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Policy for the DECT guard band

Consultation on the authorisation regime and
the licence fees

Consultation

Publication date: 29 September 2016

Closing Date for Responses: 8 December 2016

About this document

This document is consulting on the policy for authorising use of spectrum in the range 1781.7 – 1785 MHz block paired with 1876.7 – 1880 MHz block, which we refer to as the “DECT guard band”. Following an award process held in 2006, there are currently twelve licensees who are authorised to use this spectrum on a low power shared access basis. These licences have an indefinite duration but have come to the end of their Initial 10 year Term. During this period Ofcom had limited powers to make changes to the licensing arrangements – and following the initial term Ofcom may apply annual spectrum fees.

This document considers possible changes to the current arrangements, one of which could be to trigger a move to high power mobile use licensed to a single user. We also raise the possibility of opening the band to a wider range of potential users under a continuation of a low power shared access regime. Access to this spectrum may be of interest to new users because it is within the operating range of standard equipment for the 1800 MHz mobile band.

This document also considers the basis on which we might introduce spectrum fees for licensees in a low power shared access regime, either under the existing arrangements, or if we were to open the band to a wider range of potential users.

This is a consultation on future policy for this band and the broad approach we should take. We are not making specific proposals for change at this point. We would expect to do that subsequently if, following consideration of responses to this consultation, we consider it appropriate to make changes to the current arrangements.

Contents

Section		Page
1	Executive summary	1
2	Introduction	6
3	Options for the authorisation regime (high power single user vs. low power shared access)	14
4	Form of low power shared access	21
5	Licence fees	28
Annex		Page
1	Responding to this consultation	36
2	Ofcom's consultation principles	38
3	Consultation questions	40

Section 1

Executive summary

Background and rationale for the consultation

- 1.1 Licences to use the DECT guard band (1876.7-1880 MHz, paired with 1781.7-1785 MHz) are held by twelve licensees as a result of an auction held by Ofcom in 2006. These Concurrent Spectrum Access (CSA) licences allow use on a low power shared access basis – all licensees are permitted to operate in the same spectrum, under the same conditions and must coordinate deployments with each other.
- 1.2 All of Ofcom’s auctioned licences are now for an indefinite term but include an Initial Term during which there are no spectrum fees and we are not able to revoke the licences for spectrum management reasons. The Initial Term for these CSA licences expired in May 2016. Our general policy on auctioned licences at the end of their Initial Term is to introduce fees based on opportunity cost – but otherwise to leave the licences in place unless there are good spectrum management reasons to consider changes.
- 1.3 There have been a number of recent developments that mean that, in the case of the DECT guard band, it does seem right to take stock and review whether the current licensing arrangements are the most appropriate for promoting optimal use of this spectrum in the long term. In particular:
 - This spectrum has been included in auctions of the 1800 MHz mobile band in a number of European countries in the past few years. In doing so, it has been made available for high power mobile use, licensed to a single Mobile Network Operator (MNO) in a very similar way to the rest of the 1800 MHz mobile band (i.e. without the need for material restrictions on its use in order to protect DECT use in the band above 1880 MHz).
 - New use cases have emerged based on a different form of low power shared access regime which has no limitation on the number of users that can share this access, in particular in Sweden and the Netherlands where the band has recently been made licence exempt.
- 1.4 A related consideration is that the frequencies covered by the DECT guard band are now supported, as part of the 1800 MHz mobile band, for LTE as well as for GSM by almost every mobile handset on sale in the UK. In addition, we have today agreed to a request from TalkTalk, one of the holders of a CSA licence, to vary their licence¹ in order to remove restrictions on the use of standard LTE femtocell equipment, which is now widely available. This will facilitate a use case (for TalkTalk and any other CSA licensee who requests the same variation) that relies on deployments of LTE femtocells at consumer premises. For the avoidance of doubt, the possible changes we discuss in this document to the current arrangements for authorising the use of spectrum in the DECT guard band are unaffected by this licence variation.

¹ <http://stakeholders.ofcom.org.uk/consultations/talk-talk-licence-variation/statement/>

- 1.5 These developments pose two main spectrum management questions which this consultation addresses:
- Whether there is a case to trigger a change in use of this band from the current low power shared access regime to high power mobile use, licensed to a single operator;
 - If we retain the low power shared access approach, whether it would be beneficial to open this up beyond the current set of licensees, doing so via either a light licensing regime (in which the band is opened to new licence applications with no limit on the number of licensees allowed but with a requirement to co-ordinate) or via licence exemption.

High power single user vs. low power shared access

- 1.6 As noted above, recent developments raise the question of whether there is a case to trigger a change in use of the frequencies covered by these DECT guard band licences so as to enable high power mobile use, licensed to a single user. For example, Germany changed its 1800 MHz band plan so as to make this spectrum available for high power mobile use in the form of a 2x5 MHz block – and in its 2015 auction this top 2x5 MHz block sold at a relatively modest discount to other blocks in the 1800 MHz mobile band. High power mobile broadband spectrum is in high demand and is valuable – as shown by our awards and by other awards held across Europe – so we are confident that a single licence would generate significant benefits for consumers.
- 1.7 The 1800 MHz band in the UK is configured in a way that means that the DECT guard band is 2x3.3 MHz wide. A high power mobile block of this size could be valuable for a number of purposes (for example, IoT type applications). However, turning this block into a 2x5 MHz block by reconfiguring the 1800 MHz band plan could create more value – but it could also be more complex to achieve because of the reconfiguration.
- 1.8 Our spectrum management strategy supports market mechanisms – such as trading – that allow a change in use without regulatory intervention. The CSA licences and the MNOs’ 1800 MHz mobile licences are tradable, however we think it is unlikely that a change to high power mobile use would come about through a series of market-led spectrum trades. Rather, we think that a regulatory intervention is required to trigger a change to high power mobile use in the near term.
- 1.9 This regulatory intervention would require us to:
- revoke existing DECT guard band licences and hold an auction of a new high power mobile licence, and
 - if we decided to create a new 2x5 MHz block – rather than simply re-awarding the current 2x3.3 MHz in a new form – then we would have to reconfigure the rest of the 1800 MHz band. In practice one way of doing this would be shifting the existing MNO licences down in frequency and reducing the size of one or more of the existing MNO 1800 MHz licence blocks by a total of 2x1.6 MHz (which, along with an unused guard band of 2x 0.1 MHz at the bottom of the 1800 MHz band, would add the additional 2x1.7 MHz needed).

- 1.10 Achieving this would take time: we would have to give the existing twelve CSA licensees 5 years notice of revocation. We would also need to consult on variations to the existing MNO 1800 MHz licences (if creating a new 2x5 MHz block). In all, it would likely take in excess of five years before the new block was available for new, high power mobile use.
- 1.11 The intervention would have significant impact on all existing licensees involved and their customers: the concurrent licence holders would lose access to spectrum and, if creating a 2x5 MHz block, the MNOs would lose 2x1.6 MHz to which they currently have access. They would also need to reconfigure their mobile networks to shift their frequencies to the revised band plan.
- 1.12 Whether there is a case to trigger such a change clearly depends on the prospective benefits that might be derived in future in a low power shared access regime relative to the benefits in high power use. Although use to date has been modest, it is possible that the future benefits of low power shared access could be significant. Some of the CSA licensees and other stakeholders have argued that a number of new use cases will appear in the coming years. These include, among others: private mobile networks with and without roaming to public networks, deployment of femtocells at consumer premises, and improved indoor coverage solutions at public buildings and blocks of flats. The band could also play a role in addressing coverage problems in rural areas.
- 1.13 These uses have different profiles in terms of their likelihood of success and potential value for consumers. For instance, one company has plans to deploy femtocells in significant volumes. Other potential uses are more speculative at this stage but, if successful, could result in increased competition in the provision of mobile services and better coverage. In summary, the benefits of low power shared access are uncertain but, under some scenarios, they could create significant value for consumers and help promote the availability of a wide range of communication services in otherwise unserved locations.
- 1.14 We also note that this DECT guard band spectrum is the only standardised mobile spectrum that is available for low power shared access and that can be used by companies other than the main MNOs. Whereas, a new 2x5 MHz block would add only 1% to the overall amount of spectrum then available for high power mobile when it became available for use in something over 5 years' time.
- 1.15 On balance, we are not currently minded to trigger a change to high power use in the manner set out above. In part, this reflects a judgement in favour of encouraging innovation in low power shared access applications and promoting the availability of a wide range of communication services – and doing so in an environment that is open to a range of different industry players. In part, it reflects the impact of making such a change on existing users of both this band and the adjacent public mobile band. Rather, it seems more appropriate to give the low power shared access regime more time to show that it can deliver substantial benefits. We are, however, interested in stakeholder views on this question.

Authorisation options for a low power shared access regime

- 1.16 If we do continue with the low power shared access approach, we consider it appropriate to re-assess whether the current regulatory regime (with access limited to twelve licensees) is the most conducive one for maximising consumer benefits – or whether opening the band to more players could be more beneficial.

- 1.17 We have considered two ways in which the current limitation on access could be opened up: the first would be through licence exemption, and the second would be to open the current regime to an unlimited number of licensees (light licensing). These two regimes would minimise the barriers to entry and could facilitate some of the potential uses that have been presented to us.
- 1.18 The decision as to which is the most appropriate of the low power shared access approaches would depend largely on the balance between:
- the extent to which they enable additional use cases: the question here is whether a more open regime could enable business models that might not be practical under the existing licensing approach; and
 - the risks of interference: the current approach, which restricts access to twelve licensees and puts them under an obligation to coordinate with each other, was adopted in order to manage the risks of interference. However, if these risks were now thought to be minimal, then this would point us towards a licence exempt regime. If the interference risks were thought to be sufficient to require coordination but the ease of coordination was not greatly affected by the number of licensees, then there could be an argument for moving to a light licence regime open to all.
- 1.19 Our preliminary view is that it would not be appropriate to move to a licence exemption regime, at least not at this point in time. We retain a concern over the interference issues, particularly in the case of neighbouring residential deployments, and we would need to see more evidence on the extent of these risks, based on practical experience, before making a change of this nature. We also note that a licence exempt regime may be less adaptable to future changes.
- 1.20 Light licensing might offer benefits from opening the band more widely. We think it would be possible to open up this regime in the short term, alongside the existing twelve licences (possibly with changes to the coordination provision in the existing licences). However, before doing so, we would need to have a better understanding of the feasibility of coordination in a regime with a potentially large number of licensees. It might also be possible to adapt the current coordination arrangements so that they are tailored by reference to different types of deployment (where the risks of interference differ).

Licence fees

- 1.21 As noted above, Ofcom's general policy on auctioned licences is to consider the introduction of fees after licences have come to the end of their Initial Term. This is a relevant consideration in the event that we continue with the current licensing regime or if we were to move to a light licensing regime (fees are not relevant in a licence exempt regime).
- 1.22 This document outlines (in section 5) a number of options for setting a fee based on Administered Incentive Pricing (AIP), set with reference to the opportunity cost of high power mobile (as the relevant alternative use of the band). An AIP-based fee would provide us with evidence on the licensees' collective willingness to pay for access to this spectrum – and this evidence could help inform us, in a few years' time, about the strength of the case to maintain the low power shared access regime.
- 1.23 However, the fact that the licensees have shared access means that it is not straightforward to apportion the overall opportunity cost between the licensees when

setting the fee rates (as the opportunity cost relates to their collective use of the band, rather than to the use by any individual licensee on its own). The different AIP-based fee approaches that we describe deal with this challenge in different ways and have different advantages and disadvantages in terms of the incentives they afford and ease of implementation.

- 1.24 Section 5 also discusses the use of a cost-based fee approach. One reason for this approach could be if we thought that, for the practical AIP-based fee approaches, the drawbacks outweighed the benefits in terms of promoting efficient use. In that case, cost-based fees could create the most conducive environment for the development of low power shared access applications and the promotion of the availability of a wide range of communication services.
- 1.25 Some of the approaches for introducing fees are more appropriate to either the light licence version or to the current CSA version of the low power shared access regime (for the reasons explained in section 5). In this consultation we are seeking stakeholders' views on the broad approach to setting fees only (we are not consulting on specific fee proposals).

Next steps

- 1.26 This consultation is seeking responses on the broad approach we should take to authorising use of this spectrum, and on the principles for setting fees for its use. We are not making concrete proposals in this document for specific changes to the current authorisation regime or for the introduction of spectrum fees. If, following consideration of responses to this consultation, we consider it appropriate to make changes to the current arrangements then we would expect to set out specific proposals for further consultation in a new document.
- 1.27 This consultation will run for a period of 10 weeks, the last day to submit your representations will be the 8 December 2016.

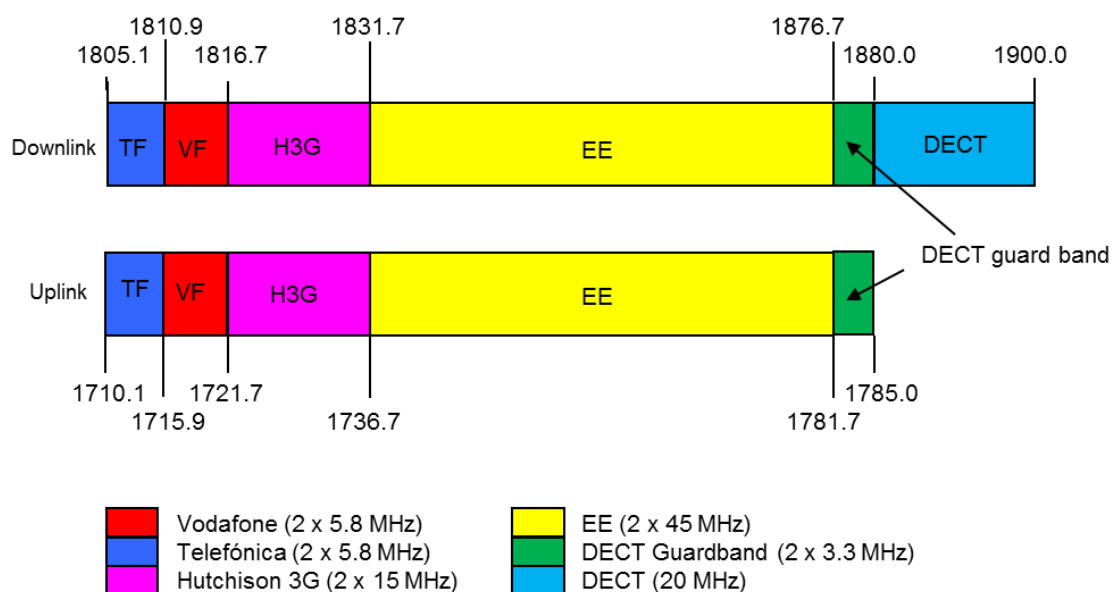
Section 2

Introduction

The DECT guard band and the Concurrent Spectrum Access licences

- 2.1 Spectrum in the 1800 MHz band was first licensed for GSM to mobile network operators in the early 1990s. As a precautionary measure, it was decided at the time to create a guard band of 3.3 MHz between GSM use and the Digital Enhanced Cordless Telecommunications (DECT) telephony allocation at 1880 – 1900 MHz.
- 2.2 However, later studies² suggested that use in the band would not adversely impact either GSM or DECT users and, in 2006, Ofcom considered the best way to make this spectrum available for use³. Having considered various authorisation options, we decided to pursue a shared access approach with a limited number of licences. We then held an award process⁴ that resulted in twelve licences for use of the 1781.7 -1785 MHz and 1876.7-1880 MHz bands. The figure below shows the location of these frequency blocks, together with the allocations in the 1800 MHz mobile band and the sizes of the MNOs' blocks.

Figure 1: Band layout (block boundaries in MHz)



² ERC report 100 "Compatibility Between Certain Radiocommunications Systems operating in adjacent bands Evaluation of DECT / GSM Compatibility"

³ Spectrum Framework Review: Implementation Plan, <http://stakeholders.ofcom.org.uk/binaries/consultations/sfrfp/summary/sfr-plan.pdf>

⁴ http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/awards-archive/completed-awards/award_1781/

- 2.3 The twelve Concurrent Spectrum Access licences for use of the 1781.7-1785 MHz and 1876.7-1880 MHz (the CSA licences) contain identical terms and conditions. In particular:
- All licensees have the same rights and obligations and they are licensed to use the same frequencies on a shared basis in the whole of the UK. However, to avoid interference each licensee must undertake technical coordination with other licensees. Licensees were also initially required to collectively develop an Engineering Code of Practice for the coordination process.
 - The licences have an indefinite duration but can be revoked on five years' notice for spectrum management reasons. However, such notice could not take effect during the Initial Term of 10 years (which finished in May 2016).
 - The award process, an auction, determined the fee paid by each licensee for the Initial Term in 2006. After the Initial Term of 10 years, the licences provide for Ofcom to introduce spectrum fees.
- 2.4 The licences are tradable and some of them have been traded since the award. The current licence holders are the following twelve companies:
- BT Telecommunications plc
 - BT Onephone Limited
 - COLT Mobile Telecommunications Limited
 - FMS Solutions Limited
 - Mundio Mobile Limited
 - TalkTalk Communications Limited
 - PLDT (UK) Limited
 - Shyam Telecom Limited
 - Telefónica (UK) Limited
 - Teleware plc
 - UK Broadband Limited
 - Vodafone Limited
- 2.5 Only a few of the licensees have made use of the spectrum so far, mainly for the provision of private mobile networks (PMN) services. This service is often marketed as a replacement for desk phones (or an enhanced DECT system) where the handsets are off-the-shelf mobile phones, with a SIM from the PMN provider. The customers are normally medium or large organisations based on large premises – such as garden centres or hotels. The provider deploys low power mobile base stations at the customer premises and connects them to the customer's switchboard, with users placing internal and external calls through the system.
- 2.6 Some of the other licensees have conducted technology trials, but the majority have yet to deploy equipment to use this spectrum commercially.

Status of the band in Europe

- 2.7 Most European countries⁵ have made the spectrum immediately below the DECT block available to a single licensee for high power mobile use, i.e. under the same conditions as the rest of the 1800 band. For example, the 2015 German auction of spectrum in the 1800 MHz band included a 2x5 MHz lot for this block (1875 – 1880

⁵ According to ECO Report 003, the following countries have spectrum available for national coverage to a single operator right up to the DECT band (ie licensed to 1879.9/1800/1800.1 MHz): Andorra; Austria; Belarus; Belgium; Croatia; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Liechtenstein; Luxembourg; Moldova; Montenegro; Romania; Slovenia; Spain; Switzerland

MHz paired with 1780 – 1785 MHz) alongside other 2x5 MHz blocks in the 1800 MHz band. A relatively small number of our European neighbours appear to have preserved a guard band.

- 2.8 Two countries – Sweden and the Netherlands – have taken a different approach to authorisation in the DECT guard band. These countries considered the regime that we have in the UK and took our low power shared access approach one step further, by opening it for licence exempt use as a 2x5 MHz block.

Legal framework

- 2.9 In addressing issues of spectrum management, Ofcom operates under a well-established legal and regulatory framework. The following paragraphs provide an overview of the main UK and European legislative provisions relevant to the issues discussed in this document.
- 2.10 The applicable legal framework derives from our duties under both domestic and European legislation, specifically from:
- the Communications Act 2003 (the ‘Communications Act’) and the Wireless Telegraphy Act 2006 (the ‘WT Act’); and
 - the European Common Regulatory Framework⁶ for electronic communications networks and services, in particular, the Framework Directive and the Authorisation Directive.

Ofcom’s general duties

- 2.11 Section 3 of the Communications Act sets out Ofcom’s general duties. Under section 3(1) it is the principal duty of Ofcom in carrying out its functions:
- to further the interests of citizens in relation to communications matters; and
 - to further the interests of consumers in relevant markets, where appropriate, by promoting competition.
- 2.12 In carrying out Ofcom’s functions, Ofcom is required to secure, amongst other things, the optimal use for wireless telegraphy of the electromagnetic spectrum; and the availability throughout the UK of a wide range of electronic communication services (section 3(2)).
- 2.13 In performing its duties, Ofcom must in all cases have regard to the principles of transparency, accountability, proportionality and consistency, as well as ensuring that our actions are targeted only at cases in which action is needed (section 3(3)).
- 2.14 Ofcom must also have regard, amongst other things, to the following matters as they appear relevant in the circumstances: the desirability of promoting competition (section 3(4)(b)); the desirability of encouraging investment and innovation in relevant

⁶ The Common Regulatory Framework comprises the Framework Directive (Directive 2002/21/EC), the Authorisation Directive (Directive 2002/20/EC), the Access Directive (Directive 2002/19/EC), the Universal Service Directive (Directive 2002/22/EC) and the Directive on privacy and electronic communications (Directive 2002/58/EC), as amended by the Better Regulation Directive (Directive 2009/140/EC).

markets (section 3(4)(d)); the desirability of encouraging availability and use of broadband services throughout the UK (section 3(4)(e)); the different needs and interests, so far as the use of the electro-magnetic spectrum for wireless telegraphy is concerned, of all persons who may wish to use of it (section 3(4)(f)); and the different needs and interests of persons in different parts of the UK (section 3(4)(l)).

- 2.15 The management of the UK radio spectrum is carried out within a framework set out by the European Common Regulatory Framework, which aims to harmonise the regulation of electronic communications networks and services throughout the European Union. Related to that, Section 4 of the 2003 Act requires Ofcom when carrying out its spectrum functions to act in accordance with “six community requirements” when managing the wireless spectrum within the UK. These include in particular the requirement to promote competition (section 4(3)).

Ofcom’s duties when carrying out spectrum functions

- 2.16 In carrying out its spectrum functions it is the duty of Ofcom (under section 3 of the WT Act) to have regard in particular to the extent to which the spectrum is available for use, or further use, for wireless telegraphy; the demand for use of that spectrum for wireless telegraphy; and the demand that is likely to arise in future for the use of that spectrum for wireless telegraphy.
- 2.17 It is also the duty of Ofcom (under section 2 of the WT Act) to have regard, in particular, to the desirability of promoting the efficient management and use of spectrum 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.
- 2.18 Where it appears to Ofcom that any of its duties in section 3 of the WT Act conflict with one or more of its general duties under sections 3 to 6 of the Communications Act, priority must be given to its duties under the Communications Act.

Licensing, licence exemption and fees

- 2.19 Ofcom’s powers to carry out its spectrum functions are set out in the WT Act. Such powers include, under paragraph 6 of Schedule 1 of the WT Act, the general discretion to revoke or vary any wireless telegraphy licences by serving a notice in writing on the licence holder or by way of general notice to licensees in a class.
- 2.20 Under section 8(1) of the WT Act it is unlawful to use wireless telegraphy equipment except under and in accordance with a licence granted by Ofcom. However, Ofcom has the discretion under section 8(3) to make regulations to exempt from subsection 8(1) the use of equipment if Ofcom if it considers it appropriate.
- 2.21 Whereas Ofcom has discretion in relation to licence exemption under section 8(3), under section 8(4) Ofcom must make regulations exempting particular equipment if certain conditions are met - in particular, if Ofcom is satisfied that the use of stations or apparatus of a particular description is not likely to involve undue (harmful) interference. These conditions are set out under section 8(5).
- 2.22 Section 12 of the WT Act gives Ofcom the power to prescribe sums payable in respect of wireless telegraphy licences and section 13 permits Ofcom to recover sums greater than those necessary to recover the costs incurred in connection with our radio spectrum functions.

Regulatory background

Award of the DECT guard band in 2006

- 2.23 In 2005 Ofcom conducted a strategic review of the way it manages spectrum and the bands that it would consider releasing in the coming years.⁷ The review included the 1781.7 – 1785 MHz block and the 1876.7 – 1880 MHz block (which we refer to as the DECT guard band spectrum). These blocks were unused at the time because, when the original GSM 1800 assignments were made, the technical opinion was that 1876.7 – 1880 MHz should be kept clear to provide a guard band to protect GSM 1800 services from interference from DECT systems and vice versa. The 2005 review explained that more recent technical work (ERC Report 100 and Ofcom's own analysis) indicated that a guard band was no longer necessary provided that certain technical constraints were imposed. The review considered the best way to make the band available and set out various options which included traditional, high power mobile services, and several low power options as well as looking at potential licence exemption.
- 2.24 Our assessment at the time was that a single national licence would be inferior to an option of low power shared access in terms of promoting optimal spectrum use and competition. We considered that licence exemption was not appropriate as we believed that coordination between service providers would be needed to ensure that the services that we expected would not suffer from harmful interference. Instead, our view was that shared licensed access, where licensees would have an obligation to coordinate deployments, would result in more efficient use.
- 2.25 We also considered carefully the optimum number of users, notably whether there should be a limitation in their number. We concluded that, in the absence of any limit, the number of licensed users of the DECT guard band could be high. Any one of these licensed users might fail to coordinate effectively with others, imposing significant costs on those other users. Also, the cost of transacting and bargaining with other users could be high, frustrating efficiently coordinated use.
- 2.26 We concluded that the best use of the spectrum was with a limited number of users (between seven and twelve) operating at low power and, given excess demand, that a competitive award was necessary. In 2006 we consulted⁸ on the conditions of the licences and on the method for the award. We then held an award process⁹ which resulted in twelve licences, each providing identical access rights as noted in paragraph 2.3.

Alternative licensing approaches

- 2.27 At the time of the 2006 award we explained that we had no plans to offer other Wireless Telegraphy licences for use of the DECT guard band or to extend the use of

⁷ Spectrum Framework Review: Implementation Plan,
<http://stakeholders.ofcom.org.uk/binaries/consultations/sfrip/summary/sfr-plan.pdf>

⁸ <http://stakeholders.ofcom.org.uk/consultations/1781/>

⁹ http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/awards-archive/completed-awards/award_1781/

the band to additional licence exemption measures. However, we also explained that Ofcom could, in the future, use its discretion to assign additional Wireless Telegraphy licences for use of the DECT guard band either of the same character or of a different character to those awarded following the auction. We also said that any such proposal would be subject to consultation, taking into account the interests of the DECT guard band licensees¹⁰. Similarly, we said that, if in the future there were reasons to consider allowing licence exempt use of the DECT guard band in conjunction with use under the existing twelve awarded licences we would consult on our plans as part of our assessment of the case for such use¹¹.

Fee policy

- 2.28 We indicated in the Information Memorandum that Ofcom would consider whether to charge fees after the Initial Term. This is also captured in the terms of the CSA licences. We have since reiterated that our policy is to consider fees for auctioned spectrum after the Initial Term of licences. In our consultation on our revised framework for Spectrum Pricing¹² in 2010 we briefly referred to the fact that we might apply Administered Incentive Pricing – based on opportunity cost – to licences that have been auctioned, after the Initial Term. We also referred to this policy in our 2013 Spectrum Management Strategy¹³.
- 2.29 We have already implemented this approach. The Spectrum Access 28GHz licences for spectrum initially auctioned in 2000 were varied in 2013 to make them of an indefinite term, subject to an AIP fee which was introduced from January 2016 following consultation last year.¹⁴

Variation to technical licence conditions to facilitate LTE use

- 2.30 TalkTalk holds one of the CSA licences to operate in the band. It submitted to us earlier this year a request to vary the conditions of its licence, where it asked for a variation of the out of block emissions requirements in order for it to deploy standard low power LTE equipment in this spectrum. We have published our statement today setting out our decision to agree to the request¹⁵. For the avoidance of doubt, the possible changes to the current arrangements for authorising the use of spectrum in the DECT guard band which we discuss in this document are unaffected by this

¹⁰ Statement on the award of available spectrum, paragraph 3.46,

http://stakeholders.ofcom.org.uk/binaries/consultations/1781/statement/statement_1781.pdf

¹¹ Information Memorandum for the auction of spectrum 1781.7-1785 MHz paired with 1876.7-1880 MHz, paragraphs 6.4 and 6.5, http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/awards-archive/completed-awards/award_1781/documents/im/

¹² SRSP: the revised Framework for Spectrum Pricing, paragraph 2.40

http://stakeholders.ofcom.org.uk/binaries/consultations/srsp/summary/srsp_condoc.pdf

¹³ Annex 5, http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum-management-strategy/summary/spectrum_management_strategy.pdf

¹⁴ <http://stakeholders.ofcom.org.uk/binaries/consultations/variation-28ghz/statement/statement.pdf>

¹⁵ <http://stakeholders.ofcom.org.uk/consultations/talk-talk-licence-variation/statement/>

variation (to TalkTalk's licence and, prospectively, to any other CSA licence whose holder requests the same variation).

Why are we consulting now and what are we consulting on

- 2.31 When auctioned licences come to the end of their Initial Term our primary focus is usually on the issue of spectrum fees, rather than on whether there might be grounds to change the licensing regime (these licences are of indefinite duration and, absent regulatory intervention, the licensees can continue to exploit the spectrum access rights they have under the terms of their licences). However, in the case of the DECT guard band licences, we think that there are particular reasons why it is appropriate to consider whether the current arrangements are still the most appropriate way to authorise use of this spectrum.
- 2.32 One reason for this lies in recent evidence from other countries that indicates that this spectrum could be used for high power mobile services in the same way as other spectrum in the 1800 MHz mobile band (a use which we know has significant value). This evidence suggests it is an appropriate time to consider whether there is a case to follow the example of other countries and to move to high power mobile use in this spectrum in the UK, particularly as there has been limited use under the existing low power shared access regime. That said, licensees and other stakeholders have told us about plans for increased exploitation of the band under the current low power, shared access regime.
- 2.33 Meanwhile, an alternative approach to low power shared access has been adopted in Sweden and the Netherlands where they have made this spectrum licence exempt (the ultimate form of low power shared access) and which, we understand, is proving successful in generating new uses. This provides a separate reason, from a different perspective, for us to review the current arrangements in the UK.
- 2.34 In the light of these developments, the main purpose of this consultation is to consider, and seek stakeholder views on, the authorisation regime for the band. Accordingly, the two main questions that we address in this consultation are whether:
- there is a case to move from the current low power shared access licensing regime to an alternative regime in which this spectrum is, instead, made available for high power mobile use, licensed to a single user; and
 - if we maintain the low power shared access regime, there could be a case to open up this regime to a wider set of prospective users, either by allowing others to apply to Ofcom for new licences (on the same terms as the existing CSA licences) or by moving to a licence exempt regime.
- 2.35 These two main questions are addressed in sections 3 and 4 respectively. This consultation also addresses the subject of spectrum fees in section 5, but this is a supplementary issue because the approach to setting spectrum fees may depend on the choice of authorisation approach.
- 2.36 Therefore we are seeking views on the broad approach we should take to authorising use of this spectrum, and on the options for setting fees for its use. We do not include proposals, at this time, for specific changes to the current authorisation regime or for the introduction of spectrum fees. If, following consideration of responses to this consultation, we consider it appropriate to make changes to the current arrangements then we will set out specific proposals for further consultation.

2.37 In accordance with our statutory duties and the factors we are required to have regard to when carrying out our spectrum functions we consider that our objective when looking at these questions is to:

- make this spectrum available for a use which is likely to result in the highest value for UK citizens and consumers in the long term, in particular taking into account the value of potential innovation, of additional competition, and the demand for use of the spectrum, today and in the future;
- consider whether and how this spectrum could play a role in promoting the availability of a wide range of electronic communication services (including the availability of mobile services in particular at locations where coverage is poor or non-existent);
- manage the spectrum in the most efficient way in the light of the uncertainties around take up of the various business models that have been proposed and the interference environment that could result.

2.38 This consultation will run for a period of 10 weeks, the last day to submit your representations would be 8 December 2016.

Impact assessment

2.39 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 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 Ofcom's activities.

2.40 This document raises two policy questions – outlined above – and presents our preliminary thinking in term of the possible options. It asks stakeholder for their views on these options and the impact on their businesses and on UK citizens and consumers. As we are not making specific proposals for change we have not carried out a formal impact assessment at this stage. Following the outcome of this consultation we will carefully consider the responses we receive from stakeholders and decide whether to consult on specific proposals for change, both in relation to future use of the band and fees. We will conduct a full impact of any proposals we put forward for further consultation and our consultation will include our assessment of the impact those proposals.

Section 3

Options for the authorisation regime (high power single user vs. low power shared access)

- 3.1 This section addresses the first of the high level issues set out in the introduction, namely the question of whether there is a case to move from the current low power shared access licensing regime to an alternative regime in which this spectrum is, instead, licensed to a single user for high power mobile i.e. used on outdoor, high power macro cell sites.
- 3.2 We set out first the feasibility and the benefits of creating a single user high power licence regime, noting some of the issues that would arise in transitioning to such a regime. We then consider the benefits of a continued low power shared access regime before setting out our preliminary view on this high level question.

High power single user in the DECT guard band

Coexistence between DECT and high power mobile use

- 3.3 CEPT has looked several times at the co-existence of cellular mobile systems in the 1800 MHz band with systems in adjacent bands. The results of the analysis are captured in three Reports: ERC report 100¹⁶ (February 2000), ECC Report 96¹⁷ (March 2007) and CEPT Report 41¹⁸ (November 2010). These reports cover co-existence of GSM, 3G and 4G systems successively. The analysis and conclusions in these reports indicate that neither a guard band nor mitigation techniques are required to ensure co-existence between neighbouring use of DECT and high power mobile using GSM, 3G or LTE technologies.
- 3.4 On this basis, our preliminary view is that, if we were to make the guard band spectrum available for high power mobile, the technical licence restrictions could be comparable to other Public Wireless Network licences in the 1800 MHz band. We do not think at this stage that additional restrictions above these licences would be required.

Benefits of creating a high power mobile block

- 3.5 Given the above, the DECT guard band spectrum could be used for high power mobile broadband, licensed to a single operator. Several countries in Europe have already released the entirety of the 1800 band for high power mobile use in this way

¹⁶ ERC report 100 “*Compatibility Between Certain Radiocommunications Systems operating in adjacent bands Evaluation of DECT / GSM Compatibility*”

¹⁷ ECC Report 96 “*Compatibility between UMTS 900 / 1800 and systems operating in adjacent bands*” – Published March 2007

¹⁸ CEPT Report 41 “*Compatibility between LTE and WiMAX operating within the bands 880-915 MHz / 925-960 MHz and 1710-1785 MHz / 1805-1880 MHz (900/1800 MHz bands) and systems operating in adjacent bands*”

(i.e. they have awarded the 1710-1785 MHz block paired with the 1805-1880 MHz block, which include the current UK guard band spectrum (1876.7-1880 MHz paired with 1781.7-1785 MHz)). The band is part of the 3GPP standards and widely supported by existing equipment – in particular nearly every mobile handset available today can operate in these frequencies. This means that, if released as a single licence for high power mobile broadband, the new frequencies could be put into use very quickly after release. Furthermore, the 1800 MHz band has become a key band for LTE – some of the MNOs have deployed this technology in their 1800 frequencies at many locations across the UK – and thus the guard band spectrum is likely to be of high value as an addition to an MNO's mobile broadband capacity.

- 3.6 A key feature of the 1800 MHz band layout in the UK is that the DECT guard band is 2x3.3 MHz wide instead of the more common 2x5 MHz used in other countries. A 2x3.3 MHz block could have value for high power mobile use in a number of ways. It could be used as a standalone 2x3MHz LTE channel that supports VoLTE (Voice over LTE). Alternatively, it might be possible to use it for narrowband Internet of Things technology recently standardised in 3GPP Release 13 (LTE advanced pro). A third possible use might be GSM: MNOs could migrate their legacy GSM services to this spectrum to facilitate re-farming of 900 MHz and other 1800 MHz spectrum for LTE, or providers who do not currently hold GSM spectrum could deploy a few GSM channels in support of their 3G/4G networks.
- 3.7 However, an alternative could be to create a 2x5 MHz block that incorporates the current guard band spectrum. This would require reconfiguration of the overall 1800 MHz band (in a manner discussed further below). A 2x5MHz LTE channel would allow for greater data throughput and enable certain attractive LTE functionalities that we understand are not currently available with a narrower channel – such as carrier aggregation. Initial conversations with the industry suggest that there could be less interest in a 2x3.3 MHz block than in a 2x5 MHz block. However, we would be interested in further views on this point.

Could high power use come about through market-led actions?

- 3.8 Given the potential benefits of high power single licence use, it is worth considering whether market players could bring this change about on their own. The CSA licences are tradable. In principle, therefore, it would be possible for an MNO (or other company) that wanted to pursue high power mobile use of this spectrum to buy all the existing CSA licences that it does not currently hold, surrender eleven of them and apply for a licence variation to permit high power use under its remaining licence.
- 3.9 In addition to the above, a high power 2x5 MHz block would need transactions that would impact the current holdings of the MNOs in the lower part of the 1800 MHz band. Each MNO would have to move down in frequency its existing block, and trades of up to 2x1.6 MHz would be necessary in order to build a 2x5 MHz block from the current 2x3.3 MHz DECT guard band. In addition, MNOs would need to request Ofcom to release the 2 x 0.1 MHz guard band that currently exists at the bottom of the 1800 MHz mobile band (at 1710.0-1710.1 paired with 1805.0-1805.1 MHz).
- 3.10 We note that these transactions towards a high power single user channel (either 2x3.3 MHz or 2x5 MHz) would have to involve the 3 MNOs that currently hold a CSA licence (Telefónica, Vodafone and BT/EE). The outcome would be that one of them – or other company – would end up with an additional 1800 MHz channel for mobile use. However these companies are competitors in the downstream market and they may not wish to facilitate such outcome for competitive reasons. We note also that agreements with all the other CSA licensees are required, something that could be

difficult to secure. Finally, if looking to create a 2x5MHz block, it requires Ofcom to release the 2x0.1 MHz lower guard band.

- 3.11 Given the nature of the required transactions, we think it unlikely that there would be a successful market-led process to create a new high power block in the hands of one MNO (or a third party). Therefore, a regulatory intervention is more likely to achieve a transition to high power use in the DECT guard band spectrum. We consider next the steps that this might require.

Regulatory steps required to create a new high power block

- 3.12 A regulatory process to convert the DECT guard band spectrum into a high power block of the same size (2x3.3 MHz) would require us to:
- Give 5 years notice of revocation to the existing CSA licensees on spectrum management grounds; and
 - Consult on and conduct a new award process for a single high power licence block of 2x3.3 MHz, which would come into effect on expiry of the existing CSA licences at the end of the 5 year notice period.
- 3.13 As noted previously, we have agreed today to the licence variation requested by TalkTalk and as we have explained in our statement, we would grant the same variation to other CSA licence holders upon request. If Ofcom should decide to move to a single user high power licence regime, it would remain open to other CSA licensees, who wished to request the same licence variation as TalkTalk, to do so on the understanding that this would be effective only for the remaining period of the licence (i.e. up until the date on which the 5 year notice period of revocation expires and the licence is revoked).

2x5 MHz block

- 3.14 If we decided that the most appropriate course of action was to create a new 2x5 MHz block for high power use, it would also be necessary to reconfigure the rest of the 1800 MHz band so as to release the additional 2x1.7 MHz (of which 2x1.6 MHz would have to come from a reduction in the existing MNO spectrum holdings in the 1800 MHz band). We would need to consult on how to achieve this and, if we decided to proceed, would need to issue notices of licence variation to the MNOs, the effect of which would sensibly be timed to coincide with the end of the CSA licences referred to above.
- 3.15 We would also have to consider the method for assignment of frequencies in the new 1800 MHz band plan so as to deliver contiguous frequency allocations for each MNO, if this was considered important. In addition, it would make sense to target an arrangement based on channels of 2x5 MHz that either are, or might in future, be used for LTE. Looking at the current band layout in figure 1 in section 2, possible options for reconfiguration that prioritise 2x5 MHz channels include the following:
- Reduce Vodafone's and Telefonica's blocks to 2x5 MHz (from 2x5.8 MHz) and move them down in frequency (so that Telefonica's block starts at 1805.0 MHz DL and 1710.0 MHz UL), and move EE and H3G allocations down as well by 1.7 MHz;

- Move all blocks down by 0.1 MHz and reduce EE's block by 1.6 MHz (we understand that EE is likely to continue to use a part of its 2x45MHz holding for GSM which does not need channels of 2x5 MHz);
- A hybrid of the above in which the licence variation process leads to an overall release of 2x3.2 MHz (2x1.6 MHz from EE's block and 2x0.8 MHz from both of Vodafone's and Telefonica's blocks).
The additional 2x1.6 MHz (over and above what is needed to create the new 2x5 MHz block) would be auctioned alongside the new 2x5 MHz block so that the MNO(s) that placed most value on retaining ongoing use of this spectrum could acquire it in the auction.

3.16 These are just three possible ways of reconfiguring the 1800 MHz band and there could be others. A point to bear in mind is that shifting the frequencies of the existing MNO licences in the 1800 MHz band– even a few hundreds of kHz – would require re-configuration of the existing networks and, in some cases, hardware changes. This should not automatically be a barrier to change – a need for similar reconfigurations will have been triggered following recent 1800 MHz auctions in Europe, where MNOs often have to shift frequencies when mobile licences come to an end and the spectrum is re-auctioned. But the cost of reconfiguration would be a relevant factor in assessing the net value associated with a switch to a high power mobile use (irrespective of who bears those costs).

Question 1: In the light of the complexities of the transition, do you have views on the relative value of a 2x5 MHz block as opposed to a 2x3.3 MHz block for high power mobile use?

Final remarks on a regulatory-led transition to a high power single user regime

- 3.17 We emphasise that we are not consulting in this document on how we might go about the process of driving a change to high power use of the DECT guard band spectrum. We are not therefore specifically seeking stakeholder comments on the process summarised above. Instead, we are sketching out that process to illustrate two main points, namely that:
- The new high power block is very unlikely to be available for use until 5 years after the notices of revocation and variation were issued – and we would not be in a position to issue these notices until we had developed detailed proposals and consulted on them. In other words, a new high power block would not be available for use until more than 5 years from now.
 - The process of creating a new 2x5 MHz high power block would not be straightforward. It might take considerable time and effort – with significant implications for existing licensees (both CSA licensees and MNO 1800 MHz mobile licensees).

Benefits of low power shared access authorisation regime

3.18 We think that the potential benefits of future low power shared access use of this spectrum could also be significant. Although the use of the band until now has been fairly low, licensees have argued that this is because the technology and commercial arrangements have not yet been there to make full use of the band. They have also argued that they have invested significantly in innovations for the band, and that their

investments will start paying off in the coming years. Two examples of these innovations are base stations that support a GSM and a LTE carrier in the same frequency block, and cloud based network functions.

Potential future uses

- 3.19 Several licensees and stakeholders that we have spoken to think that a number of innovative applications will emerge if a shared regime is retained (or opened up further). These include:
- Mobile broadband femtocells at home: TalkTalk, a CSA licence holder, has plans to deploy routers with an LTE femtocell in residential homes. Other licensees have also mentioned this as a potential application although their plans are more tentative.
 - Extension of coverage indoors at public buildings: Landlords of buildings where coverage is poor could deploy low power base stations operating in this band to provide coverage, after reaching agreements with the MNOs or with an alternative mobile operator. This way of addressing indoor coverage is being developed in Sweden and the Netherlands (see below).
 - Additional capacity for an MNO network, at locations where the 1800 network is congested: the DECT guard band is not co-frequency with the 1800 spectrum that MNOs use in their macro-cell layer, so it could be used for both outdoors and indoor femtocell deployments without affecting the rest of the MNOs' mobile network.
It could also facilitate deployment of femtocells that support multiple MNOs. An important issue for multi-MNO cells is agreeing on which frequencies to use in the cell, because an individual MNO might not want to share its spectrum resources with its competitors. Use of the DECT guard band would overcome this particular problem.
Finally, from the perspective of spectrum management, it could also be more efficient to have a channel that can be shared by all – rather than (hypothetically) each MNO putting aside for femtocell use a highly valuable high power channel.
 - Other, potentially more speculative applications include indoor coverage for MVNOs – femtocells operating in the guard band could be deployed at locations that a MVNO would like to serve, but where the partner MNO does not have an interest to extend its network – and 2G voice service on trains.
- 3.20 In addition, the shared spectrum could potentially be used to help improve rural coverage if the current licence conditions were modified to allow higher powers. Rural not-spots could be addressed by deployment of a private mobile network by a CSA licensee or by the rural communities themselves (the latter would require a regime where the licensing regime was opened up to other users). The low power limit is likely to be an important constraint in this scenario if the community is spread over a large area, but one that could possibly be addressed by a modification of the licence terms to allow for higher power used under certain conditions – such as agreement with other users or geographical isolation – or by a regime where Ofcom assigns and coordinates deployments.
- 3.21 Finally, current operations will continue. Some CSA licensees already run Private Mobile Networks, and they have told us that they are committed to continue and grow their businesses. In particular there are plans to introduce new services and technology developments using LTE.

Evidence from the Netherlands and Sweden

- 3.22 We have also investigated the use of the DECT guard band in Sweden and the Netherlands. The band is open under a licence exemption¹⁹ scheme in these countries therefore the administrations do not have records of usage. However we understand that there is now a promising market in the Netherlands with several companies – in addition to the Dutch MNOs – offering private GSM/UMTS/LTE networks mainly for large office buildings.
- 3.23 PTS, the Swedish regulator, has explained to us that one of the main objectives behind licence exemption was to improve coverage indoors. PTS believe that the band can support alternative operators (to the MNOs) providing such services, and that licence exemption can stimulate competition by lowering the barriers to entry to SIM based technologies.
- 3.24 There is evidence that open access has facilitated new business models that address the problem of indoor coverage in Sweden. Stakeholders have presented us a model where landlords of premises with poor coverage (such as residential blocks, hotels or hospitals) deploy a distributed antenna network and / or femtocells to provide a mobile service to consumers in the building. The service is provided either through a new local Mobile Network with its own SIM cards, or through agreements with the MNOs to connect their networks to the antenna system (either by placing their own pico-BS on the premises, or through a repeater). Under this system, a third party operates the local mobile network, manages the commercial agreements with the mainstream MNOs (eg. interconnect for the in-building service, MVNO arrangements for out-of-building service) and provides the technical support (the installation and maintenance of the antenna network, femtocells and other in-building networks). We are aware of one company which already provides this service to several apartment blocks and is in discussions with a major Swedish housing agency for further coverage.

Question 2: Are there any other developments, in the UK or in Europe, relevant to our policy in this band that we should be aware of? In particular, are there other potential applications that could be deployed in the band under a low power, shared access regime? It would also be helpful to receive any updates from the current CSA licensees on their plans.

Preliminary view

- 3.25 In summary:
- High power single user mobile would be a valuable use of this spectrum and could be ready quickly after its release, although getting to that point is likely to take time – the spectrum would not become available for high power use until more than 5 years from now. Also, it could be complex and costly to put in place if we decided that the most appropriate course of action was to create a new 2x5 MHz block.
 - Although the use of this spectrum for low power applications has not taken off on a large scale so far, we are aware of plans for substantial expansion in its use. This, together with the evidence from Sweden and the Netherlands, suggests that

¹⁹ Indoor use only in Sweden

the low power shared access regime also has the potential to deliver significant benefits for consumers who are otherwise un-, or under-, served through the types of application outlined above. It might also help promote the availability of a wide range of communication services. However, there is greater uncertainty associated with the delivery of these benefits.

- 3.26 These are mutually incompatible regimes for the future use of this spectrum because a regime for high power mobile use could not coexist with a low power shared access regime. The potential future benefits of the two regimes outlined above are important to the choice of future regime; however, the level of uncertainty associated with the low power shared access regime (in particular) makes it harder to make a direct comparison at this point.
- 3.27 When weighing up the relative merits of the alternate regimes we are mindful that:
- There are existing CSA licensees in this spectrum, some of whom have active plans for expanded use of their licences (in other words, we are not considering how best to authorise future spectrum use in a band which is currently vacant); and
 - This spectrum is the *only* standardised mobile spectrum that is accessible to users other than the 4 MNOs for low power mobile applications – whereas it would represent a small fraction (1%)²⁰ of the total spectrum available for high power mobile use at the time that it became available for this use (in something over 5 years).
- 3.28 Having in mind our duties, particularly our duties to promote optimal use of spectrum, to promote the availability throughout the UK of a wide range of electronic communication services and to promote innovation, we are currently not minded to trigger today an end to low power shared access regime for this band. Instead, it would make sense to see whether, over the next few years, the opportunity is taken up to exploit what is the only mainstream mobile spectrum that is available for low power, shared access. However, we seek the views of stakeholders on this point.

Question 3: Do you agree with this preliminary view that we should not trigger a change from a low power shared regime to a high power single use regime at this point?

²⁰ There is around 660 MHz of spectrum already licensed for high power single user mobile with an additional 250 MHz plus becoming available in the next few years in the 700 MHz, 2.3 GHz and 3.4 GHz bands. Reconfiguring the 1800 MHz band to create another 2 x 5 MHz high power channel would therefore add only 1% to the overall amount of spectrum available for high power mobile when it became available in over 5 years' time (note however that this argument does not change the fact that this spectrum would still be very valuable for high power mobile use).

Section 4

Form of low power shared access

- 4.1 The second of the high-level questions set out in section 2 is whether, if we maintain the low power shared access regime (as suggested in section 3), there would be a case to open up this regime to a wider set of prospective users. On one hand, widening access to the band could potentially enable new applications to emerge. On the other hand, it could result in additional costs for existing users in terms of increased interference or more complex coordination.
- 4.2 There are two ways in which the regime could be opened up in practice:
- through a licence exemption regime, similar to that in Sweden or Netherlands,
 - by opening the current regime to an unlimited number of licences. Ofcom would issue new licences to operate in the band to any new applicants, and these new licences would include the same conditions as the existing ones (notably an obligation to coordinate with other licensees). We refer to this authorisation method as a “light licence” regime to distinguish it from the current CSA regime.
- 4.3 The issues relating to interference and coordination led us to auction a limited number of licences only in 2006. However, at the time of awarding the CSA licences we envisaged the potential in the future for changes that would open up this spectrum. In particular, the Information Memorandum²¹ that we published for the award in 2006 flagged the possibility that we might decide, after the end of the Initial Term for the CSA licences, to make other assignments in the band, or consider licence exemption.
- 4.4 The Initial Term for the CSA licences expired in May 2016. We now have experience from the current coordination process, together with new information about potential future uses of the spectrum, not least the potential for new uses following the granting of Talk Talk’s licence variation request. It is therefore appropriate to consider whether the current licence arrangements remain the most appropriate version of the low power shared access regime.
- 4.5 The first part of this section considers the policy aspects of opening up the low power, shared access regime. The second part of this section discusses briefly the implementation aspects of doing so.

Policy aspects relevant to the choice of low power shared access regime

- 4.6 The case for changing the low power shared access regime so as to open it up to more users depends mainly on:

²¹ In particular, both the statement and Information Memorandum were clear that the decision did not limit Ofcom’s scope in the future to authorise other providers to use spectrum to offer competing services or to consider allowing licence exempt use of the bands. See paragraphs 6.4 and 6.5:

http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/awards-archive/completed-awards/award_1781/documents/im/

- the extent to which a more open regime would enable a wider range of applications or business models (of the types referred to in section 3) to be developed and deployed using this spectrum - and so encourage innovation and a wider range of communication services; and
 - the nature of the interference risks that would be associated with a more open regime.
- 4.7 These two factors work in opposite directions because the first would point towards a more open regime – but a more open regime could increase the risks of interference. We look at them in detail in the sub-sections below, and where relevant we make the distinction between licence exemption and light licensing.
- 4.8 Before doing so, we note that there is a possible further consideration in the case of a licence exempt approach about the implications for future adaptability. This point interacts with the policy question discussed in section 3. In particular, if there were strong grounds to trigger a change to a high power single use regime at some point in the future, then there could be additional complications in doing so if the low power shared access regime had been changed to licence exemption. This is because whilst licence exemption regulations can be withdrawn, communicating this to unwitting consumers using these devices can be difficult. Therefore, in practice, a change of use to one that could suffer interference from such licence exempt devices can be difficult and take a long time.

Enabling use cases

- 4.9 There are two aspects to the question of whether the existing CSA regime might limit the types of application or business model that might be deployed using this spectrum:
- Whether it might limit access for companies that do not currently hold licences but which could exploit the spectrum to the benefit of consumers; and
 - Whether there are types of applications or business models that might be inhibited by the current, restrictive licensing regime.
- 4.10 We do not think the first consideration is material. The existing licences are tradable, there are twelve of them, not all of which are being used by their current holders. We are not aware of any barrier to trade for a new entrant - indeed some of the licensees have told us that they would be ready to sell their licence if there were buyers.
- 4.11 However, some of the potential use cases might be inhibited under a regime with a limited number of licences. In particular, the business case for providing indoor coverage solutions by companies other than the existing MNOs, as it has emerged in Sweden, could be better facilitated by either a light licence or licence exempt regime. It has been suggested to us that this business model relies strongly on having an authorisation regime in which there is unconstrained access to spectrum in this frequency band. The point that has been put to us is that landlords would be more willing to commit to an investment in the equipment for their building if this did not lock them into a specific supplier, on whose spectrum licence the service provision would then depend²². This might not be a problem in the UK with twelve licences

²² For example, when adopting a neutral host solution that can support tenants in their building that are customers of different MNOs

available and some licensees willing to trade, however a more open regime could make it easier for other companies to enter the market and, more generally, to compete with MNOs for the provision of indoor coverage solutions (or provide indoor coverage solutions where MNOs are currently reluctant to do so).

- 4.12 In practice, stakeholders have suggested that licence exemption – as in Sweden – would be the most conducive approach for this class of use cases. However it is also possible that, under a light licence scheme, landlords could hold the necessary spectrum licence themselves (applied for under the guidance of the service provider from which they are procuring the indoor coverage solution).
- 4.13 In addition, we believe it important not to overlook the potential that light licensing and licence exemption have to trigger innovation – use cases may appear that we are not currently aware of. The particular feature of this band in this regard is that it is standardised for mobile and nearly every handset available in the UK can operate in it.
- 4.14 The converse question is whether a more open access regime might actually inhibit the deployment of certain types of application. For example, a Private Mobile Network business is likely to commit to a certain quality of service to its customer and there may be a risk that this could be compromised under a regime with no requirement for coordination (or, alternatively, made more difficult by an overly complex coordination process involving many parties).

Risk of interference

- 4.15 The regime that we put in place in 2006 restricts access to twelve users, and their licences put them under an obligation to agree a method of coordination with each other. It is worth considering whether these restrictions and requirements can be lifted, or reduced, in the light of the developments since then. In particular,
- if the risk of interference is minimal in practice, then this may point to a regime that does not require coordination of stations.
 - if the ease of coordination was not greatly affected by the number of licensees, then there may be an argument for a light licence regime open to all.
 - if the risk of interference varied for different types of deployment, this may point to a regime with different mitigation mechanisms according to each type of deployment.
- 4.16 We look at these questions in turn.

The requirement to coordinate stations

- 4.17 CSA licensees are required to coordinate the deployment of stations with each other. This requirement reflects the assessment that we made in advance of the 2006 award where we conducted a technical study²³ looking at coverage, capacity and interference in various scenarios of GSM pico-cell deployment. The study came to the conclusion that uncoordinated deployments could result in unacceptable interference in two of the scenarios considered: residential deployments and office

²³ Low-power concurrent use in the spectrum bands 1781.7 – 1785 MHz paired with 1876.7 – 1880 MHz
<http://stakeholders.ofcom.org.uk/binaries/consultations/1781/annexes/low.pdf>

buildings. On the basis of this, we concluded that technical coordination between providers was required, as it would allow mitigation of interference by locating base stations and selection of frequency channels in a way that minimised the probability of mutual interference.

4.18 We believe it is appropriate to reconsider the current approach for the following reasons:

- 4G LTE technology can now be deployed in the band. We understand that LTE has technical features that reduce interference and improve performance when deployed co-channel. These techniques could make it possible to deploy a network of LTE small cells using only one channel.
- Licence exemption in Sweden and Netherlands. These two countries have a regime in place that does not require coordination – although in Sweden only indoor use is allowed. This could indicate that the likelihood of interference is too low to justify a coordination mechanism, although the use cases in Sweden or Netherlands could be different from those expected in the UK and hence it might not be correct to extrapolate conclusions.
- Ofcom is not directly involved in the coordination mechanism that CSA licensees have agreed to. However our understanding is that there have been very few cases where there was a risk of interference identified between stations, although this is most likely due to the low level of deployments.
- TalkTalk’s licence variation request included a study²⁴ of the co-channel interference cases between GSM and LTE, and between two LTE systems. This study concluded that, although separation distances are required, they will be shorter than those required for co-channel GSM-only systems.

4.19 If the risks of interference in practice are likely to be low then, a licence exempt regime might be feasible. However, we think that the evidence is inconclusive. Licence exemption seems to be successful in Sweden and the Netherlands, but we do not know if it has resulted in interference cases there and, if it has, what process has been used to resolve them. The evidence from UK use of the band so far is not particularly informative either, because there have been too few deployments to result in interference problems. Given the high value of this spectrum, and in the light of the technical analysis so far, we think it is right to be cautious at this stage and we are minded, therefore, to maintain the requirement for coordination of stations. However, this is an area where we would greatly welcome the views of stakeholders.

Question 4: Do you think that the stations could be deployed in the DECT guard band without material interference risks or need for coordination? If so, do you have a view on the conditions for exemption such as power limits, indoor/outdoor use or others?

Question 5: Are there technology developments, such as polite protocols, that would facilitate coexistence of stations in the band?

²⁴ RF co-existence analysis of (DECT) guard-band LTE to DECT and GSM

http://stakeholders.ofcom.org.uk/binaries/consultations/talk-talk-licence-variation/annexes/Annex_6.pdf

Implications for coordination of the number of licensees

4.20 Ofcom's assessment at the time of the 2006 award was that, while having many licences would accommodate a larger proportion of demand and maximise the potential for innovation, it was nevertheless appropriate to limit their number. We were concerned that, if there was no limit on the number of licensed users, then a high number of licensed users would create a greater risk that any one user might fail to coordinate effectively with others, thereby imposing significantly higher costs on those other users. Also, costs of transaction and bargaining with other users could be high, frustrating efficiently coordinated use (although we noted an absence at the time of reliable market information on technical coordination costs).

4.21 We think it is worth reviewing this position in light of the developments referred to in paragraph 4.18 above, as well as the experience we now have of how the coordination process has worked since it was put in place in 2008 – with the caveat that use has been generally low. In particular, it could be possible to open the band through a light licence regime that does not limit the number of licences, whilst preserving the requirement to coordinate deployments with other licensees, for the following reasons:

- **Coordination could be effective even if the number of licences is high.** In practice, the coordination mechanism that current licence holders have put in place relies on a database where each base station is registered. For every new deployment, the licensee must first check the database to see whether there are already base stations in the proximity and, if so, contact the relevant licensee for coordination. We do not think that the effectiveness of this mechanism would necessarily diminish with a higher number of licensees.
- **We do not expect that opening the band will result in an excessive number of coordination agents.** Whilst a light licence regime might attract some new entrants, it seems unlikely that this would lead to significantly more than twelve active licensees permitted under the current regime. In particular, it is very unlikely that a light licence regime would result in a mass-market situation where consumers took out licences (apart from anything else, the requirement to get a licence would act as a barrier to this).
We think that the only scenario that could lead to a significantly greater number of licensees would be one that was closer to the Swedish model (see paragraph 3.24) where landlords take out the licence when entering into a contract for indoor coverage solutions. Although the number of licensees could be high in this scenario, we would expect that coordination of deployments would still be carried out in practice by a limited number of specialist companies, on behalf of the landlords.

Question 6: Do you think it would be possible to coordinate deployments if the number of licences was higher than twelve, potentially unlimited?

Differentiation in coordination mechanisms

4.22 There may also be scope for more efficient ways of coordination. For instance, different coordination mechanisms could be possible for different types of application: if two providers of residential femtocells emerge, they could set up a bilateral coordination agreement that is different from coordination with providers of private

mobile networks for businesses. Also, base stations deployed at large estates that are fully under control of a landlord might not need to be subject to the same level of disclosure to other licensees, provided that they are sufficiently geographically isolated.

Question 7: Do you think it would be possible to have different coordination procedures for different types of use?

Implementation of more open regimes

- 4.23 We think the change to the authorisation process itself would be relatively straightforward to implement. However, we emphasise that, if we thought it appropriate to change the current approach following consideration of responses to this consultation, we would consult again on specific proposals for change before doing so.
- 4.24 The current CSA licences cannot be revoked on less than 5 years notice (for spectrum management reasons). However, we do not consider that it would be necessary to revoke these licences in order to introduce a licence exempt regime, or open up the band to applications for new licences on the same terms as the CSA licences.
- 4.25 In the first case, Ofcom would introduce regulations that allow for licence exempt use. The process for making licence exempt regulations could be relatively short – we usually update our licence exemption regulations every year. We would need first to consider the conditions for the exemption. We cannot say now what these would be, but most likely they would reflect a regime similar to that in Sweden or the Netherlands. These are not very different from the technical conditions in our existing CSA licences, with the exception of the requirement in the CSA licences to coordinate deployments. Following introduction of the new regime, the CSA licensees could decide to surrender their licences as the requirement for a licence would have been removed.
- 4.26 In the second case, the CSA licensees would continue to be authorised under their existing licences and could, if they so wished, request a licence variation in line with the variation we have granted to TalkTalk. The new licences that we would issue to new applicants would be in line with the varied TalkTalk licence. The main consideration in this case would relate to the requirement to coordinate deployments with other licensees. This requirement would need to be the same for all licensees (i.e. the same for new licensees as for the existing CSA licensees) and it is possible that the practical implementation of this requirement may need to be reworked.
- 4.27 We understand that the Code of Practice agreed by current licensees, and the coordination mechanism currently in place, have performed adequately but some licensees have concerns about how to move it forward. In particular, the current process might not be optimal if one or more licensees wanted to deploy in high numbers. Therefore we think we would need to re-assess and agree with current licensees, and other stakeholders potentially interested in getting a licence, how the coordination requirement could be best implemented under a light licence regime.
- 4.28 Our current view, as expressed in our Statement with relation to the variation request from TalkTalk, is that Ofcom should remain hand-offs and let licensees discuss and agree changes to the Code of Practice for coordination. However, it could be that a scenario with more licensees would be better managed if Ofcom were more involved in aspects of the coordination process.

Preliminary view

- 4.29 A change to a low power shared access regime so as to allow unlimited access – either licence exemption or light licensing – could increase the risk of interference and hence impact existing users. On the other hand, some use cases have been put to us that could be facilitated by a more open regime and it is possible that this could also encourage the development of other, innovative uses over time that we do not know about now.
- 4.30 As regards the two methods for opening up the low power shared access regime, we remain cautious about the basis for licence exemption as we do not have confidence that the risks of interference can be managed in all circumstances without some form of coordination. We also note that a licence exemption regime could be less flexible from a longer term policy perspective.
- 4.31 Therefore, we do not think there is likely to be a robust case to move towards a licence exemption regime (although we could keep this issue under review in light of experience). However, a light licensing approach could open the band more widely whilst maintaining coordination where it is needed. We are therefore interested in stakeholders' views on this possibility.

Question 8: What do think would be the most appropriate authorisation approach regime in a low power shared access regime for this spectrum (and why)?

Section 5

Licence fees

- 5.1 Ofcom normally considers the introduction of fees after the end of the Initial Term for auctioned licences such as the CSA licences in the DECT guard band. The approach to setting fees for CSA licences will depend on the future authorisation regime – which is the subject of the issues discussed in sections 3 and 4. In light of this, we are not setting out firm proposals for fees at this stage. Instead, the purpose of this section is to give stakeholders a view of the issues that we think will be relevant to the question of setting fees for this spectrum, noting where these may depend on the nature of the authorisation regime.
- 5.2 The discussion of spectrum fees is relevant in the event that we continue with a low power shared access regime, and with a licence-based authorisation approach. That is, spectrum fees would not be relevant if we decided to introduce a licence exempt regime. If we gave notice to revoke the existing CSA licences in order to initiate a move to a high power single user licence, then a very different set of considerations would apply.

Approach to pricing (cost-based fees and AIP-based fees)

- 5.3 Wireless Telegraphy licences normally carry a fee that is set on one of two bases:
- a cost-based fee, which is generally related to the costs incurred by Ofcom in managing the spectrum
 - if the spectrum is in excess demand, then the fee would reflect the opportunity cost of the spectrum denied to other uses and users, rather than just the management costs to Ofcom – we call this an Administered Incentive Pricing (AIP) fee.
- 5.4 Our Strategic Review of Spectrum Pricing (SRSP)²⁵ from 2010 explains the principle behind AIP: if potentially higher value users or uses are, or could be, denied access to spectrum, then the current use of spectrum imposes an opportunity cost on society. An AIP fee is based on that opportunity cost. The licensee's willingness to pay the fee gives us an indication that the value it puts on access to spectrum is above the value for the alternate user or use, and hence that the licensee retaining access to the spectrum is an efficient outcome.
- 5.5 In practice, AIP fees can be effective in promoting change to higher value users or uses in cases where the spectrum is or will be in excess demand, where trading and liberalisation alone may not lead to a well-functioning market or where there is no clear case for a regulator-led change of use.
- 5.6 We think that the conditions in which an AIP fee is appropriate apply in the case of the DECT guard band spectrum. In particular, there is an opportunity cost relating to the potential use of this spectrum for the alternative use of high power single licence mobile broadband as discussed in section 3.

²⁵ <http://stakeholders.ofcom.org.uk/consultations/srsp/>

- 5.7 The circumstances of this case are unusual in that it is the only band where multiple licensees have shared access rights (i.e. the rights to use the spectrum under the same conditions in the same geography, subject to coordination) *and* where they collectively deny access to a high value alternate use (high power mobile use). These circumstances were not considered in the SRSP consultation and, as we explain below, mean that the application of the AIP principles is more complicated than in other bands.
- 5.8 The sections below therefore discuss a number of approaches for how we might set an AIP based fee and deal with the particularities of the band. We also discuss cost-based fees, before summarising our preliminary views on charging.

Opportunity cost of DECT guard band

- 5.9 The starting point for the determination of an AIP based fee in a particular band is the opportunity cost for highest value use or users. We would then assess the impact of imposing fees at that level in light of the specific circumstances and our statutory duties. The opportunity cost could be determined according to:
- “alternative-use” opportunity cost i.e. the opportunity cost from the existing use denying another use of spectrum with which it cannot coexist; or
 - if there is no alternative use, or there is one but its value is lower than the existing one, “own-use” opportunity cost i.e. the opportunity cost, in existing use, from one user denying spectrum to another user²⁶.
- 5.10 We would charge the higher of these to existing users. In the context of the DECT guard band, our view is that the relevant opportunity cost to consider for AIP is the cost of denying access to high power single user mobile. This is because:
- The spectrum in the guard band can be used for the same services as the rest of the 1800 MHz band, with the same technology and devices.
 - It is difficult to estimate the value of low power shared access at this point. A conservative assumption is that it is lower than the value of high power single use.
- 5.11 Our preliminary estimate of the opportunity cost of denying access to mobile use to the DECT guard band is around £4 million per annum. Table 1 explains how we have arrived at this number. This would be the opportunity cost of the guard band as a whole, i.e. the cost that would be reflected in the fee if there was a single licensee in the band.

²⁶ In the context of the DECT guard band this means that if low power devices can be deployed without any impact on each other, then there is no opportunity cost relating to spectrum use within a low power shared access regime. But if the deployment of a new base station by one licensee constrains the ability of other licensees to make subsequent, nearby deployments (eg. neighbouring houses in a terraced street) then there would be an own use opportunity cost of deployment (sometimes referred to as a marginal opportunity cost) within a low power shared access regime. Therefore, the considerations around own use opportunity cost are closely linked to those around co-existence and the authorisation regime.

Table 1: Opportunity cost for the DECT guard band

<p>Our recent ALF decision set the fee rate for the 1800 MHz band at £0.833m / MHz per annum (in August 2015 prices)</p>	<p>This is the relevant starting point since the spectrum covered by the DECT guard band can be used by the same technology and devices as in the main 1800 MHz band. This gives a starting point of:</p> <p style="text-align: center;">£5.50m pa for the 2 x 3.3 MHz</p>
<p>We have adjusted this rate down to reflect possible restrictions to use</p>	<p>As explained in section 3, our preliminary assessment is that the frequencies of the DECT guard band could be released for high power mobile under the same licence conditions as the rest of the 1800 band – i.e. without restrictions of use. However, for the purpose of estimating the opportunity cost, we are taking a conservative approach and assuming that a high power mobile licence would have restrictions similar to those included in the German licence – and as a result its value would be discounted.</p> <p>In the recent German auction, this top 2 x 5 MHz block sold at a discount²⁷ of 27% to the average price paid for the other 1800 MHz blocks sold in the auction. Applying this discount to the above number gives an adjusted rate of:</p> <p style="text-align: center;">£4.01m pa for the 2 x 3.3 MHz</p>

Applying AIP to the CSA licences

- 5.12 Once estimated, opportunity cost can be used directly to set an AIP based licence fee when there is only one licence for the spectrum concerned. But it is more complicated where spectrum access is shared by multiple licensees – as is the case for the DECT guard band under a low power shared access regime.
- 5.13 There is no unambiguously “right” way of splitting the opportunity cost for the overall band amongst the different licensees. This is because the licensees collectively deny the higher value alternative use. If one licensee returned its licence this would not reduce the denial of the band to an alternative use – as it would if the rights of the CSA licensees were defined geographically or frequency distinct. It is, therefore, not possible to estimate the opportunity cost that each of them individually impose.
- 5.14 Determining a fee that would incentivise use in the same way as that envisaged in the SRSP is, therefore, not obvious. However, despite these challenges, there is still an opportunity cost of the CSA use of this band that is significant. There is therefore an argument that we should reflect it in fees, so as to ensure that the licensees collectively value the use of the spectrum at least as highly as the alternative use.
- 5.15 We have looked at options for how to set up the fees, with the following three policy objectives:
- to create similar incentives for efficient use of spectrum to the CSA licensees that is provided to other licensees by an AIP-based fee;

²⁷ In the German (multiband) auction of June 2015 the price of the top block in the 1800 MHz band (block J) was €180.153m. This is 27% lower than the average price of the other blocks (blocks A-I) of €247.255m. For completeness, we note that the range of prices for blocks A-I was between €237.494m (block A) and €258.255m (block C).

- to avoid unintended consequences that result in inefficient spectrum use; and
- to ensure that fees are practical to implement.

5.16 In addition we must ensure that fees are objectively justified, transparent, non-discriminatory and proportionate. Bearing all these factors in mind, we have considered the following three options for the AIP-based fee:

- A uniform fee, which results from dividing the overall opportunity cost by the number of licensees.
- A per Base Station (BS) fee, where the individual licence fee would have a variable component, based on the number of BSs times a per-BS fee (the size of which is set with reference to the overall band opportunity cost), and a fixed component.
- a tiered approach in which there is one (relatively low, potentially cost-based) fee that applies for deployments up to a certain number of BS and another (higher, AIP based) fee which applies for larger scale deployments.

5.17 We discuss each of these in turn.

Uniform fee

5.18 The most straightforward way to apportion the opportunity cost would be to divide it uniformly between the licensees i.e. a fee that is inversely proportional to the number of licences. If there were twelve licensees this would result in an individual licence fee of around £300k per annum on the basis of the opportunity cost estimate set out in table 1 above.

5.19 A fee of this level may lead some of the twelve licence holders to surrender their licences. If this happens, the remaining licensees would have access to spectrum which is shared by fewer than twelve licence holders.

5.20 To address this effect, the individual fee should be inversely proportional to the expected number of *live* licensees, i.e. the licences that are on issue. In practice, a pragmatic approach might be to set an individual fee that is one twelfth of the opportunity cost from the outset and leave it at this level for a number of years. If licences are surrendered or new licences are issued, the individual fee rate would then be reset at a subsequent review. In the extreme case where only one licence remains, its fee would be reset equal to the total estimated opportunity cost at the time of that review.

5.21 This approach would ensure that the sharers of the DECT guard band, collectively, value access at least as much as the opportunity cost. However, it has drawbacks:

- We understand from discussions with existing licensees that a fee in the order of hundreds of thousands of pounds is likely to result in some of the smaller licensees surrendering their licence. However, if at least one or more players are willing to pay fees that, in aggregate, cover the opportunity cost, then it would be inefficient to price the smaller players out of the band (under the assumption that, in practice, they can coexist with the larger players).
- Fee levels of hundreds of thousands of pounds could hinder innovation in an environment where individual use may not impose any material constraints on

other CSA licensees who value the spectrum above its opportunity cost. In particular, a company wanting to test the viability of a new business model would be faced with high spectrum costs from the outset, regardless of its usage of the band. This could discourage new entrants, as well as some of the incumbent CSA licensees, and undermine the success of the band as a platform for innovation.

- The individual fee would depend on the number of licensees, and this would likely vary over time. This creates a regulatory risk for each user, who would have to factor into their business plans the fact that other licensees could surrender their licences and that, as a result, its own fee level would rise (potentially up to the full opportunity cost). It also creates a burden for Ofcom, who would have to conduct successive fee reviews. If the authorisation regime was light licensing then these unwanted effects would be more serious than under the current regime (with twelve licences), because the volatility of the number of licensees is likely to be higher.

5.22 We note that, if we followed this route, we could introduce a phase-in to allow existing licensees to adapt to the new charges.

Per Base Station fee

5.23 Under this approach the individual licence fee would be determined by reference to a variable and a fixed component:

- the variable component would reflect the number of BS deployed by the licensee, times a per-BS rate. The choice of per-BS rate would be a matter of judgement but, in essence, it would be derived by dividing the opportunity cost by an assumption for the number of BSs that might be deployed in the band under a successful exploitation of the band for low power, shared access uses in the longer term.
- the fixed component (that would apply even if the licensee was making no use of the spectrum) might be set with reference to Ofcom's costs of managing this spectrum. The main purpose of this fixed component would be to discourage dormant licensees from sitting on their licence without making any use of the spectrum (this can create costs for others, for example in relation to the operation and revision of the Code of Practice for coordination).

5.24 Other features of the approach might be as follows:

- To simplify the arrangements in respect of licensees with limited use, the variable per-BS fee could be introduced only once the number of BS deployed exceeded a certain threshold, such as 1000 (to put this another way, the fixed component would be treated as covering up to 1000 BSs).
- The resulting fee for any individual licensee would be capped so that it does not exceed the overall opportunity cost for the band.
- The licensees would be required to keep accurate records and to declare to Ofcom the number of stations that they have deployed at a date in each calendar year – Ofcom would use this declaration as the basis for the licence fee invoice (i.e. the fee payments would not seek to track changes in deployment during the course of the year).

- 5.25 Under this approach, we would expect to review the level of deployments after a suitable period of time. At that point we could adjust the per BS fee rate to reflect an updated view of actual deployments to date and the prospects for further deployment in future. The level of deployment might also suggest that there was a case to review the use of the band again. For instance, it might be appropriate to consider revoking the low power shared access licences if the levels of deployment were such that aggregate fees being paid were much less than our overall estimate of the opportunity cost for the band.
- 5.26 Note that the level of fee payments would build up over time as deployments increased. This would have some parallel with the use of phasing-in under the first approach above (although the overall fees would not increase towards the opportunity cost level unless the regime proved successful with large volume deployments).
- 5.27 This approach could be seen as a fairer way of apportioning the overall opportunity cost across the licensees. On one hand, those licensees that have intensive use of the band would be charged a large fee. For instance, if the per-BS fee was £4 then the opportunity cost would be covered if one of the licensees deploys a million units (or more). On the other hand, smaller licensees would be charged a proportionately lower fee. It could also be more efficient because it would avoid the unwanted effect of a uniform fee that we raised above: that smaller licensees are priced out of using the band even if, technically, they could co-exist with the larger licensees.
- 5.28 However, this approach also has drawbacks:
- There is no sound basis for setting the variable, per-BS fee rate. It would be a matter of judgement, reflecting a view of the potential scale of deployment under a successful scenario for use of the band (and actual levels of deployment would inevitably turn out to be different in practice).
 - Ofcom would review the use of the band after a period, but at the time of that review we could be in a situation where some licensees have built sizeable businesses such that the aggregate level of fees paid, although significant, is still well below the overall opportunity cost for the band. In these circumstances we may not have conclusive evidence one way or the other on whether the licensees place a value on use of this spectrum that is likely to exceed the opportunity cost (as expressed through their collective willingness to pay at the fee rates we have set).
 - Charging a per-BS fee increases the marginal cost to licensees of deploying a BS. This could provide an inefficient incentive on licensees to under-deploy and create upward pressure on prices to consumers (however, it might still lead to more deployment than if licensees were to face a high, flat fee – as under the first approach above – if the result of a high, flat fee was to cause some licensees to surrender their licences).

Tiered approach

- 5.29 This third approach for an AIP-based fee would combine aspects of the above two approaches by setting the fee for an individual licensee at one of two fee rates, based on different scales of deployment:
- a low fee payment would apply for a licensee that was deploying less than a threshold number of base stations, where this fee rate would be set at a level

similar to that for the fixed component under the second approach above (for example, in the range £1000 to £3000 a year);

- a high fee payment that would apply above this threshold, with this payment being set with reference to the overall band opportunity cost in the same way as under the first approach above.
- 5.30 As with both of the previous options, we would expect to review the state of deployment in the band in a few years' time and consider the implications both for future fee levels and future use of the band in that review.
- 5.31 The advantage of this approach is that it would avoid the situation where smaller licensees were forced out of the band when faced with a high fixed fee). It also recognises that, in order to justify the ongoing retention of a low power shared access regime in the long term there will, in practice, need to be at least some large scale deployments to provide evidence of the value of this access regime.
- 5.32 The choice of the threshold number (which triggers a move from the low fee to the high fee) would need to be chosen with care. For example, it might be set at a few tens of thousands of base stations – i.e. large enough so as to avoid an inefficient outcome in which smaller licensees are priced out. A drawback of this approach is that the threshold could act as an inefficient incentive on licensees to restrict their base station deployment below that level, to avoid moving from the low fee to the high fee.

Cost-based fee

- 5.33 Our pricing policy, captured in the SRSP and introduced above, is based on considerations about efficient use of spectrum. These principles are fully relevant when it comes to the DECT guard band, and lead us to consider that AIP fees that reflect alternative use opportunity cost would in principle lead to optimal use.
- 5.34 However, we also have to consider the practical implementation of setting fees. We have explained above how each of the three fee options has drawbacks. The magnitude of the drawbacks will in some cases depend on the choice of authorisation regime. For instance, dividing the opportunity cost by the number of licensees could be more difficult under a light licensing regime due to the unpredictability of the number of licences.
- 5.35 If we thought that, for the practical AIP options, the drawbacks outweighed the benefits in terms of promoting efficient use, then an alternative would be a fee that simply seeks to recover the costs to Ofcom of managing the band. Such fee would be a uniform and fixed annual payment that we have estimated in the range of £1000 to £3000 a year.
- 5.36 A fee of this type would be easy to put in place, and would offer users a stable charging environment in which to develop their businesses. If the drawbacks of the AIP options for efficient use exceeded the benefits, a cost-based fee could create a more conducive environment for the promotion of a wide range of communication services and for innovation in the development of low power shared access applications.
- 5.37 However, the major disadvantage of this approach is that users would not have visibility of the opportunity cost that they cause (collectively) and neither would we

have visibility of the value users attach to their use – and hence it could result in inefficient use of spectrum.

Preliminary views

- 5.38 This section has explained a number of approaches that could be used to set spectrum fees for licences in a low power shared access regime. Our preliminary view is that the fee should be based on the opportunity cost to high power single user mobile. Subject to considering the impact of the factors referred to in paragraph 5.9, this is the highest value alternate use. However, we recognise that there is not a single “right” way of applying AIP in a band that is shared, and that the options that we have considered have drawbacks as well as advantages.
- 5.39 We are not at this time presenting an opinion on which of the AIP options is best. We would like to hear from stakeholders’ view on the pros and cons of each, and on how their business could be impacted. It is worth noting however that some options are better suited to certain authorisation regimes than others:
- The uniform fixed fee version of the AIP based fee may be less appropriate in the case of a light licence regime (where there can be an unlimited number of licensees in principle) than in the context of the current CSA licensing regime which is limited to twelve licensees.
 - The variable per base station fee approach to AIP could be applied under either licensing regime. This is because the number of licensees is largely irrelevant under an approach where fees are based principally on the number of BS deployed (eg, if there are 100,000 base stations, the payments - and the incentive properties – are essentially the same whether these have been deployed by twelve or fifty licensees). It might also be possible to apply the tiered, AIP based approach to both licensing regimes.
- 5.40 We do not think at this stage that fees for low power shared access to the DECT guard band should be cost-based, particularly as there is a possible alternative use with high value, and this use is prevented from accessing the spectrum by the low power shared access usage. However, we will re-assess the drawbacks and benefits of the AIP options in terms of promoting efficient use in light of stakeholder responses.
- 5.41 As noted at the beginning of this section, we are not making specific fee proposals in this document – and we will consult again on specific proposals when we have considered our approach to the future authorisation regime in light of responses to this consultation. However, we invite responses from stakeholders on the issues relating to fees discussed in this section.

Question 9: Do you have comments on the choice of approach to setting fees under each of the options for licensing low power, shared access to the DECT guard band?

Annex 1

Responding to this consultation

How to respond

- A1.1 Ofcom would like to receive views and comments on the issues raised in this document, **by 5pm on 8 December 2016**.
- A1.2 We strongly prefer to receive responses via the online form at <http://stakeholders.ofcom.org.uk/consultations/DECTGB>. We also provide a cover sheet (<http://stakeholders.ofcom.org.uk/consultations/consultation-response-coversheet/>) for responses sent by email or post; please fill this in, as it helps us to maintain your confidentiality, and speeds up our work. You do not need to do this if you respond using the online form.
- A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to cliff.mason@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet (<http://stakeholders.ofcom.org.uk/consultations/consultation-response-coversheet/>).
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation.
- Cliff Mason
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA
- A1.5 If you would like to submit your response in an alternative format (e.g. a video or audio file), please contact Cliff Mason on 020 7783 4353 or at the email address above.
- A1.6 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt if your response is submitted via the online web form, but not otherwise.
- A1.7 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.
- A1.8 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 3. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.
- A1.9 If you want to discuss the issues and questions raised in this consultation, please contact Cliff Mason at the telephone number or email address above.

Confidentiality

- A1.10 Consultations are more effective if we publish the responses before the consultation period closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in

the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish all responses on our website, www.ofcom.org.uk, as soon as we receive them.

- A1.11 If you think your response should be kept confidential, please specify which part(s) this applies to, and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.
- A1.12 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.
- A1.13 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further at <http://www.ofcom.org.uk/terms-of-use/>

Next steps

- A1.14 If you wish, you can register to receive mail updates alerting you to new Ofcom publications; for more details please see <http://www.ofcom.org.uk/email-updates/>

Ofcom's consultation processes

- A1.15 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 2.
- A1.16 If you have any comments or suggestions on how we manage our consultations, please call our consultation helpdesk on 020 7981 3003 or email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.

If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact Steve Gettings, Ofcom's consultation champion:

Steve Gettings
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA

Tel: 020 7981 3601
Email steve.gettings@ofcom.org.uk

Annex 2

Ofcom's consultation principles

Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

- A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. 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

- A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.
- A2.3 We will make the consultation document as short and simple as possible, with a summary of no more than two pages. We will try to make it as easy as possible for people to give us a written response. If the consultation is complicated, we may provide a short Plain English / Cymraeg Clir guide, to help smaller organisations or individuals who would not otherwise be able to spare the time to share their views.
- A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.
- A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
- A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

- A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish all the responses on our website as soon as we receive them. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

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 Ofcom 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 which are 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 3

Consultation questions

Question 1: In the light of the complexities of the transition, do you have views on the relative value of a 2x5 MHz block as opposed to a 2x3.3 MHz block for high power mobile use?

Question 2: Are there any other developments, in the UK or in Europe, relevant to our policy in this band that we should be aware of? In particular, are there other potential applications that could be deployed in the band under a low power shared access regime? It would also be helpful to receive any updates from the current CSA licensees on their plans.

Question 3: Do you agree with this preliminary view that we should not trigger a change from a low power shared regime to a high power single use regime at this point?

Question 4: Do you think that the stations could be deployed in the DECT guard band without material interference risks or need for coordination? If so, do you have a view on the conditions for exemption such as power limits, indoor/outdoor use or others?

Question 5: Are there technology developments, such as polite protocols, that would facilitate coexistence of stations in the band?

Question 6: Do you think it would be possible to coordinate deployments if the number of licences was higher than twelve, potentially unlimited?

Question 7: Do you think it would be possible to have different coordination procedures for different types of use?

Question 8: What do think would be the most appropriate authorisation approach regime in a low power shared access regime for this spectrum (and why)?

Question 9: Do you have comments on the choice of approach to setting fees under each of the options for licensing low power shared access to the DECT guard band?