



Applying spectrum pricing to the Aeronautical sector

A second consultation

Consultation

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Section 1

Summary

The purpose of this consultation document

- 1.1 In this document we set out revised proposals for the application of Administered Incentive Pricing (“AIP”) to certain aeronautical uses of the radio spectrum. Specifically, we are proposing to apply revised Wireless Telegraphy Act licence fees (“fees”) to the use of aeronautical VHF communications frequencies in the band 117.975 to 137 MHz.
- 1.2 We are proposing to introduce these changes no earlier than the last quarter of 2010. However, we are proposing to phase in some of the changes over up to five years to minimise avoidable disruption to the aeronautical sector and to enable regulatory authorities to monitor and respond to any unforeseen consequences.
- 1.3 Some fees will not change:
 - We are proposing to apply AIP only to particular VHF spectrum used by ground stations (typically aerodromes and air traffic controllers). However, we are not proposing fees for the distress or fire frequencies.
 - We are making no proposals to apply AIP to aircraft radio licences or to the spectrum used by radars and navigational aids.

Why we are making these proposals

- 1.4 Spectrum is a finite resource, in that the use of spectrum for one purpose denies its availability to other users. Demand can sometimes exceed supply. AIP is intended to apply market disciplines to the holding and use of spectrum rights, by prompting users to consider their spectrum needs in light of the AIP fees payable. AIP is already paid by most private sector users of spectrum, except where upfront payments have been set at auction. Many public sector users, including the emergency services and the Ministry of Defence, also pay AIP.
- 1.5 The civil aeronautical sector is a significant contributor to the UK economy and its operations are dependent on access to radio spectrum. About 19MHz of spectrum (117.975-137 MHz) are used for aeronautical VHF communications, which is the main focus of this consultation document. This spectrum is shared between military and civilian users.
- 1.6 Fees for the use of all aeronautical spectrum are currently set on a basis which contributes to the administrative cost of issuing the licences concerned. Consequently, powerful transmitters which prevent others from using the same spectrum over a very wide area, and transmissions used in ground to air communications with aircraft at high altitude, which require protection from other users over large areas of the ground, often attract similar fees to applications which have a much more localised impact and use much less spectrum. Also, licences to use spectrum in areas of high demand (for example in South East England where there are many aerodromes and denser air traffic patterns) attract the same fee as licences to use similar spectrum in remote areas with little or no demand from other potential users. We do not think this approach promotes optimal use of spectrum and our revised proposals are intended to reflect these factors in the AIP fees payable.

- 1.7 It is important to note that AIP can improve the value that is obtained for society from a given amount of spectrum, compared with free licences or flat-rate fees, even where the spectrum continues to be used for the same application, but can be used by a different user in the same sector, potentially in the longer term.
- 1.8 Where spectrum is subject to excess demand in its existing use (as is the case with aeronautical VHF communications frequencies), there will be potential users who want to make use of that spectrum but currently cannot. In the absence of AIP, the price for using the spectrum does not equate to its value to society (its opportunity cost) and, therefore, (particularly over the long term) users may well hold onto more spectrum than they need once they have an assignment, because the cost to them is unrelated to the amount of spectrum they hold. Potential users who do not hold spectrum might have been able to produce more value from it than those who currently do hold it. If, in response to AIP, an existing user gives up some spectrum because that user values the spectrum at less than the AIP, and this is taken up by a new user who (necessarily) values it at more than the AIP, then it is reasonable to conclude that the value derived by society from using the spectrum has increased as a result of AIP.
- 1.9 As there is already excess demand and a shortage of spectrum, there are already opportunity costs in the short term. If this shortage is expected to persist and even grow in the longer term, the associated opportunity costs will also persist over the longer term. With increasing opportunities available to some users to respond to pricing signals effectively in the longer term, AIP is intended to provide sustained signals to assist in such efficient decision-making over time.
- 1.10 For the longer term incentive properties of AIP to operate to best effect, the aeronautical sector needs to be confident that future technologies and practices which enable more users, or more applications, to share a given amount of spectrum will result in lower unit AIP fees per user or application.
- 1.11 For example, we are proposing that, as and when 8.33kHz channels are deployed in place of 25kHz channels, fees will be reduced *pro rata*. If it was possible to anticipate other technological changes or changes to technical standards which will have a specific measurable impact on spectrum efficiency, we would make fee Regulations to reflect these opportunities too. In practice, it is difficult to forecast what form other such efficiency improvements might take over the longer term and we cannot set out, at this time, pricing algorithms to apply to such future systems. Nevertheless, it is important to make very clear Ofcom's commitment to reducing AIP fees for applications which use less spectrum. Thus, where less bandwidth is needed for a particular application, or more users are able to share a given frequency band, or where an application impacts a smaller geographic area than previously, we will take steps to revise AIP fees to reflect and encourage the new efficiency opportunities concerned. We believe the sector should be capable of providing advance notice of such developments so that adjusted pricing incentives can be developed to the same timescales.
- 1.12 There will continue to be an important role, of course, for other UK and International initiatives which can help improve the way spectrum is used. Ofcom recognises that AIP is one of many tools which should complement each other in achieving better use of scarce spectrum resources for the long term benefit of citizens and consumers. We also recognise that the AIP fees being proposed may need to be refined in the light of experience.

We have made significant changes to our proposals following the initial consultation last year

- 1.13 In July 2008 we published an initial consultation on applying AIP to the aeronautical and maritime sectors¹ (the “July 2008 consultation”). In that consultation we set out some indicative fees for VHF communications frequencies. We also proposed potential national reference rates which might have formed the first building block of a structure for determining licence fees for radar and aeronautical navigation aids.
- 1.14 Following that consultation, we considered the responses from stakeholders carefully and in many cases we had subsequent follow-up discussions with licensees or their representatives. We have also held extensive discussions with Government and the CAA. We also commissioned further external consultancy, which drew on inputs provided by numerous stakeholders, and we considered the conclusions of this work in detail in drawing up the proposals in this document.
- 1.15 In response to detailed comments from stakeholders and as a result of this follow-up work, we have made a number of significant changes to the initial proposals in respect of aeronautical VHF communications frequencies outlined in the July 2008 consultation, including the following²;
- **More granular proposals reflecting the varied applications** - Based on consultation responses, our consultants’ work and discussions with the CAA, we note that the amount of spectrum used in the aeronautical VHF frequencies varies considerably depending on the type of application. In light of this, we consider that a simple single uniform AIP fee, covering all applications, is not appropriate. We are now therefore proposing a much more granular set of AIP fees, ranging from £75 to £19,800 per year depending on the nature of the applications concerned. These fees are intended to reflect the fact that some applications have a much wider geographic impact and accordingly use up more scarce spectrum in given frequencies than others, and some use more bandwidth than others.
 - **Geographic differentiation reflecting varied levels of demand** – We are also proposing that some fees should vary according to the location of the transmitter. Fees for localised applications (i.e. excluding those which impact most of the UK) would be discounted by 20% in parts of the North and West of the UK, and by 50% in some parts of Northern Scotland. We believe this approach is more appropriate than the alternative of a uniform set of fees to apply across all of the UK.
 - **Multiple transmitters** In the case of some specialist applications which rely on multiple transmitters using the same frequency, we consider it is not appropriate

¹ *Applying spectrum pricing to the Maritime and Aeronautical sectors* 30 July 2008
<http://www.ofcom.org.uk/consult/condocs/aip/>

² The July 2008 consultation also considered spectrum used for maritime VHF communications channels and radar and aeronautical navigation aids. Revised proposals in respect of this spectrum were published on 13 August 2009 – see *Applying spectrum pricing to the maritime sector, and new arrangements for the management of radar and aeronautical navigations aids spectrum*
http://www.ofcom.org.uk/consult/condocs/aip_maritime/

to apply a fee for each transmitter, as the total amount (and hence value) of spectrum used is not affected by the transmitter numbers concerned.

- **Phasing in of larger fees increases.** Reflecting the concern expressed by stakeholders, that large increases in fees could have unintended impacts on the aeronautical sector in the shorter term, we are proposing to phase in significant fee increase over up to five years. We believe this should give the sector and its regulator sufficient time to respond to changes efficiently and safely.

1.16 The resulting revised fee proposals for VHF spectrum are summarised in the following Table 1 and, more fully, in Sections 2 and 7 below. Fee marked with an asterisk (*) would be discounted by 20% in parts of the north and west and by 50% in the far north of Scotland. More detail is provided in Section 2 below.

1.17 We should emphasise two important aspects of these phasing proposals:

- They are for consultation: we welcome stakeholder feedback on the appropriate duration and profile of phasing to enable licensees to adapt efficiently over the timescales that are relevant for the sector;
- As the phasing period we propose is relatively long, there would be opportunity to assess the impact of fees during the phasing in period - and if appropriate adjust future fee levels where there is evidence that future increases would create risks of unacceptable impacts. In assessing such risks we would continue to draw heavily on the advice of sector stakeholders, including the CAA, with the appropriate industry operational knowledge.

	Year 1	Year 2	Year 3	Year 4	Thereafter
Fire and Distress frequencies	£ zero	£ zero	£ zero	£ zero	£ zero
Sporting frequencies (generally unpowered flight)	£75	£75	£75	£75	£75
Offshore mobile stations	£75	£75	£75	£75	£75
Surface movement (OPC and AS) and Offshore fixed units	£350*	£350*	£350*	£350*	£350*
Aerodrome air traffic services (TWR, AFIS and A/G)	£400*	£800*	£1300*	£1900*	£2600*
Approach services (APP), Automatic Terminal Information Services (ATIS), Area Control service (ACC), Aircraft Communications Addressing and	£1,500 (£1,000)	£3,000 (£2,000)	£5,000 (£3,000)	£7,200 (£6,000)	£9900 (£9,900)

Reporting System (ACARS), and VOLMET <i>(Alternative phasing option in brackets)</i>					
VHF digital links (VDL) per frequency <i>(Alternative phasing option in brackets)</i>	£3000 <i>(£2000)</i>	£6000 <i>(£4000)</i>	£10,000 <i>(£6000)</i>	£14,400 <i>(£12,000)</i>	£19,800 <i>(£19,900)</i>

Table 1 Summary of phased fee proposals

The wider policy context

1.18 Ofcom was set up under the Communications Act to secure, among other things, the optimal use of the electromagnetic spectrum. Spectrum use is a relatively small, but important, aspect of society’s interest in the efficient, safe and productive working of the aeronautical sector. Government generally, with the support of the CAA, represents the interests of citizens and consumers in ensuring that this sector can operate in ways which serve the UK’s economic, environmental, safety and other public policy priorities.

1.19 In recognition of this, in developing our proposals we have worked closely with Government, and the CAA as the regulator with specialist sector expertise, to understand how these other interests are served by the specific transport regulatory frameworks, and to enable them to consider our proposals within the wider public policy contexts of aviation, and let us know their views. We have also shared with them our assessment of the likely impact of our proposals, and the work we commissioned from independent consultants Helios and Plum Consulting, which we are publishing with this document. On the basis of those discussions to date, our assessment of the impacts, and the evidence and analysis provided by our consultants, the Government have indicated to us that they consider our revised proposals have taken into account points made by them in response to our original consultation and form a reasonable basis for further consultation. The Government’s final position, and that of the CAA, is of course subject to consideration of any new or additional evidence that stakeholders may provide in responding to this consultation.

Government’s role in managing aeronautical VHF communications spectrum

1.20 There will continue to be an important role for Government in influencing change in international agreements relating to the use of aeronautical VHF communications spectrum, and pricing signals faced by Government could help to inform policy making. We recognise that, in principle, there is an option under which aeronautical VHF communications frequencies could be managed by Government which would face the opportunity cost of this spectrum, as we have proposed for spectrum for radar and aeronautical navigation aids³. It has been suggested to us that there is merit in this approach, in so far as (subject to Government policy) the costs could be passed on to UK citizens at large (through general taxation) and/or more flexibly apportioned to different parts of the aeronautical sector through a variety of alternative mechanisms, not all of which might be directly related to spectrum usage. We have considered this option, but are minded to conclude that, in the context of aeronautical VHF communications, fees applied directly to end users are likely to be more effective in driving spectrum efficiency changes.

³ See footnote 2 above.

- 1.21 We have two primary reasons for taking this view. First, unlike spectrum used for radar and aeronautical navigation aids, there is excess demand for spectrum used for aeronautical VHF communications. Decisions by individual users facing AIP fees, to reduce their use of this spectrum, even if only at the margins and often in consequence of other decisions over the medium and longer term, can free up spectrum for others who require spectrum for aeronautical VHF communications. This is not the case with spectrum used for radar and aeronautical navigation aids, where concerted action by the sector and its regulators is needed before spectrum can be released to meet excess demand (in those cases, from alternative users, potentially in other industry sectors). We recognise that in the longer term there may be a case for AIP fees for these frequencies, but the determination of when there might be such a case remains a matter for Government.
- 1.22 Second, in cases such as aeronautical VHF frequencies, where end users have some scope to review their own longer term use of spectrum within the existing framework of international spectrum management, we believe end users are generally much better informed than regulators or Government and better able to assess and implement options for change. This is not to say that Government should have no continuing role in influencing change but, rather, that the tool of AIP as a longer term pricing signal is more effectively deployed if applied to end users in this instance.

Disruptive impacts in the shorter term

- 1.23 We recognise that the changes which we are proposing will affect how the aeronautical sector makes its decisions. Indeed, if fees did not cause spectrum users eventually to review current arrangements, there would be little point to applying AIP fees. Changes to the financial landscape, effected in this case by AIP, will generally cause businesses to review decisions in relation to operating practices and, where these practices are unregulated, this may cause the CAA to conclude that it should review the adequacy of existing sector regulation in the light of the changed circumstances.
- 1.24 We therefore believe it is important that Ofcom should work closely with Government and the CAA to minimise any unproductive disruption during transitional periods. Responding to a changing environment is an inevitable part of the work of all regulatory authorities. As already noted, we are proposing that AIP should be introduced much more slowly than is Ofcom's usual practice even for fee increases of this scale. Our proposals for phasing are intended to allow the CAA and other stakeholders in the sector to respond in a timely fashion to any unforeseen circumstances including outcomes which start to emerge as a consequence of Ofcom's initiative, either using the CAA's existing regulatory framework or by it seeking additional powers. In the unlikely event that CAA is unable to respond in a timely fashion, there would an option for Ofcom to intervene again to modify the level or application of AIP fees. This is consistent with our cautious approach to the introduction of AIP in other sectors.

Safety regulation

- 1.25 We recognise the critical importance of safety in the aeronautical sector and, in that context, we have given careful consideration to the relevant duties of the CAA as safety regulator and how these align with our AIP proposals. As a general principle, we consider that AIP fees should be set at a level to reflect the underlying value (the opportunity cost) of the spectrum. This view applies even where spectrum-dependent

services give rise to wider social costs and benefits which are not fully reflected in the prices which users pay for those services.

- 1.26 Such wider costs and benefits are often referred to as externalities. Generally, the appropriate policy interventions to maximise such social value, or minimise social disbenefits arising from externalities, take the form of targeted subsidies and taxes and regulations for the outputs concerned (e.g. aid for remote facilities and pollution taxes or permits) rather than subsidising the required inputs (typically labour, land, equipment and, in the case of wireless services, spectrum).
- 1.27 The possibility that services provided using spectrum may cause externalities or have public good characteristics (such as helping to ensure high standards of aeronautical safety) does not change our view that setting fees to reflect opportunity cost more closely should result in net benefits to UK citizens and consumers. These net benefits are likely to be greatest if AIP is set to reflect opportunity costs and any externalities are, in parallel, addressed directly.
- 1.28 Accordingly, Ofcom does not consider that AIP fees should be reduced in response any relevant externalities. Instead, Ofcom considers that other responses, including safety regulation where appropriate, will be the more direct (and therefore more efficient) means of ensuring the highest levels of safety in the aeronautical sector are sustained. These issues are discussed in more detail in paragraphs 5.64 to 5.84 below.
- 1.29 The CAA has confirmed to Ofcom that it has adequate powers to respond to any safety concerns arising from Ofcom's current proposals to apply AIP to the aeronautical sector, and that the adequacy of VHF communications provision will be subject to safety regulation by the CAA using appropriate regulatory instruments taking into account safety justification provided by the service providers, via, for example, safety cases.
- 1.30 We have set out separately in Section 7 and Annex 7 below, our views on the likely response of spectrum users to the introduction of AIP fees, including the likely response by licensed and unlicensed aerodromes.

Wider economic efficiency

- 1.31 Our objective in proposing to apply AIP fees to aeronautical VHF communications spectrum is to improve the efficiency with which this scarce resource is used, to the benefit of citizens and consumers. In the short to medium term, the benefits are most likely to be seen in potential reallocations of spectrum, albeit at the margins and potentially focused on some applications, between different users of this spectrum for the same purposes i.e. for communications between ground stations and aircraft. We anticipate that, in response to AIP fees, some spectrum will be transferred to those who value it more highly than the current users. This will have a beneficial impact on the economy as the value of this spectrum is recognised by decision makers. Although there will be an important continuing role for the CAA in managing the use of this spectrum, we do not believe that, acting alone, command and control by the CAA, or any other authority, can achieve an equivalent outcome if users face no incentives to in relation to their use of spectrum.
- 1.32 Longer term, we envisage that AIP fees will also condition the views of UK spectrum users on wider strategic questions to do with the future international use of this spectrum, including the potential for developing technologies to enable delivery of the same, or better, communications with less spectrum. This may eventually lead to

release of spectrum for other uses or reduced pressure for additional spectrum to be allocated for aeronautical communications. These outcomes will have important benefits for the rest of the economy, removing distortions represented by existing fee rates in this sector.

- 1.33 Ofcom recognises that, currently, it may be difficult for the aeronautical sector to see clear and certain benefits of these longer term objectives in specific areas, compared with the present arrangements which may appear to guarantee low-cost and exclusive access to this resource for an indefinite period. The efficiency of this reliance on regulated access to spectrum is likely, however, to come under increasing pressure as demand for spectrum across both the aviation sector and in the wider economy continues to grow. There are benefits, therefore, in signalling the opportunity cost of this spectrum sooner rather than later, so that new technologies are fully exploited to decrease reliance on historic allocations of spectrum where this is efficient.

The international dimension

- 1.34 As a signatory to the ITU, the UK has international treaty obligations to ensure non interference with the use of spectrum in the band 117.975 to 137 MHz for aeronautical communications. We fully respect those obligations and nothing in these proposals would be inconsistent with any of the UK's international obligations.
- 1.35 We are also aware that our proposals are new in the context of the international spectrum management framework, which has not so far involved the use of market mechanisms to allocate scarce spectrum. However we consider that our proposals will not undermine the effectiveness of the international framework.
- 1.36 We note, however, that the proposals contained in this document are, of course, Ofcom's. For example the CAA has no equivalent statutory duty to consider the efficient use of spectrum in the wider interests of citizens and consumers; its duties relate to the safe and efficient provision of air transport services. As noted above, it will be important that Ofcom continues to work closely with the CAA to ensure that its proposals can be implemented without presenting risks to the CAA's own objectives. At this stage we see no reason, in principle, why a decision by Ofcom to apply AIP fees in the UK should have any adverse impact on the ability of the CAA and its international partners to achieve its objectives within the existing international framework.

Conclusions

- 1.37 Our revised proposals reflect the extensive responses to our initial consultation, the additional work we have undertaken and commissioned, and a wide range of discussions with Government, the CAA and other sector stakeholders. They seek to reflect the specific circumstances of aeronautical VHF spectrum use. As a result, our proposals for VHF licence fees in this sector have been substantially revised from those set out in our initial consultation in July 2008.
- 1.38 Our specific fee proposals for VHF spectrum are summarised in the next Section, with more details set out in Section 7, following a description of the background and basis for these proposals in Sections 3-6.

Section 2

Headline summary of fee proposals

Our key reasons for proposing AIP fees

- 2.1 When considering the fee setting approach for each category of spectrum covered in this consultation (and also in the August 2009 consultation in respect of maritime VHF communications channels), we have reviewed, amongst others, two key questions;
- **Question 1** Does demand for its current use exceed supply and can fees charged to individual licence fee payers help to manage that demand?
 - **Question 2** Is it feasible in the short to medium term to use this spectrum to meet excess demand for a different use, potentially beyond the aeronautical sector, and if so can fees help to achieve optimal spectrum use?
- 2.2 Where the answer to one or both of these questions is yes, we are proposing that AIP fees should be introduced. Where neither answer is yes, we are not proposing to introduce AIP fees.
- 2.3 In drawing up our proposals, we have had regard to two major reports submitted to the Government by Professor Martin Cave⁴. A large number of stakeholders, including the CAA, were concerned that our proposals might not correctly reflect the principles set out in one or both of these reports. They specifically queried our rationale for any pricing in spectrum which was internationally exclusively allocated to aeronautical (or maritime) use.
- 2.4 As noted below, our proposals in this document make proposals to set AIP-based fees for the use of internationally allocated spectrum in the aeronautical sector only where that spectrum is subject to excess demand from the current use, i.e. where demand for this spectrum for aeronautical communications exceeds supply. We have, in making those proposals, taken into account the estimated value of spectrum – the opportunity cost – in this current use. We consider that this approach is fully aligned with the analysis and observations in Professor Cave's reports. We set out in more detail why we think this is the case in Section 5.
- 2.5 The following Table 2 sets out our proposed conclusions on the fundamental questions set out in paragraph 2.1 above. The identities of the various frequencies, and the circumstances of their use, are discussed in more detail in subsequent sections of this consultation document;

⁴ See *Review of Radio Spectrum Management* March 2002 http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf and *Independent audit of spectrum holdings – An independent audit for Her Majesty's Treasury* December 2005 <http://www.spectrumentaudit.org.uk/pdf/20051118%20Final%20Formatted%20v9.pdf>

Category	Does demand for current use exceed supply <u>and</u> can fees help manage that demand?	Is it feasible to use this spectrum to meet excess demand elsewhere in the short to medium term?	AIP fees proposed in this document?
Aeronautical VHF communications channels (excl Fire and Distress)	Yes	No – limited by international agreements	Yes
Aeronautical Fire and Distress frequencies	No	No	No AIP fees

Table 2 Summary of rationale for proposing to apply (or not apply) AIP fees
Geographic variations

2.6 We are proposing to vary AIP fees for some aeronautical frequencies according to the location of the ground based transmitter. In these cases, we propose that fees should broadly reflect the varying probability of encountering excess demand during the period for which the proposed fees will be in operation in different parts of the country based on analysis by our consultants Helios Technology Ltd. These proposals, which divide the country into 3 areas of, respectively, High (red), Medium (dark blue) and Low (light blue) density of demand, are illustrated in the following map at Figure 1. For convenience, this map is reproduced in a larger size in Annex 6.

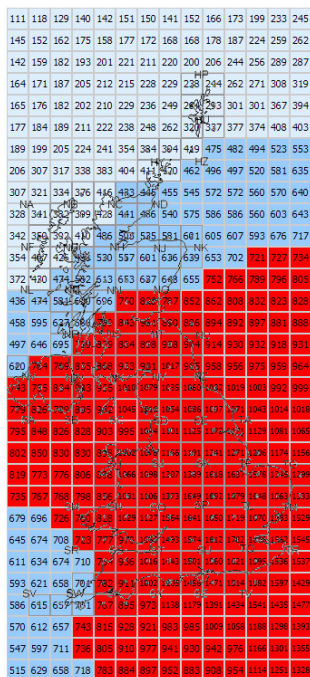


Figure 1 Proposed geographic classification

2.7 We are not proposing that fees for licence types which generally require UK-wide protection should be discounted for transmitters based in particular locations, as the

geographic location of the transmitter has little bearing on the impact on other potential users of that frequency in the UK. In respect of more localised applications, however, we are proposing that fees for transmitters located in areas classified as Medium density should be discounted by 20% and those in areas classified as Low density should be discounted by 50%. We propose that the minimum fee payable for any licence (discounted or otherwise) should be £75 (as a contribution to our administrative costs including our contract with the CAA).

Fees to reflect the relative consumption of spectrum by different applications

2.8 We are also proposing a much more granular set of annual licence fees, compared with the proposals published by Ofcom in July 2008, to apply to different types of applications to reflect their relative consumption of the available spectrum. These fees, including, where appropriate, geographic variations, are summarised in Table 3 below;

Application	High density areas	Medium density areas	Low density areas
Surface Movement Control (AS), Operations Control (OPC) and Offshore (Fixed) use	£350	£280	£170
Aerodrome Flight Information Service (AFIS), Aerodrome Control (TWR), and Air-Ground (A/G)	£2,600	£2,100	£1,300
Approach services (APP), Automatic Terminal Information Services (ATIS), Area Control service (CLIMAX enabled) and VOLMET	£9,900	£9,900	£9900
Fire assignments and distress assignments	Zero	Zero	Zero
General aviation sporting frequencies 118.675, 122.475, 129.825, 129.900, 129.975, 130.100, 130.125, 130.400, 130.525 MHz	£75 per frequency	£75 per frequency	£75 per frequency
Aircraft Communications, Addressing and Reporting systems (ACARS)	A single fee of £9900 per frequency—irrespective of how many associated ground stations	A single fee of £9900 per frequency—irrespective of how many associated ground stations	A single fee of £9900 per frequency—irrespective of how many associated ground stations
VHF Digital Links	A single fee of	A single fee of	A single fee of

(VDL)	£19,800 per frequency – irrespective of how many associated ground stations. The fee to be shared equally between two users	£19,800 per frequency – irrespective of how many associated ground stations. The fee to be shared equally between two users	£19,800 per frequency – irrespective of how many associated ground stations. The fee to be shared equally between two users.
Offshore Mobile	£75	£75	£75

Table 3 Proposed fees for aeronautical VHF frequencies

2.9 As noted in paragraph 1.11 above, we propose that, as changes to technology and operating standards evolve, fee incentives should where appropriate be modified to reflect and incentivise new opportunities to use spectrum more efficiently as they emerge. We propose that the initial application of AIP should avoid over-ambitious complexity, but we will work closely with CAA and other stakeholders to ensure that AIP is used to best effect. Any changes to refine the initial fee structure on this basis would require further public consultation.

Section 3

Background and guide to this document

- 3.1 In July 2008 Ofcom published an initial consultation⁵ which explored options for extending AIP to maritime and aeronautical spectrum (“the July 2008 consultation”). This was an initial consultation intended to set out the issues associated with valuing and pricing this spectrum, and thereby stimulate debate on options for the role of licence fees in achieving optimal spectrum use for citizens and consumers. As we noted in that consultation, we had insufficient information to enable us to conduct a detailed impact assessment for specific licence fee proposals and we asked stakeholders to provide information to inform Ofcom’s further evaluation of the options and the likely impacts. We said we would review the evidence provided and then make more detailed proposals supported by a full impact assessment.
- 3.2 As noted in Section 4 below, in response to the July 2008 consultation, we received a large number of detailed submissions (both formal written responses and views expressed during workshops and bilateral meetings). Having considered those responses, and having considered further advice commissioned from consultants Helios Technology Ltd and Plum Consulting, we are now setting out revised and more detailed proposals for VHF spectrum pricing for aeronautical VHF communications frequencies⁶.
- 3.3 We have made significant changes to the indicative fee rates for aeronautical VHF communications frequencies set out in the July 2008 consultation where we consider AIP licence fees to be appropriate. Our revised proposals are set out in detail in Section 7.
- 3.4 We currently maintain the view set out in the July 2008 consultation that spectrum efficiency gains are unlikely to result from applying AIP fees to aircraft licences issued under the Wireless Telegraphy Act 2006 (the “WT Act”). We are, separately, reviewing with the CAA the future administrative procedures for renewing aircraft radio licences, including whether the annual cycle of renewals remains appropriate. We will give further thought, in that context, to whether some recognition might be given to the ability of the radio to operate with less bandwidth. In the current proposals we are, therefore, restricting our proposals to fee to apply to ground stations (typically, aerodromes and air traffic controllers).
- 3.5 Within this overall context, the remainder of this section explains in more detail the scope, purpose and background of this second consultation on fees for aeronautical VHF communications frequencies.

Legislative framework for spectrum pricing

- 3.6 Ofcom has a general duty in Section 3 of the Communications Act 2003 (the “2003 Act”) to secure optimal use of the radio spectrum taking account of the interests of all who wish to access it.
- 3.7 Under section 13(2) of the Wireless Telegraphy Act 2006 (“WT Act”), Ofcom may, if it thinks fit in the light of its duties under section 3 of the WT Act, prescribe fees which

⁵ See footnote 1 above

⁶ See footnote 2 above in respect of maritime VHF communications channels and radar and aeronautical navigation aids

would be greater than those that would be necessary for the purposes of recovering costs it incurs in connection with its spectrum management functions. In particular, pursuant to section 3, Ofcom may have regard to the desirability of promoting:

- the efficient management and use of the part of the electro-magnetic spectrum available for wireless telegraphy;
- the economic and other benefits that may arise from the use of wireless telegraphy;
- the development of innovative services; and
- competition in the provision of electronic communications services.

3.8 The above-mentioned enabling powers are exercisable by statutory instrument under section 12 of the WT Act.

3.9 In the context of the current consultation, it is important to note that Ofcom may set fees higher than its costs only if doing so fits with its duties under Section 3 of the WT Act. We do not take into account other consequential effects of fee decisions, for example the potential effect on revenue raised for the UK Exchequer, in determining our proposals for fees.

3.10 In exercising these duties, Ofcom must, of course, fully respect international law relating to spectrum use.

Ofcom's broad approach to using fees to encourage efficient use of spectrum

3.11 The practice of setting licence fees above administrative cost has become known as Administered Incentive Pricing, or AIP. The WT Act provides that all WT Act licence fees must be prescribed in Licence Charges Regulations. AIP has been progressively rolled out since 1998 in a series of regulations⁷ and now covers the great majority of licence classes.

3.12 As we set out in the July 2008 consultation, radio spectrum is a vital resource and a major asset of the UK economy. One of Ofcom's primary statutory duties is to ensure the optimal use of the radio spectrum in the interests of citizens and consumers. It is essential that the regulatory regime for the allocation of spectrum is designed to contribute to fulfilling that duty. Ofcom's overall strategy for meeting this objective was set out in the Spectrum Framework Review⁸, which was published in June 2005.

3.13 That Review's central theme was that the management of the radio spectrum can be carried out most effectively if market forces are harnessed to a much greater degree than in the past. Ofcom considers that this approach will:

- promote efficient use of the radio spectrum by allowing spectrum to be used by the users who value it most highly;

⁷ The most recent consolidated regulations are the Wireless Telegraphy (Licence Charges) Regulations 2005 (SI 2005 No.1378)

⁸ http://www.ofcom.org.uk/consult/condocs/sfr/sfr/sfr_statement

- promote competition by increasing the availability of spectrum for use by the most valuable services.
- 3.14 Ofcom's vision for spectrum management, as set out in the Spectrum Framework Review, is therefore for market forces to play an increasingly important role in determining how spectrum is used. Ofcom believes that this will encourage efficiency in spectrum use, by increasing the likelihood that spectrum will be held by those who can make best use of it, and by creating more freedom for spectrum to be used for more valuable applications. AIP is one of the key tools which Ofcom uses to promote this, by creating incentives for users, and potential users, to take informed decisions for themselves which contribute to efficient spectrum use.
- 3.15 AIP is already paid by most private sector users of spectrum, except where upfront payments have made at auction. Many public sector users, including the emergency services, also pay AIP. Crown users of spectrum do not require licences from Ofcom and so are not required to pay licence fees. However, reflecting Government policy that public sector spectrum users should pay for spectrum on a comparable basis to private sector users⁹, MOD and the MCA make payments to Ofcom in respect of some of their direct spectrum holdings, and the conclusions of this consultation exercise will potentially influence what these and other government departments pay in future.
- 3.16 Ofcom is currently conducting a strategic review of spectrum pricing ("SRSP"). This looks at the broad principles and high-level policies that lie behind the way that we determine WT Act licence fees, both AIP-based and those designed to recover costs. The SRSP is not looking at individual licence fee levels. In future, specific reviews of fee rates will continue to be carried out through the specific processes in place at the time. However, those fee rates which are reviewed following the conclusion of the SRSP will be informed by the broader principles and policies established in the SRSP. Ofcom will ensure that the conclusions of the consultation on aeronautical and maritime spectrum are fully consistent with the emerging conclusions of the strategic review.

Government consideration of applying AIP to the maritime and aeronautical sectors

- 3.17 In 2004, the Government commissioned Professor Martin Cave to identify actions by Ofcom and/or the Government that could lead to release of spectrum to the market and an increase in opportunities for the development of innovative new services. The subsequent Independent Audit of Spectrum Holdings¹⁰ (the "Cave Audit 2005") was completed in December 2005, and recommended a wide range of changes to several areas of spectrum management including the aeronautical and maritime sectors.
- 3.18 The Government, in its response to the Audit, published on 22 March 2006¹¹, agreed with the recommendation to widen the application of market mechanisms in relation to the spectrum holdings considered. It set out a range of new actions by the public sector, including actively seeking spectrum efficiency opportunities and exploiting these either to generate more value for the existing users or to trade spectrum to other spectrum users. It also endorsed Professor Cave's call for the wider and more consistent use of AIP and spectrum trading.

⁹ *Government Response to the Independent Review of Radio Spectrum Management*, 2002

¹⁰ <http://www.spectrumbaudit.org.uk/final.htm>

¹¹ <http://www.spectrumbaudit.org.uk/pdf/governmentresponse.pdf>

- 3.19 More explicitly, the Government's response to the report also accepted the recommendations of the Cave Audit that AIP should be extended to aeronautical ground based radar. The response also committed to a wider programme of review in respect of ground based use of aeronautical navigation aids and aeronautical VHF.

Ofcom July 2008 initial consultation on the possible application of AIP fees to the maritime and aeronautical sectors

- 3.20 The civil maritime and civil aeronautical sectors together are among the biggest spectrum users in the UK, using around 7% of all UK spectrum below 15 GHz to support a wide range of applications, often safety critical. The July 2008 consultation considered the possible application of AIP to these sectors.
- 3.21 The document proposed that ground-based users of VHF communications channels (typically, ports, aerodromes and air traffic controllers) should pay AIP licence fees for their use of radio spectrum. However, we stated that we did not intend to reverse an earlier decision that ship WT Act licences should have a lifetime duration, and should be free of charge if applied for on-line. We invited comments on whether there are good efficiency argument for setting AIP fees for aircraft WT Act licences.
- 3.22 To help stakeholders comment on the likely impact of these outline proposals for VHF communications spectrum pricing, we set out some indicative fees, although we noted that it was likely that these would be modified in the light of initial comments from stakeholders and our own subsequent work to finalise an impact assessment based on more detailed proposals.
- 3.23 The July 2008 consultation also set out some indicative reference rates for spectrum used for maritime and aeronautical radar and for other aeronautical navigation aids. These were intended to provide an indication of the importance of these spectrum bands, in terms of their value to society. The rates were expressed as a value per MHz of bandwidth assuming full UK-wide coverage. We made no attempt to propose how these rates might translate to fees attaching to licences for particular types of equipment. We noted, however, that any method for doing so should take into account, as a minimum, the area sterilised by each station's use including the impact of out of band emissions and the use or otherwise of sector blanking, thus providing users with incentives to use spectrum efficiently. We also noted that there appeared to be advantages in the opportunity cost (the value to society) of spectrum allocated to radar and aeronautical navigation aids being shared between government and end users, with the DfT accountable for unused spectrum (howsoever defined) reserved for the maritime and aeronautical sectors.
- 3.24 The purpose of the July 2008 consultation was to provide sufficient information about the principles of our likely approach to enable stakeholders to present to us their views on the issues which Ofcom would need to take into account before more formally proposing fee rates for any spectrum band.
- 3.25 The July 2008 consultation (paragraphs 2.18 to 2.29) summarised the various consultancy reports commissioned by Ofcom and government since 1996 which had been used to inform Ofcom's thinking. It also set out (paragraphs 3.54 to 3.89) Ofcom's consequent approach to fee setting, including an awareness of the potential asymmetry of risks and hence a need to be conservative in introducing significant fee changes, and the desirability in principle of setting fees which are consistent with fees and auction valuations set in other bands.

- 3.26 Elsewhere (paragraphs 3.8 to 3.45), we set out some discussion of who might be best placed to respond to AIP by effecting a change in the way spectrum is used, noting in particular the extensive effect of international agreements on many aeronautical and maritime uses. In doing so we noted that in different cases the most appropriate arrangements would be different, and that it might variously be most effective for end users, sector regulators, government or no one to pay fees.
- 3.27 Annex 5 to the July 2008 consultation set out how we expected to make a more extensive impact assessment in conjunction with developing detailed proposals for any licence fees. We noted that we needed information from stakeholders before we could understand the potential impact of fees on end users and hence finalise any such proposals; and we could not carry out an impact assessment without first having some detailed fee proposals to assess.

Ofcom's approach to Impact Assessments

- 3.28 The analysis presented in this consultation document, including Helios Technology Ltd's analysis of financial impacts on stakeholders in Annex 7, represents an impact assessment (IA) in connection with our VHF fee proposals, as defined in section 7 of the Communications Act 2003.
- 3.29 IAs provide a valuable way of assessing different options for regulation and showing why the preferred option was chosen. They form part of best practice policy-making. This is reflected in section 7 of the Communications Act 2003, which states that generally we have to carry out IAs 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. However, as a matter of policy Ofcom is committed to carrying out and publishing impact assessments in relation to the great majority of our policy decisions. For further information about our approach to IAs, see the guidelines, Better policy-making: Ofcom's approach to impact assessment, which are on our website: http://www.ofcom.org.uk/consult/policy_making/guidelines.pdf.
- 3.30 As noted above, under the Communications Act 2003, Ofcom has a general duty to promote the "optimal use for wireless telegraphy of the electro-magnetic spectrum". In exercising its functions in relation to spectrum management (including its power to set licence fees), Ofcom is also required (under section 154) to have regard, *inter alia*, to efficient management and use of the electro-magnetic spectrum.
- 3.31 We have now examined the potential welfare effects of applying AIP to the VHF frequencies used by the aeronautical sector. In our July 2008 consultation¹² we outlined the broader arguments for applying AIP, including the potential welfare effects from setting AIP to reflect underlying opportunity costs in current or alternative uses (see section 2). In this second consultation document, we build on these arguments and additionally assess the appropriateness of specific fee options for the VHF spectrum used by the aeronautical sector. In this assessment, we evaluate the welfare effects of different fee options identifying impacts on both consumers and producers (see Section 7).
- 3.32 Further to this, we have undertaken an assessment of the potential financial impacts of the specific AIP fee proposals. This aims to identify any distributional effects, to enable us to consider and propose measures to mitigate the risks of unintended consequences and of potential market failure. Similar considerations were set out in

¹² See footnote 1 above

the statement Spectrum Framework Review for the Public Sector¹³ published in January 2008.

- 3.33 We will review our impact assessment in the light of responses to this consultation and, if appropriate, update the analysis when finalising our policy. Ofcom has considered each of the following factors relevant to an Impact Assessment for VHF fees proposals as set out in this consultation document, which relate to the structure of the document as set out above:
- the issues we need to consider and the identity of the citizen or consumer interest (see sections 2, 3 and 4)
 - the policy objective (see sections 3, 4 and 5)
 - options for determining fee levels (see section 6).
 - the impacts on different types of stakeholders (see this section 7 and Annex 7 and 8)
 - any impacts on competition (see Annex 7 and 8)
 - any impacts on safety (see section 5)

The structure of the rest of this consultation document

- 3.34 In this **Section 3** we have set out the background to this consultation exercise, the legal framework within which we operate, and our general approach to performing impact assessments.
- 3.35 In **Section 4** we summarise the information provided by stakeholders in their responses to the initial July 2008 consultation and the output of further external consultancy commissioned by Ofcom from Helios Technology Ltd and Plum Consulting, which have both been used in developing the revised proposals in this document.
- 3.36 In **Section 5**, we set out our reasons for now proposing to apply AIP to some aeronautical spectrum licences, including our consideration of whether spectrum users have scope to respond to AIP fees in ways which may lead to improved efficiency of spectrum use, in the spectrum bands within the scope of this consultation.
- 3.37 In **Section 6** we explore the methodologies for determining the relevant opportunity costs of the spectrum under consideration and associated options for reflecting these in fees at a high level.
- 3.38 In **Section 7** we set out detailed proposals for applying AIP to aeronautical VHF communications channels, including issues to do with phasing and review. We also set out all our consultation questions in relation to licence fees for VHF spectrum in this section.
- 3.39 **Annexes 1 to 3** explain how to respond to this consultation.

¹³ See annex 3 at <http://www.ofcom.org.uk/consult/condocs/sfrps/statement/statement.pdf>

- 3.40 **Annex 4** summarises the key questions which we have asked in the body of the text in Sections 7 and 8.
- 3.41 **Annex 5** provides a Glossary
- 3.42 **Annex 6** replicates in a larger size the map at Figure 1 above and Figure 3 below
- 3.43 **Annex 7** provides further information to support our impact assessment.
- 3.44 **Annex 8** reproduces a report prepared for Ofcom by Helios Technology Ltd and Plum Consulting which considers the range of financial impacts on stakeholders.

Section 4

Responses to initial consultation, and further external consultancy

Introduction

- 4.1 In this section we provide a detailed summary of, and comments on, the responses to the July 2008 consultation in respect of fees proposed to apply to aeronautical VHF communications frequencies.
- 4.2 We also summarise the additional consultancy work we have commissioned and the additional discussions we have had, in order to develop our revised proposals. The consultation responses and the additional work and discussions have all provided very important inputs to our revised proposals, and have enabled us to make significant revisions in a number of areas.
- 4.3 The basis for the revised proposals is then set out in the remaining sections (5 to 8) of this document.

Responses from stakeholders

Statistical overview

- 4.4 638 responses had been received when the consultation period ended. Of these nearly 80% were from individuals, and the rest were from organisations ranging from local flying clubs and training schools to major international airlines and airport operators.
- 4.5 73% of responses from individuals were intended primarily to express concern about possible impact of our proposals for maritime spectrum on RNLI and/or mountain rescue services. Most of the remainder were from people concerned about the possible impact on the General Aviation sector.
- 4.6 Of the responses received from organisations, around 30% were from mountain rescue/cave rescue teams, 27% from commercial airlines, major airports and related trade associations, around 15% from maritime organisations, 12% from organisations in the General Aviation sector, and a similar proportion from UK regulators, local and national government and MPs.
- 4.7 Responses from the aeronautical sector came from 16 airlines, 10 airport operators, NATS, the International Air Transport Association (“IATA”), the CAA, the Aeronautical Spectrum Frequency Consultation Group (“ASFCG”), plus 9 other organisations representing a variety of commercial interests.
- 4.8 Many of the responses submitted by the airlines, major airports and IATA had a large element of common concern. Many of the airlines and major airports referred to, and expressed support for, IATA’s response. A key view of the aeronautical sector was that international allocation agreements prevent trading and re-use and, therefore, there is no opportunity cost and AIP can have no useful impact on efficiency.

Comments from Government and subsequent discussions

- 4.9 Both the DfT and CAA supplied comments on the consultation. To a large extent these reflected concerns in the transport sectors, which were also raised by respondents in those sectors, and these are covered below.
- 4.10 DfT and CAA have particular and distinct positions as stakeholders in this consultation. They have, to a greater or lesser extent, policy or regulatory functions in relation to the aeronautical sector. For example, while most regulation of aviation is carried out by the CAA, the DfT is the part of central government which would formulate and lead any changes to legislation affecting either sector. They also often provide a non-legislative co-ordination role to these sectors, or to specific groups within them.
- 4.11 As a result, some of the points raised by DfT and CAA related to their policy responsibilities, and the nature of policy making and regulation in relation to the aeronautical sector. As we had made provisional proposals that would involve changes to their responsibilities, DfT and CAA expressed a wish to discuss these in more detail in order to consider them. We have therefore had a number of detailed discussions with DfT and CAA following the July 2008 consultation. We consider that our current proposals have benefitted greatly from their insight and perspectives.

Questions asked in the July 2008 consultation

- 4.12 This section summarises the responses we received to our specific questions as set out in the July 2008 consultation. We then go on to reflect the additional comments received, both on general principles and specific issues.

July 2008 Question 1: How should Ofcom manage the process of taking advice from users, regulators and government on efficient apportionment of AIP fees in the maritime and aeronautical sectors? Are any new institutional arrangements needed?

- 4.13 BAA proposed more industry workshops with smaller groups. The Airport Operators Association (“AOA”) criticised Ofcom for not engaging more with airport operators, and apparently restricting discussion to CAA and NATS. Manchester Airport Group argued that there had been insufficient contact with the airports sector until shortly before the initial consultation had been published, and that Ofcom had relied too much on discussion with the CAA and NATS.
- 4.14 Responses from the General Aviation sector asked that Ofcom ensure that the views of this sector, distinct from the commercial sector, are fully recognised.

Ofcom’s response

- 4.15 We agree that workshops and bilateral meetings can usefully complement written exchange of views in the form of consultation proposals and stakeholder comments. It is correct to note that Ofcom has held numerous detailed discussions with government and sector regulators, but this is reflective of the policy roles which these groups have within the maritime and aeronautical sectors. There has been no intention to exclude any stakeholders and, in practice, we have held meetings with a very wide range of spectrum users and trade associations. We intend to convene further workshops and meetings to discuss our revised proposals during the consultation period.

July 2008 Question 2: If you consider that our proposals for pricing ground station users for any spectrum would be likely to have a detrimental impact on safety, please let us know. In order for us to understand your assessment fully, it would be helpful if you could outline the mechanisms whereby this might happen.

- 4.16 The Aircraft Owners and Pilots Association (“AOPA”) took the view that Ofcom was proposing that aviation bands should be sold to the highest bidder, thereby compromising safety.
- 4.17 AOPA also warned that small airfields would do without VHF if they believed fees set at £4950 are disproportionate, and would revert to ground based visual aids even though safety of operations is enhanced by pilots being able to listen to radio messages.
- 4.18 The ASFCG considered there was a particular risk to safety at unlicensed airfields which might cease to use safety equipment.
- 4.19 The Light Aircraft Association (“LAA”) mentioned that there are 155 unlicensed aerodromes, plus hundreds of grass strips used for aviation, in comparison with just 145 licensed aerodromes. In its view, the unlicensed aerodromes and grass strips are likely to do without VHF if fees are set at the proposed level. LAA observed, in this context, that 68 unlicensed aerodromes already operate without VHF.
- 4.20 LAA also made the point that the proportion of aerodromes which are not licensed could grow as CAA is consulting on removing the licensing obligation for aerodromes used for flight training purposes (a point also made by the British Microlight Society).
- 4.21 The British Business and General Aviation Association (“BBGA”) stated that a number of its member flying schools, clubs and airfields had said they would switch off their transceivers if faced with a charge to use their assigned frequencies.
- 4.22 The Mid Anglia School of Flying considered that AIP would create undesirable incentives, particularly at small airfields which have no legal requirement to deploy radio equipment. This view was shared by Big Red Kite (Aviation) Ltd.
- 4.23 The Lasham Gliding Society warned that heavier use of fewer deployed frequencies could mean that important information could be lost amongst other transmissions.
- 4.24 The Royal Aeronautical Society argued that safety would be compromised in response to pricing, since providers of facilities currently use more radio applications than the minimum necessary to comply with regulatory requirements so, if charged fees, will reduce to this minimum to the detriment of safety. The Society considered that the only way to protect safety standards would be to charge no fees on licences for any applications which are safety related.
- 4.25 The Guild of Air Pilots and Air Navigators also made many of the same points as the Royal Society. The Guild also went on to express concern about the perceived possibility that aeronautical frequencies would be auctioned off to the highest bidder.
- 4.26 British Airways (“BA”) warned of the risk of additional infringements of commercial airspace by General Aviation users who would do without navigation aids in response to pricing. This would present a risk to safety which would have to be countered by reducing the density of flights, which would impact on the economy. This view was shared by the AOA. BA argued that the outcome would therefore be an inefficient use of spectrum.

- 4.27 Manchester Airports Group argued that provision of safety services is not driven solely by regulation, and that there are grey areas. The group argued that in these areas operators, particularly in the General Aviation sector, will make cuts which will reduce safety.
- 4.28 BAA did not believe fees would impact safety at large airports but was concerned by comments from the General Aviation sector which might suggest an increase in GA infringements of controlled airspace.
- 4.29 Mid Wales Airport, Highlands and Islands Airports, London Luton Airport and Cardiff International Airport all warned that other airports would be tempted on financial grounds to reduce safety related equipment. Most of these respondents explicitly stated that they would not support any degradation of safety at their own airports.
- 4.30 Leeds Bradford International Airport Ltd was concerned that AIP might cause a reduction in duplicate or back-up systems, to the detriment of safety.
- 4.31 NATS confirmed that it would not allow fees to result in safety degradations, but warned that the impact of mitigating activity, such as placing limits on capacity, may be a degrading of services, including increased delays.
- 4.32 IATA and UPS felt that the proposals did not consider the question of safety.

Ofcom's response

- 4.33 We agree with stakeholders that much of the spectrum considered in this consultation document is currently used to provide safety critical applications. We agreed in the July 2008 consultation (see paragraphs 3.46 to 3.50) that it would be essential that the introduction of AIP did not disrupt the operation of these applications. We also noted, however, that delivery of safety critical services is already reliant on access to many other resources which have to be acquired on the commercial market (not least suitable training and equipment) and that, in this respect, spectrum is currently an exception in not incurring a cost that reflects its value.
- 4.34 In the July 2008 consultation, we noted that spectrum users in the aeronautical sector are subject to sector specific regulation and wider health and safety legislation which impose specific legal requirements to maintain high standards of safety. We cited the example of the Air Navigation Order.
- 4.35 It is our view that the ability of the existing frameworks to maintain high standards of safety will not be affected by the introduction of AIP as we propose. For comparison, this ability should not, under existing oversight frameworks, be affected by changes in the costs of equipment, or training, or other costs associated with complying with radio use requirements, given that safety is paramount in these sectors.
- 4.36 This leaves the question of operators who are not currently affected by statutory regulation. We note, as some stakeholders noted, that sector-specific regulation does not currently apply to unlicensed aerodromes, and we respond to the specific points made in connection with this fact below.
- 4.37 We also note that responses from a number of stakeholders, including the ASFCG, NATS and the CAA, indicated that it would be commercial outputs, such as throughput of traffic, which operators would reduce, rather than safety, if they felt that changes in fees were disproportionate to the benefit obtained from continued

spectrum use and so wished to reduce that use. As AOPA noted, aerodromes also face commercial pressures to maintain good safety standards, as pilots are unlikely to be willing use aerodromes which are considered unsafe.

On specific points raised by stakeholders in response to this question

- 4.38 We would expect any decision by an individual user to be taken in light of all considerations, including the maintenance of safe operations. It is our view that, in the first instance, the aeronautical sector – and its customers – places a high value on safety, and would be unlikely to take actions that would compromise this element of its operations.
- 4.39 We have confirmed that spectrum that is used in response to emergencies, since it is made available on a contingency basis to any and all users necessary to the emergency response, and no user denies access to anyone else, will not be subject to any fees, either AIP-based or administrative cost-based. This is because individual licensing does not give rise to specific opportunity costs associated with that user’s use of the spectrum.
- 4.40 However, spectrum assignments in other frequencies support day to day operations, by enabling them to be conducted both expeditiously and safely. Such assignments are exclusive and so deny access to that spectrum by other users to support their operations. We consider that AIP-based fees in those frequencies which are subject to excess demand from other aeronautical users (or, in principle, from alternative users should alternative use be feasible), are likely to encourage spectrum to be held and used for the most valuable purposes, that is to support activities – including supporting the safety of those activities – which have the highest value to society. The alternative pricing options of existing fees, or no fees, would not signal to users the potential relative value of their spectrum, and so the risk that spectrum would be used in support of less valuable operations would be higher than with AIP-based fees.
- 4.41 We also note that the evidence of excess demand for spectrum across aeronautical frequency bands could, itself, raise safety concerns if a lack of spectrum to meet current volumes of air traffic compromised safety in this sector. In practice, safety standards are maintained by the CAA through regulation, but AIP may assist in ensuring that critical applications have access to spectrum.
- 4.42 On the risk that aeronautical spectrum would be sold to the highest bidder, we did not make any such proposals in the 2008 consultation, nor are we making them now. Licences will continue to be available on application to the appropriate licensing body (Ofcom or CAA). Our proposals are limited to the way in which fees for those licences will be set, and the resulting levels of those fees. Our statutory duties do not permit us to set fees to maximise revenues.
- 4.43 Several respondents raised concerns in relation to the status and potential response of unlicensed aerodromes. We are mindful of the possibility that high fees imposed with little warning could conceivably prompt some unlicensed aerodromes to decide to operate without VHF communications frequencies. We note that the overwhelming majority of assignments at these aerodromes fall into categories for which the fees we are proposing are significantly lower than the £4950 level mentioned in our 2008 consultation. Furthermore, as set out in Section 7, we are proposing phasing which will substantially reduce the impact of the proposed fee changes in the shorter term, allowing greater opportunity for adjustments to be made without affecting core outputs or services. In our view, this reduces the likelihood that operators will

respond by decommissioning equipment and thereby diminishing the services they offer to customers, although we acknowledge that there must remain a chance that this could happen in some cases.

- 4.44 We would note, however, that this would only be a possibility at those aerodromes at which the current use of VHF radio is discretionary, not mandated by sector regulation. That is, there currently exist similar aerodromes which operate without such equipment. We note the advice of the LAA that, in fact, nearly half of all unlicensed aerodromes (excluding small grass strips) already choose to operate without VHF. We further understand from the CAA that, of the 1,635 sites recognised under planning law as aerodromes, fewer than 10% are licensed. The view of the CAA, as set out in CAP428 "Safety standards at unlicensed aerodromes"¹⁴ is that the provision of air traffic services will depend on a variety of factors including the amount and type of traffic and the local conditions.
- 4.45 We have set out in paragraphs 5.77 to 5.84 below, the extensive powers which the CAA can use to ensure that all aerodromes, including those which are currently unlicensed, are suitably equipped with communications systems. As we note in those paragraphs, we are discussing the implications of our proposals with the CAA and agree that it is essential that implementation plans take full account of any legal and resource constraints which are faced by the CAA.
- 4.46 We have considered very carefully the likely response of unlicensed aerodromes to the fees which we are now proposing, based on specific work we commissioned from Helios Technology (see report at Annex 7). In light of this analysis, it is our view that most of these aerodromes (and most other spectrum users in the aeronautical sector) will be able to absorb or pass on the additional costs with little difficulty, given the scale of their other costs and revenues, and will not feel pressured to reduce safety in an unacceptable way. This is discussed in greater detail in section 7 and Annex 7.
- 4.47 Nevertheless we are proposing that larger fee increases should be phased in over a significantly longer period than usual. We believe that the phasing proposals which we are making will give spectrum users and sector regulators sufficient time to consider their options, including options for spectrum users to revise their spectrum use, or the nature of their wider operations, and options for sector regulators to review the adequacy of legislation which prescribes minimum safety standards.
- 4.48 We accept that one such considered response by operators may be to reduce the use of spectrum where more frequencies are used than have been judged necessary by the CAA for safe operations. Such a response would make spectrum available for new uses and so would potentially contribute to more efficient use of this scarce spectrum, including supporting additional safe operations at another location in the UK. We would expect any such decision by an individual airport or airfield to be taken in light of all considerations, including the maintenance of safe operations and the expectations of customers using its facilities.
- 4.49 We note that respondents to our 2008 consultation were necessarily responding in principle, without detailed information on the proposed levels of fees. Since that consultation, and following consideration of the responses and of discussions with various stakeholders, we are now making specific detailed proposals which provide better information for stakeholders to consider the potential effects on them.

¹⁴ See <http://www.caa.co.uk/docs/33/CAP428.PDF>

4.50 We do not consider that our fees proposals are likely to lead to more aircraft flying without radio equipment. In the first instance, aircraft will not face AIP fees in respect of radio equipment they carry and use. In a case where an individual airfield operator ceased to use radio equipment, it would not automatically follow that aircraft operators who mainly used that airfield would decommission their radio equipment. Each aircraft operator would consider his own relevant costs and benefits, which would include the option to use VHF communications channels when flying into or out of other airfields, and the option to use frequencies other than those deployed by aerodromes (for example the Safetycom frequency).

4.51 We therefore consider that the risk of AIP discouraging use of safety critical equipment is minimal. In any event, we note that Indepen 2007 suggests the following policy response if there were a remaining concern regarding the adverse impact of applying AIP on mandated regulatory requirements:

“If, ... there was a concern that imposing AIP might in practice compromise safety to an unacceptable degree by leading general aviation to dispense with carrying certain radio equipment, the correct policy response would be to revise the regulation to mandate general aviation to carry that equipment. Continuing to make spectrum available without charging AIP would not guarantee that the equipment would be carried and would, moreover, risk causing an economically inefficient allocation and use of spectrum.”

July 2008 Question 3: Do you have any evidence which indicates that AIP charged to ground stations could have a material detrimental impact on UK competitiveness?

4.52 AOPA argued that raising costs for safety would decrease UK competitiveness. They added that regional development would suffer if small airports ceased to offer radio-based services and foreign businessmen were unwilling to fly to them.

4.53 LAA was concerned that if aerodromes were forced to close this would mean that UK manufacturers will have to sell abroad or close. LAA also considered that flight training would move abroad. BBGA and the Mid Anglia School of Flying also expressed concern about the possible impact on flight training within the UK.

4.54 BA and Manchester Airports Group noted that the scale of fees in the consultation was such that NATS would have to pass these on. BA noted that foreign airlines may be able to avoid over flying the UK to some extent, while BA and other UK airlines would have no such choice and would face a competitive disadvantage. Virgin Atlantic expressed a similar view.

4.55 The CAA noted there could be a wider competition impact on UK aviation, dependent on how fees are imposed. CAA noted that the currently difficult economic climate, and account has been taken of these factors in other contexts such as Emissions Trading.

4.56 The ASFCG noted that CAA has statutory duties with respect to aviation safety. It was concerned that if the effects of AIP were otherwise to undermine safety, CAA would have to take action to maintain safety, which could have adverse economic impact including cessation of services.

Ofcom's response

4.57 We recognise that some UK users of VHF communications spectrum are in competition with non UK companies. For example, some aerodromes which operate as hubs for transiting passengers and goods face competition from non UK

aerodromes. We also recognise the international nature of competition between flying schools. We acknowledge that, in principle, additional costs imposed on UK industry, if not also faced by foreign competitors, could put UK players at a disadvantage. Furthermore, to the extent that additional fee costs are passed on to the UK customers of these organisations (such as UK aircraft) these too could suffer competitive disadvantage if the increase for each customer is material.

- 4.58 The work we commissioned from Helios and Plum Consulting, which we are publishing in Annex 7, looked carefully at the competitive position of spectrum users that would be affected by our fee proposals, in order to assess whether they had scope to pass costs on. Having considered their analysis, we do not believe the VHF fees we are now proposing will have a material impact on the UK aeronautical sectors. We set out our reasoning, which is largely based on the more detailed report in Annex 7, below.
- 4.59 The increase in spectrum fees which we propose to apply to the aeronautical sector amounts to approximately £4m per year at the end of the proposed phasing in period (e.g. 2015). As noted in Section 7, this is two or three orders of magnitude less than the changes in industry cost implied by both air passenger duty and carbon emissions trading. We are mindful of the possible cumulative impact of different cost changes but, in light of the conclusions of our impact assessment (see Section 7 and Annex 7), we do not believe that the aeronautical sector as a whole, nor the great majority of aeronautical spectrum users, will face a material disadvantage relative to non UK competitors. We recognise the concern about possible future changes to the way AIP fees are applied, but note that such impacts would be the subject of future assessment and consultation.
- 4.60 As explained in Section 7 of this consultation, we have concluded that it is highly unlikely that the proposed spectrum fee increases will have a material impact on the competitiveness of UK industry as a whole or of any UK spectrum user (or customer of a spectrum user) facing non UK competition.

July 2008 Question 4 : Taking into account the information available in this document, including that set out in Annex 5, our initial views on VHF radiocommunications licence fees and on the reference rates for bands in other uses, and any information you have about the organisations to whom we are proposing to charge fees, please provide any evidence that you think is relevant to us in considering the financial impact of the fees we intend to propose for VHF radiocommunications, or for other uses.

- 4.61 AOPA argued that, given the economic climate, users would have no option but to cease to use certain equipment to avoid paying fees.
- 4.62 AOPA additionally recommended that Ofcom should commission its own advice on potential impacts rather than ask the sector for evidence.
- 4.63 The General Aviation Alliance emphasised the adverse economic conditions, but also argued that even a decision to defer fees changes until better times would kill any planning for growth.
- 4.64 The smaller General Aviation societies and clubs all emphasised the risk they perceived to safety, and the economic precariousness of their sector, which would be further threatened by AIP.

- 4.65 BA also warned that foreign airlines avoiding over flying would burn more fuel, to the detriment of the environment.
- 4.66 IATA argued that the airlines will not simply be able to pass on costs as its customers are price sensitive. IATA also argued that if the UK applies AIP this could be followed by other states, thus adding very substantial costs to airlines without benefits.
- 4.67 Manchester Airports Group argued that airport operators outside London which incur costs for spectrum will not be able simply to pass on the additional costs as the market is highly contestable. It also noted that it was not possible, from the information in the July 2008 consultation, for users to cost the implications of the proposals from the information in the consultation document.
- 4.68 In contrast to its own operations, Manchester Airports Group characterised NATS as having a monopolist's ability to pass on cost increases.
- 4.69 Luton airport warned that the nature of its contracts is such that it may be difficult to pass on costs to users.
- 4.70 A number of airport operators attempted to assess the overall cost of the proposals to themselves, including the impact of potential future licence fees for radars and aeronautical navigation aids, for which Ofcom had set out only some indicative valuations of the complete spectrum bands. In the process, some operators appear to have assumed that the indicative reference rate per national MHz could be taken as an indicative fee for a single piece of spectrum-dependent equipment.
- 4.71 BAA estimated that its fees could increase from £11k to as much as £4m at its 7 airports. BAA based its assumptions on a frequency re-use factor of 5 across the UK and assumed bandwidth derived from emission codes. BAA stated that it had entered a new 5 year review period for Heathrow, Gatwick and Stansted with no prospects of passing on additional costs to customers.
- 4.72 BAA recognised that change is possible over a long time frame (say 20 years) but argued that, over that time, by its calculations UK industry will have paid £80m for VHF licences for no benefit.
- 4.73 Similar responses were received from Belfast, Cardiff and Luton airports. All attempted to estimate their own exposure and appeared to have taken the reference rates for the radar and navigational aids bands and assessed the amount of bandwidth needed for each piece of equipment which they operate.
- 4.74 AOA estimated the cost to the industry at £91m and noted, for comparison, the estimated £122m which NATS believes can be saved from the expected impact of the carbon tax through a 10% increase in ATM efficiency. It also argued that AIP will mean that there is less money available for developing new spectrum efficient technologies.
- 4.75 AOA set out its estimate of what 6 different airports might end up paying and analysed this as a percentage of operating profits. It also provided an average that was apparently taken from a survey of 12 airports. AOA warned that the fees would disproportionately affect the smallest airports as these face the same underlying costs per runway as busier airports.

- 4.76 Infracore made the point that it will be installing new SSR to mitigate the impact of wind farms in the Thames estuary, and that it now faces the threat of high spectrum fees for this facility.
- 4.77 In the CAA's view, NATS will wish to pass on costs through en route charging. The CAA acknowledged this in setting a revenue cap to the end of 2010 and said efficient impact during this period would be taken into account in the next control period from 2010; negotiations have already started.
- 4.78 The Mid Anglia School of Flying noted that the CAA has mandated that aircraft must be fitted with Mode S transponders by 2012, and that the cost of this on top of indirect impact of AIP fee, would be onerous.
- 4.79 The CAA was concerned that the proposed VHF fees could have disproportionate economic impact on general aviation.
- 4.80 Manchester Airports Group, Mid Wales Airport and St Mary's Airport warned that the economic impact of AIP would be felt disproportionately by smaller airports.

Ofcom's response

- 4.81 We welcome the information provided, both in formal written responses to the consultation exercises and in discussion with individual stakeholders and sub groups. Stakeholders will note that we have made significant changes to the initial proposals for VHF licence fees outlined in the July 2008 consultation. We have set out a much wider range of fees to apply to the aeronautical sector, reflecting the diverse impacts of different types of application on spectrum use in different parts of the country. These changes directly reflect comments made to us by stakeholders during the consultation period as well as additional work we have commissioned.
- 4.82 Many of the stakeholder comments related to the possible impact of fees on the sectors, and to analyse such impacts from our specific VHF licence fee proposals we commissioned expert advice from consultants Helios Technology Ltd (see report at Annex 7).
- 4.83 Further, we note that many respondents were assessing for themselves the expected impact of fees for VHF channels at the illustrative levels set out in the July 2008 consultation, and in addition were estimating the impacts of potential licence fees for radar and navigational aids spectrum. As we are not proposing AIP-based fees for end users of radar or navigational aids in this document, we expect that those concerns which were directly linked to the scale of fees should be proportionately reduced in line with our new proposals, compared with expectations.
- 4.84 On the AOPA comment that users will have no option but to cease to use equipment, this potential outcome was, necessarily, a key issue for our Impact Assessment as part of our revised proposals. Given the fee levels we are now proposing for AIP frequencies, and the analysis provided by Helios and Plum Consulting following their discussions with stakeholders, and our proposals to phase in the larger increases, we do not consider that users are likely to be in the position of needing to cease to use radio equipment. However we recognise that some operators may consider that this option makes sense for them, in their specific circumstances. We are inviting stakeholders to provide evidence why they might find themselves in such a position (see Question 7 in Section 7).

- 4.85 As suggested by AOPA, and as is our normal practice in relation to important proposals with a potential material impact on stakeholders, we have commissioned our own advice, which we are publishing in Annex 7. We consider that the initial input we, and our consultants, received from stakeholders in response to our 2008 consultation, has made a crucial contribution to framing our consultants' work, and to the development of the revised proposals we are now making.
- 4.86 On the point, made by more than one respondent, that the economic circumstances are currently difficult, we have been mindful of this in considering all our proposals. Where our proposals would result in significant increases in fees, we are proposing to phase these fees in over a relatively long period. These phasing periods are intended to be sufficient to allow users to plan and implement the full range of responses available to them, such as reducing the coverage of their assignments or the number of frequencies they use, and will also mean that the full financial impact of fees for those assignments they continue to hold will not be felt for some years.
- 4.87 On the point that airlines will adapt their flight plans in response to changes to fees for en-route services in over-flying UK-controlled airspace, we note that airlines can and do review their route planning frequently in response to all relevant costs and benefits (including changes in fuel prices, terminal and en route navigation charges, and so on). In considering the potential impact of changes in licence fees on such decisions we recognise that in many cases the first-run impact of a licence fee may be passed on to other members of the aviation community, and the recovery of air navigation costs for airlines is one important aspect of this.
- 4.88 As set out in the assessment carried out by Helios and Plum consulting, we expect the effect of our fee proposals in relation to the UK's en-route service provider (NATS En-Route Limited, or NERL) to be of the order of 0.4%, or less, of the £519m which was paid to NERL on 2007-08 in respect of en-route services in the airspace which it controls.
- 4.89 En-route fees are calculated according to a formula administered by Eurocontrol which takes into account (i) the weight factor (square root of mean take-off weight in metric tonnes divided by 50); multiplied by (ii) the distance travelled in km divided by 100 multiplied by (iii) the unit rate¹⁵. The UK's unit fee is currently 66.39 Euros.¹⁶
- 4.90 So, for example, an Airbus 320 with a Maximum Take Off Weight of 73.5 metric tonnes would have a weight factor of 1.21 under this formula. Therefore an Airbus 320 travelling across the UK would pay €66.39 X 1.21 or €80.33 for each 100km. If NERL passed on the full AIP fee increase we have proposed by increasing fees by 0.4% this would mean the Airbus would pay an extra 32 cents per 100km travelled in UK airspace. Depending on the routes involved, the fuel and time costs of flying alternative routes using less UK airspace are likely often to be the dominant determinants of route choices.
- 4.91 We understand from the analysis conducted by Helios and Plum Consulting that the variable cost for a very large executive jet is around £2,340 per hour or 65 pence per second. It would therefore take considerably less than a second of additional time travelled (avoiding UK airspace) to incur the same additional 32 cent cost that NERL might levy for each 100km of distance flown across the UK.

¹⁵ <http://www.eurocontrol.int/crco/gallery/content/public/docs/other/Customer%20Guide%202009.pdf>

¹⁶ http://www.eurocontrol.int/crco/gallery/content/public/docs/unit_rates/ur200906.pdf

- 4.92 We therefore consider that it is highly unlikely that changes in fees at the levels we are now proposing would have such an effect on aircraft flight plans at the margin, let alone more generally.
- 4.93 On the view, expressed by more than one respondent, that either airports or airlines will not be able to pass on costs, we note that the absolute impact of the full fee changes, compared with the volume of passenger movements, is relatively small, equating to no more than a few pence per passenger movement in the case of commercial airports (see Section 7). We also note that the expectation by airlines that such costs will be passed on to them is not shared by some airports used by them.
- 4.94 Only where a spectrum user faces no competitive pressure to minimise its costs overall, is it in a position to pass on any AIP fees to its customers without having any regard to possible efficiency savings. As a result, we believe that all spectrum users facing AIP fees will have incentives to seek ways to minimise their costs. Increased costs will tend to be passed on within the aviation supply chain only where this is the response of efficient service providers.
- 4.95 Further, we acknowledge that the position of airports and airfields varies across the UK and across the sector. Accordingly, the work commissioned from Helios and Plum Consulting looked at the impacts on individual operators of varying size and at various locations in order to identify potential differences in ability to pass on costs. The conclusion of that analysis is that airports should be able to pass on costs where necessary, given the scale of these costs compared with existing charges to airlines¹⁷.
- 4.96 Comparing the expected financial impact of our fees proposals with the baseline level of fares leads us to conclude that in general, airlines should be able to pass on the cost variations concerned where necessary. To the extent that it might not be possible to do so, this would be in cases of specific services that are currently only marginally viable, and which thereby offer lower benefits to consumers.
- 4.97 On the concern about the effects of our proposals on policy decisions taken in other countries about spectrum fees, we would note that such decisions are within the competence of each individual country, subject to the requirements, for EU member states, of the Authorisation Directive to which we are also subject in the UK. We cannot comment on behalf of other countries on matters within their competence, nor would we offer comments on decisions they might or might not take in future.
- 4.98 On the point that it was difficult for respondents to assess the impact of our proposals given the amount of information available in the July 2008 consultation, we recognise the difficulty encountered. We are inviting comments now on specific fee proposals which we consider will allow each affected operator to assess the specific impacts for them. We are consulting on these proposals, and the associated Impact Assessment, in order for individual stakeholders to be able to provide evidence of the impact they foresee from our revised proposals for fee structures and levels.
- 4.99 On the point raised by BA about the financial impact on the sector compared with the benefit, we note that, as set out in the Cost Benefit Analysis (“CBA”) element of our assessment of the effect of fees, we would expect a net welfare benefit to society for our proposals to set AIP-based fees for the use of aeronautical channels which are subject to excess demand in current use.

¹⁷ See section 3.8 of the report at annex 7

- 4.100 We will of course welcome further detailed comments on the revised proposals set out in this consultation which should enable spectrum users to make an accurate assessment of the likely financial impact of the proposals. It is generally helpful for the majority of comments to be able to be published, so that other stakeholders know what information Ofcom is taking into account along with their own comments, if they have made any. However, we understand that some stakeholders may wish to present commercially sensitive data relating to the likely impact on fees, and, subject to Ofcom's obligations under the Freedom of Information Act, we would wish to respect confidentiality in these cases.

July 2008 Question 5: Do you agree that there is little to be gained, in terms of economic efficiency, from charging AIP to WT Act licences for aircraft?

- 4.101 LAA agreed that there should be no fees charged to aircraft, as many are foreign registered. LAA also considered that since there is no air worthiness requirement when renewing licences, renewals should be automated as per maritime licences. The Mid Anglia School of Flying also took this view, noting that aircraft do not have specific assignments but, rather, tune to the frequency of the relevant ground station. Lasham Gliding Society made a similar point. AOPA and Grasshopper Flying Group also agreed that aircraft should not attract AIP fees.
- 4.102 All of the airlines which commented on this question agreed that there would be no advantage in applying AIP to UK aircraft.
- 4.103 This view was shared by AOA and most of the airports which responded, with the exception of the Manchester Airports Group which argued that similar efficiency arguments apply to ground based and airborne use of spectrum.
- 4.104 BAA warned that AIP fees applied to aircraft might discourage GA pilots from using VHF, to the detriment of safety.
- 4.105 The ASFCG considered that the proposal not to charge for airborne use was inconsistent with Ofcom's stated desire to drive efficiency. It considered that achieving accelerated moves to 8.33kHz channels would require incentives to be faced by aircraft users to change airborne transmitters. DfT urged us to give thought to this proposal.
- 4.106 NATS also argued that AIP, if applied to light aircraft (amongst others), could be used to incentivise use of 8.33kHz channels.

Ofcom's response

- 4.107 We recognise the potential benefits of providing users of aircraft radios with incentives to equip with 8.33 kHz compatible equipment, in so far as this could facilitate the accelerated adoption of 8.33 kHz channels by ground stations. This, in turn, could contribute to a major improvement in spectrum efficiency.
- 4.108 We are not, in this consultation, making proposals to apply AIP to aircraft radio licences as we have concerns that the administrative cost of the process, applied to a very large number of radio licences, would not be efficient. Also, given that aircraft radios are used to transmit on a wide variety of different frequency types, the fees structure being proposed in the present consultation, being based on a fee per frequency, would not be appropriate. We also note that UK aircraft owners could avoid these fees by registering abroad and, indeed, the incentive would not apply to foreign based aircraft wishing to use UK aerodromes.

- 4.109 We note that AIP fees applied to aerodromes, which would vary according to whether 8.33 kHz or 25 kHz bandwidth is used, would provide material incentives for the owners of aircraft based at such aerodromes to support a more rapid deployment of 8.33 kHz use by particular Air/Ground stations, or more widely, as this could reasonably be expected to lead to reduced landing fees or club fees. As such, we believe our proposals do provide some incentives for aircraft owners to start to equip with 8.33kHz compatible radios.
- 4.110 We are, separately, reviewing with the CAA the future administrative procedures for renewing aircraft radio licences, including whether the annual cycle of renewals remains appropriate. We will give further thought, in that context, to whether some recognition might be given to the ability of the radios to operate with less bandwidth. Any changes would require further consultation.

July 2008 Question 6: Do you consider that we should discount fees for any particular user or type of user? Specifically, do you consider that there should be a discount for charities whose sole or main objective is the safety of human life in an emergency?

- 4.111 Most of the responses came from those concerned primarily about the impact on RNLI and other maritime rescue teams. However responses from some airlines and airports observed that their sector too uses spectrum for safety purposes and, so, should be exempted from paying AIP fees. BBGA expressed a similar view.
- 4.112 The British Helicopter Advisory Board also noted that air ambulances are funded out of taxed donations, and suggested that on this ground it would be inappropriate to charge fees. AOPA proposed that air ambulances should attract a discount.

Ofcom's response

- 4.113 For the reasons set out in paragraphs 7.19 to 7.22 below, we are proposing that the existing 50% discount currently available to charities with a safety of life in an emergency objective, should be maintained. It should be noted, however, that we are not proposing to apply AIP fees to aircraft (including air ambulances). Where a qualifying aeronautical charity has ground based VHF assignments, these would be eligible for a 50% discount.
- 4.114 We would like to use the opportunity presented by this consultation to encourage relevant aeronautical charities (ie those whose sole or main objective is the safety of human life in an emergency) to contact Ofcom to ensure that their eligibility is known to us. Currently, no such charity benefits from a discount for fees for aeronautical frequencies.

July 2008 Question 7: Do you agree that Ofcom should apply AIP to ground stations' use of maritime and aeronautical VHF radiocommunications channels, to help manage growing congestion in current use and to ensure that the cost of denying access to this spectrum by potential alternative applications is faced by current users?

- 4.115 Airlines and airports were against this proposal, arguing that they already invest heavily in technology to improve spectrum efficiency, and that their use of spectrum is prescribed by international regulation.

4.116 CAA argued that it is unlikely that fees will drive efficiency in use of VHF channels as the number of channels used at each transmitter is dictated by operational services requirements which in turn is dictated by demand.

4.117 The other arguments promoted against this proposal are covered in the summaries of responses to Questions 1-6 above. The responses to the specific question about the structure of fees are summarised under Question 8, below.

Ofcom's response

4.118 As explained in Section 2, we continue to take the view that where demand for spectrum exceeds supply, pricing can potentially help to ensure that spectrum is directed to the application which is valued most highly by citizens and consumers. Demand for aeronautical VHF communications frequencies exceeds supply and we believe that AIP can help to ensure that these frequencies are assigned to the aeronautical users who value it most highly.

4.119 As explained more fully in Section 5, we recognise that sector regulation limits the freedom, which some users enjoy, to exercise choice in their use of spectrum. We do not accept, however, that users have no choices at the margin. Faced with material differences in relative AIP fees, which vary with the amount of spectrum used and the observed demand for that spectrum, most users will have an incentive to review their needs and some will conclude that they can make changes.

July 2008 Question 8: Do you agree with our initial view that it would be appropriate to apply a pricing system similar to that already existing for Business Radio licences to maritime and aeronautical VHF communications? If not, what are your reasons for proposing that we should develop a fee structure for maritime and aeronautical VHF channels which is distinct from that already established for Business Radio?

4.120 BAA and a number of other airport operators and airlines argued that the parallels with Business Radio were weak as Business Radio spectrum is not internationally harmonised. Many, however, chose not to comment on the detail of this proposal at this stage.

4.121 The Mid Anglia Flying School argued that no attempt should be made to vary charges by geographical variations in congestion, as an aircraft at high altitude will sterilise most of the UK and beyond.

4.122 LAA argued that a fee algorithm was needed to apportion fees to aeronautical users who do not sterilise all of the UK.

4.123 The Mid Anglia Flying School similarly noted that reuse of aeronautical assignments may vary between channels, and argued that fees should reflect this.

4.124 IATA also argued that, at present, protection levels for different users vary, but that if pricing were implemented as proposed, then all users would demand the same levels of protection, resulting in chaos.

4.125 The CAA argued that a flat rate fee for all VHF channels would be unreasonable and would not reflect the operational differences.

4.126 NATS criticised the proposal to apply the Business Radio template, noting that it is the aircraft height which is the predominant determinant of the area of spectrum which must be sterilised. NATS also proposed that any fees should be charged per

frequency rather than per transmitter (noting the use of offset carrier technology). It also noted that the Business Radio model is designed to encourage low power transmitters and coverage, whereas the aeronautical sector has legal obligations which prevent reductions in power below a given threshold.

- 4.127 The BBGA considered that the Business Radio model would not be appropriate for pulsed systems like radar and VOR.

Ofcom's response

- 4.128 We agree with aeronautical stakeholders that any fees for aeronautical VHF communications frequencies should reflect the particular impacts of different types of application on the use of spectrum. We are therefore setting out in this further consultation document a much more granular approach to determining fees for aeronautical VHF communications. Our revised proposals are now substantially different to the fees structure in force in respect of Business Radio, other than that both sets of fees aim to reflect opportunity cost by having regard to the territory sterilised to alternative use and, in the case of applications sterilising less than the whole of the UK, relative congestion in the locality.
- 4.129 Acknowledging the point made by the Mid Anglia School of Flying about relative congestion, we note that congestion in aeronautical use does not vary significantly across the majority of the UK for the majority of transmission types. However, in some specified areas, namely the north of Scotland, southern Scotland and the north of England, and the far West of England and west Wales, we consider that there is currently less demand for frequencies where transmissions do not sterilise spectrum across a wider geographic area, and so it is proportionally less likely that each assignment will exclude future use by users elsewhere the UK. We are therefore proposing a fees structure which discounts fees, for assignments used to communicate at the lower altitudes, by 50% in the north of Scotland and by 20% in the other regions referred to above.
- 4.130 We also agree with NATS that spectrum users should not be expected to pay two or more sets of fees where specialist applications require more than transmitter, but this does not materially increase the territory sterilised for alternative use. We have, therefore, set out revised fees for VDL and ACARS which reflect this response.

July 2008 Question 9: Are there any short term reasons specific to the sector(s) why it would be inappropriate to apply fees from April 2009?

- 4.131 The BBGA observed that relatively inefficient analogue equipment is used by the aeronautical sector because this is all that international regulation permits. BBGA also argued that any fees should be delayed giving time for efficiency improvements to be implemented. In BBGA's view, a precedent for this was set with Broadcasting, where AIP has been suspended until digital broadcasting can be implemented.
- 4.132 The LAA advised that they consultation should be suspended until economic growth has been re-established. Lasham Gliding Society also noted the recession.
- 4.133 BA proposed that implementation should be timed to allow change in equipment, and should also be co-ordinated with plans being developed for SESAR and SESII. This view was shared by Cardiff International Airport.

- 4.134 BAA too proposed that Ofcom should co-ordinate its work with SESAR which, in BAA's view, is expected to be fully implemented by 2020. BAA also noted the wider impact of the current recession.
- 4.135 NATS acknowledged that AIP could be a useful tool in conjunction with SESAR in future, and argued that when new technologies being developed by SESAR have come on stream AIP might have role in incentivising take up of those technologies. NATS also warned about imposing new costs on NATS midway through its regulatory control period, and proposed a delay until 2020 which, NATS believed, would be consistent with the approach taken with broadcasting.
- 4.136 The Mid Anglia School of Flying proposed that implementation should be delayed to give users time to respond to the threat of fee increases.
- 4.137 Manchester Airports Group proposed a much longer implementation timetable as per Business Radio, which the group cited as a precedent for a two year phasing. The group also noted that the Broadcasting sector had been given seven years.
- 4.138 The ASFCG considered that implementation of new fees in 2009 would fail to give users and CAA time to accommodate within budget planning timetable. As noted above under Question 4, The General Aviation Alliance, members of LAA, emphasised the adverse economic conditions, but argued that even a decision to defer fees changes until better times would kill any planning for growth.
- 4.139 The CAA warned that fees charged by Ofcom could cause difficulties for CAA in justifying implementing new aeronautical regulation if fee consequences were material.
- 4.140 The AOA, Highlands and Islands Airports, London Luton Airport and Cardiff International Airport noted the current impact of high fuel prices. All of these respondents (except Highland and Islands Airports) also noted the impending Aviation duty.

Ofcom's response

- 4.141 We are mindful of the current economic climate and also, more broadly, of the short term constraints faced by some spectrum users when responding to fee increases. Spectrum users may variously need to consider alternative options for delivering services, renegotiate contracts with customers and suppliers, and discuss changes with sector regulators. As noted in Section 7 below, we are proposing to phase in many of the proposed fee changes to provide time for spectrum users to prepare for change. We believe that the phasing options which we have proposed provide a reasonable opportunity for licensees and their customers to respond.
- 4.142 We agree that where, to achieve significant improvements in spectrum efficiency, a well developed and credible industry plan has been devised and in some cases components of it implemented via centralised industry action, there may be a reduced case for AIP in terms of incentivising efficient individual decisions about spectrum use, over the period before the centralised aspects of such a plan are devised and implemented. This observation in relation to the spectrum used for radar and aeronautical navigation aids has largely contributed to our current proposal for a new strategic role for Government, as set out in the August 2009 consultation.
- 4.143 We recognise that the European aeronautical sector is considering options for Europe-wide co-ordination of air traffic control and strategic changes to the

technology used for the purpose. Ofcom acknowledges that the SESAR programme is a major international public/private undertaking which could, potentially, transform the way air traffic control services in Europe are delivered. In Ofcom's view, however, it is too early to judge what impact this may have on spectrum use and within what timeframe in different applications in the various administrations affected by SESAR.

- 4.144 We also recognise that the CAA has a continuing programme to review the regulatory requirements for equipping aircraft and aerodromes. We are not aware that there are any well defined plans for major change at this time. We believe that AIP fees can help to inform industry considerations and the CAA's continuing review as it affects VHF spectrum.

July 2008 Question 10: Ofcom would welcome stakeholders' views on the factors which should be taken into account when apportioning fees between individual users of radars and racons.

July 2008 Question 11: Do you agree with our initial view that a reference rate of £126k per 1 MHz of national spectrum for L band and S band radar spectrum would achieve an appropriate balance between providing incentives to ensure efficient use of spectrum while guarding against the risks of regulatory failure in setting the reference rate too high? If you consider a different rate would be more appropriate, please provide any evidence that you think we should take into account.

July 2008 Question 12: Do you agree with our initial view that a reference rate of £25k per single MHz of national spectrum would be appropriate for deriving fees for licences to use X band radar?

July 2008 Question 13: Do you agree that, generally, spectrum used by aeronautical radionavigation aids is currently uncongested? Do you believe that this may change during the next few years and, if so, approximately when?

July 2008 Question 14: Do you agree with the basis on which Ofcom has arrived at its initial view on reference rates for aeronautical radionavigation aids?

- 4.145 Responses to these questions were summarised and commented on in the August 2009 consultation in the context of revised proposals for management of spectrum used for radar and aeronautical navigation aids. See paragraphs 4.115 to 4.144 of the consultation document at http://www.ofcom.org.uk/consult/condocs/aip_maritime/aipcondoc.pdf

Other issues raised by respondents

Constraints on users' ability to change use, and international constraints on the UK's ability to authorise new uses

- 4.146 The General Aviation Alliance claimed that Ofcom's proposals were contrary to the views of government's expert adviser.
- 4.147 LAA also argued that there is no opportunity cost because of the existence of the international allocations.
- 4.148 AOPA also argued that there is no opportunity cost as frequencies are protected by the ITU.

- 4.149 The LAA argued that there is no opportunity cost associated with aeronautical use, and no scope to improve efficiency as there is no legal or safe alternative use.
- 4.150 BAA argued that Professor Cave was correct in, as BAA believed, recommending that harmonised bands including aeronautical navigation aids and VHF communications have a zero opportunity cost. BAA believed that international harmonisation is such that unilateral action in the UK is not feasible. On-board equipment is internationally harmonised so there is little scope for local ground stations to change their use of spectrum or vacate bands. IATA considered that the consultation document had not addressed the question of international constraints. IATA argued that pricing was not justified as users have no ability to change their use of spectrum.
- 4.151 In NATS' view, international measures mean the UK cannot make unilateral change. They also considered that change was being held back by lack of mandates on aircraft equipage, and cited the example of the desired transition to 8.33kHz channels.
- 4.152 NATS stated that all of its en route radio stations are 8.33 kHz equipped and it is unable to do more to improve spectrum efficiency until aircraft are required to fit 8.33kHz radios.
- 4.153 The ASFCG noted that use of aeronautical spectrum is governed by international obligations, which are essential to safety and interoperability. It noted that the UK is only one of 190 ICAO contracting states with limited influence and that global change is slow. It further noted that global allocations are managed at a national level, but also co-ordinated regionally (in Europe, by Eurocontrol).
- 4.154 The ASFCG noted that Eurocontrol is introducing new IT systems to improve spectrum efficiency. UK spectrum users have little ability to choose what spectrum they use, or the technology deployed.
- 4.155 The ASFCG further noted the Single European Sky programme for Europe-wide Air Traffic Management. It reported that this has implications under UK law as, in its view, it is likely that spectrum management will fall under these new arrangements. ASFCG also noted that the EC is developing an Opinion on spectrum management; the ASFCG noted that the UK needs to co-ordinate its aspirations with this.

Ofcom's response

- 4.156 We have addressed, in Section 5 below, the question of what scope spectrum users, in particular bands, have to change their use of spectrum in response to AIP fees. In that section we also address the question of our consistency with the recommendations of the report commissioned by government from Professor Martin Cave. These issues were also explored at length in Section 3 of the July 2008 consultation.
- 4.157 We recognise that many aeronautical uses are subject to a variety of national and international regulations, which limit the scope for individuals and even for the UK authorities to make changes to spectrum use. However, as set out in Section 5, we note that (as with, say, landing slots where there is excess demand) within an existing spectrum use there is scope for assignments to be differently distributed between users, and potentially for more assignments to be accommodated if existing users reduce their spectrum requirements. In our view, this outcome is fully

consistent with future development of the Single European Sky programme for Europe-wide air traffic management.

- 4.158 We note that Eurocontrol's new IT systems may bring benefits to the sector, enabling swifter reassignment of released frequencies. It will not necessarily cause spectrum users, however, to review their own use of spectrum, as AIP is intended to do, potentially releasing spectrum for other users.
- 4.159 Our proposals for aeronautical VHF frequencies reflect the varied scope for users to respond to AIP fees. We have proposed that frequencies, such as the distress frequencies which are used on a "private commons" basis, and the fire assignments which are in frequencies already reserved for air-to-air use, should not attract AIP fees, as end users acting alone are unlikely to have scope to influence changes to the future use of these frequencies in different locations. We have also noted the particular circumstances, and scope for change, which apply to frequencies used for sporting uses (see paragraph 7.16 below).

Other points made on the overall principle of pricing

- 4.160 LAA also argued that if the appropriate response to an airfield contemplating the withdrawal of safety essential services would be to regulate to prevent such a withdrawal, that this means there can be no change of spectrum use in response to AIP.
- 4.161 IATA, BBGA, and BA noted that aeronautical VHF frequencies are highly congested in the UK. This view was shared by DfT.
- 4.162 LAA considered that there is not growing congestion, on the grounds that bands are managed internationally.
- 4.163 Manchester Airports Group noted that congestion can be caused by spectrum use outside the UK.
- 4.164 IATA claimed that the proposals failed to take into account the efficiencies which will be delivered by the Single European Sky initiative and the past improvements in converting to 8.33kHz channels.
- 4.165 IATA also considered that ICAO harmonisation results in highly efficient use of spectrum.
- 4.166 The Mid Anglia School of Flying also noted that aeronautical frequencies are used by all aircraft and so use is not within a closed community, as it perceived Business Radio use to be. The school argued that this limits scope for change well beyond the constraints applying to Business Radio.
- 4.167 The ASFCG argued that if any spectrum was released in the UK, it would be extremely unlikely to be capable of being used for other purposes, due to need to protect aviation use in neighbouring states and transiting UK airspace. The ASFCG felt that this factor threw into question the proposed AIP values.
- 4.168 NATS recognised the possible benefits of AIP where spectrum use is unconstrained, to help match demand and supply.
- 4.169 NATS proposed that DfT or CAA should face any AIP, as they have the greatest political influence in Europe.

4.170 AOA broadly argued that, where there can be no trading, there is no opportunity cost.

Ofcom's response

4.171 We fully accept that AIP will never be the sole driver of change in spectrum use, even over the longer term. Clearly, the aeronautical sector faces many varied pressures which may cause them to respond by changing their use of spectrum over time irrespective of the specific levels of licence fees at any time. We continue to believe, however, that spectrum pricing can be a valuable tool to inform longer term decision making.

4.172 Trading of spectrum, where consistent with international obligations, can potentially also be a powerful tool to incentivise efficient spectrum use. We do not accept, however, that absent the ability to trade spectrum directly between licensees, AIP has no value as an incentive mechanism. Indeed, it is our view that AIP has a specific value where trading is not possible as, where there is no trading, there is no other potential direct signal as to the opportunity cost of spectrum being held. We discuss in section 5 the scope for spectrum users to respond to AIP fees, and the benefits which these responses can bring.

Proposals for alternatives to pricing as a means of securing efficient use of spectrum

4.173 The Mid Anglia School of Flying proposed that all airfields should be licensed free of charge to use the emergency channels plus one other, and that any additional demand for channels should be paid for. The school recommended that this would help smaller airfields with low turnover. It also proposed that CAA should hold the national band.

4.174 BAA supported the idea of trading, instead of AIP, as a approach to addressing congestion. BAA was supportive of trading and liberalisation (which had not been proposed by Ofcom), provided that this is shown to be effective in improving efficiency.

Ofcom's response

4.175 At this time, we are not proposing to enable trading in any of the bands under response in this consultation exercise. We agree, however, that this option should be kept under review. We recognise the international constraints in many of the bands under review.

4.176 We agree that the distress and fire frequencies should not attract AIP fees. We have made proposals for pricing sporting frequencies which recognise the "private commons" basis on which they are used. We also note that in some geographic areas, Aerodrome Control frequencies are assigned on a basis which assumes a much higher degree of sharing than elsewhere. Should the relevant authorities decide to assign certain frequencies on a different basis, for example, a "private commons" basis, or a basis which enables more intensive use of a frequency, we would expect to review the basis and structure of any licence fee to reflect the new use.

Eurocontrol and re-use of aeronautical VHF assignments

4.177 BA argued that, to the extent that UK users give up spectrum this will be licensed to foreign users instead. BA proposed that this suggests the value of alternative use of this spectrum is zero.

4.178 LAA also argued that, as a result of international harmonisation, if a UK frequency were given up it would be taken by a foreign user through re-allocation by Eurocontrol.

4.179 NATS drew attention to the possible perverse outcome of charging fees in the UK in that spectrum might be released in the UK and licensed to users in other countries (preventing future use in the UK). NATS pointed out that under this scenario, NATS in the UK would pay and foreign users would benefit from release of spectrum. NATS concluded from this that any change decisions must not be taken unilaterally in the UK.

Ofcom's response

4.180 We fully recognise the international dimension to frequency assignment, and the ongoing possibility that, in some instances, frequencies released in the UK may be assigned to non UK users under an international agreement. We do not accept, however, that this outcome is inevitable or particularly associated with the introduction of AIP based licence fees. We consider this question in more detail in paragraphs 5.30 to 5.44 below.

Concern about possible re-allocation of aeronautical frequencies

4.181 There was also a widely expressed view that Ofcom had proposed to sell off aeronautical spectrum to the highest bidder. For example, AOPA asserted that Ofcom was proposing that aviation bands should be sold to the highest bidder, thereby compromising safety.

Ofcom's response

4.182 For the avoidance of doubt, nothing proposed in this consultation, nor in the previous July 2008 consultation, would change the existing allocation of the aeronautical bands. In relation to internationally-agreed allocations, we are bound to respect all relevant international agreements.

Process issues

4.183 A number of responses reflected a view that Ofcom had disregarded UK consultation guidelines and its statutory duties to publish an Impact Assessment.

4.184 The General Aviation Alliance considered that it had been led to believe that Ofcom had said that it would present an Impact Assessment on the last day of the consultation exercise.

4.185 IATA repeated these assertions and devoted a large part of its response to concerns about what it perceived were failures of process. In IATA's view, the proper place for taking decisions about aeronautical spectrum is ICAO and the ITU, and AIP has no part to play.

Ofcom's response

4.186 We explained in paragraphs 3.90 to 3.93 of the July 2008 consultation that we would set out a detailed impact assessment when proposing detailed fees for the use of VHF radiocommunications channels. We noted in the July 2008 consultation that we were seeking evidence and opinions from stakeholders so that we have the best information available in moving forward on our proposals. We explicitly set out in

Annex 5 to the July 2008 consultation the types of information that we considered would be important in assessing the impact of proposed fees.

- 4.187 We believe that the numerous detailed responses to the July 2008 consultation demonstrate the efficacy of this approach. In light of these views, and the output of further external consultancy, we are providing a full impact assessment of our proposals in the present consultation document as we had intended.
- 4.188 Our approach to consultation on this occasion has been entirely consistent with Ofcom's duties and usual practices with regard to impact assessment. These issues are discussed in more detail in paragraphs 3.20 to 3.33 above.

Further consultancy to inform Ofcom's decision making

- 4.189 In September 2008, Ofcom invited a number of consultancy firms to present proposals for assisting Ofcom in conducting a detailed impact assessment as part of the planned second consultation. The scope of the contract was set out as follows:
- The core objective was to provide information to enable Ofcom to assess the scope for spectrum users in the aeronautical and maritime sectors to absorb or pass on AIP fees payable for the use of spectrum. The study was required also consider scope for efficiency savings, although Ofcom did not intend that this study should be focussed on scope to make technical efficiency savings in the use of spectrum – such issues having been considered elsewhere.
 - The information was required to include data on the scale and diversity of costs and revenues faced by spectrum users (excluding those which use spectrum only for mobile applications – such as on board ships or aircraft).
 - Ofcom required evidenced advice on scope for spectrum users to pass on additional spectrum costs to their customers (or others), including how numerous and varied are those customers and whether, in response to a price increase, customers have the ability and incentive to switch supplier (including to suppliers which would not face an increase in UK spectrum fees).
 - Ofcom also required quantified information about the likely impact on those further down the supply chain (for example, airline passengers who may face additional costs if spectrum fees are passed on by providers of air traffic services to airlines).
 - We noted that the aeronautical and maritime sectors are very varied and include small charities as well as very large commercial undertakings. We also noted that some operations are run by local authorities and others by statutory trusts, and that the impact of AIP fees may be different in each group. The study was required to address this diversity.
 - We noted that some spectrum users may be constrained by regulation from passing on additional costs and others might be constrained by long term contractual agreements (if these are commonly used in certain parts of these sectors). The study was required to address any such issues, as Ofcom would require information about the speed with which spectrum users can reasonably be expected to be able to adjust to higher spectrum fees. Ofcom noted that this information might be required to inform its decisions about the need or otherwise to phase in the introduction of some fees.

- 4.190 Helios Technology Ltd, working with Plum Consulting were awarded the consultancy contract. As set out in the contract terms of reference, the consultants initially prepared a report which encompassed the impact of a range of possible fees for both radar and aeronautical navigations and VHF communications. However, as Ofcom's own analysis of consultation responses, and discussion with government about the possible role of public authorities in managing spectrum used for radar and aeronautical navigation aids, progressed, the scope of the work was narrowed to focus on VHF communications and the impacts of the specific fee proposals we were developing. Ofcom has published at Annex 7 those parts of the report which relate to fees for aeronautical VHF frequencies. Attached to that report is an additional study carried out by Helios Technology Ltd which further considered the likely impact of AIP fees on non reporting aerodromes.
- 4.191 In light of early comments from the aeronautical sector, in response to the July 2008 consultation, to the effect that different aeronautical VHF communications applications impact geographic areas of materially different sizes, Ofcom also commissioned consultants Helios Technology Ltd and Plum Consulting to devise a methodology for deriving a more granular set of AIP fees to apply to aeronautical VHF communications. This further study was commissioned in November 2008. The subsequent report has been published on Ofcom's website at http://www.ofcom.org.uk/consult/condocs/spectrum_pricing/aip.pdf.

Further discussion with stakeholders

- 4.192 After the July 2008 consultation was published, Ofcom met with numerous stakeholders, including at public workshops organised by Ofcom, a meeting organised by the CBI, further meetings organised by trade associations and bilateral meetings with individual stakeholders. These meetings have played an important part in helping Ofcom to formulate revised proposals and assess the likely impacts.

Section 5

The rationale for our revised fee proposals

Introduction

- 5.1 Licence fees for the use of aeronautical spectrum are currently set on a basis which enables them to contribute to the administrative cost associated with issuing the licences concerned. Consequently, applications which use powerful transmitters, which prevent others from using the same spectrum over a very wide area, and ground to air communications with aircraft at high altitude which requires protection from other users over a large area of ground, often attract similar fees to applications which have a much more localised impact. Also, licences to use spectrum in areas of high demand (for example in Southern England) attract the same fee as licences to use similar spectrum in remote areas with little demand from other potential users.
- 5.2 We do not believe this is a sensible arrangement because it does not reflect the potential value of each assignment to another user. In the case of spectrum assignments in this sector for which there is excess demand, either within the existing use or from an alternative use that could use the spectrum, this arrangement provides no incentives for spectrum users to manage their use of spectrum efficiently to the benefit of citizens and consumers.
- 5.3 We recognise that users sometimes do not have wide discretion over how much spectrum they use and in which bands. Commercial and regulatory pressures may be such that they would need to make significant changes to the way they operate their businesses if they were to reduce their use of spectrum, particularly in the shorter term ahead of wider equipment decisions. For example, in the transport sectors, the throughput of traffic might have to be reduced, or the type of traffic catered for might have to change. However, the rationale for applying AIP fees is not dependent on all or even most users responding to AIP fees by changing their use of spectrum. A marginal change in spectrum use will bring net benefits to citizens and consumers provided that the cost of applying AIP is lower than the benefits of improved use that are secured. This is discussed further in Annex 7 (paragraphs A7.1 to A7.13). It is also important to bear in mind that, where other users are unable to gain access to spectrum, because it has already been assigned, they too may be constrained in developing their businesses and they may have to find less efficient ways to deliver the same outputs.
- 5.4 Where the supply of spectrum is fully sufficient to meet demand, there is little to be gained from setting fees other than to recover some or all of Ofcom's administrative costs (which represent resources which also have opportunity costs). However, where there is excess demand for spectrum, we believe that more efficient spectrum use decisions are likely to result if the cost to others and the wider UK economy is recognised by the current users. AIP is intended to achieve this outcome. It is our view that there is excess demand for much of the relevant VHF spectrum used by the aeronautical sector.
- 5.5 There is excess demand for aeronautical VHF communications frequencies from within the aeronautical sector. It is often very difficult to meet new requests for aeronautical VHF communications frequencies required by aerodromes and air traffic controllers (see paragraphs 5.25-5.28 below). We believe that spectrum fees can help to manage this demand by giving existing users incentives to consider whether they are using the right amount of spectrum and, if they conclude that they do not

wish to pay for all of their current assignments, to make this available to other aerodromes or air traffic controllers.

- 5.6 There is also potential excess demand for the VHF frequencies used by the aeronautical sector, from other sectors of industry which face shortages of spectrum. This excess demand could be overcome if spectrum currently used by the aeronautical sector was made available to them. However, we recognise that, for the short to medium term at least, international agreements are such that VHF frequencies used for aeronautical communications cannot be used for other applications in the UK as these would be likely to interfere with aeronautical VHF communications.
- 5.7 For this reason, the AIP fees which we are proposing are based on the opportunity cost in the current (aeronautical) use of this spectrum, and take no account of possible alternative uses. Where there is already excess demand for the spectrum concerned aviation users are already denied the opportunity to use it to highest value in the short term. Where there this excess demand is expected to continue and even grow in the longer term (as the sector continues to grow), the associated opportunity costs are longer term in their duration. On the basis of the evidence available (including the sector's plans for growth in different areas), the relevant opportunity costs in current (aeronautical) use appear to be both shorter and longer term in their effect, and therefore underpin the case for a sustained longer term AIP signal of the opportunity costs concerned.
- 5.8 Nevertheless, it remains the case that use of this spectrum for aeronautical communications denies its availability to other potential users, and AIP fees can provide incentives for UK users to try to influence change at the international level. The continued absence of any incentives, effectively maintaining a subsidy for the aeronautical sector, will continue to support distortions in the wider economy in the longer term.
- 5.9 We acknowledge that there is an important role for the CAA and Government in influencing change in international agreements relating to the use of aeronautical VHF communications spectrum (and spectrum used by potentially substitute technologies, such as satellite communications, in some applications), potentially over long term sector planning horizons, and that pricing signals faced by Government could help to inform such strategic policy making. More broadly, however, the situation with this VHF spectrum is very different to the situation with spectrum used for, for example, radar. The radar bands are not generally congested in current use, and future efficiency improvements will be dependent on co-ordinated changes to enable this spectrum to be shared with other applications. In contrast, demand for aeronautical VHF communications frequencies already exceeds supply and, at the margins, some users acting individually, in response to AIP fees, do have scope to alleviate that excess demand. On balance, therefore, we believe that fees applied to end users of aeronautical VHF communications spectrum will be more effective in driving efficiency improvements than opportunity cost faced by Government.

Background: alignment of our proposals with the recommendations of the Cave reviews

- 5.10 As noted in section 4, a number of stakeholders in their responses to our initial consultation drew attention to the observations and recommendations made by Professor Martin Cave in his two independent reports for Government. We think it is therefore useful for us to summarise our views on Professor Cave's conclusions in

this area, to provide context for the proposals in this consultation. This explanation is necessarily very similar to that set out in the August 2009 consultation in relation to proposals to apply fees for maritime VHF communications channels, as the same underlying principles apply.

- 5.11 The Government first commissioned Professor Cave to undertake a wide-ranging independent review of the UK's radio spectrum management arrangements. Professor Cave reported in 2002 (the "2002 Review"¹⁸) and made a number of relevant recommendations including the extension of AIP to sectors including the aeronautical and maritime sectors.
- 5.12 The Government accepted this review's conclusions and also commissioned a follow-up review from Professor Cave of the management of major spectrum holdings in the public and aeronautical and maritime sectors, which reported in December 2005 (the "2005 Cave Audit"¹⁹). This audit, the conclusions of which the Government again accepted, reiterated the earlier recommendation to take forward work on applying AIP to the aeronautical and maritime sectors.
- 5.13 In both cases, Professor Cave noted the particular impact of the international regulatory framework on the use and opportunity costs of spectrum in the aeronautical and maritime sectors, and recommended that any spectrum pricing proposals should be developed with this regulatory framework and its impacts in view.
- 5.14 First, Professor Cave drew attention in the 2002 Review to the different regulatory frameworks in place. For example in aviation he noted that *"Spectrum for aeronautical use, in common with all other spectrum use, is allocated by the ITU. However, in order to achieve global inter-operability, equipment standards and frequency planning criteria are further harmonised through the International Civil Aviation Organisation (ICAO), which requires compliance with published Standards and Recommended Practices (SARPs). In addition, in Europe, the European Organisation for the Safety of Air Navigation, Eurocontrol, provides the institutional and support framework within which the spectrum and frequency management processes are coordinated in conjunction with ICAO. The overall aim is to ensure that the communications, navigation and surveillance strategies in support of aviation in Europe can be achieved. However, the overall responsibility for spectrum and frequency management remains a matter for national Governments"*²⁰.
- 5.15 His view was that *"public safety policies, international harmonisation of spectrum allocations and associated technologies, and the global nature of aircraft and vessels using UK-managed aeronautical and maritime spectrum ...limit but do not exclude the application in the UK of economic incentives to encourage greater efficiency in spectrum use"*²¹. Further, he noted that *"where there are also purely commercial applications in both sectors, such as the use of coastal radio by commercial shipping fleets and on-board telephones in aircraft...[such] applications of radio spectrum should be subject to the same market-based spectrum management tools (pricing*

¹⁸ Review of Radio Spectrum Management http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf

¹⁹ Independent Audit of Spectrum Holdings <http://www.spectrumbaudit.org.uk/pdf/20051118%20Final%20Formatted%20v9.pdf>

²⁰ Paras 12.5 and 12.5

²¹ Para 12.16

and trading) as the review advocates for their terrestrial equivalent private mobile radio²².”

- 5.16 We agree with Professor Cave’s assessment that the case for pricing incentives to improve the efficiency of spectrum use in these sectors is not overturned by the specific international regulatory frameworks in place, but that such frameworks, and the nature of the sectors concerned, need to be considered in developing specific pricing proposals.
- 5.17 In this respect Professor Cave drew a distinction between the role of pricing in reflecting the opportunity costs of spectrum in existing (aviation or maritime) use versus reflecting the opportunity costs in alternative use. This distinction is echoed by the distinction drawn, for the purpose of assessing the opportunity cost of spectrum, by Smith NERA and Indepen in their consultancy recommendations for the application of AIP, which we have reflected in both our wider spectrum pricing policies and in the proposals in this document. As Professor Cave noted, both types of opportunity costs can exist and hence there can be an efficiency benefit from pricing that reflects either. For example in the 2005 Cave Audit he noted:²³

“AIP should be extended to military and civil aeronautical uses of the spectrum where it has the potential to help increase efficiency of spectrum use now or in the medium to long term. Beneficial effects of pricing could include:

□ Maximising the benefits to aviation of its existing spectrum holdings

□ Recognising and enabling other potential uses of the spectrum (where alternative use would be possible).

- 5.18 In his 2005 audit, Professor Cave therefore indicated that two specific questions needed to be asked in assessing the likely benefits of pricing to improve spectrum efficiency by reflecting opportunity costs:
- Is there excess demand (congestion) in existing use which can be influenced via pricing? On this question, Professor Cave indicated, by way of example in the 2005 Cave Audit, that *“There may be an economic case for differential pricing of ground-based and/or airborne VHF communications licences to accelerate adoption of more spectrally efficient equipment in congested spectrum”²⁴*. This echoed his conclusion in the 2002 Review that *“where UK-based users face some technology choice for their on-board systems differential licence fees to encourage moves to more spectrally efficient equipment, thus easing congestion over time [should be applied]”²⁵*. In this context he noted that aeronautical VHF frequencies were *“under acute pressure”²⁶*
 - Can alternative use of the spectrum be envisaged in the medium to longer term where users would be willing to pay for the spectrum (i.e. had excess demand for

²² Para 12.17

²³ Para 6.1

²⁴ Para 6.9

²⁵ Recommendation 12.1

²⁶ Para 12.13

it at the relevant administrative fee level)? In this area, Professor Cave recognised that AIP was typically only of relevance to incentivise efficient spectrum use as a longer term pricing signal where international constraints existed – he observed in his 2002 Review that: *“Lead times between international policy decisions on allocations for new services and the development of commercially viable businesses and technologies can run to decades²⁷.”* and hence that *“Reforming the practice of spectrum management based on the principles and recommendations set out by the review will be a long term endeavour, requiring concerted action on a number of fronts²⁸”*. Again Professor Cave reiterated in his 2005 audit that where release of spectrum for new use was involved: *“the benefits of pricing and other Audit recommendations in this area are likely to be seen in the medium-long term.”²⁹*

- 5.19 However, Professor Cave also indicated that where neither of the above conditions held, the opportunity cost of the spectrum was zero. In his 2005 audit he summarised this for aviation as follows: *“If there is not [excess demand from other aviation users], then the opportunity cost to alternative aviation users is effectively zero...in any bands where this was the case, AIP could only be imposed on the basis of an opportunity cost to alternative users. If there is judged to be no prospect of alternative use due to international restrictions ..then the opportunity cost of the spectrum for alternative use should be judged to be zero.”³⁰*
- 5.20 We agree with this summary of the relevant economic principles. Taking first the question of any additional use (either the same use or a new use), where there is *no prospect* of excess demand, additional use is not excluded in the longer term and hence one can judge there to be no associated opportunity costs of use, which should be reflected in a longer term pricing signal. In such circumstances Professor Cave recommended that licence fees recover the administrative costs of licensing only, and we seek to reflect this principle in the specific proposals in this document. Our proposals in relation to the fire and distress channels (and maritime international duplex channels as set out in the August 2009 consultation) reflect our assessment that there is not at present foreseeable excess demand.
- 5.21 However, by the same token, we also agree with Professor Cave’s assessment that some of the VHF spectrum that is internationally allocated to the aeronautical sector is congested in existing use and that pricing signals can influence the efficient use of the spectrum concerned.
- 5.22 Taking next the question of additional or substitutive alternative use, we also agree with Professor Cave’s view that the prospects for alternative use can only be considered over relatively long timescales in this particular sector, and that in some cases these prospects, and hence the associated opportunity costs, while significant, will take long term and concerted action on a number of fronts to realise. That is, that pricing alone would be insufficient to secure changes towards optimal spectrum use which involve multiple parties in a complex international regulatory and business environment. This view was also expressed to us by stakeholders in response to our initial July 2008 consultation.

²⁷ Para 26
²⁸ Para 138
²⁹ P53
³⁰ P56

- 5.23 We have therefore reflected this assessment in our revised proposals for improving the efficient management of the spectrum currently used for civil radar and aeronautical navigational aids. In the affected bands, while there is typically limited excess demand in existing use, the opportunity costs associated with alternative use are potentially very significant, but the realisation of long term spectrum efficiencies for the UK will require coordinated action by a range of public and private stakeholders, in some cases via international fora and affecting global supply chains, with leadership from the UK sector authorities concerned. Hence we have proposed that, pending such coordinated action, reflecting such contingent, long term opportunity costs in individual licence fees would not incentivise the efficient management of spectrum at this time
- 5.24 We have applied these principles consistently in our August 2009 consultation in relation to fees proposals for maritime VHF channels. For example we reflected an assessment that early international changes to existing designations may not be incentivised by AIP fees in our proposal to set fees only to make a contribution to administrative costs for use of the internationally-allocated maritime duplex channels. Although these channels would be technologically suitable for Business Radio use, at present and pending changes to international agreements, it is not possible to authorise such alternative use in these channels. So while there is an opportunity cost to society arising from this allocation, there is not an alternative use based opportunity cost from each assignment held by a maritime user while the existing designations remain in place. Nor, in this case, given the current observed demand for these channels by maritime users, is there a current-use opportunity cost. Accordingly, in this instance, we proposed to set licence fees only to make a contribution to our administrative costs.

Excess demand for aeronautical VHF communications frequencies

Background

- 5.25 Ofcom considers that there is clear evidence of excess demand for aeronautical VHF frequencies to justify applying AIP fees for many channels. The evidence for excess demand for aeronautical VHF frequencies was initially considered by Professor Cave in 2002.

“Air-Ground voice communications are primarily met by VHF, which is in high demand and therefore under acute pressure. However, the introduction of narrower channel spacing (8.33 kHz), requiring on-board re-equipment, and in time the increased use of datalinks, will enable increasing demand to be managed more effectively. In addition, UHF and HF continue to be used to support certain voice communication applications.”³¹

- 5.26 The subsequent Cave Audit made the following additional observations regarding congestion in the aeronautical VHF bands between 117.975 MHz and 137 MHz, further supporting the view that VHF frequencies were congested:

“Channel size has been progressively reduced to accommodate increased traffic within constrained bandwidth, most recently with the start of implementation of 8.33 kHz channel spacing in place of the old 25 kHz channels. CAA’s view is that the band is virtually saturated, and that the scarcity of VHF frequencies in Europe continues to potentially limit airspace capacity and efficiency. Due to congestion there is an

³¹ Cave (2002), p 183, paragraph 12.13.

economic case for differential pricing to encourage addition of more efficiency equipment where there is a technology choice.”³²

- 5.27 Furthermore, Indepen (2007) made the following observations in relation to congestion in the aeronautical VHF bands 118-137 MHz:

“The main evidence for congestion is with respect to the VHF communications band where new assignments have to be coordinated through twice yearly regional planning meetings that attempt to accommodate new assignments by replanning existing assignments.”

“What stands outis the high value for the [VHF] communications band. This is a consequence of the considerable congestion in the band and the fact that aeronautical users do not have any alternative but to invest significant sums in more efficient equipment if future demand is to be accommodated. Our analysis suggests however there is a good case for allocating more spectrum for communications purposes to aeronautical services.”³³

- 5.28 Ofcom considers that taken in the round, the above evidence suggests that excess demand has been demonstrated for many aeronautical VHF frequencies.
- 5.29 The international frequencies concerned therefore constitute a key resource input for the industry and the UK economy. Ofcom believes applying AIP fees can help to manage this demand efficiently in the UK over the longer term as the aviation industry grows and develops. We consider that this approach is in line with the Government’s broader strategic approach, supported by competition and market mechanisms, to the provision of aviation infrastructure inputs to meet significant expected future demand growth efficiently and sustainably in different regions of the UK in the face of tightening supply constraints, as set out in the Air Transport White Paper³⁴.
- 5.30 We recognise that the international dimension to the planned use of these frequencies means that use in one country will often have an impact on the ability of other countries to use the same frequency in the short to medium term. Indeed the shortage of frequencies available in the UK is, in part, influenced by use of these frequencies elsewhere in Europe as noted by respondents to the July 2008 consultation. Over the longer term, multilateral technical and legislative developments such as those taken forward within the Single European Sky framework (including a move to 8.33 MHz channel sizes for aeronautical VHF applications) can gradually help improve both the availability of spectrum and the efficiency with which individual countries such as the UK are able to make use of the scarce spectrum resources available.
- 5.31 In the meantime, aviation use of VHF spectrum in the UK is subject to an international framework of frequency management for ICAO’s European Region, involving ICAO and Eurocontrol, which is regulated in the UK by the CAA. It involves three types of frequency allocation, all of which are established within a common international framework to manage the excess demand for spectrum that exists in these frequencies:

³² Cave Audit, Annex C, page 118.

³³ Ibid, page 86

³⁴ *The future of air transport* published on 10 2003
<http://www.dft.gov.uk/about/strategy/whitepapers/air/>

- Some frequencies are designated in the international framework as “National Aerodrome”. These are internationally co-ordinated frequencies allocated to states for national management within defined planning criteria. In the UK there are currently about 64 of such “parent assignments”. Individual licensee assignments on these frequencies are coordinated within each State (in the UK by the CAA) without recourse to international coordination. In the UK, some 950 of the 2000 total discrete VHF assignments, such as for surface movement control and air-ground communication (“ATC (A/G)”), are covered by this arrangement;
- Most of the remaining assignments are made through a designated “ad hoc” process where an individual State’s frequency manager (such as the CAA) identifies suitable frequencies in accordance with ICAO European planning rules, to meet individual national applications and notifies other European frequency managers of the proposed coordination. If no objections are received within a 28-day period, the frequency is assigned accordingly.
- Some (5% in the UK) of assignment requests cannot however be met through either of these processes due to the congestion in the VHF aviation band. These requests are subject to a European “block planning” process in which solutions are identified that require assignment shifts in other states. This is administered twice yearly by Eurocontrol, subject to advice by a central independent body – the Authorised Representative Body, or ARB – on the priority to be accorded to different States’ requests.

5.32 The CAA has expressed some concern that release of aeronautical frequencies in the UK, in response to AIP fees, will provide few benefits to UK citizens and consumers, as released frequencies are likely to be made use of in other countries.

5.33 We have discussed this question at some length with both the CAA and our expert advisers Helios Technology Ltd. We have concluded that the UK will not be disadvantaged in this way by the introduction of AIP. Our reasons are set out in the following paragraphs.

5.34 Firstly, whether subject to AIP or not, assignment of frequencies designated as “national aerodrome” will remain under UK control (via the CAA). As they are used for multiple assignments, these frequencies will generally not be made available to the rest of Europe, although should any frequencies as a whole be no longer required, they would be released to the international process. These account for nearly half of all discrete assignments, generally for more localised use. In our view, AIP applied to these frequencies will benefit the UK as assignments will be more likely to be made to those UK users who value the assignments most highly (and are willing to pay AIP).

5.35 Secondly, in our view, the introduction of AIP is unlikely to have a negative impact on the likelihood of UK requests for new assignment in other (non national aerodrome) frequencies being met, either through the “ad hoc” process referred to above or via the “block planning process. We understand that these European processes are unaffected by the UK’s introduction of AIP and, therefore, it can reasonably be assumed that 95% of these new requests will continue to be met through the ad hoc process leaving around 5% to be addressed through the block planning process. In our view, where behavioural change is induced by AIP, it is more likely that new requests from within the UK will be met through the fast track ad hoc process; this is

because these new applications will tend to be limited to those which place a relatively high value on the spectrum.

- 5.36 Finally, given the high levels of excess demand for these frequencies, we believe it is highly probable that release of an assignment in the UK (in response to AIP) will, over time, facilitate alternative UK assignments being made. Thus, we do not anticipate a material reduction, overall, in use of frequencies within the UK but, rather, expect to see relatively inefficient use in the UK being replaced by more efficient use. Nevertheless, on some occasions, release of an assignment in the UK may facilitate the grant of an assignment elsewhere in Europe (as interference to or from the released UK assignment no longer needs to be considered). This will benefit European citizens generally, which would be an outcome also consistent with Ofcom's statutory duties.
- 5.37 In general, when considered from a European perspective, we would expect that the frequency allocation outcomes from all three processes would be consistent with our objective for AIP - to facilitate the optimised use of the spectrum concerned, as the ARB prioritisation criteria are also aimed delivering efficiency and maximum economic benefit. In some cases trade-offs between the interests of non-EU and EU states may inevitably need to be made, but such issues already arise with allocation under existing licence fee structures. We do not consider the introduction of AIP would materially increase the chances of sub-optimal allocation arising in future via these international processes.
- 5.38 Under this framework, the CAA may choose to seek and obtain European co-ordination clearance for new assignment requests in the light of UK sector demand, although will usually be able to avoid the full "block planning" process for the purpose. The CAA's decision in proposing any new assignments would reflect its understanding and assessment of demand from UK operators, as well as existing assignments made and the spectrum available, so that new co-ordination might be needed to accommodate one or more different new assignments: it would not always be the case that the co-ordinated clearance for an assignment that another UK user was relinquishing would accommodate the new required assignment.
- 5.39 In framing our proposals we have been mindful of the existing spectrum allocation process in the European aviation industry as summarised above. As with airspace management, such international coordination is required to ensure that the scarce spectrum resource concerned can support the efficient operation of the aviation industry across Member State boundaries.
- 5.40 Within this framework, in theory if the UK were in future not to require a significant amount of spectrum to support aviation operations within its airspace, there may be a call to review the strategic international allocation of frequencies through the international coordination mechanisms.
- 5.41 However, for smaller reassignments of frequency within the UK to individual licensees, to reflect their evolving business needs and the overall UK use of the spectrum, the CAA is able to lead the process of reassignment concerned. For example we understand that the frequencies used to support the introduction of VDL Mode 2 technology, in line with evolving ICAO standards, was facilitated by the parallel use of 8.33 kHz channels on some UK frequencies by NATS. Similarly, where demand from gliding clubs within the UK has exceeded the capacity available on particular dedicated gliding channels, the CAA has been able to assign alternative frequencies. In practice, therefore, CAA has the ability to identify frequencies that are

not currently used by UK operators, or which could be released by them, and to re-assign them at the national level.

- 5.42 In some respects this is similar to the management of congested airspace – while Eurocontrol is involved in both the strategic and tactical real-time management of congested European airspace, the CAA’s Directorate of Airspace Policy (“DAP”) in the UK also has an important role (not least in UK civil/military strategic airspace planning), while NATS is commercially incentivised to ensure the delivery of airspace management which minimises delays to end-users, while sustaining safety as its top priority, alongside the involvement of multiple stakeholders in strategic international capacity change programmes such as SESAR.
- 5.43 Given this institutional context where administrative demand management and market mechanisms are used together on a complementary basis, and the expectation that excess demand in the relevant VHF frequencies is likely to persist over the medium term (given stakeholder views that the scope for rapid technology and capacity changes is limited), we envisage that the main impact of spectrum pricing in these congested frequencies will be to encourage gradual improvements in the efficient use of this spectrum in the UK over the medium to longer terms, rather than trigger a large strategic international reallocation of frequencies.
- 5.44 More efficient use of these frequencies within the UK will benefit consumers and citizens in the UK, making it less likely that requests for new assignments cannot be met and over time ensuring that they can be allocated to the highest value uses. Operationally this is achieved by the CAA’s assignment of frequencies to maintain the safe and expeditious flow of traffic on a day to day basis, but more marginal uses will also be influenced by price over the longer term – with the structure of prices capable, for example, of providing incentives for channel sharing in some cases.

Action by aeronautical spectrum users in response to AIP fees

- 5.45 In commercial environments, faced with paying increased prices for key inputs, users are expected to review their current use of the inputs concerned and some will identify ways either to reduce their use of these inputs, or alternative inputs which can be adapted more easily, in order to sustain outputs and profitability. In order to assess whether AIP-based fees can be expected to lead to more efficient use of spectrum, we need to understand the scope for this type of response in relation to specific user groups and in relation to specific uses.
- 5.46 In the case of VHF spectrum for aeronautical use, it will often be other inputs to spectrum itself (e.g. marginal equipment or accommodation costs within ground stations) which may be easier to vary in the medium term, while sustaining the CAA’s Approval for the operations concerned. While such inputs may be efficiently used before the AIP fees, the efficient balance following the fee change may change at the margin.
- 5.47 This has occurred following the introduction of AIP for spectrum in other sectors. For example AIP has changed the efficient commercial balance between wired and wireless technologies in the communications sector at the margin. In aviation, changes in relative input prices can also prompt a re-evaluation of the efficient mix of inputs, particularly over the longer term. For example oil price changes and the planned transition of the sector to the EU-ETS are both likely to affect the future focus on the use of fuel-efficient equipment such as aircraft and their engines.

- 5.48 While AIP for VHF spectrum would imply very much smaller changes in relative input costs for the sector, compared with the impacts referred to above, some adjustments towards more efficient input use can still be expected over the longer term at the margin. In aggregate the outcome will, over time, be that the consumption of spectrum (e.g. to meet future industry growth) will reflect more efficient marginal decisions, albeit that the speed and extent to which UK and other EU citizens and consumers benefit from such effects will also depend on the outcomes of international frequency allocation processes and will vary by the specific type of spectrum use concerned.
- 5.49 In this respect some service applications are less tightly prescribed by external regulation (including safety regulation by the CAA's Safety Regulation Group ("SRG")) than others. For example the number of OPC frequencies required by any given organisation, and the extent of unprotected airborne use beyond the aerodrome boundary, is in part conditioned by the relevant business operational need, rather than by regulation, and the level of any fees will influence the individual organisations' commercial judgements and requirements.
- 5.50 In contrast, decisions on the number of frequencies set aside for non powered sporting use are formally taken by the CAA, but the affected community of users using these dedicated channels undoubtedly has influence on outcomes and will take different views on how such shared channels are used in the longer term depending on fees payable. The decision to make more intensive use of some dedicated channels may release exclusively assigned spectrum in other frequencies for other aeronautical applications at the margin, but in this case the user communities and the CAA will both need to evaluate feasible options.
- 5.51 In the case of the spectrum used for commercial airports, whether an aerodrome operator chooses to change his operation and alter his infrastructure capability (e.g. to cater for greater volumes of traffic movements or a wider variety of customer types) will depend on the overall incremental and avoidable costs involved, including labour and equipment costs. We would expect a business case would be developed for significant changes. For example, Helios Technology have noted in their work that some airports have reserved frequency to cater for planned major expansions.
- 5.52 In such cases, safety approval for expansion may be conditional on the recruitment of trained traffic controllers at an aerodrome (depending on the incremental movements involved). Spectrum fees, alongside a wide range of other input costs including equipment upgrades, may typically be small in relation to the other key cost changes (e.g. trained personnel) required in such situations, but they should be consistently taken into account when deciding on the future direction of the aerodrome's business (and hence, overall and in the longer term, the efficient distribution of aviation traffic at different aerodromes within the UK).
- 5.53 The cost of spectrum will, along with other relevant costs for such longer term business decisions, contribute to influencing such decisions at the margin. If inputs are priced more accurately to reflect the value of the resources concerned, efficient decisions of benefit to UK citizens and consumers are more likely to be taken.
- 5.54 As stakeholders have noted, aerodrome operators and air traffic controllers do not generally equip their operations with the bare minimum number of communications channels required by SRG for a given pattern of operation. They may choose to use more channels to improve operational efficiency (for example, increasing the throughput of traffic) or to improve the quality of service to customers. These decisions will have been taken on the basis of each operator's assessment of the

costs and benefits. In future, if AIP is applied to licences for the spectrum concerned, subsequent decisions will take these fees into account along with all other costs. In the light of AIP fees, some may choose to use fewer frequencies while remaining fully compliant with regulatory requirements.

- 5.55 At the same time, many users may conclude that they are unable to reduce the number of frequencies which they use, or to change the geographic impact of their transmitters within these frequencies, and are unable to deploy transmitters which have a more localised impact on other spectrum users without making major and unacceptable changes to their current business operations. Provided such decisions are taken in the light of the costs of spectrum (as signalled by AIP) this should nevertheless result in the efficient use of spectrum being sustained in the longer term.
- 5.56 In particular, because many other complementary air navigation costs are sunk and hence not avoidable in the shorter term, the business case for changes may only develop over longer time frames. However, as acknowledged by the CAA in its economic regulation of NATS, marginal but significant changes affecting the efficiency of air navigation service provision are possible within the medium term of a regulatory price control period, with further changes possible over the longer term investment cycles.

Longer term potential benefits of AIP based pricing of aeronautical VHF frequencies

- 5.57 There is strong evidence that, given appropriate international co-ordination, there is scope to improve spectrum efficiency in these bands. For example, a wider application of 8.33kHz channels, in place of the more commonly used 25kHz channels, has the potential significantly to reduce the amount of spectrum needed for aeronautical VHF communications and hence enable future demand to be accommodated in less bandwidth. As part of the next phase of the EU's Single European Sky initiative, 8.33 kHz may become mandatory in future at all flight levels, although the implementation of the Mandate is likely to be phased in. After the implementation of AIP fees, the prospect of a transition to 8.33 kHz channels would offer not only a benefit to the sector through greater ability to meet excess demand, but also to each individual user whose fee per assignment would reduce with the transition. Wider deployment of digital technology also has potential to increase capacity while reducing spectrum use.
- 5.58 We acknowledge that in some such situations no spectrum user acting alone can unilaterally decide to move to narrower channels. Further, the fact that some users will benefit from international change, cannot, by itself, have any effect on the availability of spectrum for new uses and users. So this additional potential effect of pricing is not one that we would count as a core objective of pricing in these circumstances. That is, we would not propose to apply AIP fees if creating incentives for individual users to change international regulations or other aspects of the strategic spectrum allocation framework was the only objective. Indeed, stakeholders pointed out to us in consultation that, regardless of the pace and effectiveness of future international efforts, complete and effective change to the installed equipment base in the global aircraft fleet (including General Aviation) will be difficult to achieve rapidly on a cost-effective basis. This is a common feature of technology switchover programmes in aviation and other sectors (such as radio broadcast), so that the changes accordingly need to be managed in different national environments over many years and sometimes decades. We understand, for example, that this long

term flexibility is also reflected in the proposed implementation framework for SESAR.

- 5.59 We do believe, however, that the resulting improvement in information for industry and regulators from AIP-based pricing is a secondary and consequential benefit of introducing value-based fees. Such secondary benefits could arise in relation to a wide range of spectrum uses, to the extent that long-term changes in allocation or technology use were subject not only to market decisions but to decisions by relevant national or international regulatory bodies.
- 5.60 It is important to note that while we consider that this effect of pricing would be of net, albeit marginal, benefit to the information inputs to future international agreements, we have not based any of our proposals on this benefit. We have not relied on this observed secondary benefit to any degree when proposing to apply fees to aeronautical VHF communications frequencies. Our proposals have been determined by reference only to the potential for more efficient allocations in current use.

Exceptions

- 5.61 As the air-to-air frequencies, and the distress frequencies (121.5MHz and 123.1 MHz) are not assigned exclusively to any individual users, but are centrally assigned and used on a “private commons” basis, we see no efficiency case for applying value-based licence fees for the individual UK use of these frequencies. Similarly, assignments for ground stations to use the Fire frequencies are made in channels already exclusively allocated to air-to-air communications, mentioned above, so these assignments are considered to have no opportunity cost.
- 5.62 We are proposing to set an administrative cost-based fee of £75 for licences for ground stations to use the air-to-air frequencies (other than for fire communications). While these uses by ground stations do not impose any user-specific opportunity cost, there is a need to maintain up-to-date and accurate information about these authorisations.
- 5.63 As the authorisations to use the distress frequencies and the Fire channel are relatively stable, and these authorisations do not require much technical co-ordination (if any), we do not consider that there is a robustly identifiable (or “avoidable”) administrative cost associated with making them. We are proposing not to set administrative cost-based fees for licences authorising use of the distress frequencies or the Fire channel

Concerns about the possible impact of AIP on safety

How Ofcom has approached the issue of safety in its economic analysis

- 5.64 Our analysis explicitly recognises the critical importance of safety in the aeronautical sector and the relevant duties of the CAA as safety regulator.
- 5.65 We consider that when proposing AIP fees, these should be set at a level to reflect underlying opportunity costs of spectrum usage. This view applies even where positive or negative externalities exist in relevant markets.
- 5.66 For instance, we note that some of the services which are provided using spectrum in the UK may give rise to externalities such as pollution, and some spectrum is used to support the provision of public goods, such as national defence. These wider social costs or benefits arising from a given use of spectrum are not fully reflected in the

prices that users pay for the services provided, and the value to citizens and consumers overall of this use could be higher or lower than is signalled via market prices for these services. Generally, the appropriate policy interventions to maximise such social value, or minimise social disbenefits arising from externalities, take the form of targeted subsidies and taxes or regulation for the outputs concerned (e.g. aid for remote facilities and pollution taxes or permits) rather than subsidising the required inputs (typically labour, land, equipment and, in the case of wireless services, spectrum).

- 5.67 Accordingly, the possibility that services provided using spectrum may cause externalities or have public good characteristics does not change our view that setting fees to reflect opportunity cost more closely should result in net benefits, as measured by a CBA, to UK citizens and consumers. These net benefits are likely to be greatest if AIP is set to reflect opportunity costs and any externalities are addressed directly. This is consistent with the results of studies³⁵, at an aggregate level, of the potential benefits of market-based approaches to allocating spectrum,
- 5.68 In the aeronautical sector, a 'positive externality' will arise where the socially optimal level of safety provision is greater than the level implied by individuals' willingness to pay for safety measures.
- 5.69 For instance, customers place a high value on ensuring their own safety (e.g. when purchasing flights), and hence there are significant commercial incentives on airlines, airports and private aerodromes to provide the highest levels of safety, and to develop reputations for safety. However, it is not necessarily the case that individuals take into account risks that their use of the airspace (and spectrum airwaves) may impose on others when they decide on how much to spend on safety measures. Accordingly, from the point of view of society, 'private' spend on safety may not necessarily reflect the (higher) socially optimal level.
- 5.70 Another possible source of market failure could relate to lack of information allowing customers to identify and choose between competing airlines on the basis of their safety record. In other cases, market power may permit an operator to provide lower quality services, including reduced safety levels. In these circumstances a regulator might consider it more appropriate to address these market failures directly through requiring the provision of safety information by airlines or by lowering barriers to competition in response to market power. If this is not possible, then the next best response might be to regulate to mandate the safe operation of flights in the sector.
- 5.71 Accordingly, Ofcom does not consider that AIP fees should be adjusted (i.e. lowered) in response to this positive externality. Instead, Ofcom considers that other responses, including safety regulation will be the more direct (and therefore more efficient) means of ensuring the maintenance of the highest levels of safety in the aeronautical sector (see paragraphs 6.28 – 6.37 for more detail).
- 5.72 Because it is the CAA (and not Ofcom) that has a statutory responsibility for safety regulation in the aeronautical sector, the CAA (rather than Ofcom) is more suitably placed to determine the impact of Ofcom's pricing proposals on safety in the aeronautical sector.
- 5.73 This is not to say that Ofcom has not looked at the potential financial impacts of its proposed approach on airports and end consumers (and therefore indirect impacts on operators' ability to meet current safety levels, particularly where safety is not

³⁵ See, for example, Indepen 2007 section 2.3

currently mandated). Ofcom has undertaken a detailed financial impact assessment that has considered the impacts of the proposed fee levels on individual airports, airfield and aerodromes, including end users of airport services. These financial impacts are typically small (see Annex 7). We commissioned further analysis to identify the materiality of impacts on smaller non-reporting aerodromes and found these impacts, at least for airports with available information, were not typically different to similar size reporting airports (see Annex 7).

- 5.74 Nor is it to say the safety impacts need necessarily be adverse. Ofcom notes that, in principle, AIP may in fact assist in achieving greater safety outcomes in the sector. For instance, there is a risk attached to the current 'first come, first served' approach to allocating spectrum, even where new frequency requests are scrutinised by the CAA. Inefficient operators may be operating in the spectrum with few incentives for efficient use. This could prevent others who are more efficient from operating in the sector who arguably may have greater ability to afford expenditures on additional safety-related equipment beyond the minimum required by regulation.
- 5.75 What is key is that the CAA is able to carry out its duties in response to Ofcom's proposals. For example, in the event that the small financial impacts assessed in Annex 7 were considered by the CAA to represent an unacceptable risk to safety outcomes in the aeronautical sector, an appropriate response could be for the CAA to respond directly through mandating safety where safety is currently left to operators' discretion (e.g. at non-reporting aerodromes) (see paragraphs 5.77 to 5.84).
- 5.76 As noted in Section 1, the CAA has confirmed to Ofcom that it has adequate powers to respond to any safety concerns arising from Ofcom's current proposals to apply AIP to the aeronautical sector. The CAA has stated that the adequacy of VHF communications provision will be subject to safety regulation by the CAA using appropriate regulatory instruments taking into account safety justification provided by the service providers, via, for example, safety cases.

Impacts on CAA's continued ability to ensure safe operation by the aeronautical sector

- 5.77 Ofcom notes that one of the CAA's five main statutory functions³⁶ is regulating civil aviation safety. The Secretary of State for Transport (and, where appropriate, the Secretary of State for Defence), sets the overall policy framework for the CAA and agrees the CAA's objectives and priorities. The Secretary of State can give Directions to the CAA regarding the discharge of its duties and, acting on the advice of the CAA or otherwise, makes legislation relating to civil aviation safety.
- 5.78 The Air Navigation Order³⁷ ("ANO") currently requires that certain aircraft may not take off or land other than at a licensed aerodrome (or a Government aerodrome). The CAA is the licensing authority for aerodromes and, when considering a request for a licence, will consider the safety case presented by the applicant in the light of the expected use of the aerodrome. The safety case will usually include plans for deploying VHF communications systems which, if the CAA so determines, can be a

³⁶ See Sponsorship Statement at <http://www.dft.gov.uk/pgr/aviation/domestic/sponsorshipstatementfortheci2872>

³⁷ Statutory Instrument 2005 No.1970 <http://www.opsi.gov.uk/si/si2005/20051970.htm>

condition of the licence being granted. In this way, the CAA can ensure that adequate VHF communications systems continue to be deployed at all licensed aerodromes.

- 5.79 We note that, in respect of unlicensed aerodromes, the CAA has considered it appropriate to issue non mandatory guidance and advice.³⁸ The relevant document states that the provision of Air Traffic Services (which generally rely on the use of VHF communications) will depend on a number of factors including the volume and type of aircraft using the airfield and the complexity of the local environment. The final decision, however, is left to the aerodrome to take. Ofcom understands that around 90% of all sites in the UK which are recognised as aerodromes under planning law are currently unlicensed and, of these, less than 10% deploy VHF communications systems³⁹. If the CAA or the Secretary of State considered that this outcome failed to provide an acceptable level of safety at some or all of these unlicensed aerodromes, legislation would have been enacted (or codes of practice agreed with particular classes of user) to address the concern.
- 5.80 Ofcom notes, for example, that the CAA recently recommended to the Secretary of State that the ANO should be amended to widen the class of aircraft permitted to use unlicensed aerodromes. If accepted, this would permit training flights to use such aerodromes. Rather than use legislation to require training schools to deploy communications systems, the CAA initially encouraged the publication of a Code of Practice, to apply to training schools, which, amongst other things, addresses the need for communication systems. An alternative approach, which Ofcom understands is now favoured for this particular matter, is for the CAA to issue best practice notices. Ofcom understands that if AIP fees, or any other factors, in future caused a significant reduction in the number of unlicensed aerodromes deploying VHF communications systems, an amendment to the ANO, or agreement of a code of practice, could be used to address any concern about particular types of activity carried out at unlicensed aerodromes without access to VHF communications.
- 5.81 We also note that, in any event, section 104 of the ANO enables the CAA, in the interests of safety, to direct the person in charge of any aerodrome (other than a Government aerodrome) to provide an air traffic control service, flight information service or some other means of two way radio communication as the CAA considers appropriate. Ofcom understands that this provision applies equally to licensed and unlicensed aerodromes.
- 5.82 While safety in the aeronautical sector is ultimately a matter for the CAA, we recognise that it will be important that Ofcom takes full account of the parallel safety regulatory regime in assessing the potential impacts of our proposals. Our initial implementation and phasing proposals therefore reflect consideration of the time period that would afford the CAA sufficient time within which to assess the full implications of Ofcom's proposed fees on aviation users from a health and safety perspective and, where necessary, to take action to ensure that providers of air traffic services and aerodrome facilities maintain appropriate safety standards.
- 5.83 Finally, we note that, relative to other new charges and taxes being faced by the industry, our proposed licence fees are at least one and potentially two orders of magnitude lower (see paragraph 4.59). Annex 7 to this consultation sets out our view that, in general, the financial impact of the proposed fees on spectrum users and their customers will be modest. Where costs are passed on to passengers the

³⁸ CAP 428 Safety standards at unlicensed aerodromes <http://www.caa.co.uk/docs/33/CAP428.PDF>

³⁹ See paragraph 4.44 above

additional cost per passenger at the larger airports will typically be less than 1p. Even at the smaller airports the additional cost per passenger is less than 10p. The proposed cost per aircraft movement at the smaller aerodromes which serve mainly non commercial traffic is also low, generally being less than £1 per movement. We believe it is highly unlikely that, in response to these additional costs, airport operators will put safety at risk, even if the regulatory framework gave them the freedom to do so.

- 5.84 In conclusion, therefore, with regard to the specific fee rate and phasing proposals in this consultation we do not consider there are likely to be any material impacts on safety arising from our proposals.

Summary conclusions on the scope for AIP fees to contribute to decisions which improve the efficiency of spectrum use

- 5.85 In summary, we believe that, provided AIP fees are set at an appropriate level, AIP has the potential to incentivise more efficient use of spectrum at the margin, within the aviation sector. Setting AIP fees for spectrum ensures that users face the economic cost of scarce spectrum and take this into account in their behaviour. Without this, input choices are likely to be distorted, with the risk that spectrum will be utilised inefficiently to the detriment of citizens and consumers.
- 5.86 Ofcom notes that the above analysis is neither prescriptive nor exhaustive. Over time, users will adapt not only their spectrum use but their other inputs and the services they offer in response to a wide range of factors that are not possible to predict, including demand for those services, other changes in input markets, and changes to the relevant public policy regulations in their sectors. The intention is for the market to discover more efficient uses of spectrum in response to AIP alongside these other developments, and accordingly, it is neither necessary nor feasible to predict in advance exactly how users of particular services will respond.

Section 6

Ofcom's assessment of the different ways to set fees

- 6.1 In this section, we explore ways to set the relevant UK national reference rates for aeronautical VHF frequencies in the band 117.975 to 137 MHz.⁴⁰ This section first considers whether there is excess demand for spectrum (in which case AIP fees should apply) and second, where there is excess demand, how AIP should be applied. We consider two fee alternatives:
- Fees based on administrative cost or zero rates (Approach 1); and
 - Administered incentive prices based on the underlying opportunity cost of spectrum (Approach 2).
- 6.2 AIP fees are intended to provide price signals that incentivise users of scarce spectrum to use it efficiently (see paragraphs 5.1-5.6).
- 6.3 Where there is excess demand for spectrum, either in the current use or in an alternative use, potential users may be excluded from using the spectrum as a consequence of existing assignments. We believe that reference rates to reflect the underlying value of the spectrum - based on opportunity costs - can help to manage this excess demand by giving users incentives to consider whether they are using the right amount of spectrum.
- 6.4 Where there is no excess demand for the spectrum, each assignment is accommodated without excluding another potential user, and there is no efficiency benefit from AIP fees set for end users. In such cases we would normally set a fee to make a contribution to the administrative cost associated with issuing a licence or, where the relevant avoidable costs of administration for a particular type of licensing are *de minimis*, zero rated fees. We propose to set zero rated fees for channels that are used on a "private commons" basis for distress and fire management (see paragraphs 5.61-5.63).
- 6.5 We have also taken account of AIP fee rates which have already been set to reflect scarcity in other similar parts of the spectrum, since these are potentially relevant as benchmarks.
- 6.6 In the remainder of this section we consider:
- Approaches for setting rates for aeronautical VHF spectrum (paragraphs 6.7 to 6.27); and
 - Externalities, including safety issues, relevant to setting AIP rates (paragraphs 6.28 – 6.37).

⁴⁰ In this section, we refer to "reference rates" (expressed as £ per notional 1 X 1 MHz national channels), but note that these are distinct from the licence fees payable by licensees to recover the share of (national) opportunity costs (as reflected in the reference rate) as set out in Section 7.

Alternative approaches to setting fees for aeronautical VHF spectrum

- 6.7 As set out at paragraphs 5.25-5.28, demand for aeronautical spectrum exceeds supply at existing fee rates for many channels. For example, it is often very difficult to meet new requests for aeronautical VHF communications frequencies required by aerodromes and air traffic controllers.
- 6.8 In the context of that observation, we assess the alternative approaches to setting fees for aeronautical VHF spectrum below.

Approach 1 - Fees based on administrative costs or zero rated

- 6.9 Under Approach 1, we would set aeronautical VHF fees based on either a contribution to administrative costs or zero rated.
- 6.10 Given the excess demand in the current use, we consider that fees based on administrative costs would not facilitate aeronautical VHF spectrum being held by those who value it the most, distorting economic efficiency and reducing output below its optimal level for UK citizens and consumers.
- 6.11 As noted in paragraphs 6.3 and 6.4, we consider it is appropriate to set spectrum charges that contribute to administrative costs in those bands where there is no excess demand. This reflects the fact that when spectrum is not scarce the use of frequencies by any particular user does not exclude any other potential user and, hence, the spectrum has an opportunity cost of zero. In these circumstances, spectrum efficiency is promoted by charging a fee which contributes to the costs of spectrum management. Further, we consider that it is appropriate to set zero-rated fees only for channels where there is both no excess demand and relevant avoidable spectrum management costs are *de minimis* (including, for example, “private commons” channels).

Approach 2a - AIP fees based on opportunity costs

- 6.12 Under Approach 2, we would set a fee for aeronautical VHF spectrum based on underlying opportunity cost.
- 6.13 As set out at paragraph 5.4, where there is excess demand in current or alternative uses, we consider that consumers and citizens are more likely to benefit from an approach that sets AIP fees based on the underlying opportunity cost of that spectrum. Applying this principle, we have had regard to independent research that estimated the underlying opportunity costs of current and alternative uses of aeronautical VHF communications frequencies.
- 6.14 In their 2007 report⁴¹ for Ofcom (“Indepen 2007”), Indepen and Aegis assessed the annual current use opportunity cost of spectrum used for aeronautical VHF communications at between £1.41m⁴² and £2.95m per national MHz. This assessment was based on consideration of the likely cost of replacing 25 kHz radios with 8.33 kHz radios on aircraft operating at flight levels below 24,500ft, thereby increasing the capacity of a given amount of spectrum. This approach to determining opportunity cost is known as the “least cost alternative” approach as it considers the

⁴¹ Indepen and Aegis *Aeronautical and maritime spectrum pricing* April 2007
<http://www.ofcom.org.uk/research/radiocomms/reports/spectrumbaip/aipreport.pdf>

⁴² Indepen 2007 paragraph 6.4.1

cost of deploying an alternative technology or strategy in response to a hypothetical denial of, or constraint on, access to spectrum while sustaining existing output. Indepen noted that this implied valuation was considerably higher than the valuation in the next best alternative use, Business Radio, which Indepen noted had previously been assigned an annual value of £620k per national MHz. Indepen recommended that both the current use opportunity cost and alternative use opportunity cost should be used to determine the appropriate reference rate against which fees would be determined.

- 6.15 However, we consider that evidence provided by Indepen and gathered by ourselves suggests that there is not a realistic alternative use of the aeronautical spectrum in the short to medium term. Whilst from a technical perspective, Business Radio users could in theory use aeronautical spectrum (since aeronautical frequencies are adjacent to Business Radio frequencies and therefore have similar propagation characteristics), in practice, current international agreements prevent the use of frequencies currently allocated for aeronautical for alternative uses such as Business Radio. We do not consider that negotiations to seek reallocation of common international frequencies currently used for aviation to Business Radio or other such alternative use would be likely to be successful for the short to medium term.
- 6.16 As such, it could be argued that the opportunity cost in alternative Business Radio use has little direct relevance to an assessment of fees to apply to aeronautical VHF communications. In this instance, therefore, an approach which relies on the estimated opportunity cost in current use may be more appropriate than one which also takes into account alternative use opportunity cost.
- 6.17 However Indepen also advised that account should also be taken of general uncertainty surrounding estimates of opportunity costs, and for this purpose recommended discounting expected values by 40% in cases of very high uncertainty⁴³. Applying this discount to the lower value of £1,410,000 per 1 X 1MHz of the estimated current use opportunity cost, and taking no account of the estimated opportunity cost of Business radio, would suggest an adjusted opportunity cost in current use of £846,000 per 1 X 1 MHz.
- 6.18 However, in our view there are uncertainties inherent in estimating opportunity costs on the conservative basis adopted by Indepen, which can be inherently somewhat speculative and hypothetical in nature. In particular, we note that Indepen's least cost alternative approach to estimating opportunity costs of aeronautical VHF communications spectrum is based on the costs of a hypothetical move from 25 kHz channels to narrower 8.33 kHz channels. However, as changes to international agreements to facilitate a move to the narrower bandwidths at all flight levels have not yet taken place and, accordingly, the process and timescales for implementation remain uncertain, the costs too remain uncertain. It may, therefore, be the case that a 40% adjustment is not sufficient to take account of all relevant uncertainty in this particular case.

Approach 2b - Business Radio AIP benchmark

- 6.19 Although Business Radio may not currently be a feasible alternative use for spectrum currently used for aeronautical VHF communications and, therefore, may not have *direct* relevance in determining the opportunity cost of spectrum used for aeronautical VHF communications, the Business Radio AIP rate could suggest another benchmark for setting AIP for aeronautical VHF channels. The Business Radio AIP

⁴³ Indepen 2007 paragraph 6.5.1

rate is paid by users of similar spectrum which is technically substitutable with aeronautical VHF spectrum, even though such substitution is currently constrained by international agreements relating to aeronautical spectrum. We note that Business Radio users currently pay fees based on an AIP reference rate of £330,000 per national 1 X 1 MHz for medium congested bands and £396,000 per national 1 X 1 MHz for highly congested bands. These reference rates are themselves very conservatively set to reflect the underlying opportunity costs of Business Radio use, and have not resulted in the elimination of excess demand in the congested areas affected. These reference rates therefore provide another useful benchmark on which to base opportunity costs for setting AIP for aeronautical users (separate from the Indepen estimates of opportunity costs based on the current, aeronautical, use).

- 6.20 We note that because the Business Radio reference rate is significantly below the current use international aviation opportunity costs estimates from Indepen (based on both short and long run approaches), using the Business Radio reference rate to set AIP fees for aeronautical VHF fees would not run the risk of setting fees too high and thereby leaving the spectrum unused.
- 6.21 However, we note that the risk of setting fees too high must also be balanced against the risk of setting AIP too low. If AIP fees are too low, it is possible that price signals will not be sufficiently strong to encourage optimal use of spectrum over the longer term. Nevertheless our approach to setting AIP fees, for any licence, has been informed by the general principle that, in assessing options, the risk to citizens and consumers from setting fees too high should be given greater weight than the risk from setting fees too low. That is because the potential effects of setting fees too high includes the possibility that spectrum will be vacated by efficient users, and new users will not occupy that spectrum (whether for the existing use or a new use) on a timely basis.
- 6.22 We also note that the possibility of future review of fees provides an opportunity to address fee rates that were set too low (see further discussion of review in Section 7 below) in line with Ofcom's general approach to spectrum pricing. This means that any risks of longer term welfare losses in terms of under-incentivising efficient responses from users can be addressed in future by adjusting the fee rates concerned if necessary. In the intervening period, the spectrum will have been in use, providing some benefits for society even if not the optimal benefits that might have been provided were fees set at the correct rate. While it is true that future reviews also provide an opportunity for addressing any fees that intervening evidence then suggests have been set too high, the costs to society in the intervening period (of unused spectrum and reduced services) are higher than those of an intervening period when fees are too low.
- 6.23 These considerations, along with the large degree of uncertainty around the estimates of current use opportunity cost, suggest that setting a reference rate based on the current Business Radio AIP rate (where willingness to pay the relevant fee rates has already been demonstrated in other sectors) would reflect the lower-risk and more conservative approach.

Preferred approach for aeronautical VHF

- 6.24 Given the above, we consider that Approach 1 (fees based on administrative cost or zero rated) should be rejected, on the grounds that it would not provide the appropriate price signals for efficient use of the spectrum. Ofcom considers that Approach 1 should only apply where there is no likely excess demand in current or

alternative use at administrative fee rates. Since there is already excess demand in current use, we consider that Approach 1 should be rejected.

- 6.25 Approach 2(a), relying on Indepen's estimate of current use opportunity cost discounted by 40% to reflect uncertainty, would imply a fee of £846,000 per nominal 1 MHz channel. However, we recognise that this reference rate is significantly higher than other rates which have been used to set AIP licence fees in VHF spectrum. As noted above, we also consider that there is considerable uncertainty attached to Indepen's assessment of current use opportunity cost as this was, necessarily, based on an hypothetical scenario. This suggests that there is likely to be a particularly wide margin of error around the Indepen estimates, such that the true underlying opportunity costs could be considerably higher or lower than Indepen's central estimate.
- 6.26 We consider that, given the large increase in fees payable by this sector implied by this central estimate of opportunity cost, and given the potentially wide margin of error in relation to estimates of opportunity costs, our assessment of fees options should also give weight to alternative benchmarks that could provide sufficient directional incentives for spectrum decisions to assist in achieving our spectrum pricing objectives, while minimising the risks that could arise from setting fees too high.
- 6.27 We therefore consider that in noting the conservative basis for setting Business Radio AIP (paragraph 6.19), and balancing the risks of setting fees too high or too low (paragraphs 6.20 and 6.21) and recognising the uncertainty and potential margin of error in estimating opportunity costs in the aeronautical sector (paragraph 6.18) Approach 2b (the Business Radio AIP benchmark) represents Ofcom's preferred option. We consider that this rate provides sufficient directional incentives for spectrum decisions over the short term. Accordingly, we are consulting on a proposal to adopt Option 2b using the Business Radio AIP rate of £396,000 per notional 1 MHz national channel.

Should AIP reference rates be adjusted for externalities?

- 6.28 We note that some stakeholders have suggested that spectrum fees should be adjusted to reflect factors which are often referred to as positive externalities (e.g. the benefits provided to society by high standards of safety) or negative externalities (e.g. pollution).
- 6.29 As explained in paragraphs 5.64 to 5.76 above, we consider that where positive or negative externalities exist, public policy approaches other than adjustments to fees are generally more appropriate
- 6.30 We note that Indepen et al (2004)⁴⁴ concluded that setting prices of spectrum that promote efficiency entails setting prices equal to marginal opportunity costs. In that document, Indepen argued that this conclusion still held in a situation where spectrum was used by services which created positive or negative externalities.
- 6.31 Indepen considered whether AIP levels should be influenced by the presence of two kinds of externality in respect of use of spectrum by aeronautical and maritime services, namely

⁴⁴ Indepen, Aegis Systems and Warwick Business School *An economic study to review spectrum pricing* April 2004

- Market externalities involving financial impacts in markets which are upstream or downstream from the market subject to the initial impact (these are sometimes termed pecuniary externalities)
- Non-market externalities such as greenhouse gas emissions, acoustic noise and radio interference, which impact on consumer wellbeing and production, but not directly via the market through prices.

6.32 Specifically, Indepen concluded the following:

“We conclude that neither market nor non-market externalities due to aeronautical and maritime activity constitute grounds for modifying spectrum prices based on opportunity cost estimates. Non-market externalities should in general be tackled directly via regulation or emissions pricing. The one exception to this general principle is where the production of an externality is related in a simple and non-varying way to the use of a particular input, for example, carbon dioxide emissions by aircraft are a linear function of fuel and therefore carbon inputs. In such instances it may be easier to measure the input (fuel) than measure the emission. The key question is whether or not spectrum inputs are directly and necessarily related to the production of externality. This is not the case, for example in relation to greenhouse gas emissions from aircraft, and so there are no grounds for modifying the price of radio spectrum to take account of the negative environmental impact of greenhouse gas emissions.”

“Administratively determined controls are generally sufficient to address radio interference externalities, except in relation to radar where under current regulation there could be material impact on use in adjacent bands because they involve pulses of very high power. This may justify application of AIP to these out of band emissions because in this instance the price is directly applied to the externality (i.e. out of band emissions).”

6.33 We consider that our approach in respect of spectrum used by the aeronautical sector is consistent with our position in relation to broadcasting spectrum, and to our approach to awarding spectrum that will become available for new uses following Digital Switchover (“DSO”).

6.34 For example, in the case of broadcasting uses of spectrum, there may be externalities (i.e. socially valuable broadcasting). As set out in our consultation⁴⁵ on the principles for applying AIP to spectrum used for terrestrial broadcasting, it is Ofcom’s view that the most appropriate approach to securing these benefits is for the level of the relevant output subsidy (for example, the TV licence fee or potential additional funding from government for specific services) to take into account all of the costs of producing that output, including any cost of spectrum fees. This is the approach taken by Parliament in setting the TV licence fee rather than adjusting the price of inputs (such as those for programme making) for the BBC, for example.

6.35 We have also followed this approach in relation to our proposals to award the spectrum that will become available for new uses following DSO.

6.36 The efficient way of dealing with market failure arising from negative or positive externalities is for government to tax or subsidise, or regulate, the output or activity

⁴⁵ *Future pricing of spectrum used for terrestrial broadcasting* July 2006
<http://www.ofcom.org.uk/consult/condocs/futurepricing/>

related to the externality (in this case, for example, mandating particular safety standards).

- 6.37 We have addressed questions to do with possible impacts of AIP fees on safety at greater length in paragraphs 5.64 to 5.76 above.

Section 7

Detailed fee proposals

Introduction

- 7.1 In this Section 7, we set out detailed proposals for fees to apply to aeronautical VHF communications licences. We are proposing that these fees should be paid by WT Act licensees. As set out in paragraph 7.9, we have substantially revised our proposals compared with the illustrative fees in our initial consultation. Our proposals would set fees which differentiate between different service applications on the basis of their relative impacts on spectrum use.
- 7.2 All fees proposed in this section are annual, and per 25 kHz channel, unless otherwise stated.

How we have arrived at our specific proposals for AIP licence fees

- 7.3 Where we are proposing to set AIP-based licence fees, we have identified the following objectives, which we consider reflect the interests of citizens and consumers:
- AIP licence fees should provide incentives for users to consider their spectrum use alongside all other inputs, in light of the potential value of spectrum to other users;
 - In proposing licence fee levels and how we will implement them, we should be mindful of the risk of charging fees that result in inefficient under-use of spectrum, and take steps to reduce that risk.
- 7.4 In drawing up our specific proposals, we have had regard to both these objectives.

Aeronautical VHF communications

Current fees structure and initial proposals

- 7.5 There are currently more than 700 25 kHz VHF channels, including 2 distress channels, which are internationally allocated to aviation by the ITU. Fees currently vary according to licence type, with licence types distinguished by the broad type of aviation service supported by the licensed transmissions concerned. These do not reflect the coverage of the different applications nor varying levels of excess demand, and hence do not reflect relative opportunity costs. Current fees are as follows:

Licence type	Annual fee
Aeronautical Ground Station (Air Traffic / Surface Movement Control)	£150
Aeronautical Ground Station (Air/Ground Communications Services)	£100
Aeronautical Ground Station (Airfield Flight Information Service)	£100
Aeronautical Ground Station (Operations Control)	£250
Aeronautical Ground Station (General Aviation)	£25
Aeronautical Ground Station (Fire)	£25

Table 4 Current fees for aeronautical VHF frequencies

7.6 In the July 2008 consultation we proposed that national assignments in 25kHz aeronautical frequencies should attract an AIP fee of £4,850 (and 8.33 kHz assignments a *pro rata* fee of £1,650). We did not propose to differentiate between different types of aeronautical VHF application, and the fees proposed assumed that, in general, each application sterilises around half the UK. We proposed that no fees should apply to the two distress channels.

Revised proposals for AIP fees to apply to aeronautical VHF communications

7.7 Stakeholder feedback indicated that a more granular and cost-reflective fee structure was warranted, as different aeronautical VHF applications provide different levels of geographic coverage and hence sterilise more or less spectrum.

7.8 We, therefore, commissioned consultants Helios Technology to recommend a more cost-reflective and granular structure of fees which reflects the coverage of each of the licensed applications. We have published their report alongside this consultation at http://www.ofcom.org.uk/consult/condocs/spectrum_pricing/aip.pdf.

7.9 In light of Helios' advice, responses from stakeholders to our July 2008 consultation, and follow-up technical discussions with the CAA concerning frequency assignment, we propose that the following considerations should be reflected in fees:

- We propose the same national reference rate of £396,000/MHz (or £9,900 per 25 kHz) as proposed in the July 2008 consultation (for the reasons set out in Section 6 above), but with a revised fee structure that includes differentials to reflect both coverage and density of demand. The terminology used to describe the applications is that used by ICAO and differs, in some cases, from current licence product definitions. The licence product definitions will therefore require some revision which we have discussed with the CAA.
- Many assignments, including approach control services (APP), automatic terminal information services (ATIS), area control services (ACC), Aircraft Communications, Addressing and Reporting Systems (ACARS) and VOLMET broadcasts, offer UK-wide coverage and we therefore propose that they should attract licence fees of £9,900 per 25 kHz national channel.
- Where CLIMAX is nationally-enabled for NATS' approach communications, multiple transmitters can share the same channel and we propose that that channel should be charged for only once.
- Frequencies used for ACARS and VDL applications also involve multiple transmitters in the dedicated national channels concerned, and the fees for such applications would be on a per channel sterilised basis, with no element to reflect the number of transmitters.
- As VDL applications sterilise double the bandwidth (50 kHz), we propose that the applicable rate should be £19,800, this being double the national rate for a 25kHz channel. However, where a VDL frequency is shared between two licensees, we propose that the fee should be divided equally between the users. We propose

that when the number of sharers changes, the fee should be recalculated, pro rata, when the next annual licence fee becomes payable.

- Assignments for Aerodrome Flight Information Services (AFIS), Aerodrome Control (TWR), and Air-Ground (A/G) assignments typically exclude other assignments in just over a quarter of the national available spectrum in a given channel, and hence we are proposing a corresponding fee of £2,600.
- Localised surface movement assignments including operational control (OPC) and aerodrome surface communications (AS) are typically of lower power, with limited protection offered beyond the airfield boundary, and hence sterilise much less spectrum. We are therefore proposing fees of £350 in line with the amount of spectrum typically sterilised. While fixed offshore transmitters are of higher power, they typically operate in less congested areas in the North Sea, and therefore we also propose the lower rate of £350 for these licences. Nine frequencies are currently shared by recreational general aviation users, typically for unpowered flight. In view of the high number of users sharing these frequencies, we are proposing that each assignment should attract a fee of £75.
- Variation in congestion within the UK is relevant only to those transmissions where the area sterilised is less than the whole of the UK. For those applications which sterilise such smaller areas, Ofcom has therefore considered the extent to which levels of sterilisation (i.e. congestion) may vary by geographic area across the UK, and how these geographic variations might be factored into setting fees for these types of VHF assignments.
- Ofcom notes that there are only approximately 720 (25 kHz) channels available in the VHF band, so that theoretically there are no spare frequencies available above this number of channels.⁴⁶ Accordingly where there are:
 - more than 720 channels sterilised in an NGR defined 50 X 50 km square, Ofcom considers these squares to be highly congested (shown as red on the map at Figure 2)
 - between 360 and 720 channels sterilised in a square, Ofcom considers these squares to be medium congested. This represents areas where over half of the available frequencies are unavailable (shown as dark blue on the map at Figure 2),
 - less than 360 channels sterilised in a square, Ofcom considers these squares to be low congested (i.e. where less than half the channels sterilised, shown as light blue on the map at Figure 2).
- we are proposing that the UK should be divided, on the basis described in the preceding bullet point, into three broad classes of relative excess demand reflecting the existing relative density of aeronautical assignments. Under our proposals, assignments in the north of Scotland (where the analysis undertaken by Helios Technology suggested that the probability of assignments contributing to excess demand elsewhere in the UK is about 50% of that in High congestion areas) would attract a 50% discount, whereas assignments in the rest of the North and in the far West (where the probability of contributing to excess demand is about 20% less than that in the remaining areas) would attract a 20% discount. These areas are illustrated in the map at Figure 6 below.

⁴⁶ See Helios Pricing Report at Annex 8 for further details.

- The actual occurrence of excess demand at any time in future will depend on a wide range of factors, which will collectively determine the operational ability to make additional assignments of a given type in a given location in practice. In addition to topography and other enduring factors, this will depend on the future (uncertain) pattern of other assignments affecting a given channel at a given time, as set out in detail in the Helios Technology report. Broadly, apart from the geographical areas where we have proposed discounted fees, all channel capacity – notionally for 720 national assignments - is likely to be “in use” (i.e. sterilising the areas concerned) reflecting the significant excess demand concerned in these frequencies as a whole. However in the more remote areas away from the more heavily trafficked parts of the UK and the continent, lower existing numbers of assignments will affect the effective spectrum capacity available in future for additional assignments, increasing the chances of additional assignments being accommodated in future (depending on the specifics of coordination concerned). We have assumed that the probabilities are broadly in line with the current local density of spectrum use.

7.10 The proposed fees set out in Table 4 would apply to applications with 25kHz bandwidth (with the exception of VDL for the reasons given). Where 8.33kHz bandwidth is used for an assignment, the relevant licence fee would be reduced *pro rata*. For example, a standard £9,900 fee for a 25 kHz assignment would imply that the corresponding fee for an 8.33 kHz assignment would be £3,300. We propose that this structure should be formalised in the new licence fee regulations.

7.11 In the event that other developments arise which enable applications to use less spectrum, or which enable greater sharing of frequencies (whether on a geographic sharing, time sharing or other basis), Ofcom would be minded to review the fees structure to ensure that the enhanced spectrum efficiency that could be enabled – effectively, the reduced opportunity cost of each assignment – was reflected in the fees payable. The timing of future fee rate reviews is discussed further in paragraphs 7.24 to 7.28 below.

7.12 The fees which we propose to apply are summarised in Table 4 below. Fees for other, less, common, applications are described in paragraphs 7.14 to 7.18 below.

	High congestion areas	Medium congestion areas	Low congestion areas
Surface Movement Control (AS), Operations Control (OPC) and Offshore (Fixed) use	£350	£280	£170
Aerodrome Flight Information Service (AFIS), Aerodrome Control (TWR), and Air-Ground (A/G)	£2,600	£2,100	£1,300
Approach (APP), Automatic Terminal Information Service (ATIS), Area Control, (ACC), VOLMET	£9,900	£9,900	£9,900
Aircraft Communications, Addressing and	A single fee of £9900 per frequency –	A single fee of £9900 per frequency –	A single fee of £9900 per frequency –

Reporting systems (ACARS)	irrespective of how many associated ground stations	irrespective of how many associated ground stations	irrespective of how many associated ground stations
VHF Digital Links (VDL)	A single fee of £19,800 per frequency – irrespective of how many associated ground stations. Where a frequency is shared by two licensees, the fee to be divided equally between them.	A single fee of £19,800 per frequency – irrespective of how many associated ground stations. Where a frequency is shared by two licensees, the fee to be divided equally between them.	A single fee of £19,800 per frequency – irrespective of how many associated ground stations. Where a frequency is shared by two licensees, the fee to be divided equally between them.

Stated fees would apply to 25kHz channels with fees for 8.33 kHz channels at third of above rates.

Table 5 Fees proposed to apply to all 25kHz aeronautical frequencies

Question 1: Do you consider that our proposed fee rates for licences in the aeronautical VHF frequencies are appropriate?

7.13 As noted in Section 2 above, we are proposing to vary AIP fees for aeronautical frequencies according to the location of the ground based transmitter. We propose that fees should broadly reflect the varying probability of encountering excess demand in different parts of the country based on analysis by our consultants Helios Technology Ltd.

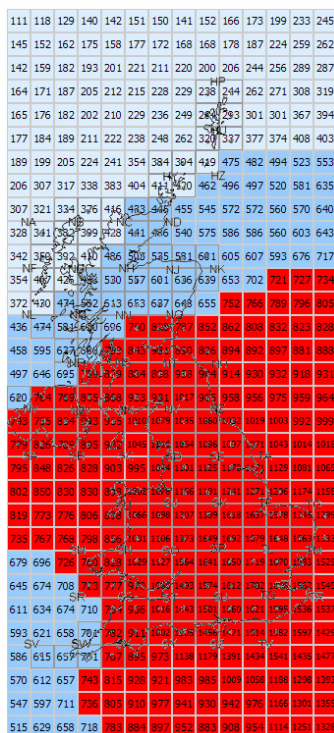


Figure 2 Proposed congestion map for aeronautical frequencies

These proposals, which divide the country in to 3 areas of, respectively, High (red), Medium (dark blue) and Low (light blue) density of demand are illustrated in the following map. For convenience, this map is reproduced in a larger size in Annex 6.

7.14 We propose that a number of applications should attract fees other than those set out in Table 4 above, reflecting their distinct pattern of use.

Fire frequencies

7.15 Fire assignments are made on frequencies which are also used for air-to-air communications in emergencies. We are not proposing to apply AIP licence fees to air-to-air use of spectrum and, in line with our proposals for maritime emergency channels, we do not propose to charge fees for ground-based use of the frequencies concerned, which will not sterilise additional spectrum. We therefore propose that the Fire frequencies should not attract any AIP fees. Further, we are proposing not to charge administrative cost-based fees for the ground based licensed use of these frequencies either.

Sporting frequencies

7.16 The CAA currently make a total of nine dedicated frequencies available for use by ground stations communicating with recreational general aviation (GA) users (gliders, paragliders, balloons, microlights, etc). They are shared by a large number of GA users. We propose that a single fee of £75 per assignment payable by each licensee (for access to the block of frequencies, with frequency assignment at CAA's discretion, as now) would make a reasonable contribution (around 50%) to the opportunity cost of this dedicated spectrum. It may be appropriate to review this fee rate following any CAA review with industry of the scope for using fewer channels.

Mobile offshore frequencies

7.17 Mobile (ship) transmitters share frequencies and locations assigned to fixed offshore transmitters, depending on their position from time to time, and generally do not require exclusive access of their own to such frequencies. Accordingly additional exclusive spectrum is not required for these assignments and we propose only to recover administrative cost contributions from the licensees concerned. We propose that a fee of £75 per assignment should apply.

7.18 These proposed fees are summarised in the following Table 5;

	High congestion areas	Medium congestion areas	Low congestion areas
Fire assignments	Zero	Zero	Zero
Sporting frequencies 118.675, 122.475, 129.825, 129.900, 129.975, 130.100, 130.125, 130.400, 130.525	£75	£75	£75
Offshore Mobile	£75	£75	£75

Table 6 Proposed annual fees for exceptional aeronautical VHF frequencies

Question 2 In devising our revised proposals, have we identified all of the aeronautical uses of VHF communications frequencies which require a distinct approach to fee setting, as set out in tables 5 and 6?

Question 3: Do you agree with our proposal not to charge any fees for Fire assignments?

Question 4: Do you agree with our proposal to set a £75 fee for assignments in any of the sporting frequencies?

Question 5: Do you agree with our proposal to set an annual fees of £9,900 and £19,800 per channel respectively for ACARS or VDL assignments, with no variation related to the number of transmitters used in such channels?

Discounts for charities whose sole or main objective is the safety of human life in an emergency

- 7.19 Current fee regulations make provision for any charity whose sole or main objective is the safety of human life in an emergency to pay only half of the licence fee which is generally applicable. This arrangement applies to all Aeronautical, Maritime and Business Radio licence classes. In the July 2008 consultation, we asked stakeholders to comment on whether these provisions should be carried forward with the new AIP-based fees for VHF frequencies that were being proposed for aeronautical (and maritime) frequencies. Stakeholders expressed strong support for this provision. Some called for the size of the discount to be increased to 100% and others recommended that any discount should apply more broadly to any organisation which uses radio spectrum to improve the safety of its operations.
- 7.20 Having considered these responses, we propose that the current discount arrangements should apply unchanged to both the new AIP-based fees and any relevant administrative cost-based fees that are being proposed in this consultation document.
- 7.21 We have given careful consideration to recommendations from some stakeholders that the discount should be increased to 100%. We note however, that it is usual for charities, or other organisations with public service objectives, to face charges which reflect the cost of the resources they use. Moreover, it is also generally efficient for them to do so, so that they can determine operationally how best to use these resources. Where spectrum, or any other operational resource, is made available free of charge, it is logical for that organisation to use that resource in preference to any substitutes which might be available at market prices, irrespective of whether (the subsidy aside) this is the most efficient way to deliver a service. Thus, where funds (such as donations and/or grants from the public sector) are made available to an organisation to help it cover its costs, it is much more likely then to choose the operational resources which it needs to deliver its services to the public in an efficient way. This is consistent with our general approach to externalities caused by spectrum using activities set out in section 6 (see paragraphs 6.28 to 6.37).
- 7.22 We believe that a 50% discount will continue to achieve a reasonable and pragmatic balance between recognising the special position of charities whose sole or main objective is the preservation of human life in an emergency, and leaving in place some incentives to consider how much spectrum, and of what technical characteristics, the organisation needs. This should mean that spectrum is used that is judged by those charities to be required for achieving their aims with an awareness of its value as a resource, making it more likely that spectrum will be available for other applications which are valued by citizens and consumers.

Review and phasing

7.23 Two important features of our fees proposals include the possible future review of fee levels, and phasing in of the fees proposed in this document over an appropriate timeframe.

Future review

7.24 For all licence fees it is important to ensure that fee rates are set appropriately and revised over time if required. This is not to say, however, that we should seek to re-estimate licence fee rates frequently. We need to strike the right balance between, on the one hand, promoting efficiency by ensuring that fee rates, including AIP fee rates as longer term pricing signals, continue to be set at appropriate levels, and on the other, giving sufficient certainty and stability to licensees to support efficient investment and other resource allocation decisions, avoiding unnecessary disruption.

7.25 Given the possibility that evidence may emerge that fee levels are either too high or too low, we consider that fees should typically be reviewed at intervals of up to 5 years. We consider that in many cases it would not be appropriate to review fee levels more frequently than every 5 years, given the length of time taken, for example, to replace current equipment for spectrally more efficient equipment.

7.26 However, equally, we do consider that it is generally prudent to review fees periodically, as one or more key factors influencing the value of spectrum to current and alternative users could change materially over time. These changes could include changes in demand for spectrum and/or changes in the availability of comparable spectrum for existing or alternative users, resulting from changes such as:

- progress in releasing substitute spectrum through auctions;
- changes in licence fees for substitutable spectrum;
- any releases resulting from changes of use by licensees in relevant bands;
- the development and availability of new technology in the UK that requires less spectrum, or less congested spectrum (e.g. greater implementation of 8.33 kHz channels for aviation); and particularly in these sectors
- progress in internationally-negotiated plans to migrate technology (for example, under discussion as part of the Single European Sky II initiative).

7.27 We may, therefore, review fee rates earlier if it becomes clear, generally via compelling evidence, that some fee levels have become significantly out of line with the assumptions made when fee rates were established over the opportunity costs and/or administrative costs of the spectrum concerned.

7.28 As noted in paragraph 1.11 above, we would also expect to review the structure and if necessary the level of fees if changes in technology and/or spectrum management practices meant that less spectrum is needed for particular applications or more assignments can be made in a given amount of spectrum. We would expect to reflect such efficiency improvements in fees as soon as reasonably practicable.

Phasing

When phasing is appropriate

- 7.29 We recognise that users of aeronautical VHF spectrum would, for the first time under our proposals, be paying fees for spectrum that reflect the pattern of its underlying opportunity costs. In some cases, where underlying opportunity costs are materially above the current administrative cost-based fees, the associated fee levels could represent a material increase in the financial cost of spectrum to some users in the context of normal variations in business costs,
- 7.30 We consider that, overall and in the longer term, any welfare effects from these direct financial impacts are likely to be more than offset by the expected net benefits to society at large from applying AIP based licence fees. Nevertheless we recognise that changes to the basis upon which licence fees are paid have inherent risks, particularly in the short term, which should be managed to avoid adverse impacts on society.
- 7.31 We recognise that AIP will cause spectrum users, at different times in the future, to review previous decisions taken at a time when spectrum attracted only very modest administrative fees. Indeed, this is the purpose of applying AIP fees as longer term signals. We acknowledge, however, that this could prove disruptive for the sector if legacy arrangements were all reviewed and changed over a short period. We also recognise that changes to the financial landscape, effected in this case by AIP, may cause some spectrum users to alter decisions in relation to operating practices, and this may cause the CAA to factor such responses into any future reviews of the adequacy of existing regulation in the light of the changed circumstances that it makes.
- 7.32 Responding to a changing environment in this way is an inevitable part of the work of any regulatory authority, and we believe it is appropriate for Ofcom to work closely with CAA to minimise any unnecessary disruption. As already noted, we are proposing that AIP should be introduced much more slowly than is Ofcom's usual practice for fee increases of this scale. As increases will be introduced only slowly, we would expect the CAA to be able to respond in a timely fashion to any such unforeseen outcomes which start to emerge, either using its existing regulatory framework or by seeking additional powers. In the unlikely event that CAA is unable to respond in a timely fashion, there would be an option for Ofcom to intervene to modify the level or application of AIP fees.
- 7.33 A key approach which we use in our fee policy, to avoid risks of adverse short term economic or regulatory impacts, is to phase in significant increases in fees over a pre-defined period. This affords affected stakeholders additional time in which to adjust their activities to the changed fee levels.
- 7.34 We consider that the principle of phasing is particularly important for mitigating the risk of changing fee rates too rapidly, and thereby risking inefficient disruption to service provision. We consider that if fees increase too quickly before action can be taken to reduce spectrum costs and if total cost changes cannot be passed through to service users, or temporarily absorbed within the business, the financial viability of licensees may be temporarily adversely affected, such that some marginal services could be put at risk and, in the most extreme cases, inefficiently withdrawn. In the extreme scenario, the value of the marginal services could then be forgone temporarily or even permanently, resulting in a loss of benefits for both citizens and consumers.

- 7.35 We note that there are also risks of increasing fees to reflect opportunity costs too slowly. For example if fees remain significantly below their underlying opportunity costs for a sustained period, existing users will have weaker incentives to review their spectrum and other associated resource use and hence could make inefficient investment or operational decisions. As a result, resources may not be devoted to their highest valued use for a longer period of time than otherwise, and so the optimal mix of outputs for consumers and citizens will take longer to achieve. In the case of VHF assignments, this could mean that it would continue to be difficult to meet requests for new assignments, and might even become impossible at certain times and at certain locations. This would place a constraint on the efficient growth of services supported by the available spectrum, with loss of potential extra benefits for citizens and consumers.
- 7.36 In considering these two opposing potential risks – from changes implemented too fast and from changes implemented too slowly – we would generally, in light of our duties to consumers and citizens, place more weight on avoiding the risks of disruption from phasing in fees too quickly.
- 7.37 We also note that, if fees are subsequently observed to be significantly below the underlying opportunity costs of the spectrum, they can be reviewed and revised upward where appropriate in future as described above, although variations of this nature should generally be restricted to the availability of significant new evidence as set out above. In light of these considerations, we generally adopt a conservative approach to phasing in increases. We believe that such an approach is appropriate in this case, and are therefore proposing phasing-in periods for significant fee increases.

We are not proposing phasing for changes which offer financial benefits to users

- 7.38 We also note that, in some cases under the proposals in this document, total fees paid could fall relative to their present levels and in these cases we are not proposing any phasing. We see no merit in delaying associated fee structure changes. Introducing these changes early would have benefits for existing users of those licences, and it would also marginally increase the incentives for any users who are currently holding higher-value assignments to switch to a lower-coverage assignment while meeting their operational requirements. We would therefore expect to implement such changes in full, from the first year.

We are proposing to phase in some fee rate increases

- 7.39 We propose that new basic annual fee rates of £2600 (including in areas where discounted to reflect lower excess demand), £9900 and £19800 would be suitable candidates for phasing in. These rates represent significant increases from the current fee base. We propose that where any of these rates are discounted to reflect 8.33kHz bandwidth these too should be phased in on a corresponding basis.
- 7.40 In some similar spectrum pricing reviews, we have proposed relatively short phasing in periods (e.g. two stages, taking two years). These periods have been applied even in cases where the proposed increases were relatively significant in percentage terms, but were relatively small in absolute terms in the context of the businesses

affected. For example, we introduced 100% increases in the comparator Business Radio⁴⁷ rates, paid by, for example, taxi-cab companies, in one step.

- 7.41 However where the increases might have a larger business impact (e.g. on small businesses which need some time to adapt efficiently), we have adopted somewhat longer periods – of three years or even longer.
- 7.42 We consider that this general approach, taking into account both the size of the fee change and the relative importance of such a change in the context of the users affected, balances the risks of increasing fees too fast against those of increasing them too slowly. The more modest increases proposed for localised applications might suggest shorter phasing in periods, and the larger increases for the licences in aeronautical frequencies used for high altitude ground to air communications identified above might imply a somewhat longer phasing in period. We are seeking views on proposals for phasing in periods, set out later in this Section.

Linear vs non-linear phasing

- 7.43 Linear phasing involves setting a series of equal steps throughout the phasing period. This relatively simple approach would generally be our preferred approach where the increases are relatively modest in total relative to the business affected, but still potentially inefficiently disruptive for some stakeholders if introduced all at once. This (rather than, say, equal % increases) ensures the financial impact on business is smoothed over the phasing period.
- 7.44 This approach is appropriate where the resulting annual increases of this sort would not be out of scale with the normal variation in business costs from one year to the next and which would typically be passed on (alongside other cost changes) in price adjustments or result in other resource cost adjustments.
- 7.45 However where increases are larger (relative to the business affected by them, rather than large as a % increase) equal annual phasing of this sort might not enable businesses to respond efficiently, particularly if that response would involve making potentially greater changes to business activity requiring more lead time (including, but by no means limited to, adjustment to spectrum use). Hence in such cases a combination of approaches may be called for:
- A longer phase-in period to ameliorate increases in any one year; and
 - A non-uniform phase-in, to reflect the greater ability of businesses to adjust as time passes.
- 7.46 In relation to the latter, the most extreme variant is simply to notify increases to start taking effect a longer time in the future (e.g. 0% increase in the first year). However, provided the Year 1 increase is set at a suitably conservative level, there are incentive benefits from introducing a change in the first year. Not all users are in the same position and some may be able to respond more quickly than others. As a result, non-linear phasing with some increase in the first year achieves a balance of providing incentives for those who can make changes quickly while ensuring that other users have sufficient time to adjust before full rates are applied. Where we are proposing a non-linear phasing approach, we are proposing a fee profile that would

⁴⁷ See, for example, Ofcom statement Modifications to Spectrum Pricing published on 10 January 2007 at <http://www.ofcom.org.uk/consult/condocs/pricing06/statement/statement.pdf>

lead to some increase in Year 1 for all licences whose AIP-based fee would be higher than the current level.

Application to specific fees

- 7.47 In the case under our proposals, as summarised in Table 3 above, we have five specific basic rates per 25 kHz channel to consider for phasing purposes (assuming that the relevant geographic discounts would apply to the phased rates in each year). Those undiscounted rates are £75, £350, £2600 and £9900 and £19,800.
- 7.48 The £75 rate would apply to users of the frequencies assigned for general aviation sporting applications, which currently attract a fee of £25. The size of the increase (£50 per year) does not appear to warrant any phasing.
- 7.49 The £350 rate would apply to ground based applications, limited mainly, if not exclusively, to aerodrome surface communications (AS) and operational control (OPC). The same fee would also apply to Offshore installations. In most cases, licensees are large airlines and oil companies, and these are currently paying a fee of £250. The size of the increase seem to us to be both in scale with existing fees, and small in the context of most of the user costs concerned. As a result there would appear to be no case for phasing this rate.
- 7.50 In the cases of the £2,600, £9,900 and £19,800 rates we are proposing a phased fee profile, and invite views both on the general approach, and on any reasons stakeholders perceive that either of the two options suggested for the £9,900 and £19,800 profile would be more appropriate.
- 7.51 The £2,600 rate would apply to the three types of aerodrome air traffic services ie aerodrome control services (TWR), aerodrome flight information services (AFIS) and air-ground (A/G). These applications currently attract fees of either £100 or £150. The scale of absolute increase, relative to the existing spectrum costs and to the businesses affected, some of which are small airfields, is hence much greater. We consider that this would justify a phasing period longer than the 3 years maximum generally applied to Ofcom fee changes.
- 7.52 Over a five year period, it would be reasonable that businesses could adjust where efficient, even if no change in spectrum use was implemented. This would imply average annual increases per channel of £500, which should generally fall within the scale of annual business cost change that such businesses deal with on an ongoing basis.
- 7.53 However, because changes to spectrum use and associated safety cases may take time to think through and if necessary implement, we consider that back-end loading the phasing in this case would be preferable.
- 7.54 In respect of the £2600 fee, we are therefore inviting views on a proposal that would introduce increases in annual charges, of £300 (or, where the current fee is £150, an increase of £250) in year 1 (ie for licences granted or renewed after 1 April in that year), £400 in year 2, £500 in year 3, £600 in year 4 and a final increase of £700 in year 5. As noted above, the relevant geographic discounts would apply to the phased rates in each year.
- 7.55 We consider that the same general arguments apply consistently in considering a phasing approach for the £9,900 and £19,800 rates. We are therefore proposing a

non-linear, that is a back-end loaded, phasing approach for this rate as well, but have set out two variant options below for consultation.

- 7.56 If the relativities implied by the phasing approach proposed for the £2,600 rate were consistently applied to the £9,900 and £19,800 rates, the following rate shown under Option 1 in the table below would be implied in each year.
- 7.57 An alternative approach for the £9,900 and £19,800 rates would be to have even slower increases in early years, with necessarily faster increases in the later years. This would have one potential advantage over the first option (Option 1) for users whose existing assignments are of the highest coverage but which may be able to make medium term adjustments, taking into account their current and future operational requirements.
- 7.58 We do not have an estimate of numbers in this group. The assessment of ongoing spectrum requirements to support operations are necessarily a matter for individual users, in consultation with the CAA, and we would not attempt to prejudge the case in relation to any individual user. However, to the extent that any such users do exist, a slower start for the increases implied by the higher rates of £9,900 and £19,800 fees could create more effective incentives for change if such changes could be efficiently implemented within a three-year period. An alternative phasing in profile that is consistent with this approach is shown as Option 2 below.

	Year 1	Year 2	Year 3	Year 4	Year 5
Shared sporting frequencies	£75	£75	£75	£75	£75
AS, OPC and Offshore (fixed) use	£350	£350	£350	£350	£350
AFIS, TWR and A/G	£400	£800	£1300	£1900	£2600
APP, ATIS, ACC, VOLMET, ACARS, Option 1	£1500	£3000	£5000	£7200	£9900
APP, ATIS, ACC, VOLMET, ACARS, Option 2	£1000	£2000	£3000	£6000	£9900
VDL Mode 2 Option 1	£3000	£6000	£10000	£14400	£19800
VDL Mode 2 Option 2	£2000	£4000	£6000	£12000	£19800

Table 7 Proposals for phasing

- 7.59 Under Option 2 for the £9,900 rate it would only be in the third year that users faced fees of similar size to the end-point of the fee (£2,600) for the lower-coverage applications. If they could agree changes with CAA and implement them in a reasonable period they could potentially avoid having to pay some fees materially in excess of those applying to the £2,600 rate assignments.
- 7.60 The relative disadvantage of Option 2 to Option 1 is however that the general incentives on all users of the high-coverage assignments would be reduced during the first three years, and the consistency between rates between assignments of different coverage would be lost during the phase in period. In responding to this proposal, therefore, we would be interested in the views of all stakeholders but in particular, to know if any individual users see a prospect that this would allow them to plan and implement a response that would have benefits not only to other potential users, and to them in future, but also in Years 2 and 3, compared with Option 1.

Question 6 Do you consider that our proposed general approach to phasing in fees for use of the aeronautical VHF communications channels is appropriate? If there are particular reasons why you consider that any user or group of users would need

longer phasing-in periods, please provide any supporting evidence for us to consider. Specifically, do you have any evidence for us to consider that would support either of Options 1 and 2 for the highest proposed fee in this sector?

Impacts on stakeholders

- 7.61 A key aspect of Ofcom's impact assessment is to consider the distribution of financial impacts on individual stakeholders arising from its aeronautical VHF fee proposals, including impacts on organisations within the UK such as National Air Traffic Services (NATS), airports (various categories), airlines and end-consumers. Ofcom considers this important to identifying whether there may be any inefficient adjustment responses to Ofcom's aeronautical VHF AIP fees proposals that could arise in the short run.
- 7.62 Ofcom commissioned Helios and Plum⁴⁸ to undertake a detailed study of the range of financial impacts on stakeholders, including an additional analysis which sought to focus specifically on impacts for smaller non-reporting aerodromes (See Annex 8). Ofcom has reviewed the work undertaken by Helios and Plum, and agrees with their findings that the impacts will typically be modest (see Ofcom's summary of the Helios and Plum study at paragraphs 7.80-7.81 and the full report at Annex 8).

Summary

- 7.63 In summary, we are inviting comments on proposals for:
- A non-uniform phase-in, with lower absolute increases in early years, over a five-year period for all fees applying to aeronautical VHF applications other than Surface Movement Control, Operations Control, Sporting frequencies and Offshore (fixed) use.
 - New fees for Surface Movement Control, Operations Control, Sporting frequencies and Offshore (fixed) applications applying without phasing.

Conclusions on the Impact Assessment for VHF fees proposals

- 7.64 Ofcom has considered each of the following factors relevant to an Impact Assessment for VHF fees proposals as set out in this consultation document:
- the issues we need to consider and the identity of the citizen or consumer interest (see sections 2, 3 and 4)
 - the policy objective (see sections 3, 4 and 5)
 - options for determining fee levels (see section 6).
 - the impacts on different types of stakeholders (see this section 7 and Annexes 7 and 8)
 - any impacts on competition (see Annexes 7 and 8)
 - any impacts on safety (see section 5)

⁴⁸ Helios Technology Ltd and Plum Consulting

- 7.65 In the light of these consideration we have then assessed the overall impacts and choice of best option (see sections 6 and 7 and Annexes 7 and 8). We summarise our conclusions on each of these factors below.

The citizen and consumer interests

- 7.66 First, we have identified the citizen and consumer interest which underpins our proposal to apply AIP fees to the aeronautical sector.
- 7.67 Where the supply of spectrum is sufficient to meet demand, there is little to be gained in efficiency terms from setting fees other than to recover some or all of our relevant administrative costs. However, where there is excess demand for spectrum, we believe the cost to others and the wider UK economy should be recognised by the current users so that they can make appropriate decisions. AIP based licence fees are intended to achieve this outcome. We believe there is excess demand for much of the spectrum used by the aeronautical sector.
- 7.68 There is excess demand from within the aeronautical sector. It is often very difficult to meet new requests for aeronautical VHF communications frequencies required by aerodromes and air traffic controllers.
- 7.69 There is also potential excess demand from other sectors of the economy which face shortages of spectrum which could be overcome if spectrum currently used by the aeronautical sector was made available to them. We recognise, however, that it is unlikely to be feasible in the short to medium term to use aeronautical VHF communications frequencies for other applications as this is likely to cause unacceptable interference with the current applications, in contravention of the UK's obligations under international treaties.
- 7.70 We consider that AIP licence fees based on opportunity costs could help manage excess demand for spectrum in the aeronautical sector in the UK, potentially leading to release of spectrum for other users, resulting in net benefits for UK citizens and consumers (see sections 3, 4 and 5). In the short to medium term these other users are likely to be from within the aeronautical sector.

The policy objective

- 7.71 Second, we consider that the proposal to apply AIP licence fees to the use of spectrum in the aeronautical sector is consistent with our duties and functions under the Communications Act 2003, since we have a general duty to promote the "efficient use and management of the electro-magnetic spectrum for wireless telegraphy" (see section 3)

Options for determining fee levels

- 7.72 Third, we have set out why we believe AIP licence fees should be applied to the aeronautical sector (sections 3 and 5). The case for applying opportunity cost based AIP licence fees for spectrum has previously been set out by Ofcom in its Strategic Framework Review for the Public Sector⁴⁹ (see paragraphs 3.42-3.46), and its July 2008 consultation (paragraphs 2.33-2.39), and by Professor Martin Cave in the

⁴⁹ <http://www.ofcom.org.uk/consult/condocs/sfrps/statement/statement.pdf>

Review of Radio Spectrum Management 2002⁵⁰ (paragraphs 134-137) and in the 2005 Cave Audit (paragraphs 2.30-2.32).

- 7.73 We have therefore identified two broad options for setting licence fees: administrative cost (including zero cost) based fees and AIP fees based on underlying opportunity costs (see section 6).
- 7.74 Under the broad option for setting fees based on opportunity costs where there is excess demand for spectrum (i.e. Approach 2), we have considered a number of possible reference rates to reflect the value of a nominal 1 X 1 MHz national channel for aeronautical spectrum frequencies, including adjustments to reflect uncertainty regarding spectrum release (taking a conservative approach) (section 6). Our proposed reference rate proposal is:
- Aeronautical VHF: £396,000 per 1 X1 MHz national channel.
- 7.75 We consider that the fees based on opportunity costs are likely to generate higher welfare benefits for consumer and producers overall where there is excess demand in current or alternative uses in line with our pricing objectives as set out in this section.
- 7.76 Where frequencies are used on a “commons” basis, often for safety of life purposes, Ofcom has proposed zero rated fees (eg international distress and fire frequencies).
- 7.77 In line with these conclusions we have proposed detailed AIP based fee structures to apply to individual licensees to reflect an appropriate estimate of the opportunity cost of the relevant national channels. The fees reflect the fact that some licensees operate at less than national scale and assignments sterilise spectrum in different geographic areas with different assignment densities and relative levels of excess demand (see this Section 7).
- 7.78 In this Section 7, we have also considered phasing-in options for detailed fees structures. This is intended to minimise unproductive disruption to spectrum users, their customers, and citizens and consumers more widely.
- 7.79 Based on the above analysis, we therefore propose to introduce licence fees as set out in this section 7, subject to an assessment of the distribution of the financial impacts of fees on individual users to identify the likelihood of any unintended consequences or possible short term transitional issues (see this section 7 and Annex 7).

Impacts on different types of stakeholders

- 7.80 Fourth, we identified the distribution of financial impacts of these detailed fees structures on different types of licensees. We commissioned analysis from independent specialist consultants to make a detailed assessment of the relevant fees impacts on individual licensees (see Annex 7). The analysis concluded the following:
- The impact of imposing AIP based licence fees for VHF on aviation users will fall on a number of different classes of user. The impact on the industry as a whole will be less than £4m annually.

⁵⁰ http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf

- The largest individual financial impact (£1.3m) falls on NATS En-Route plc (NERL), the regulated UK air navigation service provider. The total extra costs amount to 0.24% of NERL's regulated cost base. We understand that, although there may be intervening cash consequences, these costs are likely to be passed through to airlines under the next regulatory price review.
- At the large airports at which charges are regulated by the CAA, AIP charges are also unlikely to be able to be passed through in the short term so the airports affected will experience a cash impact in the relevant intervening periods before costs are potentially passed onto airlines. However, particularly in the light of our phasing proposals, such cash impacts are likely to amount to only a fraction of a penny per passenger.
- The larger commercial competitive airports will face AIP charges amounting to a relatively small proportion of their aeronautical revenue which (because the proposed licence fees are industry-wide) are likely to be passed on to users. Charges amount to no more than a few pence per passenger movement at such airports.
- The impact on smaller airports becomes proportionately larger, although at typically around 6p per passenger, in the more extreme cases, these impacts seem small both in absolute terms and relative to overall costs in the aviation value chain. Nevertheless, our proposed phasing will serve significantly to mitigate any specific transitional issues.
- Other impacts fall on a wide range of different types of licensee including airlines, aeronautical clubs, flying schools, private individuals, oil companies operating offshore installations, and research establishments. In total they form around 13% of the total charges, or around £600,000 a year in total. To put this into perspective, we note that a 2006 estimate of overall annual expenditure on private general aviation was £318 million⁵¹. Typically, licensees in this category will face new fees of £2,600 per year. The proposed charges may well have a more significant proportionate impact on small airfields, aeronautical clubs, etc, which can hold multiple licences, and in the medium term influence them in their choice of whether to maintain or replace these. Again however our phasing proposals should enable these organisations to review the impacts of fees and make any consequent business adjustments over an extended period.
- Small aerodromes – whether reporting or non-reporting - would typically see annual cost increases of 20p/movement or less. Ofcom notes that AIP per movement charges for sampled non-reporting aerodromes are low when compared to the cost of renting a small single engine craft (i.e. £80-£130 per hour before additional fees including fuel, landing fees, parking). Furthermore, the same charges are very low when compared against the variable per hour operating cost of a business jet (e.g. between £526 and £5,482 total cost per hour).

7.81 Based on this analysis, Ofcom has considered specific phasing-in options for detailed fees structures (see paragraphs 7.29 to 7.60) aimed at mitigating the transitional financial impacts that specific licensees may experience. Our proposals are aimed at reducing risks of inefficient responses to the new fees, including from the smaller

⁵¹ Helios "Aeronautical and Maritime VHF Spectrum Pricing – Impact on markets and customers: Final Report", section 3.8.

organisations which are proportionately more affected. We note that our phasing proposals are highly relevant to ensuring operators of non-reporting aerodromes are able to adjust to paying full AIP fee levels. We consider our proposals enable us to identify the impacts of incremental changes for these operators prior to full fees applying. By gradually introducing fees over time, this will ensure that Ofcom can respond quickly, as and when appropriate, during this period.

Impacts on competition

7.82 Fifth, in relation to final demand, as, and to the extent that, changes in licence fees are passed on to final consumers, demand will be correspondingly reduced.

- The Department for Transport estimate the price elasticity of air transport as -1.0 for the UK leisure sector and -0.2 for the foreign leisure market. No air fare effect could be identified for the business sector. Charter and domestic travel showed some fare effects (-0.4 and -0.3 respectively). International to international interliner traffic was found to have a price elasticity of -0.3. The resulting overall air fare elasticity is -0.45.⁵² Other estimates include the European Commission estimate of -1.5 for leisure travel.⁵³ Whilst the Department for Transport study excluded general aviation, a study for the FAA in the US included a price elasticity of demand for general aviation piston aircraft was higher than that for other aviation at -1.5 versus -1.0 for other aircraft.⁵⁴
- However, the magnitude of final fee increases likely due to the application of AIP for VHF use in the aeronautical sector is in general fairly modest relative to other costs and changes in those costs over time. It is unlikely that all the cost changes would be passed through, as a range of input efficiencies are likely to be adapted to in response to the incentives concerned. Accordingly, the overall demand impact is likely to be significantly lower than 0.1 per cent.
- A negligible reallocation of aeronautical activity away from the UK is anticipated as a result of the proposals even if all licence fee changes are fully passed through, although in practice, we consider that pass through is likely to be less than 100%. (See Appendix to the Helios Technology Report at Annex 7 for details).
- In comparison, Helios Technology note that changes in both air passenger duty and the potential opportunity cost (with both gifted and purchased permits) of inclusion of aviation in the European Emissions Trading scheme from 2012 are roughly two orders of magnitude greater than the charges envisaged with AIP. Hence a €30 per tonne carbon charge would amount to €1,080 million per annum while increases in air passenger duty in the UK are expected to increase the cost impact of this measure from around £1 billion currently to over £3 billion in 2011/12⁵⁵.

⁵² Department for Transport. January 2009. "UK air passenger demand and CO2 forecasts." <http://www.dft.gov.uk/pgr/aviation/atf/co2forecasts09/co2forecasts09.pdf>

⁵³ EC. December 2006. "Commission staff working paper – impact assessment of the inclusion of activities in the scheme for greenhouse gas emission allowance trading within the Community." Page 37. http://ec.europa.eu/environment/climat/pdf/aviation/sec_2006_1684_en.pdf

⁵⁴ www.library.unt.edu/gpo/NCARC/whitepaper/costallo.doc

⁵⁵ http://www.hm-treasury.gov.uk/d/pbr08_annexb_262.pdf , Table B13.

Impacts on safety

- 7.83 Sixth, we considered in section 5 (paragraphs 5.64 to 5.84) the possible impact of AIP on safety, and the most appropriate response.
- 7.84 Our analysis explicitly recognises the critical importance of safety in the aeronautical sector and the relevant duties of the CAA as safety regulator.
- 7.85 We noted that where services which are provided using spectrum give rise to externalities or support the provision of public goods, the appropriate policy interventions to maximise such social value, or minimise social disbenefits, take the form of targeted subsidies and taxes for the outputs concerned, or direct regulation, rather than subsidies for the required inputs (including spectrum).
- 7.86 The CAA has confirmed that it has adequate powers to respond to any safety concerns arising from Ofcom's proposals to apply AIP to the aeronautical sector, and that the adequacy of VHF communications provision will be subject to safety regulation by the CAA using appropriate regulatory instruments taking into account safety justification provided by the service providers via, for example, safety cases.

Question 7 Do you have any further quantified information to contribute to the analysis of financial impacts of the proposed fees on particular spectrum users, as set out in Annex 7? We would like to publish all responses, but will respect the confidentiality of any material which is clearly marked as such.

Environmental and social impacts

- 7.87 The DfT (and its agency, the MCA) and the CAA (amongst others) are the UK public bodies variously responsible for assessing the effects of a range of regulatory policies in the transport sector that may impact the economy, the environment and society. These bodies have specific industry expertise and accordingly we have discussed our proposals with them as set out in section 1. As noted in section 4 above, we recognise that, in principle, an increase in the cost of using UK aerodromes or UK airspace might cause some airline operators to try to reroute to avoid these costs, thereby burning more fuel, to the detriment of the environment. However, as noted in paragraphs 4.87 to 4.92 above, the proposed cost increases are so small compared with the variable costs of operating a commercial aircraft that such a strategy would not be cost effective. We therefore do not believe that these proposals will have an adverse impact on the environment.

Equality Impact Assessment

- 7.88 As discussed above, the direct financial impacts of applying AIP licence fees to licensees in the aeronautical sector may vary between groups or classes of UK consumers and citizens, depending on the geographic area in which they consume aeronautical services (e.g. flights) as well as the extent and ways in which fee changes are passed on to citizens and consumers, and the extent to which different citizens and consumers benefit from the more efficient use of spectrum which we believe will result, in aggregate, from these fees in the longer term.
- 7.89 Nevertheless as set out above, the estimated aviation passenger impacts are unlikely to exceed a penny per passenger movement in the vast majority of cases and, at their largest are no more than of 6 pence per passenger (e.g. at some of the smaller airports).

- 7.90 In addition, we note that there is no available evidence to suggest that our proposals would have a significantly greater direct financial impact on identifiable groups including any groups based on gender, race or disability, or the relevant group of consumers in Northern Ireland relative to consumers in general. Ofcom considers that the small financial impacts (in both absolute and relative terms) would not be expected to suggest significantly different fees for aviation related services for these aforementioned groups of consumers and citizens relative to consumers and citizens in general.
- 7.91 Ofcom has therefore not carried out a full Equality Impact Assessment in relation to race equality or equality schemes under the Northern Ireland and disability equality schemes at this stage.

Final conclusion

- 7.92 We have made a set of fee proposals in this document for the aeronautical use of VHF spectrum for communications in light of the objectives we identified for setting fees in Section 1 and in paragraph 7.3 above:
- Fees should provide incentives for users to consider their spectrum use alongside all other inputs, in light of the potential value of spectrum to other users; and
 - In proposing fee levels and how we will implement them, we should be mindful of the risk of charging fees that result in inefficient under-use of spectrum, and take steps to reduce that risk.
- 7.93 As set out in this Section, our proposals for fee levels, and for phasing in increases for a number of fees, have been made in the light of these objectives. Hence for VHF communications spectrum used by the aeronautical sector, where we consider there is excess demand for the current use, it is appropriate to set AIP licence fees to reflect underlying opportunity costs. Were there no excess demand in current use and no excess demand from alternative uses, Ofcom would consider it appropriate to set fees to contribute to the administrative cost of the licensing process. Where channels are used on a “commons” basis (for example the distress and fire frequencies) and most opportunity costs are not determined by individual user choices there is little scope for licence fees to drive spectrum efficiency, and it is appropriate for fees to be zero rated (for end users). Where charities whose sole or main objective is the safety of human life in an emergency use the spectrum, they will continue to receive a 50% discount.
- 7.94 Despite the expected benefits of these proposals, we recognise the potential risks in moving to a regime where licence fees reflect opportunity costs of the spectrum since this can, in some cases, imply materially higher fees for existing users. Ofcom concludes that the risks inherent in setting fees too high is greater than the risks inherent in setting fees too low and, therefore, we propose to take a conservative approach to setting fee levels. This includes taking account of uncertainty in the estimation of opportunity costs of the spectrum through downward adjustments of expected opportunity costs in the proposed Year 5 fee rates by more than 40%.
- 7.95 In addition, recognising the risks inherent in setting fees too high, we propose that where fee increases are significant, fee increases will be phased in over varying periods depending on the scale of increase. Full fees will apply thereafter until such time as a review suggests amending the fee levels

- 7.96 We consider that, in the light of these proposals, the wider societal benefits of applying AIP, i.e. greater efficiency, output and welfare, as set out in Section 5, outweighs the small risks of inefficient transition arising from the immediate financial impacts on licence holders, customers and end-users.
- 7.97 Nonetheless, Ofcom has undertaken an analysis of the financial impacts to consider the distribution of the impacts on end-users to minimise the risks of unintended consequences or relevant short term transitional issues for specific user groups. The analysis indicates that, relative to other input costs in relation to spectrum related services, licence fee changes would be in some cases material at the margin and hence could reasonably be expected to change efficient behaviour over time. However, in relation to overall costs in the value chain comprising final service provision, the proposed aggregate levels of licence fee changes are very modest and would therefore be expected to have a negligible impact on final demand for services.
- 7.98 We consider that there are grounds for phasing in larger fee increases over a longer time period due to the relative size of the proposed changes and the diversity of potentially affected licensees. Accordingly, to avoid disruptive effects on licensees making the transition to paying full AIP fees, we propose phasing-in over up to five years.

Question 8: Do you consider that our assessment of the impacts of our proposals has taken full account of relevant factors? If you consider that there is additional evidence that would indicate particular impacts we should take into account, we would be grateful if you could provide this.

- 7.99 It will be helpful if most responses to this consultation can be published, so that other stakeholders know what information we will be taking into account along with their own comments, if they have made any, in finalising fees. However, we understand that some stakeholders may wish to present commercially sensitive data relating to the likely impact of fees, or personally sensitive data (for example, in relation to evidence that may be potentially relevant for an Equality Impact Assessment), and, subject to Ofcom's obligations under the Freedom of Information Act, we would wish to respect confidentiality in these cases.

Annex 1

Responding to this consultation

How to respond

- A1.1 Ofcom invites written views and comments on the issues raised in this document, to be made **by 5pm on 19 March 2010**.
- A1.2 Ofcom strongly prefers to receive responses using the online web form at https://www.ofcom.org.uk/consult/condocs/spectrum_pricing/howtorespond/form, as this helps us to process the responses quickly and efficiently. We would also be grateful if you could assist us by completing a response cover sheet (see Annex 3), to indicate whether or not there are confidentiality issues. This response coversheet is incorporated into the online web form questionnaire.
- A1.3 For larger consultation responses - particularly those with supporting charts, tables or other data - please email AeroVHFconsult@ofcom.org.uk attaching your response in Microsoft Word format, together with a consultation response coversheet.
- A1.4 Responses may alternatively be posted or faxed to the address below, marked with the title of the consultation.

Michael Richardson
3:05
Spectrum Policy Group
Riverside House
2A Southwark Bridge Road
London SE1 9HA

Note that we do not need a hard copy in addition to an electronic version. Ofcom will acknowledge receipt of responses if they are submitted using the online web form but not otherwise.

- A1.5 It would be helpful if your response could include direct answers to the questions asked in this document, which are listed together at Annex 4. It would also help if you can explain why you hold your views and how Ofcom's proposals would impact on you.

Further information

- A1.6 If you want to discuss the issues and questions raised in this consultation, or need advice on the appropriate form of response, please contact Michael Richardson on 020 7783 4157.

Confidentiality

- A1.7 We believe it is important for everyone interested in an issue to see the views expressed by consultation respondents. We will therefore usually publish all responses on our website, www.ofcom.org.uk, ideally on receipt. If you think your response should be kept confidential, can you please specify what part or whether all of your response should be kept confidential, and specify why. Please also place such parts in a separate annex.

- A1.8 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and will try to respect this. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.9 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's approach on intellectual property rights is explained further on its website at <http://www.ofcom.org.uk/about/accoun/disclaimer/>

Next steps

- A1.10 Following the end of the consultation period, Ofcom intends to publish a statement before the end of 2010.
- A1.11 Please note that you can register to receive free mail Updates alerting you to the publications of relevant Ofcom documents. For more details please see: http://www.ofcom.org.uk/static/subscribe/select_list.htm

Ofcom's consultation processes

- A1.12 Ofcom seeks to ensure that responding to a consultation is easy as possible. For more information please see our consultation principles in Annex 2.
- A1.13 If you have any comments or suggestions on how Ofcom conducts its consultations, please call our consultation helpdesk on 020 7981 3003 or e-mail us at consult@ofcom.org.uk. We would particularly welcome thoughts on how Ofcom could more effectively seek the views of those groups or individuals, such as small businesses or particular types of residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.14 If you would like to discuss these issues or Ofcom's consultation processes more generally you can alternatively contact Vicki Nash, Director Scotland, who is Ofcom's consultation champion:

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

Tel: 0141 229 7401
Fax: 0141 229 7433

Email vicki.nash@ofcom.org.uk

Annex 2

Ofcom's consultation principles

A2.15 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

A2.16 Where possible, we will hold informal talks with people and organisations before announcing a big consultation to find out whether we are thinking in the right direction. If we do not have enough time to do this, we will hold an open meeting to explain our proposals shortly after announcing the consultation.

During the consultation

A2.17 We will be clear about who we are consulting, why, on what questions and for how long.

A2.18 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 to give us a written response. If the consultation is complicated, we may provide a shortened Plain English Guide for smaller organisations or individuals who would otherwise not be able to spare the time to share their views.

A2.19 We will consult for up to 10 weeks depending on the potential impact of our proposals.

A2.20 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.

A2.21 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.22 We think it is important for everyone interested in an issue to see the views of others during a consultation. We would usually publish all the responses we have received on our website. In our statement, we will give reasons for our decisions and will give an account of how the views of those concerned helped shape those decisions.

Annex 3

Consultation response cover sheet

- A3.23 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, www.ofcom.org.uk.
- A3.24 We have produced a coversheet for responses (see below) and would be very grateful if you could send one with your response (this is incorporated into the online web form if you respond in this way). This will speed up our processing of responses, and help to maintain confidentiality where appropriate.
- A3.25 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore Ofcom would encourage respondents to complete their coversheet in a way that allows Ofcom to publish their responses upon receipt, rather than waiting until the consultation period has ended.
- A3.26 We strongly prefer to receive responses via the online web form which incorporates the coversheet. If you are responding via email, post or fax you can download an electronic copy of this coversheet in Word or RTF format from the 'Consultations' section of our website at www.ofcom.org.uk/consult/.
- A3.27 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we don't have to edit your response.

Cover sheet for response to an Ofcom consultation

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

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

Nothing Name/contact details/job title

Whole response Organisation

Part of the response 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 4

Consultation questions

Question 1: Do you consider that our proposed fee rates for licences in the aeronautical VHF frequencies are appropriate?

Question 2 In devising our revised proposals, have we identified all of the aeronautical uses of VHF communications frequencies which require a distinct approach to fee setting, as set out in tables 5 and 6?

Question 3: Do you agree with our proposal not to charge any fees for Fire assignments?

Question 4: Do you agree with our proposal to set a £75 fee for licences in any of the sporting frequencies?

Question 5: Do you agree with our proposal to set an annual fee of £19,800 per ACARS or VDL assignment, with no variation related to the number of transmitters?

Question 6 Do you consider that our proposed general approach to phasing in fees for use of the aeronautical VHF communications channels are appropriate? If there are particular reasons why you consider that any user or group of users would need longer phasing-in periods, please provide any supporting evidence for us to consider. Specifically, do you have any evidence for us to consider that would support either of Options 1 and 2 for the highest proposed fee in this sector?

Question 7 Do you have any further quantified information to contribute to the analysis of financial impacts of the proposed fees on particular spectrum users, as set out in Annex 5? We would like to publish all responses, but will respect the confidentiality of any material which is clearly marked as such.

Question 8: Do you consider that our assessment of the impacts of our proposals has taken full account of relevant factors? If you consider that there is additional evidence that would indicate particular impacts we should take into account, we would be grateful if you could provide this.

Annex 5

Glossary

Allocation

Use of a frequency band. Entry in the table of frequency allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radio communications services or the radio astronomy service under specified conditions. This term is also applied to the frequency band concerned.

Assignment

Authorisation given by a licensing authority for a radio station to use a specific radio frequency or channel under specified conditions.

Authorisation

Given by an administration for a radio station to use a radio frequency or radio frequency channel under specified conditions.

Band

A defined range of frequencies that may be allocated for a particular radio service, or shared between radio services.

Business Radio

Business Radio (previously known as Private Mobile Radio (PMR)). A private radio service installed and operated by businesses and public sector organisations to provide mobile communications for their own workforces. A base station is installed by each organisation on a suitable site providing local coverage, and used to send or receive short messages concerning the business of the organisation to, from or between mobile units.

Communications Act

Communications Act 2003, which confers powers, duties and functions on Ofcom and came into force in December 2003.

Harmonisation

Allocation of frequencies on an international basis, e.g. within Europe or globally, for particular radio services. Such frequency ranges are known as harmonised bands, or harmonised spectrum.

Interference

The effect of unwanted signals upon the reception of the wanted signal in a radio system, resulting in degradation of performance, misinterpretation or loss of information compared with that which would have been received in the absence of the unwanted signal.

ITU

International Telecommunication Union. The United Nations agency that co-ordinates and manages radio use worldwide through the international Radio Regulations that it promulgates. These have the status of an international treaty and are binding on member states.

kHz

A frequency of one thousand Hertz (cycles per second).

Licence class

Type of licence, for example PAMR or Wide area. Volume classes refer to those licence classes for which there are significant numbers of licensees.

MHz

A frequency of one million Hertz (cycles per second).

Opportunity cost

The cost of a decision or choice in terms of the benefits which would have been received from the most valuable of the alternatives that was foregone.

Propagation

Transmission of radio waves. Propagation characteristics depend on frequency and are affected by the environmental conditions, such as terrain and atmospheric conditions.

Radio spectrum

The portion of the electromagnetic spectrum below 3000 GHz that is used for radiocommunications.

Spectrum

A continuous range of frequencies of electromagnetic radiation (eg radio waves).

Spectrum liberalisation

Removal of restrictions from WT licences and RSA to allow holders greater flexibility to change how they use spectrum.

Spectrum trading

Ability of spectrum users to transfer rights and obligations under WT licences to another person in accordance with regulations

VHF

Very High Frequency; the portion of the electromagnetic spectrum between 30 and 300 MHz.

WT Act

The Wireless Telegraphy Act 2006, which sets out the statutory framework for management of the radio spectrum consolidating a number of older Acts dating back to 1949.

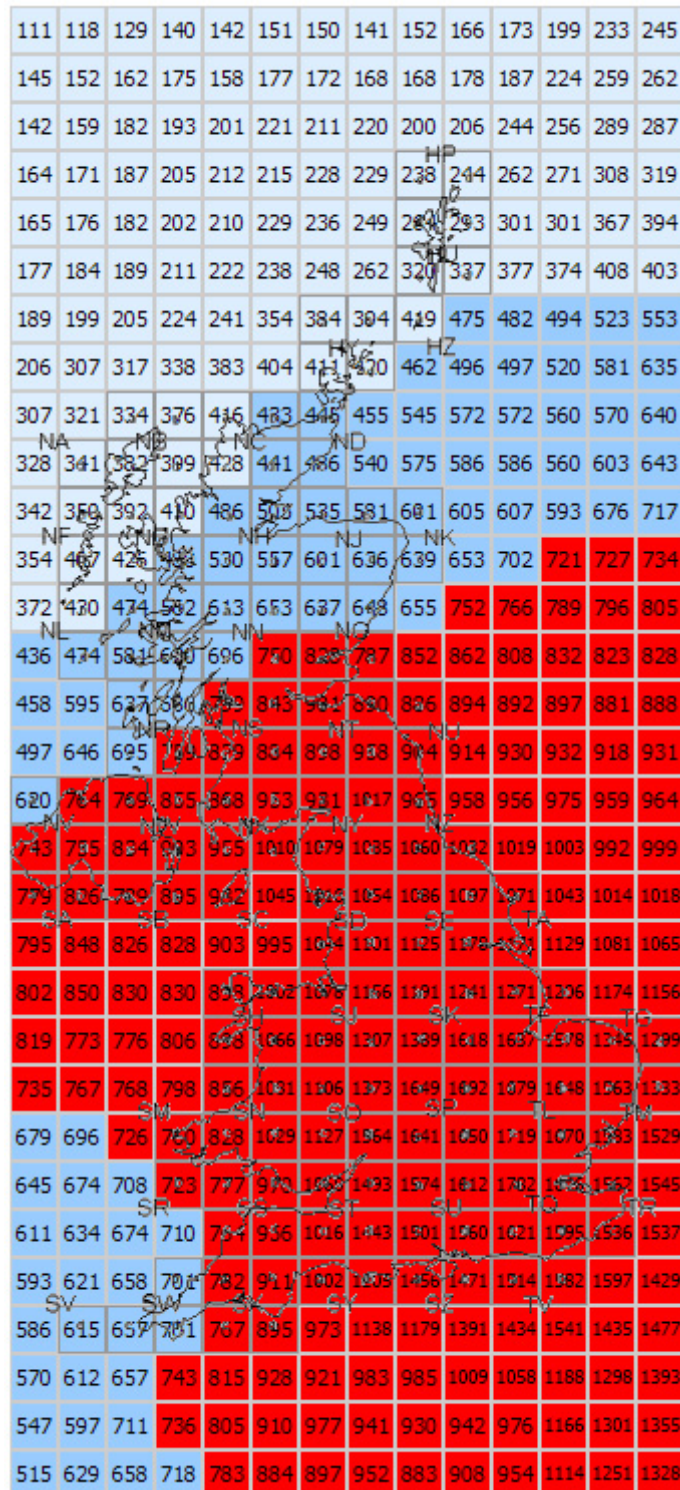
WT licence

License granted by Ofcom to authorise installation or use of radio equipment as required by section 8(1) of the WT Act.

Annex 6

Map defining proposed geographic differentiation between AIP fees

Figure 3 Proposed geographic definitions for aeronautical frequencies



Annex 7

Further analysis of the impact of fees for aeronautical VHF communications spectrum

Benefits to society

- A7.1 Quantifying the full long term benefits to society of spectrum reforms, including AIP, is inherently difficult because it is up to licence holders, not Ofcom, to decide how to respond to signals resulting from its reforms and such responses will typically only occur gradually over the longer term. The specific decisions that licensees make, which we cannot predict, will have a major impact on the costs and benefits concerned. In our statement on the Spectrum Framework Review for the Public Sector we set out an approach to determining the aggregate costs and benefits of our market-based approach based on a study produced for the European Commission.
- A7.2 A report, produced by Analysys et al⁵⁶ in 2004 on conditions and options for introducing secondary trading of radio spectrum in the European Community, concluded that there are powerful synergies between trading and liberalisation and estimated that benefits from both are over 9 times the benefits from trading alone. The study also estimated that the costs, mainly from additional interference management, amount to less than 1% of the benefits relative to the status quo. Overall benefits for the EU as a whole were estimated at €9bn a year.
- A7.3 As stated above, it is difficult to quantify the benefits in this area because they will depend on the uses to which the spectrum is put and the responses of existing spectrum users to market-based reforms such as liberalisation and AIP. It is particularly difficult where spectrum is released from an existing use and put to one of a potential range of new, more valuable, but currently uncertain uses. Based on the Analysys et al report and assuming that the benefits to the UK equate to approximately 1/6th⁵⁷ of the benefits to all of Europe, and that the ratio of costs and benefits in the UK is similar to that in Europe as a whole, it can be estimated that the benefits across all of the UK economy including licence holders and consumers from the introduction of market-based reforms, including liberalisation and trading and AIP, in all licence classes might be in the region of £1bn per year. This estimate is highly speculative and relates to all spectrum users.
- A7.4 While the CBA referred to above did not look individually at AIP reforms, nor at AIP applied specifically to the aeronautical sector, the assessment of net welfare benefits does provide an illustration of the potential order of magnitude of net welfare benefits forgone from not applying spectrum reforms that would otherwise encourage the efficient use of spectrum, such as applying AIP.

⁵⁶ *Study on conditions and options for introducing secondary trading of radio spectrum in the European Community* by Analysys Consulting Ltd and others for the European Commission, published May 2004 at http://ec.europa.eu/information_society/policy/radio_spectrum/docs/ref_docs/secontrad_study/secontrad_final.pdf.

⁵⁷ The estimate assumes that the benefits to the UK equate to approximately 1/6th of the benefits to all Europe based on relative GDP.

Why the assessment in this consultation document has two elements

A7.5 We have assessed both the aggregate welfare impacts and the distribution of financial impacts of our fee proposals because both are important. Any proposal which affects many stakeholders and could benefit citizens and consumers overall, might at the same time have unacceptable impacts on specific groups of stakeholders. We therefore need to explore both the net aggregate and the distributional impacts in our impact assessment.

The CBA element

A7.6 In a typical economic CBA of aggregate impacts, some positive and negative economic impacts on individual stakeholders will typically be netted off against one another leaving no net cost or benefit to the economy. A simple cash transfer is an obvious example of a transaction which may have a significant impact on an individual stakeholder but have none on the economy as a whole. For example when fees result in additional aggregate revenue to the government, this would exactly offset the cost to licensees of the fee payments and a CBA would take account only of the associated economic benefits of more efficient markets, and so on, which might result. A CBA therefore considers whether the aggregate, net effects of a measure are beneficial to society as a whole, by identifying the “net welfare effects”, rather than the distribution of any underlying changes in costs and benefits.

A7.7 Fees which are set at the appropriate level based on the opportunity cost of the spectrum should result in a net welfare gain for citizens and consumers, compared to fees which do not reflect opportunity costs, since:

- AIP-based fees will provide spectrum users with an incentive to use spectrum more efficiently where this is possible (for example by releasing spectrum or adjusting other inputs). This can be expected to result in a net benefit to society as spectrum is assigned to higher value uses, or users, over time. We consider this to be a likely longer term response to Ofcom’s fee proposals; and
- In situations where no change in spectrum use or associated inputs and outputs occurs, there would in aggregate be no net costs to UK citizens and consumers from applying AIP.

A7.8 As noted in Section 7 above, some of the services which are provided using spectrum may give rise to externalities. These wider social costs or benefits arising from a given use of spectrum are not fully reflected in the prices that users pay for the services provided, and the value to citizens and consumers overall of this use could be higher or lower than is signalled via market prices for these services. Generally, the appropriate policy interventions to maximise such social value, or minimise social disbenefits arising from externalities, take the form of targeted subsidies and taxes for the outputs concerned rather than subsidising the required inputs.

A7.9 Accordingly, the possibility that services provided using spectrum may cause externalities or have public good characteristics, does not change our view that setting fees to reflect opportunity cost more closely should result in net benefits, as measured by a CBA, to UK citizens and consumers. These net benefits are likely to be greatest if AIP is set to reflect opportunity costs and any externalities are

addressed directly. This is consistent with the results of studies⁵⁸, at an aggregate level, of the potential benefits of market-based approaches to allocating spectrum, which have found these to be large (see paragraphs A7.2 to A7.3 above).

- A7.10 However, we also consider whether there is a risk of inefficient responses in the short term arising from difficulties in adjusting to new levels of AIP, which could reduce the benefits of AIP. The second part of our assessment is concerned with identifying possible inefficient responses of this kind (see paragraphs A7.11 to A7.13 below).

The Distributional element of our Impact Assessment

- A7.11 As indicated above changes to an existing price structure will typically create a range of different financial impacts for individual stakeholders. Although many of these impacts will be distributional and hence not be relevant to a net aggregate CBA, significant and rapid changes in financial costs can prompt inefficient adjustments by affected stakeholders, which would hence reduce the net aggregate economic benefits of the changes concerned.
- A7.12 The distributional component to our Impact Assessment therefore seeks to identify the distribution of financial impacts of proposed changes on particular affected parties and to assess whether there may be any inefficient adjustment responses to the proposed fee changes in the short run (i.e. during the transition to the efficient use of inputs associated with the proposed new fee regime). An inefficient response could, for example, mean that there is a risk of service disruption where licensees require a period of time to respond to introduced fees, including making changes to their business operations (or seeking regulatory approval to make such changes) where efficient to do so.
- A7.13 We therefore consider that it is important to assess the financial effects on individual groups of affected stakeholders, not simply the expected aggregate effects in the economy. Therefore, in developing our proposals, we have explicitly considered the financial impact on users of fees at the proposed levels, particularly over any immediate short-run period.

Analysis of distributional impacts conducted by Helios Technology Ltd

- A7.14 Ofcom has commissioned a study to examine the distribution of financial impacts on stakeholders. The Full Report, undertaken by Helios/Plum, is attached to this consultation document at Annex 8.

⁵⁸ See, for example, Indepen 2007 section 2.3

Annex 8

Helios Technology Ltd assessment of impacts

Aeronautical VHF Spectrum Pricing – Impact on markets and customers

Final Report

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1 Introduction

1.1 General

This document has been prepared by Helios Technology Ltd and Plum Consulting for Ofcom.

It presents the results of our study considering the impact of the proposed introduction of AIP on aeronautical VHF spectrum users.

1.2 Context

Our analysis starts from a presumption that users of spectrum, along with other inputs, should face the opportunity cost of such inputs to ensure that overall economic efficiency is promoted (just as users of electricity or land typically pay for such inputs and this is viewed as efficiency promoting). In relation to spectrum utilised by the aeronautical sector Ofcom proposed the introduction of AIP in a consultation document published on July 2008¹.

It is not the purpose of this study to inform the level of AIP that is efficient, nor is it the purpose of this study to demonstrate that economic benefits of applying AIP outweigh the costs. This study is focussed on the responses to AIP and the distribution of impacts.

In considering the response to and impacts of AIP our terms of reference focus on impact assessment. Previous studies have considered the possible response to AIP in terms of spectrum efficiency gains. Whilst we comment briefly on the range of possible responses we note that the purpose of pricing is to promote efficiencies that cannot all be anticipated in advance. It is not therefore possible or meaningful to attempt to fully anticipate the efficiency responses to pricing.

In considering the impact of AIP an indication of the magnitude of prices (based on the figures outlined in Ofcom's consultation), industry specific information and an overall framework for considering the impacts is required. Our industry knowledge draws on previous consultations and studies, our own work and discussions with those involved with the aeronautical sector. The details are set out in subsequent sections.

The economics behind the overall framework that informs our analysis of impacts is set out in Appendix A. The economic framework also considers the impact of economic regulation of some airports and air traffic services. To summarise, we find that:

- The starting point in the absence of spectrum pricing could be deemed to be distorted and inefficient, since whilst users may be using existing spectrum resources "efficiently" in a technical sense, they in general have not faced the "opportunity cost" in relation to alternative competing uses/users of spectrum required to promote overall economic efficiency.
- In a competitive market the costs of AIP, after spectrum specific efficiency savings, will in general be passed on to end users.

¹ "Applying spectrum pricing to the Maritime and Aeronautical sectors. Consultation document", 30 July 2008

- Capacity constraints for some services such as landing and takeoff slots at Heathrow, Gatwick and Stansted, mean that aircraft movements and to a lesser extent passenger movements are constrained. In these circumstances existing end user prices can be expected to reflect runway scarcity and AIP may have a smaller impact on end user prices.
- Short run and long run responses will differ with greater gains in spectrum efficiency over time as capital equipment is replaced and other longer term adjustments made. The cost impact on intermediate users of spectrum and end users from a given level of AIP would therefore be expected to diminish over time as intermediate and final demand responses grow.
- For some services such as flight training, hub airports and transshipment ports substitution of activity away from the UK is a possibility. However, this is not anticipated to be material given the magnitude of AIP in relation to other costs. Nor would such a response be inefficient since if, internationally competing activities cannot pay the local resource costs in terms of alternative use required, those resources would deliver more value in alternative uses.
- Responses where AIP is applied to not-for-profit or non-end user funded entities may differ. In particular, spectrum efficiency gains may be larger or smaller depending on how other sources of funding adjust, and were funding increases to only partially offset costs associated with AIP not-for-profit entities might economise on other non-spectrum inputs and outputs (increased savings in relation to non-spectrum inputs are not anticipated for commercial entities subject to AIP).
- Where regulation is applied in relation to NATS air traffic services and airports five year price caps are applied which will be revised from January 2011 for NATS, March 2013 for Heathrow and Gatwick, and March 2014 for Stansted. Our expectation is that prudent levels of expenditure in relation to spectrum AIP costs would be allowed under revised price controls and therefore passed on to end users.
- Incentives for efficiency under regulation would remain since the costs incurred in relation to spectrum will be subject to scrutiny by the CAA and end users in setting price controls, whilst price caps will provide an incentive to economise on spectrum inputs over the duration of the price control.
- Commercial contractual relationships may change the incidence of AIP in the short term. Whilst the terms of such contracts are in general private, the possible introduction of AIP has been signalled at least since the Cave review of radio spectrum management in 2002 and we would anticipate pass-through in the near or medium term.
- The magnitude of AIP relative to other input costs at its point of application may be significantly greater than its magnitude relative to end user prices or costs. The reason for this is that spectrum is one among many inputs in the value chain. In general, AIP for VHF communications would be small relative to the overall costs of airlines or end user prices for air services.

1.3 Structure of this Document

This document has been structured as follows:

- Section 2 details the existing spectrum licence fee structures within the aeronautical industry and discusses Ofcom's proposed AIP fee structure.

- Section 3 discusses the structure of the UK aeronautical industry as it is affected by AIP, identifies the different categories of users and details the flow-through of spectrum fees.
- Section 4 provides an economic analysis of the impact of AIP in the aeronautical industry.
- Annex A details the economic framework used to consider the impact of AIP.
- Annex B provides a summary note on suitable benchmarks for the London Airports.
- Annex C provides a summary of supplementary analysis into the non-reporting aerodromes.
- Annex D provides a list of acronyms used in the document.

2 Ofcom's AIP Proposals

2.1 Introduction

This section identifies the existing licence fee structure for aeronautical VHF systems, and the revised fees which Ofcom asked us to assume when compiling this report.

Ofcom asked us to examine the impact of potential AIP based fees on VHF users, initially using the proposals set out in the July 2008 consultation for the purpose. Subsequently, Ofcom asked us to do further work on the structure of aeronautical fees which is set out in a separate report. Subsequent to that report, and taking into account the outcome from that report as well as inputs from the consultation responses, Ofcom asked us to re-examine impacts using some revised illustrative assumptions on the structure of fees. The results are reported herein. The illustrative assumptions are set out below.

Ofcom indicated to us that the illustrative assumptions we have used for this report may not represent the fee structure they will propose in all respects. Nevertheless they have advised us that the illustrative assumptions used in this report are likely to provide a reasonable indication of impacts.

2.2 Spectrum Fees in the Aeronautical Sector

2.2.1 Existing Fees

The table below details the fees for a 12 month licence payable under the existing Ofcom pricing structure for each of the different licence types based on The Wireless Telegraphy (Licence Charges) Regulations 2005.

Licence Type	Annual Fee
Aeronautical Ground Station (Air Traffic/ Ground Movement Control)	£150
Aeronautical Ground Station (Air/Ground Communications Services)	£100
Aeronautical Ground Station (Airfield Flight Information Service)	£100
Aeronautical Ground Station (Operations Control)	£250
Aeronautical Ground Station (General Aviation)	£25
Aeronautical Ground Station (Fire)	£25
Aeronautical Ground Station (Offshore Platform)	£250

Table 2-1: Existing Aeronautical Licence Fees

2.2.2 Proposed Fees under AIP

Ofcom's published proposals as per the consultation for aeronautical VHF fees areas were as follows:

- VHF communications (aeronautical ground stations) will attract an annual fee of £4,950 per annum for a 25 kHz and £1,650 per annum for an 8.33 kHz channel. These are based on a standard reference fee of £396,000 per national MHz discounted by 50% to account for shared or non-exclusive use. Only the use of distress frequencies (121.5 and 123.1 MHz) would not be charged for.

These initial fee proposals published in July 2008 were subject to ongoing consultation and it was always possible that they could be revised in light of user feedback. Indeed Ofcom subsequently commissioned Helios, as a separate exercise, to make alternative recommendations for pricing aeronautical VHF use. In preparing the current report on impacts of proposed AIP fees, Ofcom asked us to make particular assumptions which, in large part, reflect the revised fee proposals explored in this report², on possible AIP fees for aeronautical spectrum.

2.2.3 A proposed revised fee structure

As part of our work for Ofcom we have examined the use of VHF communications frequencies in order to determine whether there is the possibility of applying a more granular pricing structure than that proposed by Ofcom in its consultation, and whether such a structure could be based on the existing Business Radio structure. As a result of this work, we identified a potential tariff structure which varies by usage type and has the option of additionally varying by the level of congestion. Ofcom asked us to use this revised fee structure when assessing the impact of fees.

The table below indicates the fees (based on 25 kHz channels) which have been identified for the various service types. These are based on a reference rate of £396k per national MHz. Ofcom asked us to assume that these fees would apply in 'high' congestion areas:

² "Administered Incentive Pricing for Aeronautical VHF Communications", Helios, 2 March 2009

Service	Annual Fee
Aerodrome control ³	£2600
Aerodrome flight information service (AFIS)	£2600
Surface Movement Control (SMC) ⁴	£350
Approach control – Upper (ACC)	£9900
Approach control – Intermediate	£9900
Approach control – Lower (APP)	£9900
Area control service – Lower	£9900
Area control service - Upper or	£9900
Flight information service - Upper	
SST high level operations	£9900
VHF extended range	
Flight information service – extended range	
VOLMET	£9900
ATIS	£9900

Table 2-2: Calculated Fees by Service Type

2.2.4 Revised proposals of Ofcom

Following this work, Ofcom asked us to apply a set of slightly revised fee assumptions in order to conduct the ensuing impact analysis. These revised assumptions are documented below.

We were asked us to consider the licensing all sports use (eg those stations licensed as gliders and hang gliders, microlights, parachutists and balloonists) at a signal annual rate of £75, with no geographic (congestion) discount being applicable.

We were also asked to assume, for the purpose of the current report, that for services which are not charged at the full national rate (eg £9,900) the impact of varying levels of congestion should be to modify specific licence prices based on the geographic location of the service being licensed. For service types with national coverage, no congestion discount is applied.

We were asked to assume that congestion was defined based on a map showing varying degrees of congestion and that this congestion was defined as illustrated in map overleaf.

Areas shown in red are those where levels of congestion are considered 'high' and, we were asked to assume that the full fee level is payable.

Areas shown in medium blue are those where levels of congestion are considered medium. In these areas, we were asked to assume, where appropriate, that a 20% discount on licence fees is applied.

³ This includes frequencies identified by the CAA as TWR and A/G, as well as for fixed offshore platforms.

⁴ This includes frequencies identified by the CAA as AS, OPC and mobile offshore platforms.

Areas shown in light blue are those where levels of congestion are considered 'low'. In these areas we were asked, where appropriate, to assume a 50% discount on licence fees is applied.

In the case of ACC and VOLMET licences, in many cases there are multiple transmitters, all operating simultaneously, on the same frequency (this is known as 'CLIMAX' operation). Instead of charging for each site at the full national rate, Ofcom asked us to consider that each frequency be charged at the national rate, regardless of the number of stations operating on that frequency.

In the case of national aeronautical data networks (ACARS and VDL), there are multiple ground stations on the same frequency and again Ofcom asked us to charge these on a per-frequency and not a per-station basis in the same way as for ACC and VOLMET use.

The resulting table of fees, as per the different usage types is given in Table 2-3 below. Note that Ofcom has also rounded the fees produced by the output of our initial calculations to the nearest £10.

111	118	129	140	142	151	150	141	152	166	173	199	233	245
145	152	162	175	158	177	172	168	168	178	187	224	259	262
142	159	182	193	201	221	211	220	200	206	244	256	289	287
164	171	187	205	212	215	228	229	238	244	262	271	308	319
165	176	182	202	210	229	236	249	280	293	301	301	367	394
177	184	189	211	222	238	248	262	320	337	377	374	408	403
189	199	205	224	241	354	384	304	419	475	482	494	523	553
206	307	317	338	383	404	411	420	462	496	497	520	581	635
307	321	334	376	416	483	445	455	545	572	572	560	570	640
328	341	382	399	428	441	486	540	575	586	586	560	603	643
342	350	392	410	486	500	535	581	601	605	607	593	676	717
354	467	426	433	530	557	601	636	639	653	702	721	727	734
372	470	474	532	613	653	637	648	655	752	766	789	796	805
436	474	581	630	696	700	828	797	852	862	808	832	823	828
458	595	627	680	739	813	801	830	826	894	892	897	881	888
497	646	695	749	829	834	898	928	914	914	930	932	918	931
620	764	759	805	828	923	931	1017	905	958	956	975	959	964
743	755	834	813	825	1010	1079	1035	1060	1032	1019	1003	992	999
779	826	729	895	912	1049	1024	1054	1036	1097	1071	1043	1014	1018
795	848	826	828	903	995	1034	1101	1125	1178	1129	1081	1065	
802	850	830	830	853	1002	1071	1156	1191	1241	1271	1236	1174	1156
819	773	776	806	838	1066	1098	1207	1339	1618	1637	1578	1345	1299
735	767	768	798	826	1031	1106	1273	1649	1692	1079	1648	1563	1333
679	696	726	760	828	1029	1127	1564	1641	1650	1719	1670	1383	1529
645	674	708	723	777	970	1000	1493	1574	1612	1702	1576	1563	1545
611	634	674	710	751	936	1016	1043	1501	1560	1621	1595	1536	1537
593	621	658	704	782	911	1002	1039	1456	1471	1514	1482	1597	1429
586	615	657	701	767	895	973	1138	1179	1391	1434	1541	1435	1477
570	612	657	743	815	928	921	983	985	1009	1058	1188	1298	1393
547	597	711	736	805	910	977	941	930	942	976	1166	1301	1355
515	629	658	718	783	884	897	952	883	908	954	1114	1251	1328

Service	Annual Fee	Congestion Discount Applies?	Notes
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ACC	£9900	No	Charged per national frequency
AFIS	£2600	Yes	
APP	£9900	No	
ATIS	£9900	No	
VOLMET	£9900	No	Charged per national frequency
A/G	£2600	Yes	
TWR	£2600	Yes	
EMERGENCY	£0	N/A	Including 'FIRE' frequencies
OFFSHORE FIXED	£2600	Yes	
OFFSHORE MOBILE	£350	Yes	
OPC	£350	Yes	
ACARS	£9900	No	Charged per national frequency
BALLOON	£75	No	
GLIDER	£75	No	
PARACHUTE	£75	No	
AS	£350	Yes	
HANG GLIDER	£75	No	
MICROLIGHT	£75	No	
VDL MODE 2	£19800	No	Per national frequency (each station uses 50 kHz)

Table 2-3: Proposed Fees by Service Type

Note also, that frequencies which are assigned in 8.33 kHz channels instead of 25 kHz channels are charged at one third of the above rates (subject to a minimum fee of £75 per annum).

2.2.5 Phasing of Fee Introduction

Historically, Ofcom has taken a phased approach to the introduction of AIP across other markets and there is no reason to presume that the same approach will not be taken in the case of aeronautical users. As such, it is to be expected that the fees will be introduced over a number of years, typically three.

3 VHF Spectrum Use and Cost Structures in UK Aviation

3.1 Introduction

In this section we examine how the UK aviation industry currently uses VHF spectrum. We identify the main classes of user, and, given the pricing assumptions made in section 2, assess the likely charge burden to be borne by each class of user, looking at proposals for charging for VHF licences.

We set these potential financial costs in the context of the overall flows in the industry, and discuss how the costs might or might not be passed down the value chain, given the regulatory or competitive position of each class of user.

3.2 Licence data

Our data source for the use of VHF spectrum is a set of licence data supplied to us by Ofcom, which emanated from the CAA. We understand it to be the set of VHF licences current in March 2009. These licences relate to the use of VHF aeronautical ground stations (VHFs). On Ofcom's instructions, we have excluded all licences relating to the Isle of Man and the Channel islands.

We have examined how the use of these licences is split between various classes of user. We have split the users according to the types of service they provide, and the way their processes are regulated. For many users, the identification of the nature of their business is obvious; for others there is some uncertainty, and this should be borne in mind when examining our classification.

VHF licences have been categorised further according to the type of service provided. As discussed in our separate report on AIP for Aeronautical VHF Communication and summarised in Section 2, the prices for these licences should differ according to the area sterilised by the particular usage of the frequency. We have therefore divided these into the service types indicated in Table 2-3. Licences were assigned to these service types according to the information recorded in the CAA data base in the 'station' category

3.3 The classification of users

The users we have identified fall broadly into the following major classes:

- Air Navigation Service Providers (ANSPs);
- airports;
- aeroclubs and flying schools;
- private individuals;
- offshore installations (mobile and fixed);
- airlines and air service companies;
- research establishments
- other users (including test sites, museums, the police, government agencies, test sites and other users the nature of which we have been unable to determine).

We recognise that the Ministry of Defence (MoD) are also users of aeronautical VHF spectrum, however Ofcom has requested that we leave the MoD outside the scope of this study.

3.3.1 ANSPs

There are two organisations holding spectrum licences that can be classed as air navigation service providers (ANSPs), both are subsidiaries of National Air Traffic Services (NATS), the UK national Air Navigation Service Provider:

- NATS En-Route plc (**NERL**). NERL is the regulated subsidiary of NATS. NERL supplies air navigation services (ANS) during the en-route and approach phases of flight to all aircraft flying in controlled UK airspace. NERL is regulated and its prices are controlled under a quinquennial review by the UK Civil Aviation Authority (CAA).
- NATS Services Limited (**NSL**). NSL is the unregulated subsidiary of NATS. It supplies ANS in the final approach phase of flight at a number of UK airports, including most of the major ones. NSL could, in some senses, be viewed as an aerodrome ANS provider, however such a distinction would not affect the outcome of our analysis.

At airports where NSL does not provide air navigation services the services are provided, in most cases, by the airport operator. It is not generally meaningful in the context of spectrum use to distinguish between the local ANSP and the airport operator, even when they are distinct organisations.

NSL is currently the licence-holder at a number of airports where it acts as the ANSP. It argues that while it is the service provider at these airports, it does not own the infrastructure, and if it were to cease to be the ANSP, the licence would need to pass on. The **beneficial** licence holder is therefore the airport. NSL is seeking to transfer the ownership of these licences to the airport authorities, although this process is at an early stage.

We have accepted the argument of NSL that the airport is the beneficial licence holder if not in practice the name on the licence. It seems clear that if a charge were imposed for holding the licence, this charge would be passed through to the airport. For the purpose of this study, therefore, these licences have been assumed to be held by the airport operator, not by NSL.

3.3.2 Airports

The impact of spectrum pricing will differ greatly between different classes of airport. For the purpose of this study, we have grouped airports into six classes, depending on the way their processes are regulated, the nature of their customers, and the availability of information. The latter is an important factor as airports that do not serve commercial air transport (that is, aircraft operators flying passengers or freight for a fee) do not have to provide data on their operations to the CAA, whereas the others do. The six classes are:

- The regulated airports (**Heathrow, Gatwick and Stansted**). These three airports, all currently owned by BAA, differ from other UK airports in that the charges they can levy on users are regulated by the CAA.
- **Other large commercial airports**, with a high proportion of commercial traffic. We have made an arbitrary division: we have classified an airport as “large” if it

served more than 50,000 movements in 2007; and a high proportion of commercial traffic, if over half the movements are commercial air transport.

- **Smaller commercial airports**, with a high proportion of commercial traffic.
- **Large non-commercial airports** with more than 50,000 movements in 2007, but with more than half those movements non-commercial (such as business flights, private flights, training), but nevertheless with some commercial traffic
- **Small non-commercial airports** with fewer than 50,000 movements in 2007, and more than half those movements non-commercial, but nevertheless with some commercial traffic
- **Non-reporting airports and aerodromes** with no commercial traffic, and that therefore are not required to disclose traffic data to the CAA. A few of these, we understand, carry large amounts of traffic, but there is no systematic source of information on their traffic. At the lower end of this scale it is quite difficult to distinguish these from aeroclubs and flying schools, who might be the sole user of an aerodrome, and even from private individuals operating an airstrip for personal or industrial use.

In addition, we classify separately a set of **subsidised peripheral regional airports** owned by Highlands and Islands Airports Limited, which are in receipt of a substantial subsidy from the Scottish Government; we have classed a smaller number of airports owned by Argyll and Bute Council and other Scottish local authorities in with them, although we have no specific information on their financial status.

The classification of the 59 airports reporting to the CAA is illustrated in Figure 3-1. In addition, at least a further 73 do not report traffic so cannot be classified in this way.

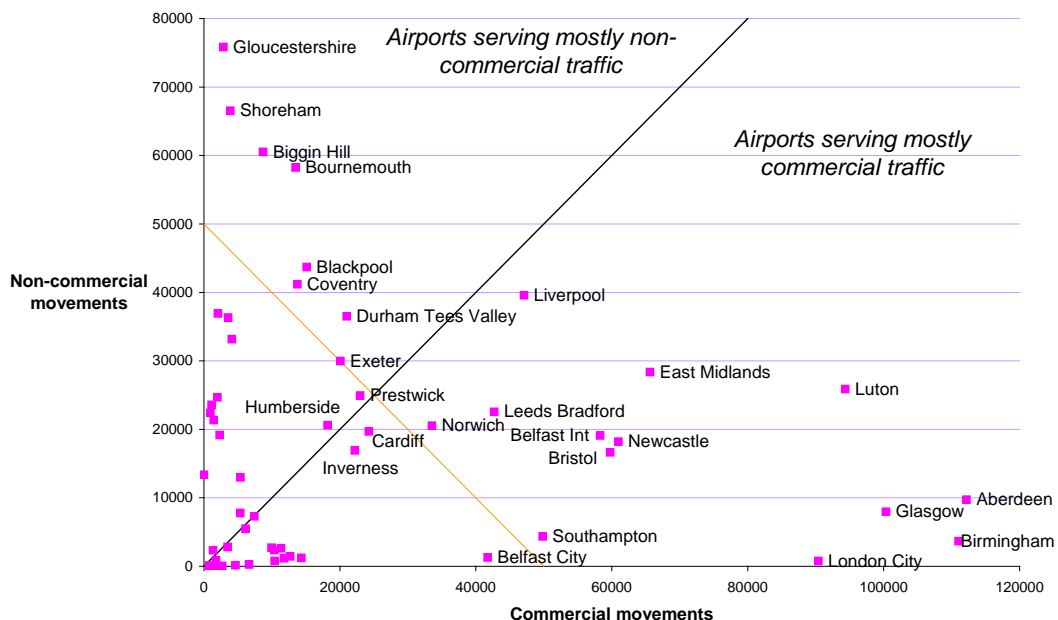


Figure 3-1: Traffic at UK reporting airports, 2007

3.4 Discounts

Ofcom have asked us to assume a pricing structure for aeronautical fees for VHF communications, which, in some cases, varies with the level of frequency congestion. The approach to defining which areas should be considered to exhibit High, Medium or Low congestion is explored in our report referenced at footnote 2 above. For each of the different levels of congestion, a level of discount applied is to the existing licence fees, as set out in Table 2-3, as follows:

- High congestion regions: **Full fees** apply;
- Medium congestion regions: A **discount of 20%** applies to the fee for each licence assignment;
- Low congestion regions: A **discount of 50%** applies to the fee for each licence assignment.

The numbers of licence assignments subject to discount and the total fee discount are shown in Table 3-1. A total of 78 assignments are subject to discounts and the total discount amounts to £23,295.

Discount applied	Number of assignments	Total discount
0%	2174	-
20%	56	£13,820
50%	22	£9,475

Table 3-1: Number of assignments to which discounts apply and total discount

Note that the discounts listed above do not include reductions in fees which are caused by the use of 8.33 kHz channels. Of the 2252 total licences, 33 are 8.33 kHz channels.

3.5 The use of VHF licences

The VHF licences used, as recorded by the CAA, are shown, by class of user, in Table 3-2. The table includes the figures from section 2 concerning the likely level of charges, and takes account of the applicable discounts as outlined in Section 3.4. We give the figures for individual regulated airports, and the figure for BAA, the largest airport operator in the UK, separately.

The primary incidence of the VHF charges is also shown in Figure 3-2.

The total charge for the licences in the CAA data base, excluding the Channel Islands and the Isle of Man, is £4.2m. The largest incidence by far falls on NERL, who will bear around 31% of the charges. BAA bears 4%. This BAA figure includes the licences held currently by NSL at BAA airports. The small proportion of charges passed in the first instance to NSL is likely to be passed through to other users, as discussed below.

	VHF frequencies assigned under licences																			Total	Projected cost			
	ACC	AFIS	APP	ATIS	VOLMET	A/G	TWR	FIRE	O/S/SHORE FIXED	O/S/SHORE MOBILE	OPC	ACARS	BALLOON	GLIDER	P/CHUTE	AS	HANG GLIDER	M/LIGHT	ATIS A			ATS (VDL MODE2)	Other	
ANSPs	218	9	27	2	11		2				1										270	£1,291,573		
NERL	2		3														1		1		7	£48,869		
Regulated airports																								
Heathrow							6										9		1		16	£28,417		
Gatwick							2	1									2		1		6	£15,800		
Stansted			1				2										2		1		6	£25,700		
Other BAA airports			7				4	2			2						4		1		20	£91,040		
Manchester	1		4				1	1									3		1		11	£57,609		
Other airports reporting traffic to CAA																								
Large airports, mostly commercial traffic			21	7			13	11			2						8		3		65	£344,200		
Large airports, mostly non-commercial			15	10			8	7			3						2				45	£270,050		
Small airports, mostly commercial traffic	1		12	3			3	6	9		3						3		1		41	£185,964		
Small airports, mostly non-commercial			14	8			2	10	10		6						1				51	£251,450		
Publicly owned peripheral airports			6	6	1		3	2	14												32	£90,880		
Non-reporting aerodromes																								
Non-reporting aerodromes	14	15	4				40	12	8		14						2				1	110	£362,875	
Aeroclubs and flying schools	4	1					40	1	2		11						7	268	25	10	6	2	378	£153,350
Private individuals			1				28	1			4						26	266		1		1	327	£100,335
Offshore installations							4				12										2	486	£605,760	
Airlines and air service companies			1				4	1			4	259	35						2		17	1	324	£199,557
Research establishments and test sites							2				6										2	10	£7,685	
Others	2	1					11	1			30						2				47	£54,280		
	222	37	127	35	11	137	71	66		191	281	353	35	35	534	25	40	10	7	10	17	8	2252	£4,185,394

Total BAA £160,957

Table 3-2: VHF licence assignments and estimated charge, by type of user

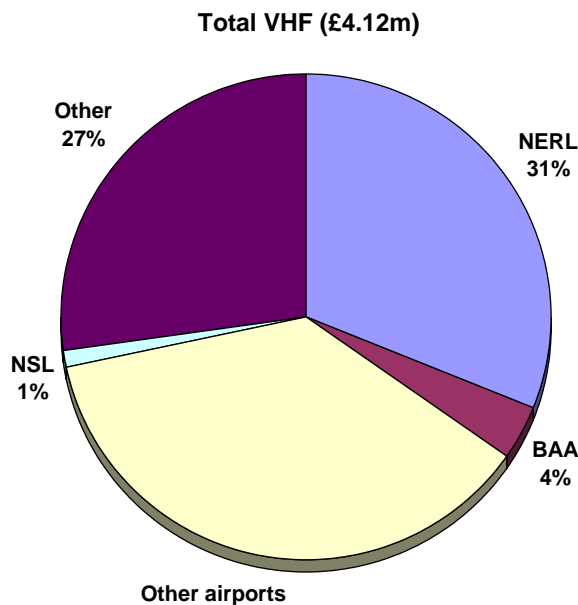


Figure 3-2: Breakdown of spectrum AIP charges by user class

3.6 The financial context

The broad financial context of the incidence of spectrum charges in aviation is outlined in Figure 3-3. The figure does not represent the current situation, but the situation once two issues have been simplified:

- the liabilities for the charges in respect of licences at airports currently held by NSL, as the terminal ANSP, are transferred to the airport operators; and
- the current situation whereby, at Scottish airports, civil airspace users are charged terminal ANS charges, is changed to the situation at other UK airports, where these charges are subsumed into the airport charges.

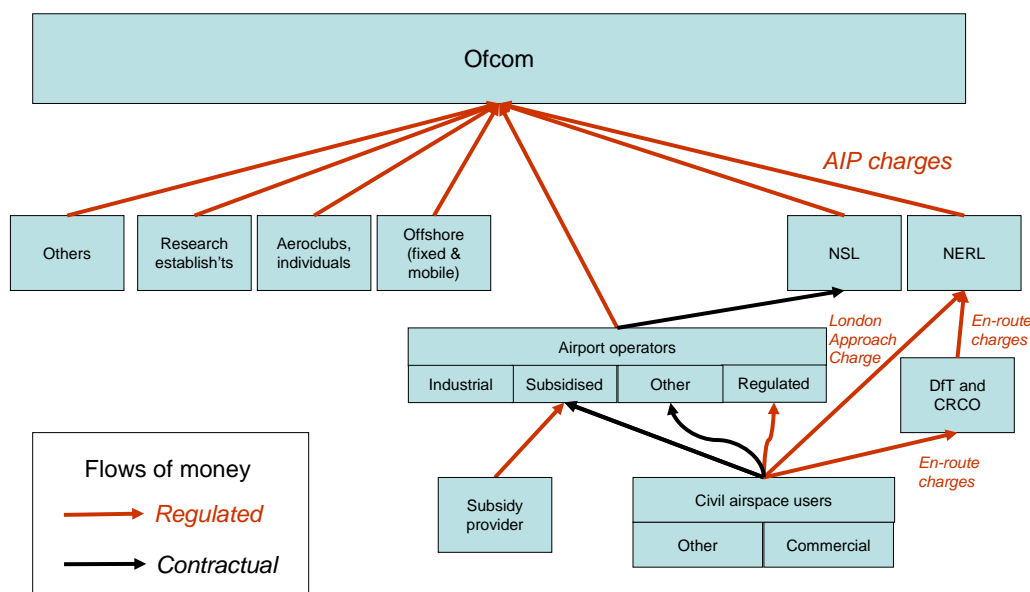


Figure 3-3: Financial flows (post 2010)

The flows from the various licence holders to Ofcom are the AIP charges. The flows below that line represent the various regulated and contractual charges that for the income of the various parties. They do not represent a judgement on how AIP charges could be passed through.

In subsequent paragraphs we discuss the main classes of licence holder in turn.

3.6.1 NERL

Charges levied on NERL form part of its cost base for regulatory purposes. NERL is about to enter its third price control period (CP3) and the CAA has initiated its investigation into how NERL's prices should be set. It is understood that the CAA will look sympathetically on NERL including any spectrum charges in the cost base for the period April 2010 to March 2015. It is therefore a reasonable assumption that any extra spectrum costs will be borne by the users of NERL's services.

NERL's regulated revenue comprises charges for area control services, and charges for the London Approach service.

Charges for area control services are charged to all users of UK airspace using a formula involving the square root of maximum take-off weight (MTOW) and the distance travelled in UK airspace, minus a 20 km allowance for the approaches to UK airports. This charge is administered by the Eurocontrol Central Route Charges Office (CRCO). Revenue to NERL from this source in the financial year April 2007 to March 2008 (2007/8) amounted to £519m⁵.

Charges for London Approach are made on all traffic arriving at or departing from London airports. In 2007/8 this amounted to £8.7m⁵.

NERL has additional sources of revenue, including revenue from the Ministry of Defence (MoD), from services to North Sea Helicopters, and other external services.

⁵ NERL Regulatory Accounts 2007/8

NERL also makes some charges to NSL for shared facilities. We have not been able to determine the magnitude of this charge. However, we note that the total intercompany revenue paid by NSL to NERL is £13.3m⁵, so this is an upper bound on the revenue obtained from such services.

The proposed AIP charges for VHF licences amount to around 0.2% of NERL's en-route plus London Approach Charges.

We have used data provided by the Eurocontrol Central Route Charges Office (CRCO) to assess how these charges are distributed between different types of airline. The incidence of charges is distributed as shown in Table 3-3. The percentages shown are the percentages of total regulated revenue.

Traffic segment	Area control charge	London Approach Charge	Total regulated charges
Domestic	12.9%	0.1%	13.0%
UK-Europe plus European overflights	38.2%	0.5%	38.7%
Intercontinental (including overflights)	47.8%	0.4%	48.2%
Total	98.9%	1.1%	100%

Table 3-3: Incidence of NERL's regulated charges

3.6.2 NSL

Charges levied on NSL in respect of licences for airport communications equipment will, as we discussed above, form part of the costs that they charge for their airport ANS. We have therefore included the charges for these licences as part of the airport's costs.

In addition, NSL holds some licences for other equipment. We have not been able to determine precisely who is the beneficiary of the services provided with the help of this equipment. We understand that some of it is related to the North Sea Helicopter Service, and some arises because of extra equipment required because of interference with radar signals caused by a wind farm. The total amount, however, is only £48,869 for VHF.

3.6.3 Heathrow

The proposed VHF charges for Heathrow airport amount to just over £28,000, a negligible quantity in the context of Heathrow's overall business.

The quinquennial price review for Heathrow has just been completed. It is seen as highly unlikely that it will be reopened to allow for the pass through of spectrum AIP costs. The costs will therefore, for the current pricing period, be borne by the owner of Heathrow, currently BAA.

In the next price review, taking effect in 2013, it would be reasonable for any increase in costs from spectrum pricing to be taken into account in the assessment. The costs from then on would be borne by the users of Heathrow.

The charge in respect of AIP for VHF licences should be seen in the context of the total costs of ANS provision at Heathrow (£50m⁶). It amounts to around 0.06%.

However, it is perhaps more relevant to consider the total aeronautical revenue of Heathrow, which amounted in 2007 to £624m.

Another interesting context is to look at the charge per passenger. In 2007, 68m passengers used Heathrow. The proposed AIP charge for VHF therefore amounts to around 0.042p per passenger.

3.6.4 Gatwick

The proposed VHF charges for Gatwick airport amount to £15,800.

The quinquennial price review for Gatwick, like that at Heathrow, has just been completed. The costs will therefore, for the current pricing period, be borne by the owner of Gatwick, currently BAA, although they might be passed through in the next pricing review from 2013.

The charge in respect of AIP for VHF licences should be seen in the context of the total costs of ANS provision at Gatwick (£16m). It amounts to around 0.1%.

However, it is perhaps more relevant to consider the total aeronautical revenue of Gatwick, which amounted in 2007 to £175m.

Viewed as a charge per passenger, this amounts to 0.045p per passenger.

3.6.5 Stansted

The proposed VHF charges for Stansted airport amount to £25,700.

The quinquennial price review for Stansted is currently not yet concluded (it is scheduled for a year later than that for Heathrow and Gatwick). Nevertheless, it is considered unlikely by all concerned parties that the review would consider increasing the regulatory cost base to allow for the introduction of spectrum AIP. The situation is therefore the same as for Heathrow and Gatwick, with the exception that the price review will take place a year later.

The final determination of the components of allowable costs is not complete, and we therefore cannot make a precise estimate of the ANS costs at Stansted. Stansted is two-thirds the size of Gatwick in terms of passengers, and 78% in terms of movements. There are some fixed costs associated with ANS provision, so a reasonable estimate of the costs of ANS provision at Stansted might be 85% of that at Gatwick or around £14m. In this light, the AIP charge for VHF licences would amount to around 0.18% of ANS costs.

Again, it might be more relevant to consider the charges in the light of the total aeronautical revenues at Stansted, which amount to £81m.

Viewed as a charge per passenger, the AIP VHF licence impact amounts to 0.11p.

⁶ See the CAA's documentation of the price review - paragraph 6.50 and table 6.13 of their initial November 2007 proposals. http://www.caa.co.uk/docs/5/ergdocs/priceproposals_nov07.pdf. These figures did not change in the final recommendation (accessible at http://www.caa.co.uk/docs/5/ergdocs/heathrowgatwickdecision_mar08.pdf), where Table 5.10 shows any deviations from the November 2007 document.

3.6.6 BAA non-London airports

BAA operates in the UK, in addition to the three major London airports, three Scottish airports, and Southampton.

The proposed VHF charges for these four airports, taken in total, amount to £91,040.

No estimate could be obtained for the ANS element of the costs at these airports. We understand from BAA, however, that using their estimate of the AIP charges (which we can confirm in total lies within our range) that the AIP charge amounts to 'up to 1%' of ANS costs.

The total aeronautical charges at these airports amounted in calendar year 2007 to £129m.

These airports are deemed by the regulator and the DfT to operate in competitive markets. This being the case, it could be supposed that an increase in costs arising through the imposition of AIP, applied uniformly across airports, should flow through to the market price. Simplistically, then, one would expect the costs to be passed through to the user.

However, we understand that for the three Scottish airports, BAA has entered into a voluntary agreement with its major users to price 'as if' regulated. In this case, the costs could well be borne by BAA initially, but ultimately passed on to the airports.

The total passengers carried at these airports amounted in 2007 to 23.2m. The proposed AIP charges for VHF licences therefore amount to a substantially larger sum than those at the London airports: 0.375p per passenger.

3.6.7 Other large airports serving commercial traffic

These airports comprise the eleven airports shown in Table 3-4. Of these, Manchester is clearly in a class of its own and so is dealt with separately.

Manchester

AIP charges for VHF at Manchester amount, according to the figures in section 2, to £57,609. Expressed as a cost per passenger, this amounts to 0.26p.

We have no information on the costs of ANS at Manchester.

Total aeronautical revenue in the year ending March 2008 amounted to £139m.

Manchester, like all the airports in this group, is deemed by the CAA and the DfT to be operating in a competitive market. One would therefore expect an increase in costs to be passed through to the airlines using the airports. In practice, however, the AIP costs may not be uniform. We explore this variation below, taking all the major airports, including BAA-owned ones, together.

Airport	Traffic data (2007)			
	Passengers (m)	Commercial movements	Non-commercial movements	Total movements
Manchester	22.11	213451	9252	222703
Luton	9.93	94367	25871	120238
Birmingham	9.23	111030	3649	114679
East Midlands	5.41	65629	28360	93989
London City	2.91	90403	774	91177
Liverpool	5.47	47098	39570	86668
Newcastle	5.65	60986	18214	79200
Belfast International	5.27	58304	19091	77395
Bristol	5.93	59778	16650	76428
Leeds Bradford	2.88	42701	22548	65249
Norwich	0.64	33551	20535	54086

Table 3-4: Traffic at large, non-regulated airports with mostly commercial flights

Other airports in the category

For the other airports in this category, the VHF AIP charge according to the proposals amounts to £0.34m. Again we have no systematic information on the ANS costs at these airports. Neither do we have systematic information on the overall aeronautical revenues, although these are disclosed for the airports in the Manchester Airports Group (Manchester and East Midlands in this class of airport). The figure for East Midlands was £29.5m.

The total passengers carried at these airports amount to 53.3m. The proposed cost per passenger at the airports therefore amounts to 0.65p. However, as airports serve increasing numbers of non-commercial movements, the cost per passenger becomes a less meaningful figure, since revenues will be derived from an increasing proportion of traffic with no reported passengers.

An approximate adjustment can be made for this effect by making an assumption of how the costs are shared between commercial and non-commercial traffic. It would not be appropriate to split the costs according to movements, since airport charges are in general dependent on aircraft size in some way (usually through MTOW) and non-commercial traffic tends to involve smaller aircraft.

In the absence of further information, we assume that costs are shared so that each non-commercial movement bears half the cost of a commercial movement. Using this assumption, we can calculate the share of the AIP costs that might be assigned to commercial traffic. Making this adjustment for non-commercial traffic, the cost per passenger falls to between 0.3p and 2.9p. We stress, however, that this adjustment is highly provisional, in that the ratio of revenues per movement between commercial and non-commercial movements is difficult to estimate.

The conclusions relating to individual airports in this category are shown in Table 3-5.

Airport	VHF AIP charge	Pence/pax	Charge/mvt	Adj p/pax
Manchester	£57,610	0.3	£0.26	0.3
Belfast	£34,900	0.7	£0.45	0.5
Birmingham	£42,900	0.5	£0.37	0.4
Bristol	£32,650	0.5	£0.43	0.4
East Midlands	£32,650	0.6	£0.35	0.4
Leeds Bradford	£32,300	1.1	£0.50	0.7
Liverpool	£32,650	0.6	£0.38	0.3
London City	£18,400	0.6	£0.20	0.6
Luton	£52,450	0.5	£0.44	0.4
Newcastle	£32,650	0.6	£0.41	0.4
Norwich	£32,650	4.7	£0.60	2.9
Total airports this category	£401,810	0.5	£0.37	0.4

Table 3-5: AIP for VHF licences at large airports with mostly commercial flights

3.6.8 Small airports serving commercial traffic

These ten airports vary hugely both in size (from 2750 movements a year to nearly 50,000) and in the degree to which they serve commercial air transport, from 50% to nearly 100%. Some further airports in this category in Scotland are owned by Highlands and Islands Airports Limited (HIAL), which is in receipt of a subsidy from the Scottish Government. These are discussed separately in Section 3.6.11.

Airport	Passengers (m)	Traffic data (2007)		
		Total movements	Commercial movements	Non-commercial movements
Cardiff	2,111,148	43963	24284	19679
Belfast City	2,186,993	43022	41746	1276
Lands End	29,005	14718	7425	7293
Scilly St Mary's	134,361	14138	12700	1438
Scatsta	252,905	12961	11779	1182
Doncaster	1,078,374	12667	9959	2708
Derry	427,640	11598	6130	5468
Newquay	376,792	11178	10421	757
Penzance	115,998	6899	6643	256
Scilly Tresco	44,570	2752	2690	62

Table 3-6: Traffic at small airports with mainly commercial traffic, 2007

The AIP cost to these airports for VHF licences amounts to around £184,000. The costs per movement of these VHF licences varies from small (where only the low-coverage VHF is required) to over £2.50 a movement at Doncaster and Newquay.

Using the adjustment described in the previous section, we see a cost per passenger of on average 2.2p, although at some airports this could be as much as 8p.

The licence requirements at these airports vary hugely. Small heliports, such as those serving the Isles of Scilly, appear to require only one or two VHF licences, and only those with limited coverage. Others have more powerful VHF requirements, pushing the costs up greatly and may decide to downgrade facilities if AIP is applied.

These small airports are deemed by the CAA and DfT to be in a competitive environment, so costs imposed on all airports will, in principle, be passed through.

Airport	AIP charge for VHF	Pence/pax	Charge/mvt	Adj p/pax
Cardiff	£37,109	1.7	£0.84	1.0
Belfast City	£32,650	1.5	£0.76	1.4
Lands End	£2,080	4.7	£0.14	3.6
Scilly St Marys	£9,900	7.4	£0.70	6.6
Scatsta	£19,975	7.9	£1.54	7.2
Doncaster	£32,650	3.0	£2.58	2.4
Derry	£12,500	2.9	£1.08	1.6
Newquay	£32,340	8.1	£2.89	8.0
Penzance	£4,680	4.0	£0.68	3.9
Scilly Tresco	£2,080	4.7	£0.76	4.6
Total airports in this category	£185,964	2.7	£0.86	2.2

Table 3-7: AIP charges at small airports with mainly commercial traffic

3.6.9 Larger airports serving mostly non-commercial traffic

These eight airports each served more than 50,000 movements in 2007, of which more than half were not commercial air transport.

Airport	Traffic data (2007)		
	Total movements	Commercial movements	Non-commercial movements
Gloucestershire	78694	2860	75834
Bournemouth	71742	13491	58251
Shoreham	70420	3890	66530
Biggin Hill	69244	8723	60521
Blackpool	58824	15116	43708
Durham Tees Valley	57515	21020	36495
Coventry	54925	13743	41182
Exeter	50062	20096	29966

Table 3-8: Traffic at larger airports with mainly non-commercial traffic, 2007

The AIP cost for VHF licences for this group would amount to just over £270,000, or on average 53p a movement.

Airport	AIP charge for VHF	Charge/mvt
Gloucestershire	£32,300	£0.41
Bournemouth	£33,000	£0.46
Shoreham	£32,300	£0.46
Biggin Hill	£22,750	£0.33
Blackpool	£32,300	£0.55
Durham Tees	£32,300	£0.56
Coventry	£42,550	£0.77
Exeter	£42,550	£0.85
Total airports in this category	£270,050	£0.53

Table 3-9: AIP at larger airports serving mainly non-commercial flights

Shoreham served over 70,000 movements in 2007, and has only four VHF licences. The current traffic at Shoreham consists very largely of private general aviation flights, although there is a small number of scheduled passenger services, and some public utility flights.

There is no systematic data on revenues for these airports. However, we have examined some price lists. Airports of this type generally earn most of their income through landing charges, although there is supplementary income from parking charges and from profits on fuel sales. Some airports also earn income from ground-based services, although at others this is outsourced. Where passengers are served, an extra charge is often made – sometimes this includes a separate component to cover the costs of providing border security.

The potential charges per movement discussed above can be viewed in the context of the airports' published prices. The general pricing policy of airports in this class is to charge per tonne (MTOW). Prices vary widely but are generally in

the region of £10-£25 per tonne. Depending on the commercial policy of the airport, prices can be flat rates per tonne, reducing rates for heavier aircraft, or increasing weights for heavier aircraft.

For airports where there are aspirations to serve large volumes of commercial traffic (examples from the above list include Bournemouth, Durham Tees Valley, Coventry and Exeter), the average tonnage might be expected to be quite high. In these cases the proposed AIP charges might form a relatively small proportion of the total landing charge and even less of total aeronautical charges (including passenger fees). However, in the one case for which we have been able to obtain data, the total aeronautical income at Bournemouth (owner by Manchester Airport Group) in 2007/8 was around £4.7m. The proposed AIP charges amount therefore to 0.7%.

The impact at airports specialising in general aviation (such as Gloucestershire or Shoreham) appears to be small. Charges for spectrum use for VHF licences amount to no more than 85p a movement.

3.6.10 Small, reporting airports serving mostly non-commercial flights

These twelve airports each served fewer than 50,000 movements in 2007, of which fewer than half were commercial air transport.

Airport	Traffic data (2007)		
	Total movements	Commercial movements	Non-commercial movements
Prestwick	47910	22971	24939
Southend	39881	3564	36317
Cambridge	38983	2080	36903
Humberside	38797	18198	20599
Swansea	26663	1981	24682
Lydd	24725	1135	23590
Carlisle	23363	952	22411
Hawarden	22801	1443	21358
Kent Int	21521	2334	19187
Plymouth	18377	5386	12991
Bembridge	13354	0	13354
London Heliport	13126	5341	7785

Table 3-10: Traffic at small airports with mainly non-commercial flights

Airport	AIP charge for VHF	Charge/mvt
Prestwick	£33,000	£0.69
Southend	£42,550	£1.07
Cambridge	£32,650	£0.84
Humberside	£32,300	£0.83
Swansea	£2,600	£0.10
Lydd	£22,750	£0.92
Carlisle	£12,500	£0.54
Hawarden	£22,400	£0.98
Kent Int	£32,650	£1.52
Plymouth	£12,500	£0.68
Bembridge	£2,950	£0.22
London Heliport	£2,600	£0.20
Total airports in this category	£251,450	£0.76

Table 3-11: AIP at small airports with mainly non-commercial flights

The AIP charge for VHF licences at these airports is around £250,000, or around £0.76 per movement on average.

Again there is variation in the charge between airports, with Swansea airport having the lowest charge per movement at 10p, whilst the charge at Kent International is £1.52 per movement.

As for the previous class, there is no systematic data on revenue or prices. Pricing in general appears to be on the same per tonne basis as the larger airports. The same observations apply. For airports with aspirations to serve commercial traffic (Prestwick, Southend, Humberside) the overall AIP charge per movement might form a small proportion of the total.

One of the airports in this group is Hawarden, owned by BAE. We understand that this airport is largely for industrial use, and therefore different economic considerations might apply.

3.6.11 Airports in peripheral regions

We discuss separately the airports in the peripheral regions of Scotland. These are owned mostly by Highlands and Islands Airports Limited (HIAL), although a few are owned by local authorities – Argyll and Bute Council and Shetland Council. The Argyll and Bute Council airports do not report traffic data to the CAA; neither do some other small airports owned by local authorities, charities, or community organisations. The group discussed here therefore comprise the eleven HIAL airports, plus Tingwall in Shetland.

Airport	Traffic data (2007)			
	Passengers	Total movements	Commercial movements	Non-commercial movements
Inverness	703,408	39139	22205	16934
Dundee	65,419	37292	4104	33188
Kirkwall	144,254	15574	14345	1229
Sumburgh	150,443	13984	11341	2643
Stornoway	127,768	12716	10358	2358
Wick	22,935	6327	3499	2828
Benbecula	35,607	4810	4664	146
Campbeltown	9,181	3674	1332	2342
Islay	28,486	2650	1796	854
Tingwall	5,059	2050	2028	22
Barra	10,415	1296	1212	84
Tiree	7,807	868	762	106

Table 3-12: Traffic at peripheral, subsidised airports

Airport	AIP charge for VHF	Charge/mvt
Inverness	£11,980	£0.31
Dundee	£9,900	£0.27
Kirkwall	£9,900	£0.64
Sumburgh	£11,200	£0.80
Stornoway	£9,900	£0.78
Wick	£9,900	£1.56
Benbecula	£9,900	£2.06
Campbeltown	£2,600	£0.71
Islay	£2,080	£0.79
Tingwall	£1,300	£0.63
Barra	£1,300	£1.00
Tiree	£2,080	£2.39
Total airports in this category	£82,040	£0.58

Table 3-13: AIP at peripheral, subsidised airports

HIAL is in receipt of a substantial grant from the Scottish Government.

The AIP charge in respect of VHF licences at these airports amounts to £82,040 or around £0.58 a movement. However, at certain airports this cost per movement can be as high as £2.39 (though note that with such a small number of movements, this figure is highly sensitive to small changes).

This can be set in the context of aeronautical revenue for HIAL in 2007/8 of £12.0m, and a subsidy from the Scottish government of £15.3m.

As with the other small reporting airport categories, the charge per movement is very variable.

It is assumed that these subsidised airports will not be required to pass the AIP costs through to their users.

3.6.12 Non-reporting aerodromes

A large number of airports and aerodromes are not required to report traffic to the CAA, as they serve no commercial air transport. We have no information therefore on the traffic that they serve. At the margin, these aerodromes are difficult to distinguish from flying clubs and training schools, who often have exclusive use of an aerodrome.

With the current AIP proposals, the total charges to such aerodromes for VHF licences amount to £362,875, including airports owned by Argyll and Bute Council and other Scottish local authorities.

However, most of these organisations hold one VHF Air/Ground licence or similar, and the burden will generally be only £2600, or lower if a discount is applicable.

Table 3-14 lists the non-reporting aerodromes in order of their total proposed AIP charge.

Aerodrome	AIP charge (VHF)	Aerodrome	AIP charge (VHF)
Farnborough	£42,550	Dunkeswell	£2,600
Warton	£28,300	Elmsett	£2,600
Filton	£25,700	Eshott	£2,600
Oxford	£23,100	Fishburn	£2,600
Cranfield	£22,750	Foula	£350
Woodford	£22,750	Great Oakley	£2,600
Yeovil	£22,400	Haverfordwest	£2,600
Redhill	£12,500	Headcorn	£2,600
Lasham	£9,900	Henstridge	£2,600
Wolverhampton	£9,900	Little Rissington	£2,600
Crowfield	£2,600	Newcastle heliport	£2,600
Fairoaks	£2,600	North Weald	£2,600
Oban	£2,600	Northolt	£350
Barton	£2,600	Nottingham	£2,600
Blackbushe	£2,600	Perth	£2,600
Caernarfon	£2,600	Old Sarum	£2,600
Cumbernauld	£2,600	Redlands	£2,600
Elstree	£2,600	Rocester	£350
Kemble	£2,600	Rougham	£350
Retford/Gamston	£2,600	Sandtoft	£2,600
Rochester	£2,600	Seething	£2,600
Sywell	£2,600	Sherlowe	£2,600
Wellesborne	£2,600	Stapleford	£2,600
West Wales	£2,600	Sturgate	£2,600
White Waltham	£2,600	Tatenhill	£2,600
Walney Island	£8,150	Turweston	£2,600
Dunsford Park	£2,950	Wasing Lower	£2,600
Goodwood	£2,600	Welshpool	£2,600
Badminton	£2,600	Wickenby	£2,600
Bagby	£2,600	Enniskillen	£2,600
Bruntingthorpe	£2,600	Coll	£2,080
Cardiff heliport	£2,600	Colonsay	£2,080
Compton Abbas	£2,600	Glenforsa	£2,080
Crosland Moor	£2,600	Fair Isle	£1,300
Damyns hall	£2,600	Skerries	£175
Deanland	£2,600	Unst	£1,300
Denham	£2,600		

Table 3-14: AIP impacts at non-reporting aerodromes

The largest burdens are borne by Farnborough, an airport serving business users, and industrial airfields, in particular BAe's sites, and the Westland site at Yeovil. It

is thought unlikely that charges at the level suggested will make a significant impact on such airfields.

A number of aerodromes in this category appear to have similar characteristics to the larger ones discussed in the previous section. Further analysis is provided in Annex C.

3.6.13 Aeroclubs and flying schools

The estimated cost of spectrum for VHF for this group is around £150,000. Most of these users will pay for a single, low-coverage VHF licence. A few, however, maintain the more expensive AFIS licences, at £2600, and one, the RAF flying club, holds an APP licence at £9900. There are cases, as well, where a single airfield will hold multiple licences; the extreme case is Snitterfield, where the Stratford-on-Avon Gliding Club holds 25 licence assignments on five frequencies.

The proposed pricing system might encourage substituting lower-coverage licences for the AFIS, or economising on the number of licences held.

It is not possible to estimate how widely this burden will be spread. However, it could be that at the higher end of this range of prices, some elasticity might be observed among the members or trainees.

3.6.14 Private individuals

327 VHF licences appear to be held by private individuals. The vast bulk of these are the low-coverage or sports licences, although there is one AFIS licence. In many cases these may in practice be small private airfields, and thus similar in nature to the smaller members of the class described in Section 3.6.12. The total charges for this class of user amount to £100,000, though this may be significantly lower if the concept of a common aeronautical licence for certain uses were established. The same considerations apply as outlined in the previous paragraph.

3.6.15 Offshore installations

A large number of offshore installations, both fixed platforms and ships, maintain aeronautical licences. These include VHF licences, exclusively of the low-coverage variety. The total AIP charge for this group is around £605,000. This comprises fixed sites and mobile sites where fees of £2600 and £350 respectively are payable. We have no way of estimating the relevant cost base of such installations, but we are confident that the AIP fees will be small compared to the value of the industry which it supports. The Government received £8 billion in tax from oil and gas producers in 2007/8.

3.6.16 Research establishments and test sites

Research and testing establishments maintain individual VHF licences. The AIP charges amount to £7685 for VHF.

3.6.17 Air services companies and airlines

A number of organisations that operate from aerodromes or around airports hold VHF licences, including airlines, aircraft charter companies, and suppliers of airborne services or services to airlines and airports. These are intrinsically for surface communications so comprise the lowest-cost licences. The magnitude of the impact of VHF AIP on this group is just short of £200,000.

3.6.18 Other organisations

Other licences are held by the police, by museums, and by organisations we have been unable to classify.

3.7 Spectrum charges and airport competition

The proposed charges differ greatly between airports, and, in an environment where airports are often in competition with each other, might have an influence on that competition and the choice of equipment.

Figure 3-4 shows the range of proposed AIP charges for VHF at the airports serving mainly commercial traffic (omitting the three regulated London airports, and Manchester, for clarity).

The expected increase in costs per movement for smaller airports is evident, since AIP is to some extent a fixed cost and must be shared among fewer users. At the very small end, some airports have very low AIP costs since they can operate without the full range of equipment.

There are nevertheless some extreme variations among airports of similar size.

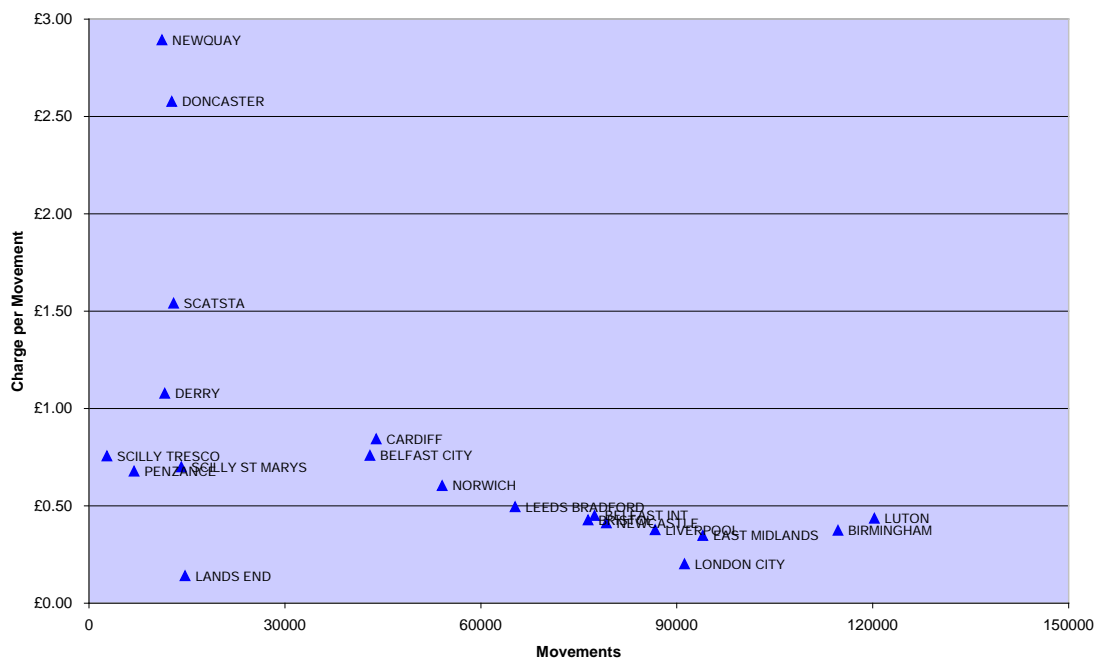


Figure 3-4: Proposed charge per movement for VHF licences at airports with mainly commercial flights

Figure 3-5 shows the picture for airports with mainly non-commercial flights. Again, the picture shows general economies of scale, but with lower costs at the very smallest airports. However, as for the airports serving commercial traffic, there is huge variation even among airports of comparable number of movements.

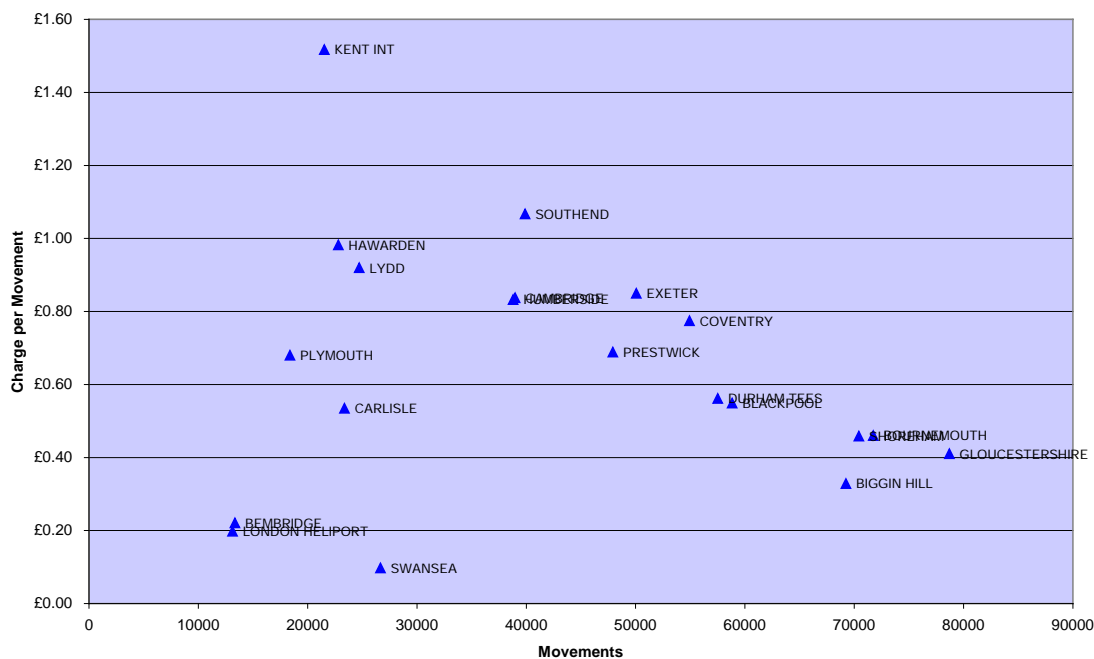


Figure 3-5: Proposed charge per movement for VHF at airports with mostly non-commercial flights

3.8 Conclusions

The impact of imposing AIP charges for VHF on aviation users falls will fall on a number of different classes of user. The impact on the industry as a whole will be around £4.1m annually.

The largest individual impact (£1.3m) falls on NATS En-Route plc (NERL), the regulated UK air navigation service provider. Those extra costs amount to 0.2% of NERL's regulated cost base. We understand that these costs are likely to be passed through to airlines under the next regulatory price review.

More than half the costs fall on airports. At the top end, the UK's larger airports will face AIP charges amounting to a relatively small proportion of their aeronautical revenue. Furthermore, at most airports (given that AIP is an industry-wide charge) the charges will be passed through to users. Charges amount to no more than a few pence per passenger at such airports.

At the airports at which charges are regulated, AIP charges are unlikely to be able to be passed through in the short term, but amount to only a fraction of a penny per passenger.

The impact on smaller airports becomes proportionately larger, although at most amounts to around 6p per passenger.

Other impacts fall on aeroclubs, flying schools, private individuals, offshore installations, and research establishments. They form around 13% of the total charges, or around £600,000 in total. To put this into perspective a 2006 estimate of overall expenditure on private general aviation was £318 million.⁷ For the most part, these organisations will face quite low charges of £350 or £2600 per year, which, although significantly higher than the present cost is unlikely to be material. The proposed charges may well have an impact on small airfields, aeroclubs, etc, which hold multiple licences or AFIS licences, and influence them in their choice of whether to maintain or replace these, however the concept of the sports licence will reduce this burden significantly.

⁷ Lober. February 2006. General aviation small aerodrome research study. An estimate of the annual direct socio-economic contribution of GA to the UK economy. Table 15.
<http://www.gaac.co.uk/gasar/gasar.htm>

4 Economic Analysis

4.1 Overall impacts taking account of economic, regulatory and contractual considerations

The previous sections have considered the magnitude of assumed AIP relative to other revenues and in terms of end user impacts.

Impacts were assessed on the basis of an assumed 100 per cent pass through along the value chain, no change in spectrum demand and no reduction in final demand. In practice dynamic adjustments can be expected which will change the magnitude and potentially the distribution of impacts over time. Further, contractual and regulatory arrangements could alter the timing and magnitude of impacts along value chains. The implications of these considerations are discussed below.

4.1.1 Pass through

An economic assumption of 100 per cent pass through is reasonable where markets are competitive and an input cost change is common across market players. It is also the assumption made by the European Commission in assessing the impact on aviation of the European Emissions Trading scheme.

In the case of Heathrow and to a lesser extent Gatwick and Stansted respectively, constraints on runway capacity mean that end user prices will already reflect such scarcity, and the imposition of AIP could see substantially less than 100 per cent pass through to end user prices, and a corresponding reduction in airline profits. To the extent that there is a reduced impact on end user prices there would be less (or potentially no) impact on demand for air travel from these airports (consistent with the fact that there is currently excess demand).

In the case of not for profit and/or publicly funded entities the impact depends on opportunities for cost pass through to end users and/or funding agencies. In relation to subsidised Scottish and Highlands air services our assumption is that additional costs would be offset by additional public subsidy.

Where economic regulation applies, in relation to some NATS aeronautical navigation services and Heathrow, Gatwick and Stansted airports pass-through of prudently incurred costs is anticipated, but with a lag depending on the time of introduction of AIP. New price controls will be implemented for in January 2011 for NATS, March 2013 for Heathrow and Gatwick, and March 2014 for Stansted. Contractual arrangements may also introduce lags before AIP ends up in final prices.

4.1.2 Impact on spectrum demand

In relation to spectrum demand, in some areas demand is growing in the absence of AIP, for example, aeronautical communications. The application of AIP would be expected to reduce spectrum demand relative to a business as usual scenario (and potentially in absolute terms for some services) as operational and equipment purchase/replacement decisions are reassessed to reduce spectrum costs. Assuming overall demand for spectrum is reduced the impact of AIP on costs and prices would be less than calculations in this report indicate. However, demand reduction would occur over time, so initially estimates of impacts based on current use are reasonable, but overstate longer term impacts.

4.1.3 Overall impact including final demand response

In relation to final demand, as, and to the extent that, AIP is passed on to final consumers demand will be correspondingly reduced. In the aeronautical sector, a demand elasticity (the percentage reduction in demand for a given percentage increase in price) of -0.45 has been estimated for the UK (see Appendix A for details).⁸

However, the magnitude of final price increase involved with the application of AIP for VHF use in the aeronautical sector, assuming full pass through, is very modest at around 0.1 per cent and the reduction in demand would therefore be expected to be approximately half this, or around 0.05%.

A negligible reallocation of aeronautical activity away from the UK is anticipated as a result (see Appendix for details).

A sense of perspective is gained by considering other costs. For example, both air passenger duty and the potential opportunity cost (with both gifted and purchased permits) of inclusion of aviation in the European Emissions Trading scheme from 2012 are roughly two orders order of magnitude greater than the charges envisaged with AIP (a €30 per tonne carbon charge would amount to €1080 million per annum). Further, increases in air passenger duty in the UK are expected to increase revenue from this source from around £1 billion currently to over £3 billion in 2011/12.

In conclusion, AIP is designed to change behaviour in relation to spectrum use. Relative to other costs in relation to spectrum related services AIP would be material and would reasonably be expected to change behaviour over time. However, in relation to overall costs in the value chain comprising final service provision proposed levels of AIP are very modest and would be expected to have a negligible impact on final demand for services.

⁸ Department for Transport. January 2009. "UK air passenger demand and CO2 forecasts." <http://www.dft.gov.uk/pgr/aviation/atf/co2forecasts09/co2forecasts09.pdf>

A Economic Framework

A.1 Potential Responses to AIP

The impact of AIP and the incidence in terms of who pays ultimately depend on the response to AIP. The response to AIP involves three elements:

- A potential reduction in the amount of spectrum used to generate a particular service such as air navigation. This might require additional use of other resources such as capital labour to reduce spectrum demand, for example, through re-planning of the way in which frequencies are used to release spectrum.
- A potential reduction in final demand for the services that create demand for intermediate services and therefore spectrum. To the extent that spectrum charges are passed through to end consumers - after allowing for any efficiency savings – they will result in some reduction in demand.
- A potential change in supply in response to the change in demand which in turn which in turn may change unit costs and the incidence of the final impact.

It is likely in practice that the first response will dominate the other two, given that spectrum costs would make up a far greater proportion of the costs of say air traffic services than they are of overall aviation sector costs. Nevertheless, in terms of the final incidence of charges supply and final demand responses do matter. We also consider the possibility that introduction of AIP would motivate efficiency unrelated to spectrum use.

Other considerations that would impact on the magnitude and timing of price pass through and response are contractual considerations and economic regulation (a form of “contract”). The latter applies to both some airports and air traffic services. Both contractual relationships and regulation could result in a lag before AIP charges are passed along the value chain.

Competitive conditions can also impact on the pass through of costs. Pass through of increased costs into final prices would be expected in competitive markets where the cost increase is common to all service providers. In contrast, with imperfect competition pass through may be more or less than 100%⁹. We assume 100% pass through on average.

Finally, if constraints apply to other inputs then final end user prices may already be elevated reflecting scarcity and end user prices may be relatively unresponsive to the introduction of AIP. This applies in particular to Heathrow, but also Gatwick and Stansted.

A.2 Static Picture of Supply, Demand and Incidence

It is helpful in thinking about responses to AIP to have a simple picture of supply and demand in mind. Two cases need to be considered:

- The supply and demand for spectrum.

⁹ Defra. November 2007. “A study to estimate ticket prices changes for aviation in the EU ETS.” <http://www.defra.gov.uk/environment/climatechange/trading/eu/pdf/ticketprices-report.pdf>

- The supply and demand in intermediate and final service markets where spectrum is one input among many.

Figure 1 illustrates the impact on the supply and demand for spectrum considering two competing users/uses of spectrum competing for a fixed amount of spectrum.

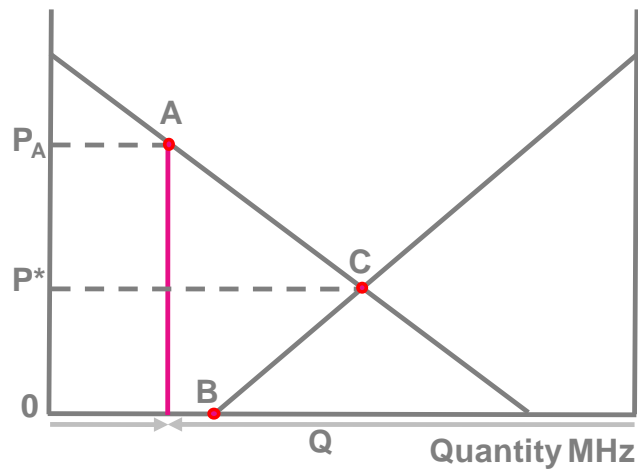


Figure 1: Marginal opportunity cost of spectrum

Figure 1 illustrates two potentially competing uses of a given band, with scarcity of spectrum for use A (say mobile broadband) and no scarcity for use B (say VHF communications). The existing allocation constraint is shown by the vertical line terminating at A. The optimal allocation of spectrum without the constraint is at point C. Spectrum pricing is designed to move towards this efficient allocation, and the efficient price that would achieve this is P^* . A further point is that spectrum pricing will be most effective at motivating spectrum efficiency when it is applied to those whose behaviour most directly impacts on spectrum demand.

The imposition of AIP could have a potentially significant impact on spectrum demand (price has moved from zero to an approximation of P^*). However, the impact on price and demand in intermediate and final service markets will be much more modest since spectrum is only one input among many. Figure 2 illustrates this.

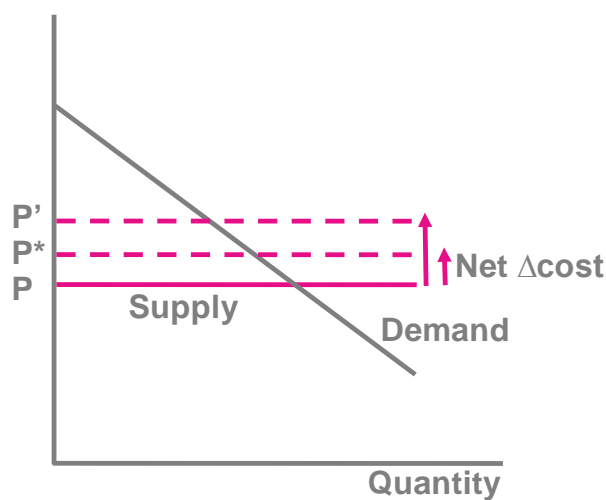


Figure 2: Adjustment in final service market

For illustrative purposes we have assumed that supply is horizontal (unit costs of production are constant) and that the market is competitive. In this case the

change in final prices is equal to the change in input costs. Two price changes are shown – P' and P*. The first P' corresponds to the full impact of AIP assuming existing demand for spectrum, the second P* allows for the fact that spectrum demand may fall in response to pricing (as illustrated in Figure 1). In practice there may be intermediate markets, for example, AIP might be applied to aeronautical VHF communications, which in turn would raise the price of air traffic services, which in turn would raise the price of air services¹⁰. The demand reduction from end consumers would then feedback through the chain of linked markets.

If the supply curve were upward sloping (unit costs rise with output) then the adjustment to final prices would be smaller than the increase in input costs, and if competition is imperfect the impact on final prices may be larger or smaller than the cost increase.

Finally, if constraints apply to other inputs then final end user prices may already be elevated reflecting scarcity and end user prices may be relatively unresponsive to the introduction of AIP. In particular some routes and some airports are capacity constrained. In relation to some routes there are capacity restrictions in bilateral agreements, though this will be less of an issue with Open Skies. In relation to airports the Competition Commission concluded that Heathrow is “*characterised by capacity constraints and excess demand*” whilst Gatwick as excess demand some of the time and Stansted does not face excess demand¹¹. The reason for this is that where other inputs such as runway capacity are scarce one would expect prices to already be marked up, and AIP may be absorbed rather than passed on to final end users.

A.3 Dynamic Consideration

A.3.1 Lagged Response

Adjustment to AIP will take time with the longer term response larger than the short term response since capital investment decisions are involved, existing assets may continue to be utilised for some time and planning and regional or international coordination may be required to achieve potential savings. Regulatory and contractual arrangements may also limit pass through in the short term.

The phased nature of response is not of itself a reason for phasing in price changes. There are short term and long term adjustments in other markets, for example in response to changes in energy prices, yet it is economically efficient to allow these price changes to be reflected through the value chain without artificial delay.

A.3.2 Feedback from Response to Efficient Pricing

The magnitude of anticipated response does, however, potentially impact on the efficient level of pricing. In a market these feedbacks may be near instantaneous

¹⁰ In point of application of a charge within a value chain does not necessarily alter the final incidence in terms of who pays. Harberger. 1962. "The incidence of the corporation income tax." Journal of Political Economy, 70.

¹¹ Competition Commission. August 2008. "BAA airports market investigation – provisional findings report." Paragraphs 4.141, 4.138 and 6.6
http://www.competition-commission.org.uk/inquiries/ref2007/airports/pdf/prov_find_report.pdf

and prices will adjust until supply and demand are in equilibrium. When prices are set administratively there will be lags in price adjustment due to the time taken to calculate and adjust prices. These lags, combined with potential asymmetry in the costs of setting prices initially too high (underuse of spectrum) versus too low (insufficient incentive to change behaviour and/or reallocate spectrum) may mean that AIP should be set below or above (less likely) the best estimate of the opportunity cost of spectrum¹².

Historically Ofcom have adopted a conservative approach to spectrum pricing, setting prices below the best estimate of opportunity cost given uncertainty over the likely response and efficient level of pricing in equilibrium. For example, Ofcom note that *“In relation to setting the ‘correct price’ for spectrum, Ofcom is aware of the informational issues in setting AIP and has a policy of setting AIP conservatively for that reason”*¹³.

A.4 Regulatory and Contractual Issues

Both regulatory and contractual considerations could impact on the timing and magnitude of cost pass-through. Regulatory and contractual arrangements could also impact on the incentive to make spectrum efficiency gains.

Regulatory considerations are more transparent (contracts are in general private). Regulatory considerations apply to some air traffic control services and some airports, but not ports. These considerations are set out below.

A.4.1 Airports

Charges at the BAA airports Heathrow, Gatwick and Stansted are regulated by the CAA¹⁴. The charge controls run for a period of five years. Other airports are not price regulated and have a mix of scheduled prices and contractual relationships with airlines.

On 11 March the CAA published its findings on the Economic Regulation of Heathrow and Gatwick airports for the period 1 April 2008 to 31 March 2013¹⁵. This set the overall level of price controls for these airports, which now include NATS charges for air navigation services which were previously levied directly to aircraft operators at Heathrow and Gatwick. NATS contracts with BAA over the level of charges.

In relation to Stansted, the CAA made a reference to the Competition Commission in April 2008 for the period 1 April 2009 to 31 March 2014 and the Competition Commission reported in November 2008 on recommended charges¹⁶.

¹² Indepen-Aegis. April 2007. “Aeronautical and maritime spectrum pricing.” Appendix E. <http://www.ofcom.org.uk/research/radiocomms/reports/spectrumpaip/aipreport.pdf>

¹³ <http://www.ofcom.org.uk/consult/condocs/futurepricing/statement/statement.pdf>

¹⁴ The CAA proposes a charge control and refers this to the Competition Commission, the Competition Commission reports on the proposals and the CAA decides on the final charge control. Manchester airport was previously regulated, but is no longer a designated airport.

¹⁵ CAA. March 2008. http://www.caa.co.uk/docs/5/ergdocs/heathrowgatwickdecision_mar08.pdf

¹⁶ CAA. April 2008. http://www.caa.co.uk/docs/5/ergdocs/stansted_reference_apr08.pdf and Competition Commission. 4 November 2008. http://www.competition-commission.org.uk/rep_pub/reports/2008/539stansted.htm

The regulated airports will have an incentive to economise on spectrum related costs under the price controls since the CAA and users will scrutinise cost assumptions, and the airports operate under 5 year price caps. Further, under the proposed separation of ownership of London airports there would be additional competitive pressure in relation to spectrum costs.

A.4.2 NATS

NATS enroute services provided by NERL and London approach charges are regulated by the CAA¹⁷. The NATS price control for En route and Oceanic Air Traffic Control was set in 2006 by CAA for the period 2006-2010. The CAA decision states in paragraph 31, in relation to the regulatory asset base (RAB) that: *“For the avoidance of doubt, the opening RAB in CP3 would also take into account any adjustment made in respect of radio spectrum costs.”* In other words a change in spectrum pricing would be reflected in the next price control.

A review of the current charge control began in October 2008 and the new charge control will apply from January 2011 to December 2015¹⁸. In the initial consultation the CAA note that spectrum related charges may increase and ask how any increase should be treated.

NATS will have an incentive to economise on spectrum related costs under the price control since the CAA and users will scrutinise cost assumptions, and NATS operates under a price cap which allows retention of outperformance for five years under a rolling incentive mechanism (under which savings are in effect kept for five years irrespective of when they are made within a price control period).

A.5 Contractual Issues

In a 2007 spectrum pricing study for Ofcom¹⁹ it was noted that contractual arrangements may limit the extent to which changes in cost can be passed on in the short term but these can be expected to be modified in the longer term to take account of changes in spectrum fees. The study noted that Air Traffic Service (ATS) contracts are usually for five or more years but the other terms are not public.

Parties to contracts might be expected to have been aware of the prospect of an increase in spectrum costs since the time of the Cave review in 2002²⁰, and might be expected to make contractual provision for the change, if they thought it material.

¹⁷ CAA. Commentary on the price control condition in the NERL licence. Revenues from Shanwick Oceanic control services and North Sea Helicopter Advisory services are also regulated.
http://www.caa.co.uk/docs/5/ergdocs/erg_ercp_natslicencecommentary.pdf

¹⁸ CAA. October 2008. NATS (En Route) plc price control for Control Period 3, 2011-2015.
<http://www.caa.co.uk/docs/5/ergdocs/081029CP3ApproachConsult.pdf>

¹⁹ Indepen-Aegis, April 2007, “Report on Radio Spectrum Administered Incentive Pricing for Aeronautical and Maritime sectors”

²⁰ Martin Cave. March 2002. “Review of radio spectrum management.”
http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf

A.6 Potential Spectrum Efficiency Savings

It is not possible to draw on experience and estimated price-demand elasticity relationships to estimate the impact on spectrum demand of AIP since there is no experience of spectrum pricing to draw on (what is proposed is the introduction of a price, not an incremental change to an existing price). The response to AIP will also depend on future expectations regarding the price of spectrum since investment decisions, both in terms of capital and managerial time, are involved in achieving reductions in spectrum use.

The response to AIP will also depend on the detailed structure of prices which is, as yet, undecided. For example, were a flat rate per kHz to apply to VHF communications the response would be different than if tiered rates applied depending on the level of spectrum sterilisation (in turn dependent on equipment power and other factors). Further, the response would depend on whether ground equipment only was subject to AIP, or aircraft equipment was also subject to AIP (whilst ensuring that there was no excess recovery overall).

Further, the purpose of pricing is to ensure that users of spectrum factor to their decisions about use of spectrum, including equipment replacement and band planning decisions, the opportunity cost of spectrum. If it were possible to perfectly second guess the response, then it would be possible to impose an efficient outcome administratively. In practice this is not possible and that is the rationale for pricing (and/or spectrum trading).

It is however possible to consider some of the ways in which demand might change and to draw on existing engineering cost estimates of alternative ways of meeting demand for services in the aeronautical sector to illustrate some of the possible responses to AIP. In principle options for reducing demand for spectrum might include:

- Investing in more infrastructure to achieve the same quantity and quality of service with less spectrum.
- Adopting narrower bandwidth equipment.
- Replanning a band to allow the release of a block of unused spectrum.
- Switching to an alternative band.
- Switching to an alternative service or technology.
- Speeding up technology transitions and switching off legacy systems.
- Changing the nature of end use, for example, utilising larger aircraft which increase passengers and revenue per MHz.

The 2007 pricing study for Ofcom included the estimated costs of achieving reductions in spectrum demand, including estimates based on work by Eurocontrol and QinetiQ for aeronautical radio²¹.

New equipment utilising more spectrally efficient technology might also be developed in response to AIP, or replacement purchases of more spectrally efficient technology brought forward.

²¹ http://www.eurocontrol.int/ses/gallery/content/public/docs/ru/SES_IOP_VCS_JMA_v2.0.pdf

The overall response to AIP may therefore be more continuous as a function of price than specific existing engineering estimates would suggest. In particular, the option to bring forward equipment replacement would be a continuous function of price in the sense that the economic case for bringing forward replacement improves the higher the price of spectrum and existing assets will have a distributed age profile. It is not therefore sensible to think of a specific threshold at which AIP will have a material impact - the level of AIP should be set based on best available estimates of opportunity cost and potentially modified over time as new information on opportunity cost (including knowledge of the demand response) becomes available.

A.7 Other Potential Efficiency Savings

For a profit motivated firm non-spectrum related efficiency savings would not be anticipated in response to AIP since the firm is seeking to minimise its costs given its output mix and input prices. If non-spectrum prices have not changed, then, aside from an ongoing search for cost savings generally, no change in the efficiency of use of non-spectrum related inputs would be anticipated. For example, the opportunity for fuel related savings is under intense scrutiny at present given the increase in oil and aviation fuel prices²².

Other considerations might further complicate this picture. For example, constraints on management time rationally lead to limited focus which might shift marginally away from other areas if AIP and opportunities for spectrum efficiency received greater prominence. Increased efficiencies in relation to spectrum use might therefore be associated with a marginal decrease in efficiency elsewhere, rather than AIP motivating greater efficiency across the board.

Finally, not for profit entities may face somewhat different incentives depending on how their budget/revenues respond to changes in input costs. If additional costs are compensated via increased external funding then incentives to improve spectrum efficiency may be weaker (though not necessarily as costs will surely come under some scrutiny). Alternatively, if increased costs in relation to spectrum go uncompensated then a not for profit organisation may be motivated to seek savings in other areas in addition to economising on spectrum use.

A.8 Final Demand Elasticities

Whilst a reduction in final demand for the services utilising spectrum from the application of AIP is not the objective of AIP, it does form part of an efficient response to spectrum pricing. End users should face the cost of all resources used in the production of goods and services, including spectrum inputs. If they are not prepared to pay for services provided on that basis then a reallocation of resources to other services is efficient.

Price elasticity of demand estimates are available for aviation transport. The Department for Transport estimate the price elasticity of air transport as -1.0 for the UK leisure sector and -0.2 for the foreign leisure market. No air fare effect could be identified for the business sector. Charter and domestic travel showed some fare effects (-0.4 and -0.3 respectively). International to international interliner traffic was found to have a price elasticity of -0.3. The resulting overall air

²² See, for example, The Times. 13 August 2008. "Weight-watching airlines shave off pounds." http://business.timesonline.co.uk/tol/business/industry_sectors/transport/article4526730.ece

fare elasticity is -0.45.²³ Other estimates include the European Commission estimate of -1.5 for leisure travel²⁴. Whilst the Department for Transport study excluded general aviation, a study for the FAA in the US included a price elasticity of demand for general aviation piston aircraft was higher than that for other aviation at -1.5 versus -1.0 for other aircraft.²⁵

At the margin some aeronautical demand would also be reallocated away from the UK since AIP would (initially at least) apply in the UK but not elsewhere. However, such substitution is not unique to AIP since other costs may apply uniquely or are higher in the UK than elsewhere. For example, the cost of land or electricity may be higher in the UK than in some other locations, and certain charges are specific to the UK, for example, UK air passenger duty which is expected to raise £1.9 billion in 2009 rising to £3.06 billion in 2011-12.²⁶

Further, as noted earlier, the magnitude of AIP proposed is potentially small relative to the impact of inclusion of aviation in the European ETS, which is estimated to cause 0.03% of overall passengers (2.6% of non-EU point-to-point passengers) to transfer at a non-EU airport. Further, the Competition Commission concluded that²⁷:

“Around two thirds of Heathrow’s passengers terminate at Heathrow (for which neighbouring airports are potential substitutes) and the remaining one third are transfer passengers (for which alternative hubs such as Paris Charles de Gaulle, Amsterdam and Frankfurt are potential substitutes). However, terminating and transfer passengers travel on the same flights and there are important complementarities between the two sources of demand—a high level of point-to-point demand enables Heathrow (subject to capacity constraints) to have frequent services to a large number of destinations and hence makes it attractive for transfer passengers, while a high level of transfer demand further increases the number of destinations and/or frequency of services (again subject to capacity constraints), making it more attractive to passengers for point-to-point journeys to or from the South-East.”

Heathrow is a strong position vis-à-vis other hubs.

Some services are not dependent on particularly terminating and originating hubs and may therefore be more internationally mobile and sensitive to input price changes, for example, commercial flight training schools. In this market the UK competes with other locations such as the Florida in the US and Nelson in New Zealand. However, this is not an argument against the full cost of local service provision applying since not pricing locally scarce inputs for internationally mobile services may deny other valuable services, say mobile broadband, access to the economically efficient level of spectrum.

²³ Department for Transport. January 2009. “UK air passenger demand and CO2 forecasts.” <http://www.dft.gov.uk/pgt/aviation/atf/co2forecasts09/co2forecasts09.pdf>

²⁴ EC. December 2006. “Commission staff working paper – impact assessment of the inclusion of activities in the scheme for greenhouse gas emission allowance trading within the Community.” Page 37. http://ec.europa.eu/environment/climat/pdf/aviation/sec_2006_1684_en.pdf

²⁵ www.library.unt.edu/gpo/NCARC/whitepaper/costallo.doc

²⁶ FT. 24 November 2008. http://us.ft.com/ftgateway/superpage.ft?news_id=fto112420082312394239&page=2

²⁷ Competition Commission.

A.9 Intermediate Supply Side Responses

The assumption of 100% cost pass through rests not only on an assumption of competitive supply, but also a horizontal supply curve i.e. unit costs are constant. If unit costs are rising/falling pass-through will be less/more than the input cost increase since final demand reduction will impact on unit costs. These impacts may also differ in the short and long run, as some supply costs may be fixed in the short term.

A.10 Comparison with European Emissions Trading Scheme (ETS)

Analogous to the introduction of AIP for aeronautical use is the proposed extension of the European Emissions Trading Scheme (ETS) to aviation from 1 January 2012 (a key difference to with AIP is the fact that the ETS will be Europe wide).²⁸ This provides a useful benchmark in terms of the magnitude of proposed charge and estimated impacts – which have been assessed by the European Commission²⁹ and others including Defra.

The impact assessment of the introduction of the ETS was conducted on a range of assumptions including a “higher end” price of €30 per tonne of CO₂ (roughly the same as the UK official estimate of the opportunity cost of CO₂ emissions)³⁰ In the UK this would cost €1080 million based on emissions of 36 million tonnes per annum,³¹ before allowance for any emissions reduction. A €30 per tonne price is estimated by the EC to:

- Reduce emissions by 7-8% by 2020.³²
- Increase ticket prices by around 4%, an average increase of €4.6 on a short haul round trip and €19.8 for a long haul flight.
- Reduce air traffic demand by 1.5%-1.9% by 2020.
- Cause 0.03% of overall passengers (2.6% of non-EU point-to-point passengers) to transfer at a non-EU airport.
- Have a marginal impact on airlines and airports.

Wit and Dings³³ also estimate that a €30 per ton of CO₂ charge would reduce demand by 3.1% and increase a one-way short haul flight cost by around €3-€45 and a long haul flight by €10-€16.

²⁸ European Parliament. 8 July 2008. “Amendment of Directive 2003/87/EC so as to include aviation activities in the scheme for greenhouse gas emission allowance trading within the Community.” <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0333+0+DOC+XML+V0//EN&language=EN>

²⁹ EC. December 2006. “Commission staff working paper – impact assessment of the inclusion of activities in the scheme for greenhouse gas emission allowance trading within the Community.” http://ec.europa.eu/environment/climat/pdf/aviation/sec_2006_1684_en.pdf

³⁰ The UK shadow price of carbon is estimated at around £30 per tonne of CO₂ in 2015. <http://www.defra.gov.uk/environment/climatechange/research/carboncost/pdf/HowtouseSPC.pdf>

³¹ <http://www.defra.gov.uk/sustainable/government/progress/national/3.htm>

³² The reduction in emissions compared to business as usual depends on underlying growth in aviation demand. The actual reduction would differ if Joint Implementation and Clean Development Mechanism credits were allowed.

The magnitude of cost increase involved with a carbon charge estimated to raise €1080 million with no allowance for demand changes) is significantly greater than that contemplated with AIP.

³³ Wit, R. C. N and Dings, J. M. W, July 2002, "Economic incentives to mitigate greenhouse gas emissions from air transport in Europe".

B Suitable benchmarks for London airports

- B.1 It can be observed that the AIP charge levied at the major London airfields (Heathrow, Gatwick and Stansted) is in some cases significantly less than at other airfields of similar size and also in many cases at much smaller airfields. This apparent difference can be explained in part by the nature of the air traffic services provided over London and of which organisation holds the allocations relating to that service provision.
- B.2 The London Terminal Control Area (TMA) is the airspace over London (beneath the upper airspace) in which traffic in-bound to, and out-bound from the major airports are controlled. The TMA is operated by NATS (En-route) and they provide radar approach control services to Heathrow, Gatwick, Stansted, Luton and London City. The approach control handles aircraft on initial approach to the airfields, sequences them with other traffic onto the final approach to their destination and then passes them to the airfield tower controller for landing clearance.
- B.3 The provision of radar approach control services by NERL obviates the need for the airports to provide the services themselves. Most do not therefore hold their own allocations for the VHF frequencies to provide approach control. Luton is an exception in that it holds the approach control allocations, even though the service is provided by NERL. The approach frequencies held are used for voice communications between the controllers and pilots.
- B.4 At airfields outside of the London TMA, radar approach control services are provided by the airfield air traffic operator themselves – where required³⁴ - and they therefore need to hold the necessary allocations to allow them to do this. This may require one or more approach allocations at £9,900 each (typically larger regional airports will hold 2 or more allocations for approach control purposes). Without these approach allocations the AIP charges would be comparable to, or less than the London airfields.
- B.5 The table below illustrates the difference in AIP charges to the airport air traffic operator as a consequence of the TMA approach service for a selection of airports. It also highlights the AIP charge at the airfields outside of London with the cost of APP allocations removed.

³⁴ Radar approach control services are generally implemented where separation of aircraft needs to be assured by ATC, this could be due to airfield traffic levels, airspace complexity or else where there is a reasonable level of other traffic in the vicinity of the airfield that could be problematic for arriving and departing aircraft.

Airport	VHF AIP charge	APP allocations	Movements	TMA APP service?	VHF AIP w/o APP
Manchester	£57,609	4	222,703	No	£27,909
Luton	£52,450	4	120,238	Yes	£15,800
Birmingham	£42,900	3	114,679	No	£13,200
Belfast	£34,900	2	77,395	No	£15,100
Newcastle	£32,650	2	79,200	No	£12,850
Gloucester	£32,300	2	78,694	No	£12,506
Heathrow	£28,417	0	475,789	Yes	£28,417
Stansted	£25,700	1	191,522	Yes	£15,800
London City	£18,400	0	91,177	Yes	£18,400
Gatwick	£15,800	0	258,921	Yes	£15,800

Table 4-1: AIP charge comparison for TMA APP service

B.6 It can therefore be surmised that in order to compare like for like, the AIP charges at the London airfields should only be compared with each other, or else they should be compared to the AIP charges at other airfields with the cost of the approach allocations removed.

C Review of non-reporting aerodromes

C.1 Data collection methodology

Ofcom requested that Helios collect the following set of information for the five non-reporting airfields that could potentially be paying the most under an AIP regime, and also for ten airfields that would be paying the baseline fee of £2,600:

- Annual movements
- Passenger numbers
- Club member numbers
- Annual income from airport charges
- Landing (and other aeronautical) fees
- Turnover (broken down into airport charges vs. other revenue sources)
- Operating costs
- Customer groups including revenue share generated by each group

By definition the identified non-reporting aerodromes do not provide statistics to the UK CAA for collation in the UK annual aviation reports. Therefore obtaining information on the traffic at the airfields was challenging. The approach taken to obtain the necessary information was as shown in Figure 4-1 and as described below.

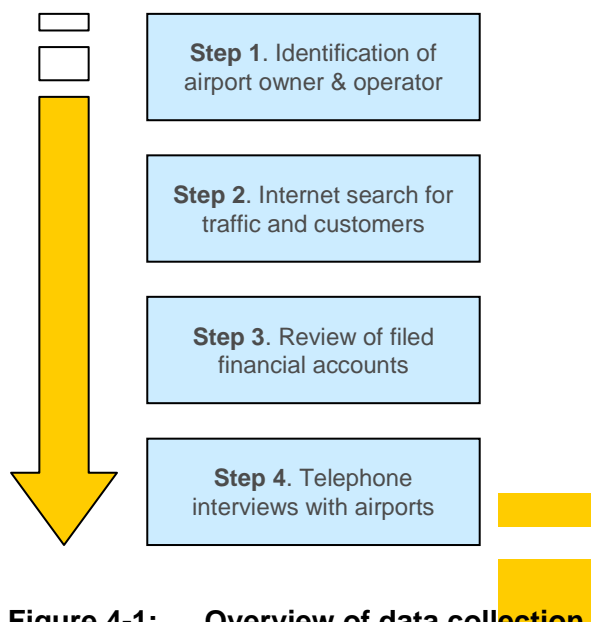


Figure 4-1: Overview of data collection methodology

In the first instance the owner and/or operator of the airfield was identified either from the UK Aeronautical Information Publication (AIP), pilot guides or else from the airfields own publicity (predominantly their website). The objective here being to develop an understanding of the likely commercial objectives, use and customers of the airfield.

Subsequently, an Internet search was undertaken to obtain publically available information on the number of movements at the airfield and of the mix of airfield

users by type. This research also extended to identifying other companies, organisations or clubs that may be resident on the airfield and to whom revenues may be due to the airfield operator for aeronautical or other purposes. In some cases traffic figures have been published by the airport themselves – this is typically the case for larger business aviation airfields, such as Farnborough. In other cases the information is available through the publically available minutes of airport consultative committees or else through the websites of local authorities who are concerned with the airfield either for planning and development or environmental reasons. A large number of airfields however make no information available publically.

The annual report and accounts of the airfields covering the years from 2006-2008 (where available) were obtained from Companies House³⁵. These reports were used to provide airfield turnover, operational costs and to help identify a split of revenues by customer group. However, due to the small size of many of the companies involved in the running of the airfields it was typical that the accounts filed with Companies House were in the format allowed for small businesses (typically a one page balance sheet).

Finally, in order to fill the gaps in the publically available information a number of airfields were contacted directly. The nature of the approach consisted firstly of an email to an airfield contact outlining the objective of our study and explaining what information we were seeking followed by a subsequent telephone call to the contact to obtain the necessary information. The data was then collated into the analysis spreadsheet for further use by Ofcom.

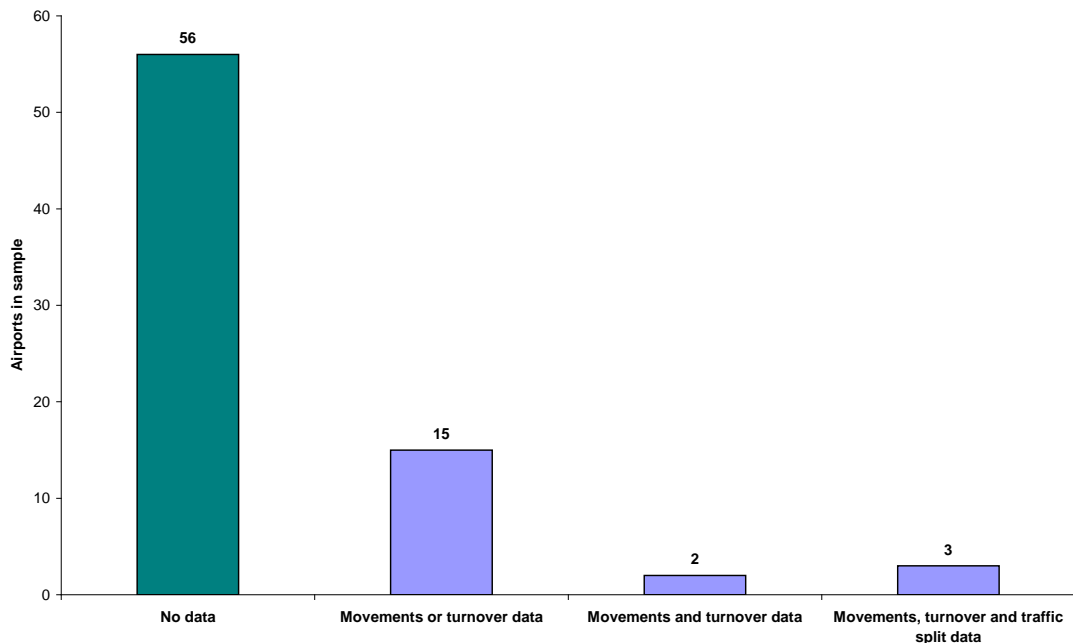


Figure 4-2: Summary of collated data

Despite the research undertaken and people contacted it has still proven to be challenging to obtain a complete set of information across all of the (5 plus 10) airfields. To mitigate this, available data from as many airfields as possible has

³⁵ For a full list of the purchased reports see Ref 1.

been collated for use in Ofcom's analysis. Figure 4-2 above summarises the data set collected broken down by those airfields for whom no data, partial data or full data were available and highlights that there were ultimately 20 sets of data from airfields within the sample that could be used for analysis.

The data collection activity for this study took place between Thursday 11th June and Thursday 18th June 2009.

C.2 Results of the data collection

C.2.1 General

The available information demonstrates the variety of the airfields that sit within the 'non-reporting' category. All of the airfields have in common that they tend to serve General Aviation (GA), there is very little routine scheduled public transport activity. However, within the GA area there are airfields that focus predominantly on business aviation, such as Farnborough, those that serve a mix, like Oxford, and those that are predominantly private flying such as Crowfield. Figure 4-3 below shows the range of annual movements across the airfields with available data. This reinforces the variety in the category, with Oxford supporting as many movements as commercial airfields like Cardiff or Belfast City, whilst at the other extreme Crowfield serves no more than 20 movements per day.

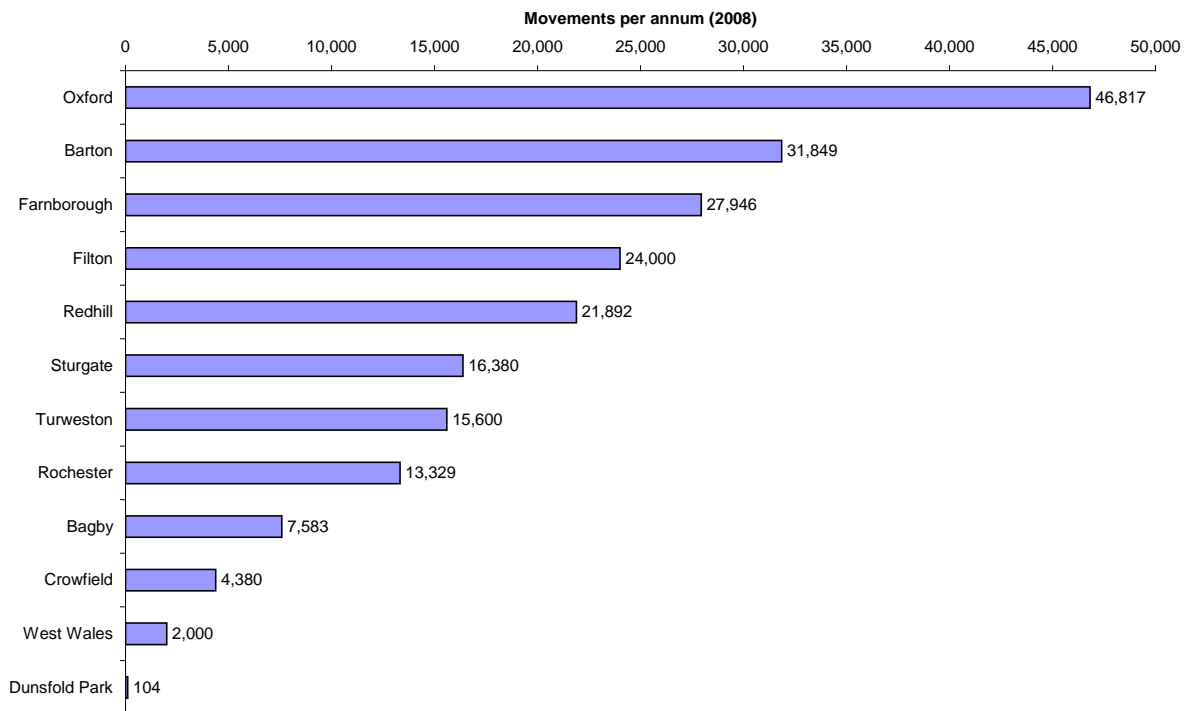


Figure 4-3: Movements at non-reporting aerodromes (2008)

Few airfields provide a further breakdown of traffic by type, but information for three of those that do are shown in Figure 4-4 below. For these airfields Oxford shows a very different make up of traffic to either Redhill or Rochester. Both of the latter two airfields are predominantly private flying locations where the airfield is a base or destination for private flyers and related flying clubs. Oxford on the other hand is a major UK hub for flight training and this is reflected both in the large proportion of training flights as well as the large overall number of movements per

annum. These movements are related to a significant number of students being active at the airfield on a daily basis.

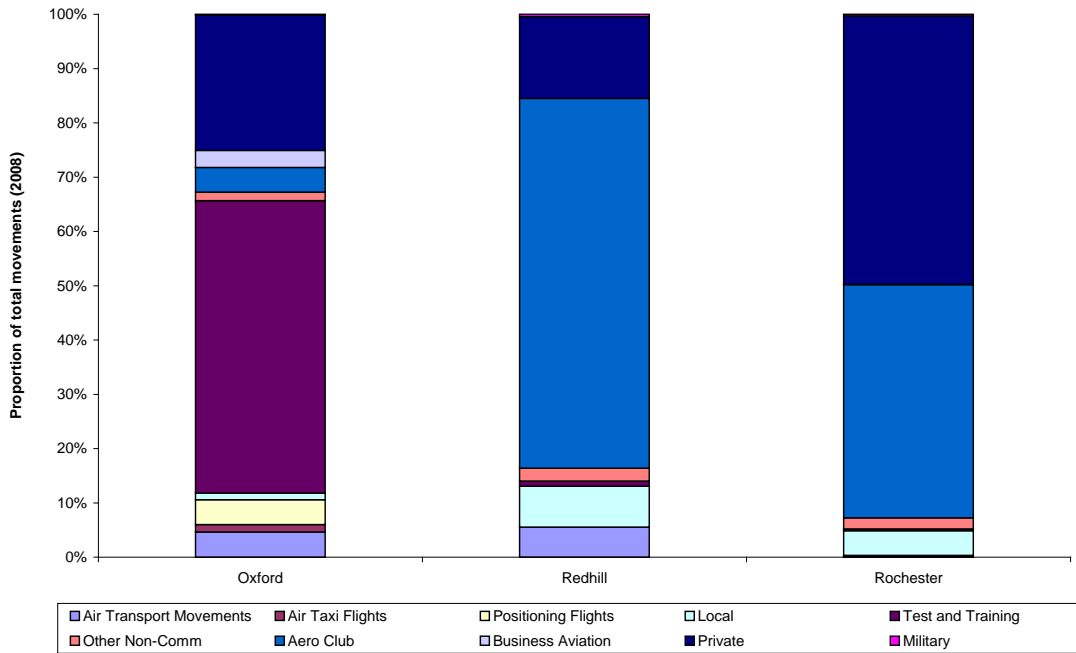


Figure 4-4: Proportion of airfield traffic by type (2008)

C.2.2 Impact of the AIP charges

The Figure 4-5 shows the AIP charge per movement versus the number of movements annually at a mix of the non-reporting airfields and at a number of the smaller reporting airfields. It clearly highlights that the financial impact on a per movement basis is of the same magnitude between reporting and non-reporting airfields.

Furthermore, Figure 4-6 illustrates the proportion of the landing fee that the AIP charge represents on a per movement basis. It shows that at a number of airfields with a reasonable level of movements, the AIP charge if passed through in the landing fee would constitute only a few percentage points change in the fee. However, at airfields with a very small number of movements or where there is a reasonably large AIP charge it is possible that there could be a large impact on charges. This does not in itself imply that the landing charges under AIP would be unaffordable, just that there would be a discernable impact.

The difference between the reporting and non-reporting airfields in the sample above is that there is typically a much lower level of commercial traffic at the non-reporting airfields. It is therefore likely to be individuals, flying clubs and smaller businesses who would feel the impact of AIP if passed through in landing fees. How affordable the AIP fee is at the level of the airfield operator, business aircraft operator and private pilot is considered below.

The per movement AIP charges shown below whilst potentially representing a reasonable proportion of landing fees for some destinations are still small when compared with the per hour cost of operating a light aircraft. Typical aircraft rental costs for a small single engined aircraft are of the order of £80 - £130 per hour before additional costs such as fuel, landing fees, parking, etc. However, it should

also be considered that small aircraft owner/operators are experiencing many financial pressures from regulation within the aviation industry.

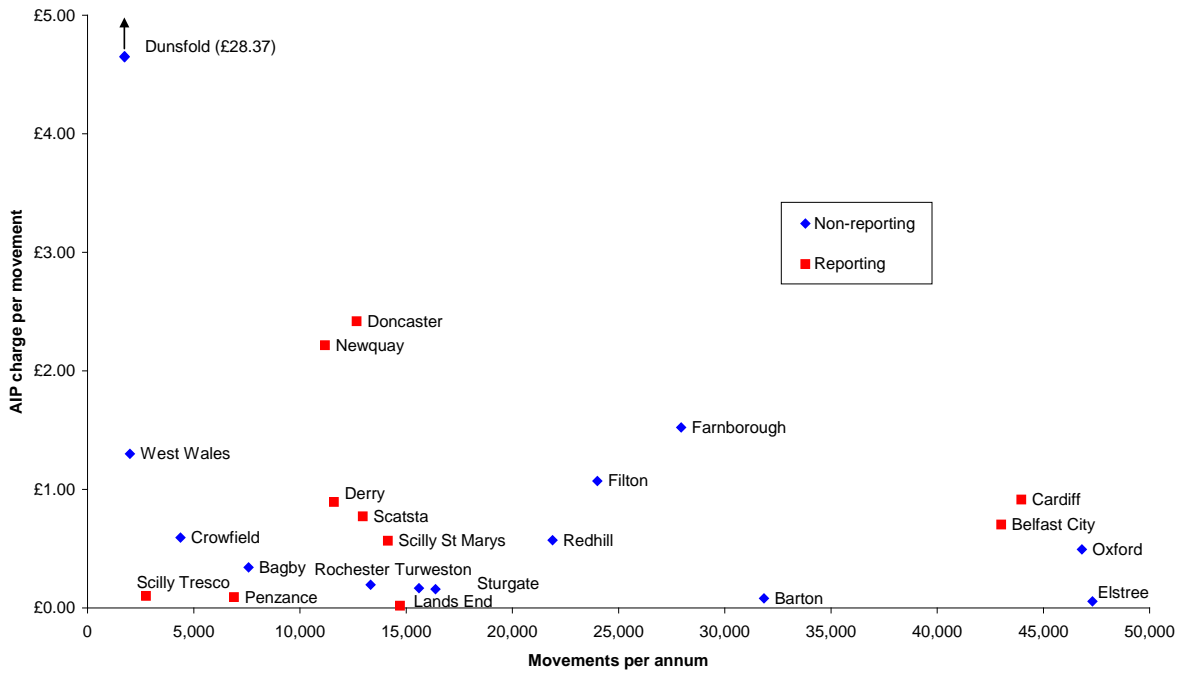


Figure 4-5: Movements versus AIP charge per movement

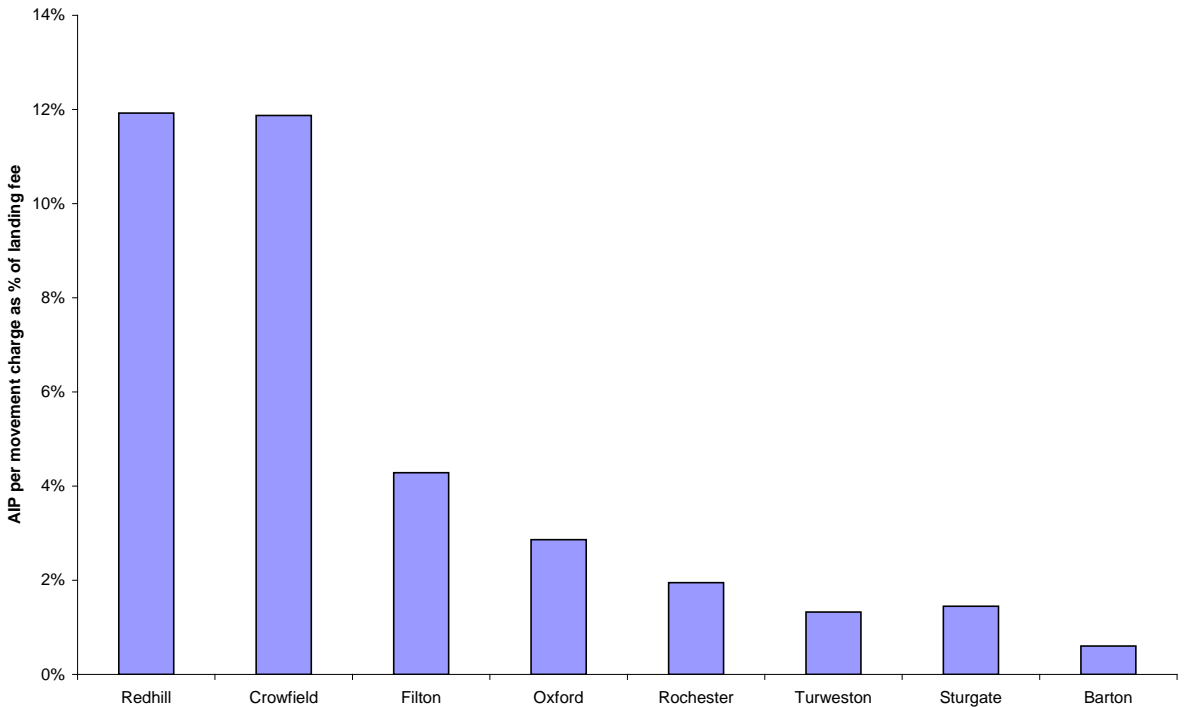


Figure 4-6: AIP charge per movement as a proportion of landing fee

In the case of business aircraft operations that may take place at the non-reporting aerodromes they will tend to be concentrated around the airfields such as

Farnborough, Cranfield, Barton, Fairoaks and the heliports. These locations have set out to attract business traffic and particularly in the case of Farnborough are being very successful. The per-movement AIP charge at Farnborough for example is approximately £1.50. This should be compared with the minimum landing fee levied on small aircraft of approximately £365.

The per-hour operating costs of a business jet are as shown in Table 4-2 below for a range of aircraft from Very Light Jets (VLJ) through to very large such as the Boeing Business Jet (BBJ) – a variant of the 737. Even the variable costs are significantly higher than any per movement AIP charge that is likely to be levied. Much of the business jet traffic into and out of non-reporting aerodromes in the UK are flying sectors of more than 2 hours (e.g. medium to long haul). There is likely to be no substantive impact of AIP on this category of airspace user.

Category	Model	Seats	MTOW (kg)	Range (nm)	Annual nm	Hours p.a.	Var cost/hr	Total cost/hr
VLJ	Eclipse 500	4	2,576	1,280	175,000	327	£300	£526
Small	Learjet 35A	6	8,301	1,930	175,000	233	£1,021	£1,620
	Citation II	7	6,396	1,220	175,000	301	£799	£1,274
	Beechjet 400A	7	7,303	1,180	175,000	243	£857	£1,523
Medium	Learjet 60	6	10,659	2,186	175,000	235	£977	£2,079
	Citation Sovereign	9	13,608	2,643	175,000	245	£1,006	£2,231
	Hawker 800	8	12,428	2,390	175,000	260	£1,101	£1,945
Large	Challenger 600	9	18,711	2,800	175,000	247	£1,897	£2,937
	Citation X	8	16,193	2,890	175,000	213	£1,419	£3,255
	Falcon 900C	12	20,638	3,450	175,000	239	£1,335	£3,556
V. Large	Gulfstream G-450	13	33,520	3,880	175,000	236	£1,625	£4,046
	Global Express	13	43,091	5,940	175,000	233	£1,803	£4,811
	Gulfstream G-V	13	41,050	6,250	175,000	230	£1,825	£4,523
	Airbus Corp. Jet	18	75,500	6,100	175,000	247	£2,340	£5,427
	Boeing BBJ	18	77,564	6,171	175,000	262	£2,345	£5,482

2006 GBP³⁶

Table 4-2: Business jet operating costs

At the level of the airfield operators the proposed AIP charges as a proportion of both turnover and operating expenses are shown in Figure 4-7. Generally for most airfields the AIP charges represent less than 1% of turnover and opex. There are some exceptions in the data set, notably Damyns Hall (2.8/2.3%) and Henstridge (11/26%) respectively.

Clearly we have a limited data set in terms of airfields providing turnover and operational expense figures and there would appear to be some airfields where AIP costs could be significant. In order to obtain a feeling as to whether this is likely to be a problem for other airfield operators where turnover data is not necessarily available Figure 4-8 shows the ratio of the airfield AIP charge to individual landing fee ratio. The idea here being to illustrate the number of landings required before the AIP charge for the airfield would be recouped. This figure suggests that for a broad sample of airfields from Perth and below the traffic levels required to cover the AIP costs seem low. Where the number of movements required is high it is typically at airfields with higher movement levels.

³⁶ Business Jets and ATC User Fees: Taking a Closer Look, The Reason Foundation, Autumn 2006.

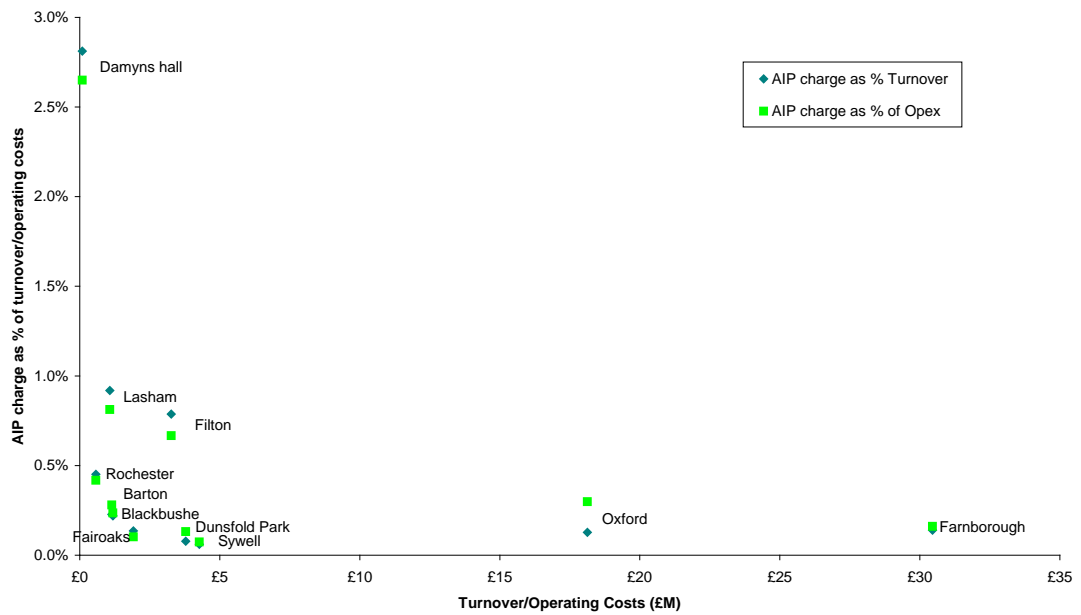


Figure 4-7: AIP charge as a proportion of turnover/opex vs. turnover/opex

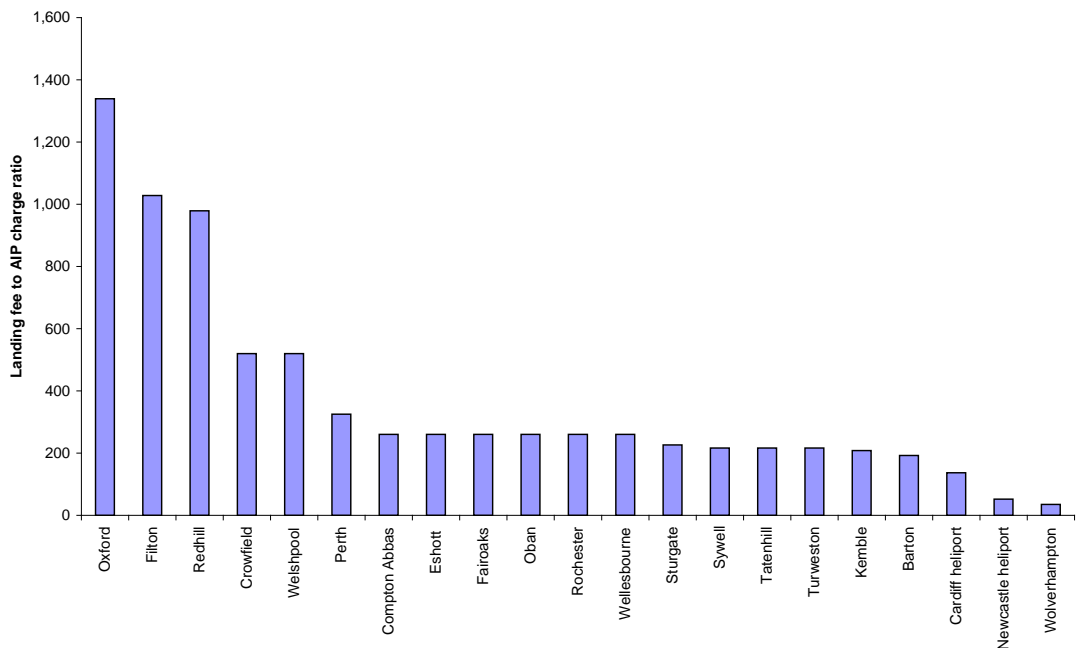


Figure 4-8: Airfield landing fee to AIP charge ratio

C.2.3 Analysis of possible outliers in the data set

Under the current aeronautical licencing regime there is no strong financial incentive for licensee's to scrutinise their need for specific radio allocations or even to ensure they are requesting the correct class of licence. During the review of the non-reporting aerodromes one clear example of the latter case was identified. As a result the allocations held by further airfields both within the non-reporting category and smaller airfields within the reporting category were considered to see if the

implementation of AIP would be likely to lead to significant change in the allocations held. The VHF allocations at the airfields shown in Table 4-3 were considered.

▪ Badminton	▪ Dunsfold Park	▪ Lydd	▪ Skerries
▪ Bagby	▪ Elmsett	▪ Newcastle heliport	▪ Southend
▪ Barton	▪ Elstree	▪ Newquay	▪ Stapleford
▪ Belfast City	▪ Enniskillen	▪ North Weald	▪ Sturgate
▪ Bembridge	▪ Eshott	▪ Northolt	▪ Swansea
▪ Blackbushe	▪ Fair Isle	▪ Nottingham	▪ Sywell
▪ Bruntingthorpe	▪ Fair Oaks	▪ Oban	▪ Tatenhill
▪ Caernarfon	▪ Farnborough	▪ Old Sarum	▪ Turweston
▪ Cambridge	▪ Filton	▪ Oxford	▪ Unst
▪ Cardiff	▪ Fishburn	▪ Penzance	▪ Walney Island
▪ Cardiff heliport	▪ Foula	▪ Perth	▪ Warton
▪ Carlisle	▪ Glenforsa	▪ Plymouth	▪ Wasing Lower Farm
▪ Coll	▪ Goodwood	▪ Prestwick	▪ Wellesbourne
▪ Colonsay	▪ Great Oakley	▪ Redhill	▪ Welshpool
▪ Compton Abbas	▪ Haverfordwest	▪ Redlands	▪ West Wales
▪ Cranfield	▪ Hawarden	▪ Retford/Gamston	▪ White Waltham
▪ Crosland Moor	▪ Headcorn	▪ Rocester	▪ Wickenby
▪ Crowfield	▪ Henstridge	▪ Rochester	▪ Wolverhampton
▪ Cumbernauld	▪ Humberside	▪ Rougham	▪ Woodford
▪ Damyns hall	▪ Kemble	▪ Sandtoft	▪ Yeovil
▪ Deanland	▪ Kent Int	▪ Scatsta	
▪ Denham	▪ Lands End	▪ Scilly St Mary's	
▪ Derry	▪ Lasham	▪ Scilly Tresco	
▪ Doncaster	▪ Little	▪ Seething	
▪ Dunkeswell	▪ Rissington	▪ Sherlowe	
	▪ London Heliport		

Table 4-3: Airfields subject to review

Of the airfields considered there were very few atypical airfields. The following observations were made:

Cranfield holds a specific VHF allocation for the purposes of communicating with flight test aircraft. This is most likely related to the activities undertaken by Cranfield Aerospace a commercial organisation again owned by the University. This is relatively unique amongst the sample of airports and it would be expected that the cost of this frequency would be met only by those using it.

Most of the other airfields are reasonably consistent in their use of the spectrum and tend to polarise into one of two groups – the airfields using a single A/G or AFIS channel for all of their activities, or one of the airfields with multiple APP, TWR, ATIS, OPC, GMC and

FIRE channels. Plotting the movements at an airfield versus the proposed AIP fee as a proxy for the number of frequencies in use results in

Figure 4-9 below. Both non-reporting and some of the smaller reporting airfields are shown. This figure shows the groupings discussed above, where Group 1 are those airfields operating with a single A/G or AFIS channel and those in Group 2 typically use spectrum in proportion to the number of movements at the airfield. The airfields outside of these groups are perhaps those where something slightly out of the ordinary is taking place.

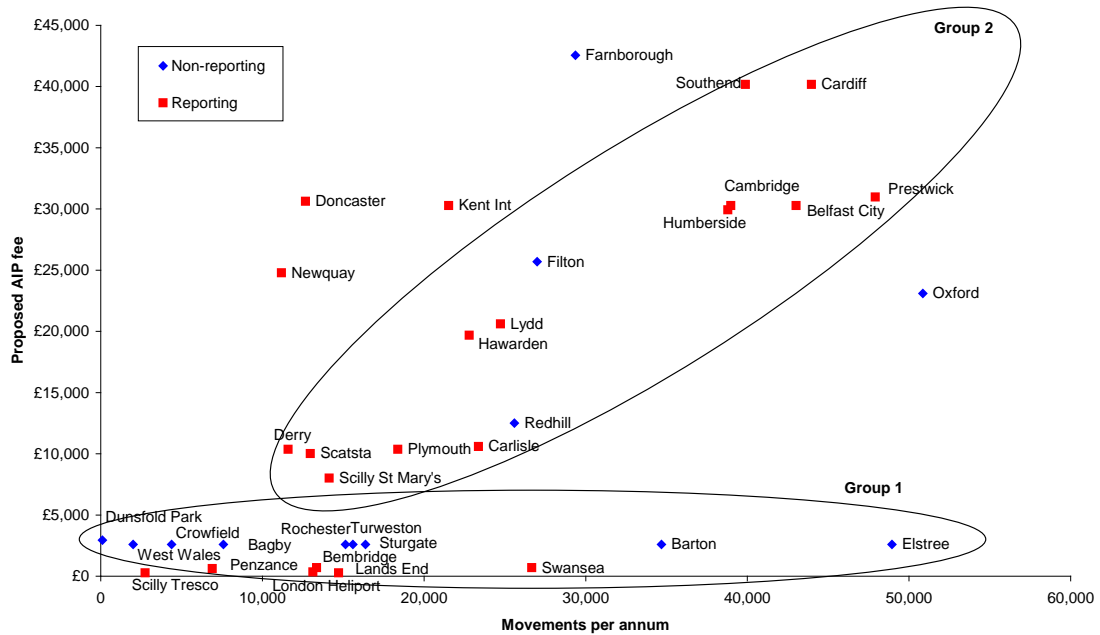


Figure 4-9: Proposed AIP fee versus airfield movements per annum

In the case of Oxford the airfield is supporting a relatively high level of movements with less spectrum usage than other fields. This could be explained by its lack of a radar control service, if pilots wish to have that facility they must contact the Lower Airspace Radar Service (LARS) at nearby RAF Brize Norton. Therefore, Oxford holds no frequencies for the provision of this service.

Farnborough has perhaps the highest spectrum usage of the group of airfields and this can be explained by the wide use of radar control around the airfield to provide high safety levels to arriving and departing aircraft in what is uncontrolled airspace together with the need to provide services equivalent to those at other major airfield destinations.

Reporting airfields such as Newquay, Doncaster and Kent International (Manston) all appear to have higher levels of spectrum usage than their movements would imply is necessary.

Newquay airport transferred into a full civil licensed aerodrome in 2008; it was formerly RAF St. Mawgan. The airfield is in the midst of an ambitious growth and redevelopment plan an element of which is clearly to provide the standard of air traffic services (ATS) that would be expected at other major UK regional airfields.

Robin Hood Airport (Doncaster Sheffield) was formerly RAF Finningley and transferred to civil ownership in 2005. It has since seen a significant growth in

traffic and passengers. Owned by Peel Airports the airport has clearly invested in its ATS facilities and provides radar control services in the vicinity of the aerodrome. The airport has recently completed a new round of master planning and is focussed on catering for forecast passenger growth to 6.6 million annual passengers by 2016 and 10.8 million annual passengers by 2030.

Kent International Airport (formerly RAF Manston) was bought by the Infratil Group in 2005 following the bankruptcy of the airports previous owners, Planestation. The airport is expecting the return of scheduled services soon and is master planning for significant growth.

It would therefore appear that all three airports have ambitions to grow, supporting additional commercial operations and as such have invested in better infrastructure in the belief that the traffic levels will increase.

C.3 Conclusions

The UK non-reporting aerodromes are a varied collection of airfields predominantly serving GA traffic. Some of the airfields are busy, even by the standards of some airfields serving commercial traffic. A small number of the airfields have focussed on serving business aviation; the majority of the others are serving the private flyer either through flight training, flying clubs or just being a destination for private flying.

There is a very limited set of data publically available on which to draw conclusions about the impact of AIP amongst the non-reporting aerodromes especially those at the smaller end of the spectrum. However, some tentative conclusions can be drawn:

Business aviation operators, particularly those operating business jets are unlikely to be negatively impacted by AIP charges at the airfields examined. The operating costs of the aircraft are too high for AIP charges to significantly deter an operator from choosing one airfield over another on the basis of a minor increase in landing fees.

If the AIP charge were to be recouped solely through landing fees the per-movement charge for the non-reporting aerodromes in the sample is of the same order of magnitude as for other small reporting aerodromes and broadly seems affordable. There are some exceptions, –such as Dunsfold³⁷.

The per-movement AIP charge at the airfields in the sample is sufficiently small when compared with the costs of operating a small aircraft that in itself it should not deter pilots using an airfield. However, there is the perception in the GA community that the cumulative impact of AIP together with other costs being driven by regulation are making private flying more expensive overall and putting people off flying as a past time. This brief study has not examined this cumulative impact.

A brief review of the allocations held by the non-reporting aerodromes and a sample of the small reporting aerodromes has concluded that the vast majority of airfields hold appropriate licences for the operations that they conduct.

³⁷ Furthermore, the owners of Dunsfold have been attempting to replace the aerodrome with business and private property. Whilst the local council refused the initial application the owners have appealed. The long term future of the airfield must therefore be in doubt.

D Abbreviations and acronyms

A/G	Air – Ground Licence - where the ground operator may only pass advisory information regarding the situation local to the aerodrome
AFIS	Aerodrome Flight Information Service - the ground operator may only pass advisory information regarding the airborne situation local to the aerodrome but can pass instructions to aircraft on the ground at the aerodrome.
AIP	Administered Incentive Pricing
AIP	Aeronautical Information Publication
APP	Approach - where the ground operator controls the aircraft in the vicinity of an aerodrome traffic zone when the aircraft is not flying by visual reference to the aerodrome.
ATIS	Automatic Terminal Information Service - A broadcast transmission from a ground station to one or more aircraft in which information relating to the aerodrome from which the transmission is being made is conveyed. Within the UK this service is regarded as an air traffic control service and may only be provided by an aerodrome which also provides a tower and/or an approach service.
ATS	Air Traffic Services
BBJ	Boeing Business Jet
CAA	Civil Aviation Authority
GA	General Aviation
GMC	Ground Movement Control
ICAO	International Civil Aviation Organisation
LARS	Lower Airspace Radar Service
NFL	National Flying Laboratory
OPC	Operational Control - A two way communication between an aircraft and a ground station for the purposes stated in ICAO Annex 6, Parts 1 & 3, chapter 1 which is reproduced below:- "Operational Control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of safety of the aircraft and the regularity and efficiency of the flight."
TWR	Tower - where the ground operator controls the aircraft in the vicinity of an aerodrome traffic zone when the aircraft is flying with visual reference to the aerodrome.
VHF	Very High Frequency
VLJ	Very Light Jet