutherland House
149 St. Vincent Street
Glasgow G2 5NW

Tel: 0141 229 7401
Fax: 0141 229 7433

Email vicki.nash@ofcom.org.uk

Annex 2

Our consultation principles

A2.1 We have published the following seven principles that we will follow for each public written consultation.

Before the consultation

A2.2 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

A2.3 We will be clear about whom we are consulting, why, on what questions and for how long.

A2.4 We will make the consultation document as short and simple as possible. We will try to make it as easy as possible to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Our consultation champion will also be the main person to contact with views on the way we run our consultations.

A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We will usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and an account of how the views of those concerned helped shape them.

Annex 3

Consultation-response cover sheet

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website: www.ofcom.org.uk.
- A3.2 We have produced a cover sheet for responses (see below) and would be very grateful if you could send one with your response. (It is incorporated into the online web form if you respond in this way.) This will speed up our processing of responses and help to maintain confidentiality where appropriate.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore, we would encourage respondents to complete their cover sheet in a way that allows us to publish their responses upon receipt rather than waiting until the consultation period has ended.
- A3.4 We strongly prefer to receive responses via the online web form, which incorporates the cover sheet. If you are responding via email or post, you can download an electronic copy of this cover sheet in Word or RTF format from the consultations section of our website at www.ofcom.org.uk/consult.
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details or job title to remain confidential, please provide them in your cover sheet only so that we do not have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing	<input type="checkbox"/>	Name/contact details/job title	<input type="checkbox"/>
Whole response	<input type="checkbox"/>	Organisation	<input type="checkbox"/>
Part of the response	<input type="checkbox"/>	If there is no separate annex, which parts?	

If you want part of your response, your name or your organisation not to be published, can we still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

Annex 4

Consultation questions

Protecting PMSE users

Question 1. Do you agree with our proposal that we should review our approach to FRND obligations at the same time that we initiate our first review of AIP levels, three years after the band manager starts operating?

Question 2. Do you agree with the objectives that we are seeking to achieve through our application of FRND to the band manager?

Question 3. Do you agree with our proposal that under the benchmark approach excess PMSE demand for spectrum should be dealt with by the band manager using non-pricing methods?

Question 4. Do you have any views on how best to deal with excess PMSE demand using non-pricing methods?

Question 5. Do you agree with our benchmark approach to assessing whether the band manager is pricing in a discriminatory way?

Question 6. Do you agree with our benchmark approach to ensuring that service levels are met in an FRND way?

Question 7. Do you agree with our proposed approach that any proposal by the band manager to allow non-PMSE use of the spectrum in this award should be first approved by us?

Question 8. Do you have any comments on how efficient sharing and coordination between Games and non-Games use of spectrum to be awarded to the band manager can best be achieved?

Benchmark approach to FRND terms and conditions

Question 9. Does our FRND benchmark approach provide sufficient information for applicant band managers to make commitments to PMSE users based on our FRND principles and objectives?

Question 10. Does our FRND benchmark approach strike an appropriate balance between giving applicant band managers sufficient certainty to plan their business and giving sufficient flexibility to determine whether FRND obligations have been breached?

Question 11. Do you agree it may be appropriate for us to review the FRND benchmark approach?

Question 12. Do you agree with our proposal to hold an initial review of the FRND benchmark approach in parallel with the initial AIP review, three years after the band manager starts operating?

Question 13. Do you have any suggestions as to how the band manager can transparently and proportionately allocate its fixed costs across bands and authorisations?

Question 14. Do you agree that ROS is most appropriate measure of profitability? Do you agree the indicative ROS figures set out are reasonable? Are there any more appropriate benchmarks?

Question 15. Does securing continuity with existing arrangements for spectrum access but adjusting in response to changing conditions and PMSE needs provide the best trade-off between avoiding disruption to PMSE users and promoting efficient use of spectrum?

Question 16. What are the key types and categories of PMSE spectrum access that should be kept to secure continuity? What types and categories would you be interested in seeing emerging?

Question 17. Does our interpretation of how the band manager should meet PMSE demand on FRND conditions provide adequate protection for PMSE users?

Question 18. Do you agree that service levels are an inherent part of the terms and conditions for PMSE spectrum access and should be subject to FRND obligations?

Question 19. Do you agree with our overarching approach to enforcing FRND obligations?

Question 20. Do you agree that a minimum set of information needs to be published by the band manager in order to ensure that PMSE users can seek spectrum access in a manner that meets their needs and the reassurance that their request will be dealt with on FRND terms and conditions?

Question 21. What minimum set of information should the band manager publish? What additional information would PMSE users benefit from seeing it publish?

Question 22. Do you think that it is reasonable to expect the band manager to provide this information at the time of a dispute?

Question 23. Do you agree that the provision of information by the band manager as proposed is an integral part of assessing the extent to which the terms and conditions it offers to PMSE users are FRND?

Our objectives and approach in applying AIP

Question 24. Do you agree with our objectives and approach in applying AIP principles to the licence fee payable by the band manager?

Our pricing proposals for the band manager

Question 25. Do you agree with our proposal to assess viability of alternative use of spectrum based on the secondary nature of PMSE access where applicable?

Question 26. Do you agree with our approach to assessing whether there is an opportunity cost of spectrum based on competing PMSE use?

Question 27. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity costs of UHF 1 and UHF 2?

Question 28. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity cost of interleaved spectrum?

Question 29. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity costs of channel 69 and channel 38?

Question 30. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity cost of spectrum at 2-3 GHz?

Question 31. Do you agree with our estimate, based on Analysys Mason's report, of the opportunity cost of spectrum at 7 GHz?

Question 32. Do you agree with our proposal to phase in AIP on a band by band basis?

Question 33. Do you agree with our proposal to phase in the band manager's AIP based licence fee such that no band increases by more than 40% in the first year that it is operating compared to 2008/09 licensing receipts?

Question 34. Do you have any comments on any other aspects of our proposals to introduce AIP for the spectrum to be awarded to the band manager?

Question 35. Do you agree with our estimates of the opportunity cost of temporary PMSE access to cleared spectrum?

Question 36. Do you have any views as to whether the aggregated or disaggregated approach to setting the band manager's licence fee is the best one?

Question 37. In light of our further proposals, do you agree that we should first review the AIP charged to the band manager after three years?

Technical licence conditions

Question 38. Do you agree with our proposed TLCs?

Next steps

Question 39. Based on the information contained in this and our July 2008 consultation document, are you interested in applying to become the band manager with obligations to PMSE users?

Question 40. Is there any further information that you would need to assist you in making a decision as to whether to apply to become the band manager?

Annex 5

Impact assessment

Introduction

- A5.1 The analysis presented in this annex and the consultation document as a whole represents an impact assessment, as defined in section 7 of the Communications Act.
- A5.2 You should send any comments on this impact assessment to us by 7 September 2009. We will consider all comments before deciding whether to implement our proposals.
- A5.3 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Communications Act, which means that generally we have to carry out impact assessments where our proposals would be likely to have a significant effect on businesses or the general public or when there is a major change in our activities. However, as a matter of policy we are committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions. For further information about our approach to impact assessments, see the guidelines “Better policy-making: Ofcom’s approach to impact assessment,” which are on our website at www.ofcom.org.uk/consult/policy_making/guidelines.pdf.

The citizen and/or consumer interest

- A5.4 PMSE users make a major contribution to diverse forms of entertainment, news gathering, sporting event coverage and various community activities. We have long recognised that this sector contributes to the social and cultural well being of citizens and consumers in the UK. It is at the forefront of the UK being a world leader in the worlds of theatre, broadcasting and film.
- A5.5 We therefore consider that it is in the interests of citizens and consumers that robust provisions are established to secure PMSE users’ future access to spectrum in a way that will maximise the total value to society generated by using spectrum over time. This is consistent with our wider objective for the digital dividend. In achieving this, we must have regard to both specific circumstances in the UK – including current and planned uses of this and adjacent spectrum – and evolving plans in other European countries and the European Union.

Previous impact assessments

- A5.6 Our impact assessment of the wider policy goals which underpin the band manager award was set out in both our December 2007 statement and our July 2008 consultation document. We do not repeat the assessments therein in this consultation document.

Objectives for the band manager award

- A5.7 The proposals set out in this consultation document seek to implement a number of decisions on future institutional arrangements for PMSE access to spectrum as set out in our December 2007 statement. We subsequently set out high level proposals

on the detailed design of the band manager award in our July 2008 consultation document. We stated at that time that we would need to develop details of those proposals, namely:

- we would need to provide details of the proposed level of AIP that would be charged to the band manager together with proposals for any phasing in period that would be applied;
- we would need to provide details of the technical licence conditions for the spectrum that we are proposing to award to the band manager; and
- we would seek to give more details on the proposed mechanism that the band manager would use in authorising third party use of the spectrum that will be awarded to it.

A5.8 We do not address the issue of spectrum authorisation in detail in this consultation document although the issue remains important to the substance of the band manager award. We will shortly consult separately on proposals that will be relevant to all licensees interested in allowing third-party use of their spectrum.

A5.9 We further reflected that this consultation document should develop the issue of how we will define the meaning of FRND terms and conditions. We therefore have set out benchmark guidance for stakeholders as to how we will assess whether FRND terms have been adhered to in the event of a dispute between the band manager and PMSE users.

A5.10 In developing our proposals, we have been guided by our four stated objectives for future PMSE access to spectrum:

- avoiding disruption to PMSE users that adversely affects their ability to provide a wide range of services to citizens, consumers and business customers;
- facilitating participation of the PMSE sector in a market-based approach to spectrum;
- promoting the optimal use of spectrum in relation to all potential uses and users over time; and
- avoiding the risks of regulatory and market failure.

A5.11 This annex outlines our analysis in making the following key proposals for future PMSE spectrum access:

- our approach to holding formal reviews of our FRND guidelines;
- our approach to FRND enforcement;
- how FRND pricing may be determined, including whether we consider excess PMSE demand would best be dealt with by the band manager through pricing or non-pricing mechanisms;
- how we should ensure that PMSE access to the spectrum to be awarded is protected when there are proposals to allow non-PMSE use of that spectrum;

- whether the AIP based licence fee should be phased in on band by band or on an aggregated basis;
- our approach to the provision of cost and price information at the application stage; and
- our approach to determining the appropriate phasing period for relevant bands in the award.

Our approach to holding formal reviews of our FRND guidelines

A5.12 The policy options relevant to reviewing our FRND guidelines are discussed in sections 3 and 4.

A5.13 Our policy preference is for the first review of the FRND guidelines to be aligned with the first review of AIP for the reasons set out in section 4. See in particular paragraphs 4.26-4.29.

Our approach to FRND enforcement

A5.14 The policy options relevant to our approach to FRND enforcement are discussed in section 4. The reason for our preference for a case-by-case *ex post* approach to enforcement is set out in paragraphs 4.133-4.139.

Our approach to FRND pricing

A5.15 Our approach to FRND pricing in our benchmark guideline is briefly outlined in section 3 (paragraphs 3.22-3.29) and then discussed in more detail in section 4 (paragraphs 4.32-4.108).

A5.16 We propose that FRND prices should be cost-oriented (allowing for a reasonable rate of return) and judged on the basis of cost forecasts before efficiency gains are taken into account. We are minded to require the allocations of common costs also to be guided by those cost drivers that were relied upon to allocate the incremental costs.

A5.17 Our approach to FRND pricing is complex because there are several sets of options relevant to different aspects of the pricing proposal, such as the basis for cost allocation or rate of return. This is why we do not provide a further description of these here. The details of the different options and our assessment of them are set out in section 4.

Our approach to dealing with excess PMSE demand

A5.18 The policy options relevant to dealing with excess PMSE demand are discussed in section 3. Our preference is for relying on a non-pricing mechanism to ration demand when PMSE demand for spectrum exceeds supply. The reasons for this preference, when compared to other options, are set out in particular in paragraphs 3.34-3.43.

Ensuring PMSE access to spectrum when there is competing non-PMSE demand

- A5.19 Our approach to ensuring PMSE access to spectrum when there is competing non-PMSE demand was set out in our July 2008 consultation document in sections 8 (see paragraphs 8.14-8.21) and 9 (see paragraphs 9.16 to 9.20).
- A5.20 In this consultation document, we further develop our proposals to more effectively meet our wider objectives for PMSE access to spectrum. We propose that we have a power of veto over any non-PMSE use of the spectrum being awarded to the band manager. The reasons for revisiting our initial proposal in the way we are proposing now are discussed in paragraphs 3.65-3.69.

Our approach to setting AIP taking into account the band manager's costs

- A5.21 A discussion of the issues relevant to setting an AIP-based licence fee to the band manager is set out in section 6 (see paragraphs 6.104-6.118). At this stage we do not have a strong preference for either of the two options and we have invited stakeholders to comment on these options and indicate their preferences.
- A5.22 In the next sub-section, we outline the link between the approach to setting AIP for the band manager and the amount of cost and price information that will need to be submitted at the application phase. Stakeholders will need to have regard to this link when expressing their views and their preferences on how to set AIP.

Our approach to the provision of cost and price information at the application phase

- A5.23 The issues relating to information provision at the time of applications are discussed in section 3 (see paragraphs 3.30-3.32) and section 4 (see paragraphs 4.141-4.146). This discussion concerns mainly cost and price information.
- A5.24 There is a link between the amount of information to be provided on cost and prices at the time of applications and the choice of approach to setting AIP discussed both in the previous sections and in section 6. The choice of a disaggregated approach to setting AIP would require providing cost and price information in a disaggregated form. More flexibility would exist under the aggregated option to setting AIP. The cost and price information provided at bidding stage could be provided to varying levels of detail, as long as it enabled the AIP to be set.
- A5.25 There are two options:
- option 1 – provision of aggregated cost and price information; and
 - option 2 – provision of disaggregated cost and price information.
- A5.26 The advantages and disadvantages of the two options are summarised in table A1.

Table A1. Assessment of options for providing cost and price information

	Advantages	Disadvantages
Option 1: aggregate	Easier (faster and cheaper) to provide Reduced risk that <i>ex ante</i> price indications do not materialise	Weaker <i>ex ante</i> indication of likely prices structure and levels
Option 2: disaggregate	Clearer <i>ex ante</i> indication of likely price structure and levels	More difficult (time and effort consuming) to provide Increased risk that <i>ex ante</i> price indications do not materialise

A5.27 In common with our approach to setting AIP, we do not express a preference here for either option. As long as there is sufficient information to enable us to assess whether FRND terms and conditions have been met, we would be content for either option to be adopted.

Whether AIP should be phased in on band by band basis or over all bands

A5.28 The policy options relevant to phasing AIP are discussed in section 6. Our preference is for phasing the AIP on a band by band basis for reasons set out in particular in paragraphs 6.60-6.66.

Our approach to selecting a criterion for phasing opportunity costs

A5.29 The policy options relevant to how quickly we phase in AIP are discussed in section 6. We prefer option 1, whereby the increase of revenues to be collected by band is fixed on a per year basis and is limited to 40% in the first year when compared to current JFMG fees. The reasons for this preference are set out in particular in paragraphs 6.67-6.77.

A5.30 The outcomes of the calculations that led us to identify the phasing period for each of the band groups for which phasing has been identified as appropriate to minimise disruption to PMSE users are presented below. The tables show for each band group the minimum number of years required to reach full opportunity cost under the three options we considered (based on a starting point of existing JFMG revenues for that band group.)

A5.31 The figures in the tables below are derived from following the same methodology:

- we calculate the difference between current JFMG revenues and the opportunity cost estimates for each band group (where the latter is higher than the former);
- we divide this difference by a phasing length, and we vary this duration from no phasing (that is, an immediate introduction) up to eight years. The outcome represents the fixed amount by which the fees are to be increased every year in order to move from current JFMG revenues to opportunity cost estimates given the chosen duration;
- for each potential duration we calculate how much of an increase this amount represents compared to current JFMG revenues;

- we select the phasing period that generates an increase that matches our criteria – up to 40%, up to 60% and up to 80%; and
- we calculate the increased fees over the phasing period that would result from relying on that phasing. This is done by adding the fixed amount every year, starting from current JFMG revenues.

Table A2. UHF 1

	Current revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
40% increase	£88k	£122k	£156k	£190k	£224k	£257k	£291k	£325k	£359k
60% increase	£88k	£133k	£178k	£224k	£269k	£314k	£359k		
80% increase	£88k	£156k	£224k	£291k	£359k				

Table A3. UHF 2

	Current revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
40% increase	£466k	£615k	£764k	£912k	£1.06m	£1.21m			
60% increase	£466k	£714k	£962k	£1.21m					
80% increase	£466k	£838k	£1.21m						

Table A4. Channel 69 and Channel 38

	Current revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
40% increase	£102k	£122k							
60% increase	£102k	£122k							
80% increase	£102k	£122k							

Table A5. 1.5 GHz low

	Current revenues	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8
40% increase	£14k	£19k	£24k	£29k					
60% increase	£14k	£22k	£29k						
80% increase	£14k	£25k	£29k						

Our approach to setting AIP and the band manager licence fee

A5.32 Our approach to setting AIP and the band manager’s licence fee is discussed in section 6. Options for setting the licence fee are outlined in particular in paragraphs 6.110-6.121. We are open to both options and invite interested stakeholders to express their views and preferences.

Annex 6

Responses to the July 2008 consultation document

Introduction

A6.1 In our July 2008 consultation document, we asked a number of questions in relation to our proposed approach to future spectrum access for PMSE users. Many of these questions are material to the issues which we have explored further in this second consultation document. The responses we received to those questions have, to some extent, guided the more detailed proposals that have been set out in this consultation document. We therefore consider that it is appropriate to set out the responses that we received to those questions and address the points raised.

Do you agree with our proposal to set a separate fee for each Ofcom managed band to be awarded?

A6.2 Most respondents expressed their concern that the price of spectrum fees to PMSE users would increase as a result of our proposals. They highlighted the potential adverse effects on PMSE users they believed could result from this – especially that some might be priced out of the market.

A6.3 A number of respondents stated their belief that PMSE users should have continued access to affordable spectrum. Two respondents suggested that the prices charged to PMSE users should allow the band manager to receive an appropriate return on its capital. Some respondents stated that PMSE users should not have to operate in a fully market-led environment.

A6.4 Several respondents also expressed their concern that under these proposals, the band manager would face incentives to attract higher value non-PMSE users to use the spectrum, forcing out PMSE users.

Our response

A6.5 We are aware of the concerns of PMSE users and recognise that a significant increase in fees could cause them disruption if introduced too early. We have sought to minimise this through our further proposals for the implementation of AIP to the band manager and our objectives for setting prices on FRND terms and conditions.

A6.6 Specifically, in terms of our pricing proposals, we have based our opportunity cost estimates for spectrum being awarded to the band manager on conservative assumptions. We have then sought to phase in the related AIP based licence fee to the band manager on a band by band basis so that the magnitude of the increase in total fees paid by PMSE users of each band is limited compared to the previous year's fees. We believe this means individual PMSE users will be less likely to face significant price increases early in the band manager's operation.

A6.7 In terms of our FRND proposals, we have set out a benchmark approach to how the band manager's FRND obligations could be interpreted in the event of a dispute. Under this approach, any assessment of whether FRND pricing is being adhered to

would focus on ensuring that the band manager's prices to PMSE users related to the costs of managing that spectrum or its opportunity cost (including a reasonable rate of return). This would effectively prohibit the band manager from charging excessive prices to PMSE users while at the same time allowing it to earn an appropriate return. We anticipate that any proposals put forward by applicants in the award would produce a similar end result.

- A6.8 In terms of the band manager having incentives to price spectrum at a level which would be attractive to other non-PMSE users, our proposals stipulate that it must make the spectrum in the award available for PMSE use and ensure that this spectrum is priced at FRND levels. We have further proposed that the band manager can only make spectrum available for non-PMSE use when it can demonstrate to us that it has otherwise met its obligations to PMSE users.

Do you agree with our proposal initially to set fees for access to MOD-managed spectrum on a comparable basis?

- A6.9 Respondents' views reflected on the uncertainty over the future use of MOD-managed spectrum. The BBC thought that we should not apply our proposals to MOD-managed spectrum yet but wait until the MOD has set out its new spectrum-management arrangements. Arqiva, ITN and JFMG thought that fees for this spectrum should be reduced to reflect the uncertainty over its use in the future.

Our response

- A6.10 We considered that it was consistent with our key objective of promoting efficient use of spectrum to apply AIP to MOD spectrum. However, in light of the uncertainty that is inherent in the future use of some of these bands, Analysys Mason concluded that there would be a reduced level of commercial incentive for alternative users to deploy services. Where this uncertainty exists, we have reflected this in either zero or significantly reduced AIP levels.

Do you agree with our proposal to determine the band manager's licence fee first by deriving estimates of the opportunity costs of the spectrum to be awarded and second by setting band-by-band prices that strike an appropriate balance between objectives for this award?

- A6.11 Most respondents agreed that it is appropriate to charge different levels of AIP for the different bands included in the band manager award. However, opinions were mixed on whether AIP should be set in line with the opportunity cost of the spectrum. Some agreed that this is the most suitable method of pricing spectrum, while others argued that AIP should reflect the value of the spectrum to PMSE users, rather than non-PMSE users.
- A6.12 Several respondents highlighted the difficulty in accurately calculating the opportunity cost of spectrum, and urged us to use a transparent approach, taking a conservative estimate of opportunity cost as the basis for AIP. Several parties suggested that AIP for bands with low or no demand should be close to or equal to zero. Another respondent noted that the calculation of opportunity cost depends on the current market conditions, and so the timing of the calculation is important.
- A6.13 Some responses noted that the opportunity cost of channel 69 would be equal to the value of a mobile broadband network using 2×10 MHz, making it unfeasible to continue to allocate this spectrum to PMSE. They also suggested that the likely duplex gap resulting from EU-wide harmonised use of the 800 MHz band for mobile

services using frequency-division duplexing (FDD) would have a near-zero opportunity cost, and would therefore be more suitable for PMSE use.

Our response

- A6.14 AIP based licence fees are based on the opportunity cost of spectrum taking into account the value placed on that spectrum by all potential users. We and our predecessors have used this approach since 1996 when we adopted a model provided by Smith NERA. Taking into account the value placed on spectrum by all users gives a more accurate view of that spectrum's true value than if we only took into account the value placed by PMSE users alone. This in turn helps to promote a more efficient use of spectrum.
- A6.15 We agree with those stakeholders who stated that we should set our opportunity cost estimates at a conservative level, and our proposals as set out in section 6 consistently take a lower bound estimate for each band. Bands with low or no demand have their opportunity costs estimated to be close to or equal to zero. In terms of opportunity cost levels being dependent on current market conditions, we have accounted for this by proposing regular AIP reviews which will enable us to adjust our AIP fees where changes in market conditions have led to changes in the opportunity cost of the spectrum.
- A6.16 We agree with the respondents who noted an increased opportunity cost of channel 69 as a result of other European countries' decisions to make the whole 800 MHz band available as their digital dividend. In section 6 we set out our estimate of the opportunity cost of this channel as being in the region of £24m per year. This would certainly be beyond the ability of PMSE users to bear. We have recognised the importance of a UK-wide 8 MHz channel for PMSE use, and in our 800 MHz consultation document we proposed that channel 38 should be awarded to the band manager as a replacement for channel 69 if the latter is cleared in the UK. Channel 38, currently used by radioastronomy, is estimated to have an opportunity cost of £122k, which is broadly equivalent to current licence spend with JFMG for channel 69.
- A6.17 We note the responses which suggest that the proposed duplex gap in the FDD band plan identified by the European Conference of Postal and Telecommunications Administrations could also be an effective replacement for channel 69. We will address this shortly in our statement on clearing the 800 MHz band.

What are your views on the options for phasing in AIP to full opportunity cost?

- A6.18 In general, respondents felt that a three year phasing in period was too short, and there was no certainty that PMSE users could move to cheaper bands at the end of the three years. JFMG suggested that the phasing in period may need to be longer than three years, so that the band manager can set reasonable fees to realise a return on its investment.
- A6.19 Two respondents suggested that because PMSE equipment has a long lifecycle, some PMSE users may be locked in to using certain spectrum and unable to afford higher prices yet unable to migrate to lower cost frequencies.

Our response

- A6.20 We recognise that three years may be an insufficient phasing in period to move PMSE users to access fees based on full opportunity cost. This is why, guided by the need to balance spectrum efficiency and PMSE protection considerations, we have designed a phasing approach on a band by band basis. Our phasing proposals reflect the idea that, on a band by band basis, the duration of phasing in should depend on the level of current licence spend with JFMG and the magnitude of increase that would be incurred when compared to the level of opportunity cost of that band. For instance, the opportunity cost of channel 38 is not significantly higher than the current fee level for channel 69 which is paid to JFMG. We therefore consider that no phasing in period is required.
- A6.21 Conversely, UHF 1 has an opportunity cost of a much greater level than current JFMG fee levels. We have proposed that we should therefore phase in AIP over a period of eight years (subject to review after three). Those users who have concerns over the affordability of higher fees will be assisted by these more gradual phasing in periods.

Do you agree with our proposal to set the band manager's licence fee for three years and to review it after that period?

- A6.22 There were mixed responses regarding whether or not the proposal to review AIP after three years was suitable. Some respondents agreed that it would be an appropriate period of time over which to keep prices constant, while others believed that a longer period would provide a greater degree of certainty over the price of spectrum. One of these respondents argued that this period should be more in line with the lifecycle of PMSE equipment.
- A6.23 Another respondent suggested that there should be a notice period for changes to AIP, so that users would have time to adjust their decisions based on proposed changes in price.

Our response

- A6.24 In proposing that the review period should be three years we have attempted to balance the need for providing certainty for the band manager to plan its business with the need for us to intervene where we have set AIP at a level which no longer reflects the reality of the market.
- A6.25 We do not consider that three years is too short a period and remain of the view that a longer period, whilst giving greater certainty to the band manager, does not give us sufficient ability to reassess our AIP estimates. This is particularly the case in a new market where our understanding of how it will develop in its early years is imperfect. We will need to have the ability to revisit our AIP estimates in case we have overstated them and are causing significant disruption to PMSE users or in case we understated them which may lead to inefficient use of spectrum.
- A6.26 In terms of giving notice to PMSE users of any price rises that will result from an AIP review, we consider that this would be unnecessary as any future review would continue to take account the impact of price rises to the PMSE users and seek to minimise disruption to them. This would be the case even where there are increases in our opportunity cost estimates.

Do you agree with our proposal to set the band manager’s licence fee periodically but no more frequently than every three years thereafter?

A6.27 Respondents were concerned that the three-year review would lead to price increases. Some suggested that the price increase should be phased in over the three year period. The BBC and Arqiva wanted reviews after a longer period, so that the reviews would be comparable to the life-cycle of PMSE equipment.

Our response

A6.28 We reiterate our view that setting licence fees no more frequently than every three year strikes an appropriate balance between giving sufficient certainty for the band manager to plan its business, while allowing us to intervene where developments in the market mean that our opportunity cost estimates need to be adjusted.

Do you agree with our proposal that “reasonable” PMSE demand for the spectrum to be awarded to the band manager should be defined as actual demand from PMSE users at FRND prices?

A6.29 There were concerns over the way that FRND pricing would be set for PMSE use, especially if the FRND prices were to be determined by other types of new use and not what other PMSE users could pay. ITN also noted that PMSE demand for spectrum is not driven in the same way as other demands for spectrum, as users only use spectrum if there is a programme need. They thought that pricing may be a barrier rather than a factor in buying decisions.

A6.30 Some respondents noted practical issues with such a proposal, such as the possibility that meeting reasonable demand could compromise spectrum efficiency. One respondent suggested that with increasing AIP, the band manager may find it difficult to meet reasonable demand. A number of respondents suggested that reasonable demand should reflect current PMSE demand, but some parties noted that current usage figures are not accurate.

A6.31 JFMG raised a possible scenario where if the band manager were to offer spectrum to any PMSE user willing to pay for it, a user who may want some spectrum for a short period of time may block access for another user who wants to use the same spectrum for the whole year.

Our response

A6.32 We note the concerns that have been raised about how future pricing levels will affect PMSE users’ ability to access spectrum under FRND terms and conditions. Our wider proposals are designed to minimise any negative impact by phasing in AIP where necessary and by ensuring that prices to PMSE users are FRND.

A6.33 The concerns that applying FRND terms and conditions may impair the efficient use of spectrum reflect the balance that we are trying to achieve through all of our key objectives for PMSE access to spectrum. We consider that we are able to strike this balance by introducing protection measures for PMSE, whilst maintaining incentives for the band manager to use spectrum efficiently. These incentives include:

- being able to charge unregulated fees to non-PMSE users (as long as the band manager meets its obligations to the PMSE sector); and

- being allowed to realise efficiency savings it makes as profits for a period of time.

- A6.34 The statement that the band manager would not be able to meet reasonable demand if AIP rises may misunderstand what we mean by “meeting reasonable demand”. Meeting reasonable demand means making spectrum available for PMSE users ahead of any competing non-PMSE use and making sure that this spectrum is available on the basis of our FRND principles. It does not mean that the needs of all PMSE users must be catered for even when there is more demand for spectrum than there is supply. In the latter scenario, we have proposed that the band manager should suggest and implement a rationing mechanism which would allow him to meet the needs of PMSE users so that as few of them as possible have difficulties providing a service because of the lack of spectrum.
- A6.35 The usage figures we have been using in this document are based on 2008 licensing figures and are therefore the most accurate full calendar year’s data available to us.
- A6.36 JFMG suggestion that a PMSE user may block spectrum for other PMSE users is a case in point of how the band manager should be addressing how to authorise spectrum access in a fair manner where there is excess demand for that spectrum. We have asked for their views in section 3 on how the band manager can best serve the needs of PMSE users in these circumstances.

Do you agree with our proposals for ensuring that the band manager meets reasonable PMSE demand on FRND terms?

- A6.37 All respondents agreed with this proposal, but the BBC added that we should determine the appropriate ROCE. The BBC and SIS Outside Broadcast also suggested that there should be protection from anticompetitive behaviour, such as raising prices anticompetitively or holding more spectrum than can be used.
- A6.38 BEIRG stated that meeting demand should also involve ensuring that the right quantity and quality of spectrum should be made available for PMSE needs.

Our response

- A6.39 Our benchmark FRND guidance outlines how we could assess what an appropriate ROS will be for the band manager. Indeed we are proposing that ROS is a better measure of whether FRND principles have been breached in this instance because of the relatively low levels of capital investment likely to be a feature of the band manager. This benchmark FNRD guidance also indicates how we intend to investigate anticompetitive practices and signals how the band manager is expected to care for ensuring that access to spectrum be fairly distributed among PMSE users.
- A6.40 We agree with BEIRG that the band manager should meet the needs of PMSE users with suitable spectrum, charged at FRND prices. It should make the spectrum awarded to it available to PMSE users when they require it and in a manner that fits reasonably with their needs as long as they are prepared to pay those FRND prices.

Do you agree with our proposals concerning disputes between the band manager and PMSE users as a whole?

A6.41 All respondents agreed with this proposal. Additionally, the BBC specifically supported the proposal for an annual audit of the band manager's performance.

Do you agree with our proposals concerning disputes between the band manager and individual users?

A6.42 All respondents agreed with this proposal.

Do you agree with our proposal to use the block edge mask approach to determine the technical licence conditions relevant to this award and to base these masks broadly on existing arrangements for spectrum access?

A6.43 Most respondents agreed with this proposal. The BBC also suggested that the TLCs should be compatible with the appropriate compliance specifications.

Our response

A6.44 Our proposals, as set out in section 8, outline BEMs consistent with the relevant ETSI standards related to the existing use of spectrum in each band we are proposing to award to the band manager.

Annex 7

Glossary of abbreviations

Δf	Change in frequency
ADR	Alternative dispute resolution
AIP	Administered incentive pricing
BEM	Block edge mask
dB	Decibel
dBm	Decibels relative to milliwatts
dBW	Decibels relative to Watts
DSO	Digital switchover
DTT	Digital terrestrial television
EIRP	Effective isotropic radiated power
ERP	Effective radiated power
ETSI	European Telecommunications Standards Institute
FDD	Frequency-division duplexing
FRND	Fair, reasonable and non-discriminatory
GHz	Gigahertz
IM	Information memorandum
JFMG	Joint Frequency Management Group
kHz	Kilohertz
km	Kilometre
KPI	Key performance indicator
LRIC	Long run incremental cost
MHz	Megahertz
MOD	Ministry of Defence
mW	Milliwatt

PMSE	Programme making and special events
PSD	Power spectral density
ROCE	Return on capital employed
ROS	Return on sales
RSA	Recognised spectrum access
SFR	Spectrum Framework Review
SRSP	Strategic Review of Spectrum Pricing
STU	Spectrum tariff unit
SUR	Spectrum usage right
TLC	Technical licence condition
UHF	Ultra High Frequency
W	Watt
WiMAX	Worldwide Interoperability for Microwave Access