

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 maritime uses of the radio spectrum. Specifically we are proposing to apply revised fees to the use of some, but not all, maritime VHF channels used for communications or Differential GPS.
- 1.2 We are proposing to introduce these changes in the first half of 2010, although we are proposing to phase in some of the changes over up to three years.
- 1.3 Many fees will not change;
 - We are not proposing to apply AIP to maritime VHF channels used on a shared basis for search and rescue and related activity (we are now proposing to include more channels in this exempt class).
 - We are no longer proposing any changes to fees applicable to the marina channels.
 - We are not proposing any change to the licence fee discount available to charities whose sole or primary objective is the safety of human life in an emergency. We are moreover setting out new proposals to make one or perhaps two maritime VHF channels available for use by such charities as working channels, on a shared basis, to be managed by the Maritime and Coastguard Agency ("MCA"), free of charge to such end users.
 - As set out in July 2008, we are not proposing any change from the current licence fees for ship radio licences
- 1.4 We also set out in this consultation document our intention not to apply AIP to the operators of aeronautical and maritime radar systems and aeronautical navigation aids at this time. We are instead proposing revised arrangements under which Government would undertake a new strategic management role with respect to the spectrum used by these systems.
- 1.5 This document does not deal with the issue of the fees that should apply to aeronautical VHF communications frequencies. At this time we are continuing to work with the Civil Aviation Authority (the "CAA") to better understand the potential impacts of the application of incentive pricing to these frequencies. We expect to publish a separate document on future licence fees for these frequencies later this year.
- 1.6 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 fees have been set at auction. Many public sector users, including the emergency services, also pay AIP.

- 1.7 The civil aeronautical and maritime sectors are significant contributors to the UK economy and their ability to operate safely and efficiently is dependent on access to radio spectrum. Their use of VHF radiocommunications, radar and other radionavigation aids together occupies about 7% of all spectrum below 15GHz^{1.} Of this, VHF spectrum for which new licence fee proposals are made in this document spans frequency bands of around 26 MHz, parts of which are shared with some other applications.
- 1.8 Fees for the use of all maritime and aeronautical spectrum are currently set on a basis which wholly or partly covers the administrative cost of issuing the licences concerned. Consequently, applications which use frequencies which are in short supply often attract similar fees to applications which use less popular frequencies, and powerful transmitters which prevent others from using the same spectrum over a very wide area 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 around major ports and airports) attract the same fee as licences to use similar spectrum in remote areas with little or no demand from other potential users.
- 1.9 AIP can improve the value that is obtained for society from a given amount of spectrum, compared with free licences or flat-rate fees, without any need for the spectrum to change use. Where spectrum is subject to excess demand in its existing use, this means that there are potential users who want to make use of that spectrum but currently cannot. Because, in the absence of AIP, the price for using the spectrum does not signal its opportunity cost, operators get spectrum on a first-come-first-served basis. They 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 clear that the value derived from using the spectrum has increased as a result of the imposition of AIP.

We have made significant changes to our proposals following the initial consultation last year and propose to introduce pricing in fewer areas.

- 1.10 In July 2008 we published an initial consultation on applying AIP to the aeronautical and maritime sectors (the "July 2008 consultation"²). We set out some indicative fees for VHF communications channels and 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.
- 1.11 Following that consultation, we have considered the responses from stakeholders carefully and in many cases we have had subsequent discussions with licensees or their representatives. We have held extensive discussions with Government, the MCA and the CAA. We have also commissioned further external consultancy, which drew on inputs provided by numerous stakeholders, and we have considered this in detail in drawing up the proposals in this document.

¹ See Chapter 1 to Independent audit of spectrum holdings – An independent audit for Her Majesty's Treasury December 2005 at

http://www.spectrumaudit.org.uk/pdf/20051118%20Final%20Formatted%20v9.pdf ² Applying spectrum pricing to the maritime and aeronautical sectors 30 July 2008 http://www.ofcom.org.uk/consult/condocs/aip/fullpdf.pdf

- 1.12 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 outlined in the July 2008 consultation, including the following;
 - Radar (and racons) and aeronautical navigation aids. Reflecting comments made to us, we consider that further research and technical planning is needed before any decisions can be taken on the feasibility of sharing with other applications spectrum used for radar and aeronautical navigation aids. Therefore, the proposals in this document do not include any proposal to apply AIP fees to radar and aeronautical navigation aids. We are instead proposing that Government should take a strategic management role in relation to this spectrum.
 - Internationally recognised maritime VHF channels for port operations. We recognise that, of the 59 internationally recognised maritime VHF channels, only 8 are available in the UK for core simplex (single frequency) port operations, and it is only these that are subject to excess demand from UK maritime users. The remainder have either been allocated internationally as duplex (two frequency) channels (for which there is not excess demand in the UK) or have been assigned for specialist, often Search and Rescue ("SAR") related, purposes in the UK. We are therefore making revised fee proposals specifically tailored to these eight channels, which are the ones where the spectrum concerned is in greatest demand.
 - Fee differentials for the core port operations channels. Based on consultation responses and further technical analysis, we consider that the gradient between fees proposed for these channels in the July 2008 consultation (which ranged between £1480 and £75) did not reflect the relative use of spectrum or the pattern of demand by maritime sector users in the channels concerned sufficiently accurately. Accordingly we are now proposing a revised structure of fees for these specific channels which are less sharply differentiated (ranging between £500 and £75). We are also proposing that it should be the height of the antenna measured from Mean Sea Level that is used for charging purposes to reduce the risk of anomalous incentives for maritime users.
 - Maritime international duplex channels. In these channels, demand does not exceed supply. Given the international constraints placed on the use of these channels, it is unlikely that these channels can be used to meet demand for spectrum from other possible applications in the short to medium term. We are therefore proposing to apply a £75 annual fee set only to contribute to the cost of the licensing process. This would be a reduction from the current fee of £100 per year.
 - Maritime VHF channels used for SAR and related activity. In addition to channels 16 and 70 noted in the July 2008 consultation, there are other maritime VHF channels (including the AIS channels) which are used for SAR and related activities on a shared ("private commons") basis. This means that individual users do not, through their decisions, exclude other users from the spectrum concerned. Accordingly the efficient use of these channels would not benefit from AIP fees being applied to individual end users. We are therefore proposing that the use of these channels should be managed by the MCA and we are not proposing to apply AIP to individual licensees using these channels.
 - **The marina channels.** The three marina channels are intensively used, but on a private commons basis where the different individual users do not exclude each other from spectrum. As with the SAR channels, AIP fees would not provide

effective incentives for individual decisions over efficient spectrum use. We are therefore proposing that the current £75 fee should remain unchanged.

- Use by suppliers and demonstrators. We agree that the particular basis on which maritime channels are used by suppliers and demonstrators does not exclude frequencies from being used by others, and hence does not warrant the application of AIP fees. We are therefore proposing to apply a £75 fee (per licence permitting the use of a range of channels) to contribute to the administrative cost of the licensing process.
- A new working channel (or channels) for SAR organisations. We consider that there is merit in consulting on whether organisations engaged in maritime search and rescue should have access to one or perhaps two common channels which can be used for routine communications (in addition to the SAR channels which are used during the course of maritime emergencies under the co-ordination of the MCA, discussed above) free of charge. We are asking for views on the merits of such an arrangement from those SAR organisations which might benefit.
- 1.13 The resulting revised fee proposals for maritime VHF spectrum are summarised in Section 2 below.

Search and rescue organisations

1.14 Responses to the initial consultation expressed strong support for the role played by search and rescue organisations, and concern about the possible impact of changes in licence fees on these organisations.

Land search and rescue (including mountain rescue)

1.15 As we noted in a public Update published on 20 October 2008³ (the "October 2008 Update"), we have no plans to revise the arrangements under which Mountain Rescue teams access the VHF spectrum they need through the auspices of the UK Search and Rescue Operators Group. Ofcom granted the MCA, which is an executive agency of the Department for Transport ("DfT"), the authority to use these channels, and land search and rescue organisations use these channels under the control of the MCA (administered via the Land Search and Rescue Operators Group). The MCA has paid AIP based fees for these channels since 2005. It is for the MCA to determine what charges, if any, to apply to the use of these frequencies by the end users that it authorises.

Maritime rescue

- 1.16 Under current arrangements, many VHF channels used by maritime search and rescue organisations to assist the MCA and Secretary of State do not attract any fees for the individual organisations involved (neither AIP-based nor those intended to contribute to the administrative cost of the licensing process). As set out above we now propose to widen that group of frequencies. As a consequence, the only AIP fees which such search and rescue organisations might face in future would be those which apply to channels used for routine operational working purposes.
- 1.17 At present such organisations use a wide variety of different channels for these working purposes. We do not believe this *ad hoc* use of frequencies is the most

³ http://www.ofcom.org.uk/consult/condocs/aip/update201008/

spectrally efficient arrangement for citizens and consumers more generally, nor is it likely to be economically or administratively efficient for the users concerned. As indicated above we are therefore consulting on a proposal to make one or perhaps two dedicated channels available to these organisations as working channels for routine communication. Authority to use the channels would be controlled by the MCA. In light of the communal use involved we do not propose to apply any end users licence fees (AIP-based or otherwise) for the use of such channels.

- 1.18 Some search and rescue organisations may decide, nevertheless, that they prefer to have exclusive use of spectrum for routine working purposes. In these instances, we are proposing to continue the rule that any fees payable by charities whose sole or main objective is the safety of human life in an emergency should continue to be discounted by 50%, as at present.
- 1.19 As we noted in the October 2008 Update, some organisations, including maritime SAR charities, with multiple VHF transmitters (typically those which require widespread radio coverage) may also find it advantageous to acquire an "Area Defined" licence. This a licence product which is currently available for Business Radio users which we propose to extend to the maritime sector using VHF spectrum where available. It permits the use of any number of transmitters for a given frequency within the licensed area. Under our proposals a licence to transmit on a UK allocated simplex channel anywhere in the UK would cost £8,250 per year, and a UK duplex channel would cost £16,500. These figures would be discounted by 50% for charities whose sole or main objective is the safety of human life in an emergency.

A new strategic management role for Government

- 1.20 As noted above. we are not proposing to set AIP licence fees for radar or navigational aids uses of spectrum. Instead, we are proposing a new strategic spectrum management role for Government.
- 1.21 These proposals have been developed after discussions with Government because we recognise that, in some cases, decisions by individual users of spectrum may release spectrum for others only to a small extent, and may not deliver the potential collective benefits to society that could be achieved from a more managed approach.
- 1.22 For example, spectrum currently reserved for radar use is potentially suitable for other applications where there is strong demand. However AIP licence fees imposed on individual radar users might not help to release useable spectrum efficiently in the short to medium term. This is because wider strategic management and co-ordination in the sector, potentially taking a number of years, may first be needed, before any spare radar spectrum can be identified, made available and ultimately used for other applications. In these cases, the major benefits for citizens and consumers from releasing spectrum would only become available after an industry-level transition programme. Given the current pattern of assignments and use, such a programme would need to be managed and carefully co-ordinated to ensure the operational and safety requirements for all users would continue to be met.
- 1.23 We have reflected this assessment in our revised proposals. 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 longer term in nature. The realisation of significant, 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. We therefore consider that, pending the outcomes from such coordinated action, reflecting such contingent, uncertain long term opportunity costs in individual licence fees would not incentivise the efficient management of spectrum at this time.

- 1.24 Instead, we consider that a strategically-managed transition of the form outlined above would be more likely to release material amounts of spectrum for new (transport or non-transport) uses.
- 1.25 Accordingly we are now proposing that the DfT take strategic responsibility for planning and authorising changes of use of spectrum in the maritime and aeronautical radar and navigational aids bands. On this basis it would be for Government to consider any incentive structures that would be appropriate to inform decisions about whether and when to carry out any re-planning for assignments in those bands. We have not, therefore, set out proposals for AIP-based fees for the end users of the affected spectrum in this document and are not proposing any changes to current fees.

The wider policy context

- 1.26 Ofcom was set up under the Communications Act to secure, among other things, the optimal use of the electromagnetic spectrum. Spectrum use is a small, if important, aspect of society's interest in the efficient, safe and productive working of both the aeronautical and maritime sectors. Government generally, with the support of the CAA and the MCA, represents the interests of citizens and consumers in ensuring that these sectors can operate in ways which serve the UK's economic, environmental, safety and other public policy priorities.
- 1.27 In recognition of this, in developing our proposals we have worked closely with Government, the CAA, and the MCA, as the regulators 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 shipping, and let us know their views. We have discussed our proposals with Government, the CAA and the MCA, and we have 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.
- 1.28 On the basis of those discussions to date, our assessment of the impacts, and the evidence and analysis provided by our consultants, the Government has indicated to us that it considers our revised proposals for the maritime sector have taken into account points made by it in response to our original consultation and form a reasonable basis for further consultation. The Government's final position is of course subject to consideration of any new or additional evidence that stakeholders may provide in responding to this consultation.
- 1.29 In mentioning these discussions, we would ask stakeholders to note that the proposals in this consultation document are Ofcom's, not Government's. Ofcom is the independent statutory spectrum licensing authority for the UK and, unless exceptionally directed by the Secretary of State, fulfils its statutory duties independently.

Conclusions

- 1.30 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 and sector stakeholders. They seek to reflect the specific circumstances of maritime spectrum use. As a result, our proposals for maritime VHF licence fees have been substantially revised from those set out in our initial consultation in July 2008, and we are now also no longer proposing to apply AIP to the end users of aeronautical and maritime radar and navigation aids.
- 1.31 Our specific fee proposals for maritime 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.
- 1.32 Our proposals for changes in the management arrangements for aeronautical and maritime radar and navigation aids spectrum are set out in Section 8.
- 1.33 We expect to make revised proposals for fees to apply to aeronautical VHF communications frequencies later this year.

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, 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 medium term to use this spectrum to meet excess demand for a different use, potentially beyond the current sector, and 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 were concerned that our proposals did not correctly reflect the principles set out in one or both of these reports. They specifically queried our justification 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 maritime sector only where that spectrum is subject to excess demand from the current use. We have, in making those proposals, taken into account the estimated value of spectrum the opportunity cost in 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 sets out our proposed conclusions on these fundamental questions (the identities of the various channels and frequencies, and the circumstances of their use, are discussed in more detail in subsequent sections of this consultation document). These issues are explored further in Section 5 below.

⁴ See *Review of Radio Spectrum Management* March 2002

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

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 or medium term?	Are AIP fees proposed in this document?
Maritime and aeronautical radar (and racons) and aeronautical navigation aids	No excess demand	Not without significant prior research and planning	No. Government to take new strategic management role
Maritime channels (simplex and duplex) recognised as such only in the UK (excl those used on a shared basis)	No excess demand	Yes	Yes
Maritime channels (simplex only) recognised as such internationally (excl those used on a shared basis)	Yes	No – limited by international agreements	Yes
Maritime channels (duplex only) recognised as such internationally (excl those used on a shared basis)	No excess demand	No – limited by international agreements	No AIP fees
Maritime channels used on a shared (private commons) basis	Some face excess demand, but little opportunity to manage demand through pricing individual licensees.	No	No AIP fees

Table 1 Summary of rationale for proposing to apply (or not apply) AIP fees

Headline approach

Geographic variations

2.6 We propose to vary maritime AIP fees by geography. In the case of internationally allocated channels we propose that fees should reflect the varying probability of encountering excess demand for these channels in different parts of the country in future (as indicated by the relative number of existing assignments in these

channels). In the case of internationally allocated maritime channels, we are proposing four categories of High density, Medium density, Low density and No congestion. In the case of UK allocated channels, which could feasibly be used for other applications, we propose to use the same population-based measure of relative demand as is used with fees for Business Radio (ie three classifications of High Density, Medium density and Low density). Our proposals are summarised in the following colour coded maps (with International areas of No congestion coded white). These maps are reproduced in a larger size in Annex 6.





Figure 1 UK allocated channels

Figure 2 Internationally allocated channels

Variations in coverage

2.7 Where it is proposed that AIP fees should apply, we also propose that fees for technically-assigned licences should vary according to the coverage of the transmitter. We have proposed three broad classifications (High, Medium and Low coverage) and fees for these different classifications are summarised in the following paragraphs.

International maritime simplex VHF channels available for general port operations

- 2.8 As noted in Section 1 above, there are eight International simplex channels available for general port operations. These channels use the following frequencies; 156.425 MHz (channel 68), 156.450 MHz (channel 9), 156.475 MHz (channel 69), 156.550 MHz (channel 11), 156.575 MHz (channel 71), 156.600 MHz (channel 12), 156.700 MHz (channel 14) and 156.725 MHz (channel 74).
- 2.9 We propose that technically-assigned licences permitting the use of one of these channels at one transmitter should attract annual AIP fees as follows. In all cases the maximum permissible effective radiated power ("erp") would be 25 watts). The fees set out would apply to 25 kHz simplex channels with pro rata adjustment for different bandwidths should these become available:

	High coverage (Watts erp/Antenna metres) P>=24 and A>=10 P>=10 and A>=20 P>=5 and A>=30	Medium coverage (Watts erp/Antenna metres) P>10 and A<10 7 <p<24 5<a<20<br="" and="">3<p<10 10<a<30<br="" and="">1.5<p<5 a="" and="">20 P<5 and A>30</p<5></p<10></p<24>	Low coverage (Watts erp/ Antenna metres) P<=10 and A<=5 P<=7 and A<=10 P<=3 and A<=20 P<=1.5 and A<=30
Geographic area			
High density area	£500	£400	£300
Medium density area	£ 200	£ 150	£125
Low density area	£100	£75	£75
Areas with no congestion	£75	£75	£75

Table 2 Proposed annual fees for international simplex maritime port operations channels

2.10 We propose that area-defined licences permitting the use of one of these licensed channels at any number of transmitters in the licensed area should be available at the following annual fees:

Area	Fee
UK	£9275
50x 50km unit in a High congestion	£220
area	
50x 50km unit in a Medium congestion	£85
area	
50x 50km unit in a Low congestion	£45 (subject to a minimum
area	of £75 per licence)

 Table 3 Proposed fees for area-defined licences applicable to simplex internationally allocated maritime channels

Internationally allocated maritime duplex channels

- 2.11 With the exception of channels used on a private commons basis (summarised in Table 6 below) we propose that technically-assigned licence fees for internationally allocated maritime duplex channels should be limited to a simple flat, low-cost fee to contribute to the administrative cost of the licensing process, which we propose to set at £75 a year.
- 2.12 We propose that any new area-defined licences for these international duplex channels should attract fees to contribute to administrative costs, in line with technically-assigned licences in these channels. We propose to employ a working assumption that a technically-assigned licence of average coverage would require us to co-ordinate with other spectrum use across at least four 50kmx50km grid squares. We are therefore proposing that, should a user seek an area-defined licence for internationally allocated duplex channels, a sensible approach to fees would be to charge a minimum fee of £75, but to charge a higher fee that reflected additional administration and coordination requirements, reviewed on a case-by-case basis for any such area licences requested that comprised more than four 50kmx50km grid squares.

UK maritime VHF channels

2.13 With the exception of the channels used on a private commons basis and discussed in paragraph 2.15 below, we are proposing that UK maritime VHF channels (including those used for DGPS) should attract the following annual fees in line with the existing Business Radio structure for similar VHF channels. The fees set out would apply to 25 kHz simplex channels with pro rata adjustment for different bandwidths. With the exception of the £75 de minimis fee for Low coverage/Low density (which would also apply to duplex channels), a double fee would apply to duplex channel licences as twice as much spectrum is denied to alternative users.

	High coverage (Watts erp/Antenna metres) W> 5 and A > 10 or W ≤ 5 and A > 30	Medium coverage (Watts erp/Antenna metres) W ≤ 5 and 10 < A ≤ 30 or W> 5 and A ≤ 10	Low coverage (Watts erp/Antenna metres) W ≤ 5 and A ≤ 10
Geographic area			
High density	£740	£370	£100
Medium density	£250	£170	£85
Low density	£90	£80	£75

Table 4 Proposed annual fees for UK maritime simplex channels

2.14 We propose that area-defined licences for UK allocated channels should be made available at the following annual fee rates. Here again, we are proposing that fees for duplex channels would be double those stated.

Area	Fee
UK	£8,250
50x 50km unit in a High congestion	£990
area	
50x 50km unit in a Medium congestion	£125
area	
50x 50km unit in a Low congestion	£12 (subject to a minimum
area	of £75 per licence)

 Table 5 Proposed fees for area-defined licences applicable to simplex UK allocated maritime channels

Maritime channels used on a private commons basis

2.15 Channels used on a private commons basis include the two emergency and calling channels (plus 4 adjacent channels with a very restricted range of applications), five channels used for co-ordinated search and rescue activity, two AIS channels, and three channels used by marinas and sailing clubs. A variety of channels are also used to support the work of search and rescue organisations, in addition to the channels used for co-ordinated search and rescue activity. We propose to apply (or not apply) fees as follows;

Application	Frequency MHz	Proposal
2 calling and distress	156.525,156.750,	Free of charge to licensees
channels and 4 associated	156.775, 156.800,	(guard band/adjacent
guard bands	156.825, 156.850	channels not normally
		licensed to shore stations)
5 search and rescue	156.375, 156.500,	Free of charge to
channels	156.675,	authorised end users
	156.000/160.600,	
	161.225	
Maritime weather reporting	157.150/161.750,	Free of charge to users
channels	157.225/161.825,	accessing these channels
	157.325/161.925	for search and rescue
		purposes
	457.005/404.005	075
Package of 3 marina	157.025/161.625,	£75 per annum
	157.850, 161.425	Franciska serve to
Package of AIS channels	161.975, 162.025 (pius	Free of charge to
	156.525)	authorised end users
Intersnip channels	156.300, 156.400,	Free of charge to licensees
	150.025, 150.050,	(not normally licensed to
One or two working	150.075, To be determined	
One or two working	To be determined	Free of charge to
channels to be used by		authonsed end users
organisations whose sole of		
of human life in an		
emergency		

Table 6 Summary of proposed fee arrangements for maritime channels used on a private commons basis.

Maritime training school licences

2.16 In our Spectrum Pricing Statement in January 2007⁵, we indicated that we planned to implement a proposal to make these licences indefinite in duration ("lifetime licences"), and free of any charge if issued on-line, with a £20 fee for licences applied for by post. We hope to be able to implement the change decided on in 2007 as part of any licence structure and fee change implementations following the conclusion of this consultation.

Maritime radio (suppliers and demonstrators) licences.

- 2.17 In the case of Maritime Radio (Suppliers and demonstration) licences, where appropriate, power can be radiated at normal levels and the full range of maritime VHF channels is available e.g. for tests. Use of the channels is for non-operational purposes and is subject to not causing interference.
- 2.18 In the July 2008 consultation we proposed that AIP would be applicable to these licences. Following further consideration, we are now proposing an administrative cost-based fee of £75 per annum. This reflects the non-interference constraint on the

⁵ Modifications to Spectrum Pricing, a Statement, http://www.ofcom.org.uk/consult/condocs/pricing06/statement/statement.pdf

use authorised by these licences which means that the licensees concerned should not impose opportunity costs on other spectrum users.

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

- 2.19 As noted in Section 1 above, under our revised proposals most maritime channels used by search and rescue charities will not attract AIP fees. Also, as noted above, we are proposing that one or two further channels should be made available for use by search and rescue organisations on a private commons basis as a routine working channel with no licence fee payable.
- 2.20 In the event that charities whose sole or main objective is the safety of human life in an emergency also seek maritime licences which would otherwise attract fees (AIP or administrative cost-based), we are proposing that the current 50% discount should continue to apply. For example, if the RNLI required exclusive use of a UK duplex channel with full national coverage (in addition to the search and rescue channels and any new common working channel(s) which would not attract fees), the standard AIP fee for a UK-wide area defined licence (see paragraph 2.14 above) would be reduced from £16,500 (ie 2x £8250 for a duplex channel) to £8250 per year.

Timeframes

2.21 We are proposing to introduce these changes during the first half of 2010, but we propose to phase in some fee changes over up to three years (see paragraphs 7.103 to 7.110 below). Where fees are being reduced, or a new option is being introduced which may be attractive to spectrum users, we will introduce the change in full without phasing. For example, the new option of an area defined licence (as illustrated in paragraph 2.20 above) is expected to reduce the fees payable by the RNLI from about £35k per year to £8250. The new option of a shared working channel for search and rescue providers (see paragraph 2.19 above) would further reduce maritime fees payable to zero. These changes would be implemented without phasing.

Section 3

Background and guide to this document

- 3.1 In July 2008 Ofcom published an initial consultation⁶ which explored options for extending administered incentive pricing to maritime and aeronautical spectrum ("the July 2008 consultation"). This was an initial consultation intended to raise 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.
- 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 in the maritime sector.
- 3.3 In this context we have made significant changes to the indicative fee rates for maritime VHF communications channels set out in the July 2008 consultation for those channels where we consider AIP licence fees to be appropriate, and we are also proposing that a wider range of the maritime VHF communications channels should not attract AIP licence fees. Our revised proposals are set out in detail in Section 7.
- 3.4 The July 2008 consultation set out proposed reference rates for radar and aeronautical navigation aids, but did not attempt to explore how these valuations might translate to licence fees for end users. The reference rates were intended to provide a sense of scale, and a possible first building block when establishing a future structure of fees. We observed that the bandwidth used and territory sterilised were likely to be key factors in such a future structure but we noted that the methodologies for determining end user fees could be complex. For example, we observed that some spectrum allocated for use with radar and aeronautical navigation aids might currently be considered to be unused but reserved for these transport sectors. We observed that Government might have a role in managing some of this spectrum (thereby influencing the optimal allocation of spectrum to the transport sector and potentially other sectors for future use in the longer term).
- 3.5 Following detailed discussion with Government, and having given careful consideration to stakeholders' comments, we are proposing in this consultation that Government should have a strategic management oversight of the spectrum allocated for radar and aeronautical navigation aids, and in light of that proposal we are now not proposing to set AIP licence fees for end users of this spectrum. The reasons for this, and the implications, are explored in Section 8 below.
- 3.6 We have no plans to reverse the decision implemented in 2006 to issue lifetime licences issued under the Wireless Telegraphy Act 2006 (the "WT Act") for ships free of charge if applied for on-line, or for a small administrative fee if applied for by post.

⁶ See footnote 2 above

3.7 Within this overall context, the remainder of this section explains in more detail the scope, purpose and background of this second consultation.

Legislative framework for spectrum pricing

- 3.8 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.
- 3.9 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 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.
- 3.10 The above-mentioned enabling powers are exercisable by statutory instrument under section 12 of the WT Act.
- 3.11 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.

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

- 3.12 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.
- 3.13 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 strategy for meeting this objective was set out in the Spectrum Framework Review⁸, which was published in June 2005.

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

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

- 3.14 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 transferred to, and used by, the users who value it most highly;
 - promote competition by increasing the availability of spectrum for use by the most valuable services.
- 3.15 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.
- 3.16 AIP is already paid by most private sector users of spectrum, except where upfront fees have been set 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 their direct spectrum holdings.
- 3.17 Ofcom is currently conducting a strategic review of spectrum pricing (the "SRSP"). This will look 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.

Government consideration of applying AIP to the maritime and aeronautical sectors

- 3.18 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.
- 3.19 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

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

¹⁰ http://www.spectrumaudit.org.uk/final.htm

¹¹ Government response and action plan March 2006

http://www.spectrumaudit.org.uk/pdf/governmentresponse.pdf

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.

3.20 More explicitly, the Government's response to the report noted, amongst other things, that Ofcom and the MCA would begin work as soon as possible on the extension, subject to consultation, of AIP to maritime radar, Coastal Station (UK) VHF radio and DGPS. It also accepted the recommendations of the Cave Audit 2005 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

- 3.21 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.
- 3.22 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 ships' WT Act licences should have a lifetime duration, and should be free of charge if applied for on-line. We also stated that we did not see a good efficiency argument for setting AIP fees for aircraft WT Act licences.
- 3.23 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.
- 3.24 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.
- 3.25 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.
- 3.26 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.

- 3.27 Elsewhere (paragraphs 3.8 to 3.45), we set out some discussion of who might be best placed to respond to AIP, influencing 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.
- 3.28 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

- 3.29 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.
- 3.30 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.
- 3.31 As noted above, under the Communications Act 2003 Ofcom has a general duty to promote the "efficient use and management of the electro-magnetic spectrum for wireless telegraphy; and for connected purposes". 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 use and management of the electro-magnetic spectrum.
- 3.32 We have now examined the potential welfare effects of applying AIP to the VHF frequencies used by the maritime sector. In our July 2008 consultation 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 in the aeronautical and maritime sectors (see section 2). In this second consultation document, we build on these arguments and additionally assess the appropriateness of specific fee level options for the VHF spectrum used by the maritime sector. In this assessment, we evaluate the welfare effects of different fee options identifying impacts on both consumers and producers (see Section 7).

- 3.33 Further to this, we have undertaken an assessment of the potential financial impacts of the specific AIP fee level 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 the statement Spectrum Framework Review for the Public Sector¹² published in January 2008. Further information is set out in Annex 7 below.
- 3.34 We will review our impact assessment in the light of responses to this consultation and, if appropriate, update the analysis when finalising our policy.

The structure of the present consultation document

- 3.35 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.
- 3.36 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.
- 3.37 In **Section 5**, we set out our reasons for now proposing to apply AIP to some maritime spectrum licences. We include 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.
- 3.38 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.
- 3.39 In **Section 7** we set out detailed proposals for applying AIP to maritime VHF communications channels, including issues to do with phasing and review.
- 3.40 In **Section 8** we explore the different challenges for efficient spectrum allocation presented by spectrum used for radar and aeronautical navigation aids, and we set out our revised proposal that this spectrum should be strategically managed by government for the medium term.
- 3.41 **Annexes 1 to 3** explain how to respond to this consultation.
- 3.42 **Annex 4** summarises the key questions which we have asked in the body of the text in Sections 7 and 8.
- 3.43 Annex 5 provides a Glossary
- 3.44 **Annex 6** replicates, in a larger size, the maps at Figures 1 and 2 above and 3 and 4 below.
- 3.45 **Annex 7** provides further information to support our impact assessment.

¹² See annex 3 at <u>http://www.ofcom.org.uk/consult/condocs/sfrps/statement/statement.pdf</u>

Section 4

Responses to initial consultation, and further external consultancy

Introduction

- 4.1 In this section we provide a detailed summary and comments on the responses to the July 2008 consultation, and summarise the additional consultancy work we have commissioned and the additional discussions we have had, in order to develop our revised proposals in respect of maritime uses of spectrum¹³.
- 4.2 The consultation responses and the additional work and discussions concerned have all provided very important inputs to our revised proposals, and have enabled us to make significant revisions in a number of areas. 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

- 4.3 638 responses (including those in respect of proposed fees for aeronautical VHF frequencies) had been received when the consultation period ended. Of these nearly 80% were from individuals, and the rest were from organisations ranging from local mountain rescue teams to major international airlines.
- 4.4 73% of responses from individuals were intended primarily to express concern about possible impact on RNLI and/or mountain rescue services. Most of the remainder were from people concerned about the possible impact on the General Aviation sector.
- 4.5 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.
- 4.6 Responses from the maritime sector came from the MCA, DfT, Chamber of Shipping, the Royal Yachting Association ("RYA"), the UK Major Ports Group and British Ports Association a joint submission- (UKMPG/BPA), the General Lighthouse Authorities –a joint submission- ("GLAs"), as well as the RNLI and other maritime rescue organisations and a small number of sailing clubs.
- 4.7 Responses from many maritime organisations shared the same focus on, and concerns about, particular elements of the proposals. Most of these responses considered that the implication of statements in the Cave Audit 2005 was that there was no efficiency case for AIP in any bands subject to international allocation agreements.

¹³ Responses relevant to our proposals in respect of aeronautical uses of spectrum will be summarised in a later document.

Comments from Government and subsequent discussions

- 4.8 Both the DfT and MCA supplied comments on the consultation. To a large extent these reflected concerns in their sectors, which were also raised by respondents in those sectors, and these are covered below.
- 4.9 DfT and MCA 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 and maritime sectors. For example, MCA co-ordinates access to maritime search and rescue channels; and, 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.
- 4.10 As a result, some of the points raised by DfT and MCA related to their policy responsibilities, and the nature of policy making and regulation in relation to the aeronautical and maritime sectors. As we had made provisional proposals that would involve changes to their responsibilities, DfT and MCA expressed a wish to discuss these in more detail in order to consider them. We have therefore had a number of detailed discussions with MCA and DfT (and the 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

4.11 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?

- 4.12 The maritime sector noted the importance of ensuring that all interested parties are aware of the consultation exercise. The RNLI was concerned that some search and rescue organisations might not be aware of the consultation exercise, although others such as the Old Gaffers Association noted that the issues had received widespread coverage in the specialist press. One sailing club was explicit that the RYA should be considered as its formal contact route. Both the RYA and the, MCA noted that the standing committee (hosted by Ofcom) known as the Maritime Radio Spectrum Users Group (MRSUG) serves as a useful forum for exchange of views between Ofcom and maritime spectrum users. The GLAs, however, proposed that a more formal process involving public hearings should be adopted. The MCA also proposed that liaison arrangements with the offshore industry could be improved.
- 4.13 Several respondents felt that, in taking views into account, we should give greater weight to responses from the search and rescue and emergency services sectors than to responses from the commercial sector.

Ofcom's response

4.14 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, and 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.

4.15 On the specific point about giving different weight to comments from different types of user, we would always endeavour to give due weight to all respondents and to the points they made in relation to the interests of citizens and consumers. In the case of any conflict, we would weigh the conflicting points by reference to the interests of citizens and consumers rather than by the identity of the person making the point; but we recognise that certain stakeholders represent, because of their activities, some particularly important citizen or consumer interests such as the need for adequate responses in emergency situations. In the case of this consultation, we do not consider that there was an observable conflict between points made by SAR charities and emergency services on one hand, and commercial stakeholders on the other, so there was no call for us to prioritise one sector's views over another's.

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 Responses from the UKMPG/BPA and the Chamber of Shipping expressed concern that AIP fees for VHF licences would encourage the use of fewer transmitters with lower power output, with potential impacts on safety. The GLAs too expressed concern that AIP fees would encourage service providers with limited budgets to make decisions on the basis of price rather than safety.
- 4.17 The UKMPG/BPA was also concerned that the proposals would encourage the removal of Racons.
- 4.18 While noting that maritime regulation requires port authorities and the MCA to provide ships with radio and radar coverage in areas of high traffic density and in Traffic Separation Schemes, the Chamber of Shipping, nevertheless, warned that AIP might results in ships being denied access to basic safety services. The RNLI warned that substantial increases in charges may cause safety related services to be reduced or removed.
- 4.19 The MCA noted that the services which it provides are offered in pursuance of the UK's international obligations with regard to safety at sea and will, necessarily, remain free at point of use. Nevertheless, the MCA expressed concern that UK AIP fees might be *perceived* as likely to reduce safety standards, thereby undermining the UK's credibility on maritime safety matters.
- 4.20 The MCA and the Gosport and Fareham Inshore Rescue Service both warned that AIP fees payable for spectrum might divert funds from other safety related investment.
- 4.21 The GLAs noted that AIS channels are allocated internationally and a time division protocol is used, with fixed slots assigned to aids to navigation. GLAs argued that if the cost became too high then this use might have to be reconsidered, with consequences for safety, but this would not release any spectrum, or significantly affect channel loading.

4.22 The UKMPG/BPA asserted that the proposed reference rates for radar and navigational aids bands had been kept "artificially high" by Ofcom. They claimed that this will result in users either reducing safety margins by ceasing to use equipment, or investing in equipment using long pulse lengths (and narrower bandwidth) which suffer greater operational inference, and sterilise larger areas. The outcome would therefore be no increase in spectrum efficiency and a reduction in utility.

Ofcom's response

- 4.23 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.
- 4.24 In the July 2008 consultation, we noted that maritime spectrum users 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 Port Marine Safety Code. We acknowledged that this is not mandatory, but we observed that failure to act in accordance with this Code is likely to expose ports to legal claims under wider health and safety legislation and/or breach of statutory duties.
- 4.25 It is our view that the ability of the existing framework 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 the existing oversight framework, 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 this sector.

On specific points raised by stakeholders in response to this question

- 4.26 As our revised proposals do not include AIP-based fees for either radar or navigational aids end-users, we are responding here only to those comments raised in relation to fees for VHF communications licences, and general comments.
- 4.27 On **AIS channels**, we have stated in this consultation document that we do not see a case for applying licence fees for access to these channels. As a result, the concern that fees might discourage use will not now arise.
- 4.28 Similarly, in relation to **radar channels**, we are not proposing to set AIP-based fees for end users in our revised proposals. The existing administrative cost-based fees will continue to apply. As a result, we do not expect there to be any effects on incentives to use radar installations from our current proposals.
- 4.29 On **maritime VHF channels**, we acknowledge that one effect of AIP-based fees may be that some port users reduce the coverage of their transmitters. As this would make more spectrum available for other users, this would in the first instance represent an improvement in the efficiency with which the spectrum is used. Where there is excess demand from other maritime users, the availability of spectrum for another maritime user would support an increase in safe operations by that user.

- 4.30 We would expect any such 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, port operators and their customers place a high value on safety, and would be unlikely to take actions that would compromise this element of their operations. Further, we note that the absolute financial impacts of our fee proposals for maritime VHF channels are, for the majority of users, relatively small (and in some cases positive compared with current fees).
- 4.31 On the suggestion that spectrum used for safety-related purposes should be treated differently from other spectrum, we do not share this position. 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.
- 4.32 However, spectrum assignments in other channels 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 channels which are subject to excess demand, either from other maritime users or alternative users, 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 flat 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.
- 4.33 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 fee proposals for maritime VHF communications which provide better information for stakeholders to consider the potential effects on them.
- 4.34 As noted in Section 1, this consultation does not propose AIP-based fees for spectrum used for radar or aeronautical navigation aids. Further, we have proposed that a number of specific maritime channels within the VHF communications allocations should not be subject to AIP-based licence fees. We have conducted a more detailed assessment of the use of those VHF channels for which we do propose to set AIP-based fees, with the result that many individual assignments will, under our revised proposals, attract fees considerably lower than the illustrative fee rates in the 2008 document.

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?

- 4.35 UKMPG/BPA and Chamber of Shipping expressed concern about the possible impact of fees on the UK's competitiveness, although this was qualified by noting that this risk would depend on the level of fees. The UKMPG/BPA noted that other countries have exempted port and VTS users of spectrum from paying fees. The RNLI also expressed concern about the likely impact on trade.
- 4.36 The Chamber of Shipping expressed concern about the possible impact on offshore platforms and, while noting that the radio systems used by these are mainly outside

the scope of the current consultation, warned that the cost of ships servicing these may rise if ports pass on spectrum fees. The Chamber considered there was a risk that this may cause some boats to switch to bases in other countries.

- 4.37 The Chamber of Shipping also expressed concern that the MCA would pass on any increases in its costs to the shipping sector.
- 4.38 The Scottish Government expressed concern that introducing AIP in the UK while it is not applied in other countries could disadvantage Scottish industry.

Ofcom's response

- 4.39 We recognise that some UK users of VHF communications spectrum are in competition with non UK companies. For example, some major container ports, which operate as hubs for transiting goods face competition from non UK ports. 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 ships) these too could suffer competitive disadvantage if the increase for each customer is material.
- 4.40 The work we commissioned from Helios and Plum Consulting, which we are publishing in Annex 7, looked carefully at the competitive position of maritime 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 maritime VHF fees we are now proposing will have a material impact on the UK maritime sector. We set out our reasoning, which is largely based on the more detailed report in Annex 7, below.
- 4.41 The proposed fee changes for the maritime sector represent a small increase in aggregate compared with the fees currently paid by the sector annually. The total value of fees for the maritime sector equates to little more than twice the cost of one large container ship making a single visit to a UK port (see bullets below paragraph 7.131 below) and the aggregate increase much less than that.
- 4.42 We also note that proposed fees for the sector equate to about 1% of the total cost of UK light dues. In a study¹⁴ commissioned by the DfT in 2003, MDS Transmodal concluded that Light dues were

"unlikely to be having any significant direct impact on shipping line behaviour and that there is unlikely to be any significant distortion of competition between UK and Continental ports. Similarly, the analysis of the wider economic impacts suggests that the most likely impact would be a reduction in costs for shipping lines and fishing craft owners. If all the reduction in costs for shipping lines were passed onto UK businesses it would lead to a 0.003% reduction in their costs."

4.43 We therefore believe that the proposed changes in fees for maritime VHF communications spectrum will not have a material impact on UK competitiveness.

¹⁴ Study of Economic effect of Light Dues – MDS Transmodal 2003 http://www.dft.gov.uk/pgr/shippingports/ports/studyofeconomiceffectoflightdues

- 4.44 As explained in Section 7 of this consultation, we have concluded that it is highly unlikely that the proposed spectrum fee increases for the maritime sector 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.
- 4.45 On the question of MCA passing on costs, any such decision would be for Government, not Ofcom. We would however note that, on the basis of the fees proposed in this consultation, the AIP fees applicable to the assignments held by the MCA would not be dissimilar to the fees currently payable.

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.

- 4.46 The MCA noted that information on future costs is unclear, but raised a concern that high fees could deter the industry from im*p*lementing new technologies.
- 4.47 The Chamber of Shipping expressed concern that fee increases payable by GLAs may result in increases in Light Dues and expressed the view that for ports and other maritime organisations there is no monetary benefit in providing maritime communications with ships.
- 4.48 The GLAs warned that pricing VHF channels will lead to increased use of fewer channels, resulting in more congestion. They argued that, as channels are internationally harmonised, this could not lead to spectrum release.
- 4.49 The GLAs also noted that there are statutory exemptions for all aids to navigation from public and local taxes, and for all light dues from duties. The GLAs considered that setting licence fees based on AIP would run against this principle.
- 4.50 The UKMPG/BPA claimed that AIP-based fees for radar would result in no increase in spectrum efficiency and a reduction in utility. The KMPG/BPA also warned that difference in fee levels applied in different parts of the UK would run counter to the principle of maintaining a level playing field between ports.
- 4.51 The RNLI, the National Coastwatch Institute, Hornsea Rescue and the Gosport and Fareham Inshore Rescue Service expressed concern about the impact of fees on their overall costs.
- 4.52 One sailing club expressed concern that additional fees would impact negatively on the viability of clubs and, in turn, on the sport as a whole.

Ofcom's response

4.53 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 material changes to the proposals outlined in July 2008 to apply fees to international maritime channels, and to maritime channels which are used on a private commons basis. These changes directly reflect comments made to us by stakeholders during the consultation period as well as additional work we have commissioned.

- 4.54 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).
- 4.55 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, and as the overall estimated impact of our revised proposals for maritime VHF channels are materially reduced in comparison with the illustrative impacts in our 2008 consultation, 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 their expectations.
- 4.56 In considering the specific effects of our proposals on the lighthouse authorities' fee payments and hence any potential effect on the levels of light dues themselves, we note that the aggregate level of Light Dues in 2007-08 was £67.5m. If the lighthouse authorities between them paid for the duplex lighthouse channel at £8250 per leg, ie £16,500 in total per year, this would represent 0.02% of the 2007-08 total of light dues.
- 4.57 On the concern that AIP will lead to increased signal congestion in channels, we do not consider that this would necessarily follow. The responses of individual stakeholders to the change in the basis of, and effective distribution of, licence fees, will be for them to decide and we have not made any presumptions of large-scale changes in channel use and coverage of individual assignments. Our fee proposals explicitly distinguish between channels that are currently subject to high demand, and those which are not congested, such that where users are able to change between channels, and where they decide this would be beneficial to them, it is more likely that they would migrate from highly congested channels into ones which are not congested, than the converse.
- 4.58 On the second point made by the GLAs, as noted elsewhere in this document, we have taken into account the potential for spectrum to be used by non-transport sector users only when considering fee options for UK allocated channels where such use could feasibly be accommodated without the need for any changes to international agreements.
- 4.59 On the GLAs' third point, we note that there has to date been no statutory exemption for aids to navigation from administrative cost-based spectrum licence fees.
- 4.60 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 a range of the 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.
- 4.61 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

for maritime VHF 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.

4.62 We will of course welcome further detailed comments on the revised proposals set out in this consultation which should enable maritime 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?

4.63 We will summarise responses to this question when we make revised proposals in respect of fees for aeronautical VHF communications frequencies later this year.

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?

- 4.64 A large number of responses came from those concerned primarily about the impact on the RNLI and other rescue teams.
- 4.65 The consultation document had observed that charities with a safety of life objective currently enjoy a 50% discount on any administrative fees payable for maritime licences, and stakeholders were asked whether they considered that Ofcom should discount fees for any particular user or type of user, including charities whose sole or main objective is the safety of human life in an emergency.
- 4.66 Responding to public concern about the possible impact of fees on the search and rescue organisations such as the RNLI, we clarified that, under the Business Radio pricing template, which Ofcom had proposed to apply to maritime VHF spectrum, users with a number of transmitters in a particular channel would be entitled to apply for an Area Defined licence. This would potentially be cheaper, under our July 2008 fees proposals, even than the current administrative cost-based fees for users, such as the RNLI, with a large number of assignments.
- 4.67 Responses to the July 2008 consultation argued that organisations such as RNLI should not have to pay any fees, both because of their intrinsic value and because of their charitable status. This view was widely expressed. The Green Party suggested a variation whereby the RNLI and similar charities would pay on condition that the Government made good any costs by an equivalent subsidy; but also supported a 100% discount as the alternative. The RNLI itself similarly noted that it has no means of passing on costs and proposed that it should pay no fees at all. In supporting this proposal, the RNLI referred to its role in delivering, without cost to the tax payer, the UK's international treaty obligations to provide maritime search and rescue.

- 4.68 The GLAs, similarly, noted that they meet the UK's international obligations with respect to navigation and wreck marking, again without cost to the tax payer and, furthermore, are exempted under the Merchant Shipping Act 1995 from paying rates, local taxes and duties in recognition of their importance. The GLAs argued that any imposition of fees would be contrary to the spirit of this Act. We would note however that the GLAs currently pay fees for their spectrum licences, set on an administrative cost basis.
- 4.69 The MCA too referred to the UK's duties to provide maritime SAR, and noted that it too provides safety critical services. The MCA, too, argued that all search and rescue and counter-pollution channels should be considered to have a zero opportunity cost.
- 4.70 The RNLI also argued that the channels which it uses are all internationally harmonised for SAR use, that the RNLI has no option but to use this spectrum, and that there can be no opportunity cost. The GLAs presented a similar argument in respect of the channels which they use.
- 4.71 A small number of independent maritime rescue organisations also expressed concern about the possible impact of increased fees on their viability. They use a variety of different channels and some of those who responded to the consultation called for a more co-ordinated approach to assigning channels for maritime SAR, akin to the current arrangements for co-ordinating land SAR channels.
- 4.72 The RYA argued that the marina channels are used for safety purposes and should be subject to a safety of life discount. The DfT also lent support to the CAA's view that Ofcom should distinguish between "safety of life in an emergency" and "safety of life" operational functions. The MCA noted that it too offers safety of life services and asked that this should be borne in mind when considering discounts for others.
- 4.73 Some respondents considered that any use, or any safety-related use, of spectrum by any not-for-profit entity should be free of any charge.

Ofcom's response

- 4.74 For the reasons set out in paragraphs 7.67 to 7.73 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.
- 4.75 We are also proposing that the maritime VHF channels which are used during maritime search and rescue activity co-ordinated by the MCA should be made available free of charge to end users, and should be managed by the MCA. (see paragraphs 5.46 to 5.47). Any payment for this spectrum should be for Government to determine as the MCA is an executive agency of the DfT. We are making this proposal as we do not believe individual users of these channels, acting independently, can materially influence the future use of these channels as they are used on a private commons basis.
- 4.76 We are also proposing to make available one or perhaps two maritime channels, also to be used on a private commons basis, to be used as a working channel by maritime search and rescue organisations. This spectrum would be managed by the MCA and free to end users. This consultation seeks views from search and rescue users as to whether this arrangement would be attractive to them.
- 4.77 We believe that the result of these proposals will be that few if any maritime search and rescue charities will face licence fees for the use of maritime VHF channels.

Where they choose to continue to hold spectrum for their exclusive use, the associated fees for maritime VHF channels would continue to be subject to a 50% discount.

4.78 On the question of extending this discount, or a higher discount, to all not-for-profit entities' exclusive use of spectrum, we are not proposing to do this. The activities of not-for-profit entities are often very similar to those of organisations that make profits. For example, some ports used by commercial traffic are publicly-owned but profit-making, and some are non-profit-making private trusts. In the leisure sector, the profit or non-profit status of a marina, for example, may reflect whether it is owned by user-members or by an independent operator. However, the purpose of the spectrum use is essentially the same. As these similar-purposed organisations may in some circumstances compete with one another, offering a discount (or free licences) to one group but not another would, in our view, be discriminatory and could disadvantage certain ports, harbours or marinas on the basis only of their different constitutions.

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?

- 4.79 A number of maritime stakeholders observed in bilateral meetings that in respect of maritime channels allocated for specific purposes (often for use on a private commons basis for search and rescue), users have no choice but to use these channels if they wish to participate in particular activities.
- 4.80 The Chamber of Shipping noted our reference in the initial consultation to the ability of spectrum users to pass on costs, and questioned whether, if ports and harbours could pass on costs, there would be any material incentive for them to respond to pricing by considering their spectrum use.
- 4.81 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

- 4.82 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 exceeds supply for the eight core simplex international maritime channels which are available for use as port operations channels. Demand, within the maritime sector for UK specific channels does not exceed supply but the spectrum can feasibly be used to meet excess demand from Business Radio users.
- 4.83 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.
- 4.84 In considering this possibility, we recognise that many spectrum users will be able to pass on costs to customers, as noted by the Chamber of Shipping in its response.

However, this ability does not remove all incentives for a spectrum user to consider its spectrum holdings, particularly over the medium and longer term. The overall incentive for any supplier (such as a port, harbour, or marina) to keep costs under review would apply to spectrum fees alongside all other costs. Further, as noted by our independent consultants Helios (see Annex 7 to this consultation), in practice it is unlikely that 100% of any cost impacts from fees would be passed on.

- 4.85 However, our further analysis, conducted in the light of consultation responses, leads us to conclude that duplex international maritime channels are unlikely to be in excess demand in their current maritime application and cannot at this stage be used for alternative applications because this would be likely to conflict with the UK's obligations to prevent interference with international maritime use. We are therefore proposing that these channels should attract fees which are set only to contribute to the administrative cost of the licensing process.
- 4.86 We agree with stakeholders that there is little to be gained from applying AIP to the maritime channels used for search and rescue and related activities on a private commons basis. We are not proposing to set fees, either on an AIP or administrative cost basis, for end users who access these channels.

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?

- 4.87 The Chamber of Shipping argued that comparisons with Business Radio are inappropriate as business radio users are able to use alternatives such as mobile phones and are incentivised to maximise efficiency as they are profit oriented organisations. By contrast, the Chamber considered that ports are not motivated by a profit incentive. The UKMPG/BPA did not accept the explanation in the consultation document as to why we proposed to charge AIP for internationally harmonised VHF channels. They claimed that use of VHF channels by ships will sterilise the entire UK and prevent any alternative use.
- 4.88 The UKMPG/BPA also argued that pricing of VHF communications channels would be at least as complex as pricing of radar, and that decisions should be deferred until 2010. Ofcom's willingness to consider the view of stakeholders at the public workshops, and to modify the proposals in the light of responses, was cited as evidence that Ofcom 's initial proposals were flawed.
- 4.89 The response from the UKMPG/BPA made a number of points about the detailed structure of fees proposed in the July 2008 consultation, including that no proper explanation had been given for how congestion should be represented in the fee structure for maritime VHF frequencies, in comparison to the population basis used for Business Radio fees. The National Coastwatch Institute, too, questioned the way congestion had been defined.
- 4.90 The Green Party agreed with this proposal.
- 4.91 During discussions with maritime users following the publication of our proposals, some stakeholders raised the point that Ofcom should consider the intensity of use in assignments, that is how much communication is carried on over them at any time. In discussions, stakeholders further proposed that "consequential" use of channels should be excluded from any assessment of the occupancy of those channels. From

further discussions, we understand this referred to the situation where a community of interest chooses to use assignments in a common channel to aid communication between them.

- 4.92 There were numerous objections to the proposal in the July 2008 consultation to define congestion differentials (and therefore fee differentials) using 50km x 50km grids. In the view of port respondents, this grid was considered to be too fine-grained, as each maritime transmitter sterilises a much larger territory.
- 4.93 MCA too registered concern that the 50km grid square was not the right approach for maritime assignments.
- 4.94 The Sutherland Partnership took issue with the initial consultation's assertion that the VHF maritime channels were congested, particularly in the Scottish Highlands.
- 4.95 Stakeholders in subsequent meetings considered that under the structure proposed in July 2008 and particularly in light of the steep gradient of fees, to avoid paying a fee based on high congestion, a user could relocate his transmitter to a low congestion area and transmit at higher power, thus sterilising a far larger area. It was also felt that the differentials for the different congestion areas had not been sufficiently explained.
- 4.96 The potential of charges being set per transmitter, where there may be more than one in a locality, was also criticised, as was the limited detail made available about the Area Defined approach (an approach since highlighted in our update in October 2008). This latter approach was criticised as being intended to benefit larger government organisations.
- 4.97 UKMPG/BPA argued that it would be wrong to charge double fees for a duplex channel, noting that simplex is already the preferred choice and a lower fee for simplex (relative to duplex) could increase demand for the already congested simplex channels.
- 4.98 A case was presented at the MRSUG working group, after closure of the consultation period, for a different treatment of AIS channels, reflecting the very intensive common use of these channels.
- 4.99 The Old Gaffers Association considered that we should draw a clear distinction between the internationally-allocated channels and the UK-allocated channels.
- 4.100 Several respondents agreed with the proposal in principle, on the condition that emergency uses of spectrum would not attract any fees. Others agreed that commercial or leisure users should pay fees, in principle, but that voluntary organisations, particularly search and rescue organisations, should not.

Ofcom's response

4.101 On the argument that maritime use should be treated differently, in principle, from Business Radio use on the grounds that Business Radio users have a profit incentive, we do not agree. Many users of Business Radio, or the customers of Business Radio service providers, provide public services for which there are no charges to recipients and where the profit incentive does not apply. Nevertheless, such public sector or charitable users are subject, like both trust and commercial ports, to incentives to secure the optimal benefit from the resources available to them, and thereby to arrive at the optimal mix of inputs, informed by the costs of those inputs and the benefits, in terms of each individual operators' desired outputs, that can be generated from each input. We do not consider that trust ports are, generically, less able to assess the mix of inputs they use than all Business Radio users. Conversely, many ports are run by quoted companies with standard fiduciary duties.

- 4.102 On the point raised by the UKMPG/BPA on the relevance of Business Radio opportunity costs, our proposals in this document acknowledge that a key reference point for assessing whether and how to set AIP-based fees for internationallyallocated channels is the degree of demand from the existing use.
- 4.103 In relation to the argument that international maritime channels are sterilised across the UK, we do not agree this is the case. There are inland areas of the UK where these channels would not, absent the international constraint on use, be affected by their use by ships. However, we would note that in practice we have not taken account of the potential opportunity cost of alternative uses at inland locations in developing our revised proposals for the international channels, which reflect the observed levels of demand from existing maritime use.
- 4.104 On the point that developing fees for maritime VHF channels is complex, we agree that the circumstances of channels, and their use, is relatively complex. This is why our current proposals vary by the status of the channel allocation (UK or international), the nature of the use (private commons or exclusive access by users), and by the observed demand, both by channel type (international duplex versus international simplex) and location. We do not consider that this complexity of itself means that proposals should not be made until 2010, although in practice we are now proposing that the new structure is not introduced until 2010.
- 4.105 On the difference between charges for duplex and simplex channels, we note that, in respect of internationally-allocated channels, we are proposing lower, flat fees set to make a contribution to administrative costs for the duplex channels where there is a low likelihood of excess demand in the medium term. To the extent that users may use assignments in these channels in preference to the simplex channels, this differential in fees should be expected to make such a choice comparatively more cost-effective. Each user's individual choice would, of course, take into account not only spectrum fees but any equipment costs and the operational needs of the coastal station.
- 4.106 In relation to the UK-allocated channels, we have taken as the reference point the opportunity cost of the alternative, Business Radio use because of the excess demand for this type of frequency from Business Radio. Use of a duplex channel for maritime VHF communications uses twice as much spectrum as a simplex assignment, and the alternative use opportunity cost is correspondingly doubled.
- 4.107 We have taken close account of the responses of maritime spectrum users when revising our fee proposals for maritime use of VHF spectrum. As noted in paragraph 7.11 below, we have made changes to the way relative levels of congestion in international simplex channels are reflected in fees. As a consequence, the gradient between fees in different locations is less steep, We have also proposed that the height of the transmitter (one of the factors defining the coverage class of a maritime VHF assignment) should be measured from Mean Sea Level (rather than ground level), this should avoid creating an unintended incentive to place transmitters on high ground and, thereby, increase the size of the sterilised area.
- 4.108 On the point about reflecting intensive use of channels, we note that some users deploy numerous transmitters on a single frequency, and in some cases a group of users will each use a transmitter on the same frequency at a particular location. However, the use of a channel (however intensively), denies its availability to other users and it is this factor which we are addressing through pricing. We note that, where a community of users chooses to share a channel using multiple transmitters, the option of an area-defined licence may be the most efficient solution (both in spectrum efficiency terms and in terms of economic efficiency for the users).
- 4.109 It is of course true that some assignments may be in heavy use for communications for most of the day, while others may only be used on occasion throughout the day. Hence some users may derive more benefit from similar assignments than others, even though the opportunity costs are the same. However our proposed fees structure is intended to reflect relative opportunity costs and not relative private benefits (and hence willingness to pay relativities).
- 4.110 We acknowledge that use of a 50km x 50km grid square to define areas facing different levels of congestion will, in some case, not reflect more granular geographic differences. However, it is our view that this scale offers a reasonable degree of granularity given the coverage of a typical maritime transmitter (which typically exceeds the area represented by a single square). We also note that the differentials between fees in adjacent areas are now proposed to be much less steep than we proposed in July 2008.

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?

- 4.111 The Chamber of shipping and the RYA both warned that Ofcom should take into account the cycle for annual budget setting by maritime spectrum users. MCA recommended notice of at least 18 months.
- 4.112 The Green Party considered that there was no reason to delay implementation.

- 4.113 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.
- 4.114 We agree that where, to achieve significant improvements in spectrum efficiency, a well developed and credible industry plan has first to be 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 not to apply AIP to these uses, and for a new strategic role for Government.

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.

- 4.115 The UKMPG/BPA argued that the issues are complex and that further studies should be undertaken before any firm proposals are made. The UKMPG/BPA argued that a long term approach was necessary, given the long lifetimes of radars and racons.
- 4.116 The Chamber of Shipping focused on the use of Racons and noted that these do not transmit all of the time. The Chamber wished to emphasise the importance of Racons to shipping.
- 4.117 The GLAs too expressed concern about possible pricing of Racons, noting that these are essentially passive devices which respond to radar and, therefore, their technology and spectrum use is determined by the nature of the maritime radars in use. The GLAs also pointed out that the power of these Racons is usually far lower than that of radar typically 1W as against several kW. Furthermore, they noted that the offshore location of these is often so remote that they deny no one else the use of spectrum.
- 4.118 The MCA noted that a design for end-user pricing for radar would be complex; and that ship-based use of radar necessarily affected the scope for any efficiencies in land use that could result in spectrum becoming available for new uses.
- 4.119 NATS too noted the method used to derive any aviation radar licence fees would need to be complex, and might need to take into account the adverse impact of wind farms. NATS also asked how the limitation on the use of the radar bands, by amateur TV repeaters, satnav and space based radar applications would be taken into account in spectrum pricing terms. Manchester Airports Group, too, considered that the matter would be complex, noting the different coverage and strengths of different radar, and the continuing changes in the extant population of radar equipment.
- 4.120 Most of the airlines considered it premature to attempt to comment on this question.
- 4.121 IATA proposed that the level of radar fees should depend in part on whether the spectrum used is measured at the receiver bandwidth or transmitter bandwidth. IATA also argued that X band radar is susceptible to inference from UWB and noted that fees would not come with additional protection from this interference.
- 4.122 The ASFCG considered that fees for radar should be based on coverage, and that the associated assessments would require access to a CAA planning tool such as ICS Telecom.
- 4.123 Highlands and Islands Airports proposed that the size and commercial viability of stakeholders should be taken into account.
- 4.124 BAA agreed that the most important factors would be transmission bandwidth and the geographical size of the interference zone around the radar.

Ofcom's response

4.125 As explained in Section 8 below, we are proposing that Government should take a strategic management role in the spectrum bands used for radar and aeronautical navigation aids. AIP licence fees would not, in our view, provide useful incentives to individual spectrum users while Government evaluates the strategic options for the

spectrum concerned with the sector stakeholders affected. Therefore, the question of apportioning AIP licence fees between radar and racon users does not arise in this consultation.

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 $\pounds 25k$ per single MHz of national spectrum would be appropriate for deriving fees for licences to use X band radar?

- 4.126 The UKMPG/BPA observed that the L band Auction would imply a value of about £14k per MHz. These organisations also drew attention to recent auctions of spectrum comparable with X band and argued that these too imply much lower values for this spectrum. The UKMPG/BPA asserted that the proposed reference rates had been kept artificially high by Ofcom.
- 4.127 The Chamber of Shipping questioned the value ascribed to radar bands, noting the possibility of a possible downturn in spectrum demand in light of the wider economic downturn.
- 4.128 The MCA expressed concern that large fee differences between X band and S band radar could cause users to migrate to X band, foregoing the superior target detection offered by S band. The MCA also asserted that there have been significant changes in the market since Ofcom's consultants Indepen and Aegis had completed their report on AIP.
- 4.129 Those airlines which commented proposed that account should be taken of the susceptibility of aeronautical spectrum to interference.
- 4.130 BAA argued that the proposed rates are all far too high. In respect of S and L band, BAA proposed that the most relevant benchmark is the recent 1452-1492 MHz L band auction, rather than mobile telephony for which aeronautical spectrum is not harmonised. In respect of X band, BAA proposed that the 10-40GHz auction provides a useful reference.
- 4.131 Several respondents agreed with the reference rates, on condition that any resulting fees would not be charged in respect of emergency or search and rescue uses.

Ofcom's response

4.132 As noted in Section 8 below, we are proposing that the Government should take a strategic management role in the radar bands. Actions and incentives for the efficient use of these bands will therefore be a matter for Government. Without prejudging the matters which Government may choose to take into account, we note that non-confidential comments by stakeholders in response to our 2008 consultation, along with the analysis in the Indepen study¹⁵ commissioned by Ofcom in 2007 ("Indepen

¹⁵ Aeronautical and maritime spectrum pricing Indepen (2007) http://www.ofcom.org.uk/research/radiocomms/reports/spectrumaip/aipreport.pdf

2007"), are available to Government in considering the value of the spectrum concerned.

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?

- 4.133 Stakeholders responding to this question appear to have taken different interpretations of the terms "uncongested". Some considering it to refer to channel occupancy and some to the availability of channels for new applications.
- 4.134 AOPA did not consider that there was growing congestion. AOPA also said that there is no reason to believe congestion on aeronautical radionavigation aids bands will get worse.
- 4.135 AOPA also considered that in future, use of GPS will reduce the need for more DME and VOR, and that ADF use was likely to reduce to nothing.
- 4.136 IATA and its member airlines reported that most aeronautical navigation aid bands are already congested.
- 4.137 BAA noted that the current lack of available spectrum generally, particularly at Heathrow, is such that it affects airports operations and services.
- 4.138 In contrast Manchester Airports Group considered that aviation spectrum is generally uncongested, except where the network of airports and airspace is particularly dense. AOA and its members expressed a similar view.
- 4.139 Luton airport argued that spectrum bands used for aeronautical navigation aids are uncongested and. therefore, there is no opportunity cost.
- 4.140 In general, NATS did not accept that spectrum used for aeronautical navigational aids is uncongested, and believed that congestion may get worse over the next 10-15 years. NATS also specifically questioned what spectrum efficiency improvements are likely to be possible in practice with SSR as the relevant frequencies are co-occupied by civil and military users.

Ofcom's response.

- 4.141 As noted in Section 8, we are not proposing in this document to apply AIP licence fees to aeronautical navigation aids. We are, instead, proposing that Government should take a strategic management role in these bands.
- 4.142 We note the varying responses from stakeholders to the question whether these bands are congested, and believe that the CAA should be well placed to advise Government on a consolidated industry picture of the future demand for the frequencies concerned by civil aviation users.

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?

4.143 There were no comments specifically limited to the reference rates for the bands used by aeronautical radionavigation aids. The comments made by stakeholders in response to our question on the reference rates for radar bands are assumed to apply, where relevant, to this question too.

Ofcom's response

4.144 As noted in Section 8 below, we are proposing that the Government should take a strategic management role in these bands. Without prejudging the matters which Government may choose to take into account in undertaking this role, we note that non-confidential comments by stakeholders in response to our July 2008 consultation, along with the analysis in the Indepen 2007 study, are available to Government in considering the value of the spectrum concerned.

Other issues raised by respondents

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

- 4.145 The UKMPG/BPA and the Chamber of Shipping questioned why Ofcom was proposing to apply AIP fees to maritime spectrum, given that they considered Cave had recommended against applying AIP for uses which are set in international agreements.
- 4.146 The RYA made a similar comment, but further considered that Government had accepted that all maritime spectrum is internationally constrained and that users have little scope to change their use of any such spectrum.
- 4.147 The MCA and DfT also observed that maritime users have limited discretion to change the use of spectrum because of the international nature of the assignments.

- 4.148 We address, 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.
- 4.149 We recognise that many maritime 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 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. We also note in Section 5 that there are some bands, or channels within bands, over which the UK has considerable flexibility.
- 4.150 Our proposals in relation to maritime VHF channels cover the range from no fees at all for end users, through administrative cost fees only, to AIP-based fees where we consider there is potential scope for benefits from incentive pricing that reflects relative levels of excess demand in the current use, or alternative use where this is possible. In drawing up these revised proposals we have taken careful consideration of the circumstances of each channel and the points made to us by respondents to the July 2008 consultation. We set out in section 5 the thinking behind these different proposals.

Other points made on the overall principle of pricing

- 4.151 The Chamber of Shipping questioned what improvements in efficiency there can be if, as acknowledged in the consultation, many of the additional costs will be passed on (for example to ship owners).
- 4.152 The RYA noted that there would be limited scope for a VHF channel released by a port authority in response to AIP licence fees to be re-used by other operators in the port, as they would need to be able to communicate with that port authority and hence to use the same channels it used.
- 4.153 The UKMPG/BPA argued that shore stations are constrained by mobile stations in their ability to improve spectrum efficiency.
- 4.154 One respondent considered that there were no grounds for charging fees for any spectrum whatever; that all spectrum should be free. Another respondent made a similar point but added that if there was any fee, it should be charged "up-front" as an additional element in the purchase price of equipment.

- 4.155 We recognise that where a spectrum user faces no competitive pressure to minimise its costs overall, it could (depending on the regulatory arrangements imposed by public authorities) be in a position to pass on any AIP fees to its customers without having any regard to possible efficiency savings. We do not however believe this situation generally pertains in the maritime sector, as providers of spectrumdependent services are either operating in a competitive market or are regulated to prevent inefficiency and abuse of market power. 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 as an efficient response only where no other feasible options have been identified, just as with other input cost variations experienced by the affected sector over time.
- 4.156 We accept that future spectrum efficiency improvements in the maritime sector may be impacted by the future uses of spectrum by ships. However, as noted in paragraph 3.6, above, we do not believe that efficiency improvements would arise directly from the application of AIP-based fees to UK registered ships. We do not believe this factor negates the potential benefits of applying AIP fees to VHF communications spectrum used by ground stations. In most instances, within prevailing international frameworks as appropriate, it is the ground station which determines which frequencies or channels that are used by the mobile station to communicate with the ground station.
- 4.157 The impact of spectrum use by ships could be more significant in the context of radar, for which we are making no proposals to apply AIP in this document.
- 4.158 We fully accept that AIP will never be the sole driver of change in spectrum use, even over the longer term. Clearly, the maritime sector faces many varied pressures which may cause it to respond by changing its 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.

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

- 4.159 The Chamber of Shipping recommended that Ofcom should work with the IMO and other international bodies to change maritime equipment standards to drive efficiency improvements.
- 4.160 The GLAs argued that there are technical solutions to both the congestion in VHF bands (digital, narrow band technology) and to the need to reduce the bandwidth used by radar (solid state, pulse compression etc). GLAs considered that technological improvements to deliver more efficient use of spectrum could only be achieved through leadership and facilitation from regulators.
- 4.161 Similarly, UKMPG/BPA argued that better spectrum management, including more efficient regulatory co-ordination of assignments with neighbouring countries, would be a better way to address concerns about congestion.

Ofcom's response

4.162 We agree that technological change has a major role to play in improving spectrum efficiency, as does sector regulation within the UK and abroad. However, research and change costs may be significant and, where spectrum is perceived to be a free resource, there may be few incentives to invest in such research. AIP fees can provide an incentive, enabling spectrum users to make an informed assessment of the benefits of investing now to save costs in future years.

Mountain rescue services

4.163 Concern was expressed by hundreds of individuals about the possible impact of fees on mountain rescue services. It was not wholly clear why our consultation prompted this concern, as we made no proposals in relation to the mountain rescue channels, nor in relation to the current arrangements by which users access them.

- 4.164 In practice, fees for land SAR channels have been set at AIP levels, and paid at these levels by MCA, since 2005; MCA co-ordinates access to these channels in emergencies under arrangements agreed at the UK Search and Rescue Operators Group.
- 4.165 The basis for concern expressed by stakeholders responding to the July 2008 consultation appears to have been a belief that MCA might withdraw access to these channels if faced with increased fees for its current use of maritime spectrum. Such a withdrawal was not proposed in our consultation nor proposed by the MCA or DfT, and in January 2009 the Government confirmed that there were no plans to make any changes to the arrangements whereby the mountain rescue services access the inland search and rescue channels¹⁶.
- 4.166 Ofcom has no plans to impose a charge on mountain rescue teams for the use of these channels. We believe the model for managing the land search and rescue channels is a good one, and we are proposing a similar model to apply to maritime search and rescue channels.

¹⁶ MRT-RF licences – epetition response, http://www.number10.gov.uk/Page17936

Process issues

- 4.167 A number of responses reflected a view that Ofcom had disregarded UK consultation guidelines and its statutory duties to publish an Impact Assessment.
- 4.168 Many responses from maritime organisations also asserted that it had been procedurally improper to publish an update, referring to the possibility of RNLI acquiring an Area Defined Licence, midway through the consultation period.
- 4.169 The GLAs proposed a review of impacts after the event, and formal public hearings.

- 4.170 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 had 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.
- 4.171 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.
- 4.172 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 3.21 to 3.28 above.
- 4.173 The October 2008 Update was published to address public concern arising from misunderstandings about what Ofcom was proposing. As evidenced by the hundreds of written responses expressing concern about the possible impact on mountain rescue teams, and the fact that 30% of all responses from organisations were from mountain/cave rescue teams, there was a widespread belief that Ofcom was proposing to change the arrangements under which radio channels are made available to land search and rescue. As noted in paragraph 1.15 above, these channels are already centrally managed and funded by public authorities and AIP based fees are already paid by those authorities. Therefore, the July consultation which proposed applying AIP based fees to maritime channels had no bearing on mountain/cave rescue teams.
- 4.174 In our view, since we had made no proposals in relation to mountain rescue access to spectrum, it was entirely right to make this clear as soon as possible. There was no question of pre-empting the result of the consultation or our consideration of responses, as this concern was not related to anything we had proposed.
- 4.175 The widespread concern about the possible impact on the RNLI depended, to a large degree, on a misunderstanding about the potential financial impact of our proposals. It was clear that many people expected an impact on the RNLI that was extremely high, compared with the actual potential effect of our proposals. As a result, we considered that clarifying the potential impact of our actual proposals was important, to enable stakeholders to formulate their views in light of those potential effects. Again, this improved explanation did not involve pre-empting the consultation, nor

prejudging our conclusions in light of stakeholder responses, nor a revision of our initial consultation proposals.

Further consultancy to inform Ofcom's decision making

- 4.176 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.
- 4.177 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 radar and aeronautical navigations, maritime VHF communications and aeronautical 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 was narrowed to focus on VHF communications and the impacts of the specific fee proposals we were developing. We have published at Annex 7 the

outputs of that study which relates to maritime VHF communications channels. We will publish the advice which we have received in relation to aeronautical VHF communications when we make revised fee proposals in respect of such use.

Further discussion with stakeholders

4.178 After the July 2008 consultation was published, Ofcom met with numerous stakeholders, including at public workshops organised by Ofcom, meetings of the Maritime Radio Spectrum Users Group, 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 reasons for proposing AIP fees

Introduction

- 5.1 Licence fees for the use of maritime spectrum are currently set on a basis which wholly or partly recovers the administrative cost associated with issuing the licences concerned. Consequently, applications which use frequencies which are in short supply often attract similar fees to applications which use less popular frequencies, and powerful transmitters which prevent others from using the same spectrum over a very wide area 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 around major ports) attract the same fee as licences to use similar spectrum in remote areas with little or no 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 in the short to medium term, 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. 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 particular 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, it is 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 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. 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 at least some of the spectrum used by the maritime sector.
- 5.5 Some of the excess demand comes from within the sector. For example, requests for new assignments of internationally recognised maritime channels required by ports are often difficult to meet (paragraphs 5.26-5.28). 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 ports.
- 5.6 In other instances, the excess demand comes from other sectors of industry which face shortages of spectrum which could be overcome if spectrum currently used by the maritime sector was made available to them. For example, although UK specific maritime channels are generally under-used, these channels are technically well suited to meeting excess demand from Business Radio users (paragraph 5.35). In

some instances, this may require changes to permitted use. Where there is no charge to continued use of the spectrum, there is no incentive to invest resources in considering how the spectrum may be used more efficiently.

5.7 Where current users have scope to consider how they might use less spectrum, and hence make spectrum available for additional new users, we believe they should face incentives to do this in bands where demand exceeds supply.

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

- 5.8 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.
- 5.9 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"¹⁷) and made a number of relevant recommendations including the extension of AIP to sectors including the aeronautical and maritime sectors.
- 5.10 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 Audit"¹⁸). 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.
- 5.11 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.
- 5.12 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

¹⁷ Review of Radio Spectrum Management <u>http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf</u>

¹⁸ Independent Audit of Spectrum Holdings <u>http://www.spectrumaudit.org.uk/pdf/20051118%20Final%20Formatted%20v9.pdf</u>

*in Europe can be achieved. However, the overall responsibility for spectrum and frequency management remains a matter for national Governments*¹⁹.

- 5.13 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"²⁰. 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 and trading) as the review advocates for their terrestrial equivalent private mobile radio²¹."
- 5.14 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.
- 5.15 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 Review he noted:²²

"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).

- 5.16 In his 2005 Review, 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 Review, 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

¹⁹ Paras 12.5 and 12.5

²⁰ Para 12.16

²¹ Para 12.17

²² Para 6.1

efficient equipment in congested spectrum²³. 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]²⁴. In this context he noted that aeronautical VHF frequencies were "under acute pressure"²⁵

- 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 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 decades²⁶." 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 fronts"27. Again Professor Cave reiterated in his 2005 review 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."28
- 5.17 However, Professor Cave also indicated that where neither of the above conditions held, the opportunity cost of the spectrum was zero. In his 2005 review 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.²⁹"*
- 5.18 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 search and rescue channels, the fire and distress channels, and the AIS channel all reflect our assessment that there is not at present foreseeable excess demand.
- 5.19 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 and

- ²⁴ Para 12.1
- ²⁵ Para 12.3
- ²⁶ Para 26
- ²⁷ Para 138
- ²⁸ P53
- ²⁹ P56

²³ Para 6.9

maritime sectors is congested in existing use and that pricing signals can influence the efficient use of the spectrum concerned.

- 5.20 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 these particular sectors, 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.
- 5.21 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.
- 5.22 We also reflect this assessment in our proposals 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. Nor, given the current observed demand for these channels by maritime users, is there an current use opportunity cost. Accordingly, we are proposing to set licence fees only to make a contribution to our administrative costs.

Maritime use of VHF spectrum for radio communications

Background

- 5.23 Some maritime VHF channels in the UK have been internationally designated and are used by international fleets, and others are designated within the UK with less international utilisation. Accordingly demand for some, but not all, types of maritime VHF communications channel exceeds supply, while other types of maritime VHF channels are only lightly used. Of the latter, some could potentially be used for other applications in the UK, of benefit to citizens and consumers of other services, while others are more rigidly constrained by international agreements.
- 5.24 Furthermore, a number of channels are used in the UK on a shared private commons basis, often for search and rescue and related activities, which means that individual users may have little influence on how much spectrum is used for these purposes. It is therefore necessary to consider the different factors specific to each channel when considering whether spectrum efficiency could be improved if that channel attracted AIP fees.

5.25 In particular, many of the maritime VHF simplex channels used by UK ports and other coastal radio stations have been reserved for this purpose by international agreements. Demand for these channels ("International simplex maritime channels") is much stronger than demand for channels which the UK has additionally made available for maritime purposes ("UK maritime channels"). This is because the international maritime channels are used by the worldwide fleet of ships and are an essential means by which ports communicate with those ships, whereas the UK maritime channels are generally suitable only for use within a single organisation or for a co-operating community of users which has tuned its radios to the particular frequency assigned to it.

International maritime VHF channels

Decisions by users of maritime international simplex channels

5.26 Demand for simplex international maritime channels exceeds supply in the UK, particularly in the busy coastal areas in the south and south east, and it is often difficult to meet requests for new assignments. In 2005, the Cave Audit considered the evidence for congestion in international maritime VHF frequencies:

Due to congestion in the bands (we understand for example that Ofcom has had difficulty in assigning channels in the South and South East), the Audit feels that in the case of the CSR international bands, whilst taking into account international use, there is merit, for the longer term, in such a study being carried out jointly by the MCA and Ofcom.³⁰

5.27 Of com subsequently commissioned the Indepen 2007 report which identified the following evidence for congestion:

"The main evidence for congestion is with respect to the [international] VHF communications band where it is becoming increasingly difficult to make new assignments to ports particularly around the English Channel and the South / South East coast of the UK.³¹

- 5.28 Ofcom considers that the above evidence demonstrates clearly the excess demand for international maritime VHF frequencies.
- 5.29 We believe AIP fees can therefore help to manage this demand efficiently, given the limits to changing the effective amount of spectrum capacity available to the sector in the short to medium term.
- 5.30 Faced with fees which reflect the relative amounts of spectrum used by a particular application (which will vary with the location, power and antenna height of the transmitter concerned), users will review their needs. In some cases, users could elect to move to less congested and cheaper UK designated channels where these are available, although this is likely to be an option chosen only by a sub-set of users needing to communicate with UK based vessels for business purposes (e.g. fisheries and local tourist river boats).

³⁰ Ibid, page 68

³¹ Indepen (April 2007) *Aeronautical and Maritime Spectrum Pricing* page 87. <u>http://www.ofcom.org.uk/research/radiocomms/reports/spectrumaip/aipreport.pdf</u>

5.31 While the maritime sector may argue that it is unable to change its spectrum use without having disproportionately adverse impacts on its day to day operations, we believe some users will decide that they are content to use fewer or different channels or to use less powerful or alternatively located transmitters which have a more localised impact. We would expect any operator considering such a change to take into account not only the potential saving in spectrum fees but all of the other associated effects on operations, most clearly the reduction in the area over which ships or other coastal stations could be contacted. As a result of such reduced use by some users, over time it will become less likely that requests from the maritime community for new international assignments will have to be refused, improving the potential value derived from these channels by the UK's shipping sector, increasing the benefit to the wider economy.

International duplex channels

- 5.32 Some international maritime channels have been designated as duplex channels. These are much less popular than simplex channels and demand does not currently exceed supply. Indeed many are underused. The ITU and standards organisations have taken initial steps to facilitate the alternative use of the frequencies of a duplex channel as 2 separate simplex channels. However, this will require regional cooperation which may take several years to achieve, particularly as ship radios will require re-programming and in some cases upgrading.
- 5.33 In the meantime, the UK has international obligations to prevent interference with users of any international maritime channel (simplex or duplex). This limits our ability to authorise use of this spectrum for other purposes such as private mobile radio systems. Although, in principle, this spectrum could be used for other applications away from the coasts, in practice technologies for enabling alternative use without causing interference to maritime use have not been developed, aside from some limited use for applications away from the coast for SAR related activities (eg mountain rescue). Furthermore, some of these channels are also used for maritime purposes in areas such as inland waterways, ship canals and rivers. Consequently, the duplex international maritime channels are likely to remain under-utilised across the UK as a whole even if some international changes are agreed in the medium term which would allow use by alternative uses away from the coast and from waterways.
- 5.34 Accordingly, it is unlikely that excess demand for these channels can be envisaged except perhaps in the longer term. While such longer term opportunity costs may still be material, there is very limited scope for individual users to influence allocation decisions to help realise this value in the shorter term. In these circumstances we see no merit in applying AIP fees for their use at this time. We propose, instead, to retain a flat fee structure that will make a contribution to the administrative cost of the licensing process. As with all fee decisions, this position would need to be kept under review if the future international position were to change (e.g. following the ongoing considerations by the ITU and IMO).

UK maritime VHF channels

5.35 The UK maritime channels are generally under-used by the maritime community. Unlike international simplex channels, there is therefore no need to use AIP fees to help deal with excess demand for this spectrum capacity from within the sector. The frequencies are however well suited to land-based private mobile radio use where there is already excess demand in many areas of the UK and where we have introduced or are proposing AIP based fees for other affected frequency users including Business Radio and the PMSE community. While it is rarely the case that Ofcom has to reject outright a request for a new Business Radio assignment, because no channel is available, we are often unable to meet users' preferences with respect to service quality. Users often have to accept a channel in a band which is not their first choice and/or accept that they will have to share where assignments have to be closely spaced. Requests for Area defined Business Radio licences are particularly difficult to meet. We have noted an marked increase in the volume of private trades of Business Radio channels, reflecting Ofcom's inability to meet demand. Indepen (2004)³² too noted the following evidence of congestion from substitutable Business Radio use:

"The spectrum for [Coastal station radio (UK) licence (VHF)] use is not internationally harmonised, and the frequencies are for use purely within the vicinity of the UK and cannot be used in the waters of other administrations. There appears to be a good case for applying incentive pricing here. For example, the use of reduced bandwidths (from the current 25 kHz) would free up spectrum for use by Business Radio users, suggesting that a Business Radio AIP rate may be appropriate. These channels are within sections of the band between 156 MHz to 163 MHz. There is considerable demand by BR users in VHF mid-band, in which these maritime bands are located."³³

- 5.36 As the UK has discretion to determine how the UK maritime channels should be used, some of them could potentially be made available to meet this demand from land-based, non-maritime, users within the framework of UK spectrum planning. This would require appropriate consultation within the UK, but would not require changes to international agreements. A change to make spectrum available for alternative users could therefore be achieved in the relatively near term. As a result, we believe it is appropriate to apply consistent approaches to AIP fees which reflect the wider demand for the substitutable spectrum concerned, to facilitate a market-based approach to spectrum management in this area, in line with our wider spectrum management approach.
- 5.37 We see no fundamental distinction, in the aspect of demand from existing use and potential for alternative use, between simplex and duplex UK maritime channels in this respect, except that duplex channels use twice as much spectrum and hence involve double the associated opportunity costs. We believe this factor should be reflected in the fee structure.
- 5.38 Faced with AIP fees, some users of UK maritime channels may conclude that they wish to reduce the number of such channels that they use, or reduce the coverage of the transmitter (where this can be expected to reduce fees and is consistent with operational requirements). It is also possible that some users of UK channels may decide to use alternative, cheaper, technology, including mobile phones, that better meet their business needs, provided they can maintain the necessary operational safety standards. AIP fees set at an appropriate level can help to ensure users make informed business decisions. In turn, as more capacity can be made available to

³² An economic study to review spectrum pricing Indepen, Aegis Systems and Warwick Business School February 2004

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

³³ Indepen (2004), page 66.

other land-based users, a better spectrum supply/demand balance can be achieved across all the affected frequencies.

5.39 The UK duplex lighthouse channel is used by the lighthouse authorities, and a very small number of legacy licensees. We note that the small number of users in this channel offers scope for co-ordinated action which could reduce fees costs and could, further, allow for more efficient use of the spectrum. In response to AIP-based fees, it would be possible for the lighthouse authorities to take shared responsibility for managing this channel, by taking a UK-wide area-defined licence for it. There would also be a choice for the lighthouse authorities whether to "carve out" the assignments for the legacy licensees, or to seek agreement with them that there would be one UK-wide licence with contractual sharing arrangements with these licensees. Collectively, the users of this channel would be able to determine whether the benefits of duplex operation over simplex justify the additional cost, and whether and how the channel could be shared with other users to defray the cost. This, in turn, could have the effect of easing the pressure of excess demand in other communications channels, making it possible for more assignments to be made from within the current spectrum available.

The marina channels

- 5.40 The three "marina channels" (one International and two UK) are used by leisure users including marinas and sailing clubs. No planning is undertaken to avoid interference between users of these channels, and they are used by a relatively large number of distinct organisations. Use of these three channels for this particular purpose does however deny their availability to others and, as noted above, this imposes opportunity costs on affected citizens and consumers, which could in principle be reduced with more efficient use of the spectrum. It is possible, for example, that fewer channels could be deployed in some areas with little or no loss in functionality. It is unclear, for example, how much actual spare capacity exists in the two UK channels and hence whether they are both needed on a national basis.
- 5.41 For this reason, we believe there could potentially be benefits from users collectively facing the opportunity cost of this spectrum. However, while a collective decision could increase the availability of spectrum for other users, an individual user's decision would not have any such effect. As a result, we are proposing an administrative cost-based fee of £75 for a licenses authorising use of all three channels.

Maritime channels used on a private commons basis

- 5.42 As noted above, some maritime VHF channels (UK as well as International) are used on a shared basis. These include the two emergency and calling channels (and adjacent channels which serve as guard bands), five channels used for co-ordinated search and rescue activity, and two AIS channels. A variety of channels are also used to support the work of search and rescue organisations (in addition to the channels used for co-ordinated search and rescue activity).
- 5.43 We believe that there is limited scope for end users acting alone to make more efficient use of these channels. As a result, we do not believe that AIP fees are the best way to ensure efficient use of this spectrum. We set out below our reasons for taking this view, and explore in Section 8 alternative arrangements for managing these channels.

Emergency and calling channels

- 5.44 The two emergency and calling channels (international channels 16 and 70) are used worldwide on a private commons basis. Although, in principle, there may be scope for the voice channel 16 to be used more efficiently by the worldwide maritime community (for example, by using narrower bandwidth), in practice such developments can be expected to emerge as part of a wider development relating to the generality of international maritime channels affecting the global shipping fleet. We also note that given the nature of its use, in which short bursts of data are sent by ships and receiving shore stations, channel 70 is effectively also used on a private commons basis. We do not believe that action by any individual shore based users will have any measurable impact on future use of either of these channels. We therefore see no efficiency case for applying value based fees to these two channels.
- 5.45 Furthermore, given that no additional frequency planning is needed from Ofcom to enable this co-ordinated use, and given that authority to use these channels is generally associated with licences to use other channels, we believe authorisations should be free of any charge. Similar issues apply to the adjacent channels 15, 17, 75 and 76 which are used as guard bands with limited independent application (these channels are not normally assigned to shore stations).

Channels used for co-ordinated search and rescue

- 5.46 International channels 10, 67 and 73, and UK channels 156.000/160.600 MHz ("0/00") and 161.225 MHz (the "UK Beach Lifeguard channel")) are used on a shared basis by search and rescue organisations. Here again, we do not believe that action by any one user can result in more efficient use of this spectrum as participation in particular types of search and rescue currently requires access to the relevant channel(s) granted at the discretion of the MCA.
- 5.47 We do not propose to apply AIP fees to end users of these centrally-coordinated channels. Furthermore, for the same reasons as for the emergency and calling channels, we do not propose to apply administrative fees to end users either.

AIS channels

- 5.48 The two channels used for AIS rely on a time slot sharing process that is also coordinated by the MCA. The channels are used by the worldwide fleet of ships and a relatively small number of coastal stations and Aids to Navigation Stations ("ATONS"s) (mainly operated by the MCA and the lighthouse authorities). Channel 70 is licensed along with the two AIS channels as a single licence product and used for AIS channel management. We see little scope for UK shore based end users acting alone to influence how much spectrum is used. If channel occupancy was starting to reach saturation point, when pressure might build for international allocation of further channels for AIS use, there might in future be merit in charging fees to end users to help in managing demand. However we have no evidence that this is a concern in the UK for the foreseeable future.
- 5.49 As a result, we currently see little value in applying AIP fees to end users. Given that the assignment process is co-ordinated by MCA, nor do we propose to apply administrative fees. Proposals for management of these channels are explored in Section 8 below.

Longer term potential benefits of pricing internationally harmonised maritime channels

5.50 In principle. we also believe that, over the longer term, AIP based fees for internationally harmonised spectrum (whether congested in current use or not) would improve the information taken into account by users and regulators in relation to international decision-making about future uses of spectrum. However, we do not currently believe that this effect alone would warrant the application of AIP fees, as the influence of individual end users is likely to be fairly weak in international fora. Indeed, we agree with the view of respondents to our July 2008 that effective action by sector regulators and other public authorities will also be needed to secure the optimal use of this spectrum over the longer term. For this reason, as noted above, we are not proposing to apply AIP fees to uncongested international maritime duplex channels.

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

- 5.51 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 maritime 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.
- 5.52 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 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 maritime VHF frequencies.³⁴ 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. For each band, we consider two fee alternatives:
 - Fees based on administrative cost or zero rates (Approach 1); and
 - AIP fees based on the underlying opportunity costs of spectrum (Approach 2). In respect of Approach 2, we explain our proposed methodology for deriving the reference rate for fees based on the national opportunity cost of the spectrum.
- 6.2 AIP licence fees are intended to provide price signals that incentivise users of scarce spectrum to use it efficiently (see paragraphs 5.1-5.7).
- 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 arising from the allocation 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 (see paragraphs 5.1-5.7).
- 6.4 Where there is no excess demand for the spectrum, each assignment is accommodated without excluding another potential user, and we therefore consider 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. In addition, we propose to set zero rated fees for channels that are used on a private commons basis for search and rescue purposes, including international distress and calling channels (see paragraphs 5.422-5.47).
- 6.5 We have also taken account of AIP reference rates which have already been set to reflect scarcity in other similar parts of the spectrum, since these are potentially relevant as benchmarks. For instance, AIP reference rates have already been set for Business Radio use. Business Radio uses similar VHF spectrum and is, at least in respect of some maritime spectrum, considered to be the highest value alternative use of the VHF spectrum where the existing legal framework may enable alternative use in future.
- 6.6 In the remainder of this section we consider:
 - the approaches for setting rates for UK maritime VHF channels (paragraphs 6.7 to 6.35);

³⁴ In this section, we refer to reference rates (expressed as £ per 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.

- the approaches for setting rates for international maritime VHF channels (paragraphs 6.36 to 6.56);
- externalities and safety issues relevant to setting AIP reference rates (paragraphs 6.57 6.61).

Alternative approaches to setting rates for UK maritime VHF spectrum

- 6.7 Under Approach 1, we would set a reference rate for UK maritime VHF either based on administrative costs or zero rated.
- 6.8 As set out at paragraph 5.4, demand can sometimes exceed supply, denying others use of that spectrum. 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 licence fees payable based on AIP reference rates.
- 6.9 As set out at paragraph 5.35, the UK allocated maritime channels are generally not subject to excess demand from the maritime community. However, many of these frequencies are well suited to Business Radio use where there is already excess demand in many geographic areas of the UK.
- 6.10 In the context of these observations, we assess the alternative approaches to setting reference rates for UK maritime VHF spectrum below.

Approach 1 Fees based on administrative costs or zero rated

- 6.11 Under Approach 1, we would set a reference rate for UK maritime VHF either based on administrative costs or zero rated.
- 6.12 As noted in paragraph 6.4, we consider that it is appropriate to set spectrum charges that reflect 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 an administrative fee which reflects the costs of spectrum management. We also consider that it is only appropriate to set zero-rated fees for channels where there is no excess demand, and for which spectrum management costs are *de minimis* (including, for example, channels used on a private commons basis).
- 6.13 Given the excess demand in the alternative Business Radio use, we consider that fees based on administrative costs would not facilitate UK maritime 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.

Approach 2 AIP fees based on opportunity costs

- 6.14 Under Approach 2, we would set AIP for UK maritime VHF spectrum based to reflect underlying opportunity costs.
- 6.15 As set out above at paragraph 5.35, there is excess demand for UK maritime VHF spectrum from alternative Business Radio use.
- 6.16 We consider that consumers and citizens are more likely to benefit from an approach that sets AIP fees based on the underlying opportunity costs of that spectrum. This is

because fees which reflect the opportunity cost, or value to another user, will prompt users to consider the costs and benefits of continuing to hold spectrum compared with those of reducing it at the margin, or substituting an alternative input that is subject to lower demand and therefore has a lower price. Over time, decisions made by users on the basis of assessing these costs and benefits will be more likely to lead to spectrum being held by those who can secure the most value from it for society.

- 6.17 In order to arrive at a fee proposal under Approach 2, we need to assess the underlying opportunity costs. We have had regard to independent research on the underlying opportunity costs of current and alternative uses in the maritime sector carried out by Indepen in 2004³⁵ and 2007³⁶.
- 6.18 First, Indepen has estimated opportunity cost in current use. Indepen 2007, in considering the frequency range 156-163MHz, suggested some excess demand from maritime communications in some locations. We have analysed this evidence, along with evidence gathered prior to this consultation including from discussions with spectrum users and our own evidence of levels of requests for assignments in these channels. It is not apparent that UK maritime VHF channels (duplex and simplex) face excess demand. Accordingly, Ofcom considers that the opportunity cost in current use is effectively zero and may remain so without other changes in spectrum allocations.
- 6.19 Second, Indepen has assessed the opportunity costs in the highest value alternative use. Indepen 2004 identified that the highest value alternative use of the spectrum is Business Radio. Indepen 2004 then applied a least cost alternative method to deriving the marginal value of the Business Radio spectrum. This approach estimates the opportunity cost of the spectrum based on the resource cost of employing a more spectrally efficient technology to deliver the current level of service or functionality. On this basis, Indepen estimated that the opportunity costs in alternative use, (ie Business Radio use), are £620,000 per 1 X 1 MHz on a national basis.
- 6.20 Indepen 2004 estimated the marginal value of spectrum for Business Radio services based on the assumption that the least cost alternative to the use of a congested band is to switch to an alternative uncongested band. Indepen assumed that users must replace existing equipment when they move band and that the existing equipment is half way through its useful life. To estimate the marginal value of a national Business Radio channel, Indepen took account of both the physical re-use of the channel and the varying geographic demand for Business Radio services. This implied a national value of the spectrum at £620,000 per 1 X 1 MHz.
- 6.21 We propose to apply an approach recommended by Indepen which indicates that the reference rate should lie between current and alternative use opportunity costs. Specifically, we note Indepen's approach to take the midpoint between current and alternative use opportunity cost to derive the long run opportunity cost of the spectrum:

"In reaching an overall conclusion a judgement is required taking account of the following considerations. First, what is the range of marginal benefit estimates? Second, how large a quantity response is anticipated? Third, is the release of spectrum likely to promote

³⁵" Indepen 2004" see footnote 40 above

³⁶ "Indepen 2007" see footnote 21 above

innovation and new demand in terms of an enhancement to an existing service or new entry?

As a rule of thumb, unless there are good grounds for thinking the second or third considerations will dominate, it may be reasonable to conclude that the central estimate of opportunity cost lies mid-way between within band and adjacent band estimate of marginal benefit.³³⁷

- 6.22 We consider that taking the midpoint appropriately balances the risks of over- or under-stating the long run opportunity cost of the spectrum, particularly given the inherent uncertainties regarding estimates of current and alternative opportunity costs, which are somewhat speculative. In this case, our judgement is that it would be appropriate to set a reference rate of £310,000 per 1 X 1 MHz national channel (i.e. midway between zero and £620,000 per 1 X 1 MHz national channel).
- 6.23 We note that Indepen have highlighted that, where there is a degree of uncertainty surrounding estimation of opportunity costs, it may be appropriate to adjust the estimated equilibrium price downward to reflect this uncertainty. This is to avoid the risk that setting fees too high results in spectrum being left unused. This implies a conservative approach may, in some cases, be appropriate when setting AIP fees.
- 6.24 This is a key concern for us as it is important to ensure that spectrum prices are not set so high that spectrum is left unused. In the case of Business Radio (the best alternative use for UK simplex, as discussed in more detail below) there is excess demand for spectrum to varying degrees in different parts of the UK. This suggests that the prevailing national average AIP fee rate for Business Radio, set at £330,000, has not eliminated excess demand overall. Our assessment is that the present excess demand in Business Radio use would be unlikely to be met solely by additional spectrum equal to the volume of existing vacant UK maritime assignments and that significant further additional spectrum would be required before the marginal value to Business Radio use would start to reduce.
- 6.25 Accordingly, given our above estimate of opportunity costs of £310,000, is slightly lower than the prevailing Business Radio AIP fee rate, the risk that setting fees based on this reference rate would leave spectrum unused must be viewed to be low. Therefore, we consider that the equilibrium rate of £310,000 does not need to be adjusted downward to reflect uncertainty of the estimated value.
- 6.26 Application of the Indepen method leads to a fee slightly below the Business Radio charge. However, the Indepen method yields only an approximate estimate of the expected spectrum opportunity cost at equilibrium. One reason is that, although it is a reasonable assumption that the equilibrium value will equal the mid-way points between the existing and alternative use opportunity costs, this is not a precise estimate.
- 6.27 In practice, we think it is likely to be undesirable to maintain a differential. This is because Business Radio users operate at frequencies that have similar propagation characteristics to UK maritime VHF spectrum. We are not aware of any additional costs to Business Radio of operating at the UK maritime frequencies, as equipment currently used in the Business Radio sector is conditioned to operate across the range of both frequencies. We are also not aware there would be any material loss of service capability from Business Radio operating at UK maritime VHF frequencies.

³⁷ Indepen 2007, page 61.

Finally, we note that, in recognition of this substitutability, we would be able, in principle, to remove the distinction between the two spectrum frequencies and classify maritime VHF spectrum as Business Radio. We consider that the UK maritime VHF spectrum is therefore (close to) perfectly substitutable for Business Radio use. Therefore, if traded in a competitive market, it is to be expected that the same price would apply to UK maritime VHF and existing Business Radio spectrum.

- 6.28 Accordingly, since UK maritime VHF spectrum can be substituted for spectrum in Business Radio use at no extra cost to Business Radio users, it is reasonable to suggest that the reference rate for maritime UK VHF spectrum be set at or near to the current AIP rate for Business Radio of £330,000 per 1 X 1 MHz (i.e. the Medium Popular reference rate which applies to the Business Radio frequencies which are close in range to the UK maritime frequencies).
- 6.29 An advantage of using the AIP rate for Business Radio as a relevant reference rate for UK maritime VHF fees is that it would minimise relative distortions in use, particularly given that the spectrum is viewed as being highly substitutable. Pricing UK maritime VHF lower (or higher) than the Business Radio AIP rate could result in under (over) release of spectrum to Business Radio use over the longer term.

Preferred approach for UK maritime VHF

- 6.30 We consider that Approach 1 should be rejected on the grounds that it would not provide the appropriate price signals for efficient use of the UK maritime VHF communications channels. Fees set to reflect administrative costs should only apply where there is no likely excess demand in current or alternative use. Since there is excess demand from alternative Business Radio use, Approach 1 should be rejected.
- 6.31 We note that we have adopted this approach to fee setting (ie based on an assessment of excess demand in current and alternative use) elsewhere, including in respect of our recent work on assessing AIP in the PMSE sector³⁸. This is also consistent with the AIP rate paid by users of substitutable Business Radio spectrum, and so would minimise any distortions in Business Radio use.
- 6.32 In weighing up these alternatives, we have also had regard to the consequences if maritime users of UK channels moved to international channels in response to fee differentials (or vice versa). Although we have estimated that in specific locations (such as London) the respective levels of excess demand in maritime and alternative uses justify such fee differences, and hence limited substitutions of this nature would be efficient, we note that there is a potential risk of incentivising inefficient oversubstitution if the relevant new fee differentials are too great (given that existing demand patterns reflect existing fee levels).
- 6.33 In practice however there is relatively low risk of users of the international ports channels using UK channels, as communication with the shipping fleet needs to be sustained. Instead there is potentially greater likelihood of some users moving from UK channels to international ones in response to fee differentials. However in practice, as set out in section 7, the main area where such a significant fee differential is proposed is in London, where there are relatively few users of affected UK channels. Accordingly we consider the likelihood of inefficient substitution

³⁸ *Digital dividend: band manager award: Second consultation on detailed award design* published by Ofcom on 22 June 2009 http://www.ofcom.org.uk/consult/condocs/bandmanager09/

occurring to be low, particularly in the light of our phasing proposals as also set out in section 7.

- 6.34 We consider that price signals should reflect relative opportunity costs. Our estimates, using the Indepen method, suggest that the appropriate reference rate for UK maritime spectrum should be somewhat below that for international maritime spectrum. This seems reasonable, given the lack of excess demand in UK channels from existing use and current excess demand in international maritime channels, since a pricing differential would provide incentives to use uncongested UK maritime VHF channels if these are suitable.
- 6.35 We consider that the rate which balances all of the considerations above appropriately is the Approach 2 rate based on the Business Radio AIP reference rate of £330,000 per 1 X 1 MHz simplex spectrum.

Alternative approaches to setting fees for international maritime VHF spectrum

- 6.36 As set out at paragraphs 5.26-5.28, demand for simplex international maritime channels exceeds supply in the UK for many channels, particularly in the busy coastal areas in the south, and it is often difficult to meet requests for new assignments.
- 6.37 In the context of that observation, we assess the alternative approaches for setting fees for international maritime VHF spectrum below.

Approach 1 Fees based on administrative costs or zero rated

- 6.38 Under Approach 1, we would set a reference rate for international maritime VHF based on either administrative costs or zero rated.
- 6.39 As noted in paragraph 6.4, we consider that it is appropriate to set spectrum charges that reflect 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 an administrative fee which reflects the costs of spectrum management. We also consider that it is only appropriate to set zero-rated fees for channels where there is no excess demand, and for which spectrum management costs are *de minimis* (including, for example, channels used on a private commons basis).
- 6.40 Given the excess demand in the current use, we consider that fees based on administrative costs would not facilitate international maritime 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.

Approach 2 AIP fees based on opportunity costs

- 6.41 Under Approach 2, we would set a reference rate for setting AIP fees for UK maritime VHF spectrum based on underlying opportunity costs.
- 6.42 As identified above, there is excess demand in current use and we therefore consider that consumers and citizens are more likely to benefit from an approach that sets AIP fees based on the underlying opportunity costs of that spectrum. Applying this

principle, we have had regard to independent research that has estimated the underlying opportunity costs of current and alternative uses.

- 6.43 Indepen has estimated the opportunity cost in current use. Research undertaken by Indepen for the frequency range 156-163MHz³⁹ and evidence gathered during the development of these revised consultation proposals suggests that it is likely that simplex international maritime VHF channels already experience excess demand, and are heavily congested in parts of the UK (including the south east of England). Indepen estimated the national opportunity cost in current use at £618,000 per 1 X 1 MHz.⁴⁰
- 6.44 In relation to opportunity costs in alternative use, we note that evidence gathered during the development of these revised consultation proposals suggests that it is unlikely that there are practical alternative uses for the international maritime VHF spectrum frequencies at least in the short to medium term because of constraints imposed by international agreements.
- 6.45 We therefore estimate an opportunity cost in equilibrium by taking the estimated opportunity cost in current use of £618,000 per national 1 X 1 MHz. Indepen estimated this value by assessing the options for reducing excess demand in the maritime communications band by existing operators moving to narrower bandwidth equipment and/or making greater use of simplex channels. For the purposes of this calculation, Indepen assumed that all other countries move to narrower bandwidth communications (i.e. from 25 kHz to 12.5 kHz bands), so that any ships entering UK ports are suitably equipped and problems of interference with neighbouring countries using different channelization do not occur. Indepen assumed that users would then need to replace their radios involving a refit cost of £100 per radio. Indepen estimated a total one-off cost for the industry of around £21m, implying an annualised cost of £0.618m/MHz assuming a loss of access to 2x2 MHz of spectrum.
- 6.46 We note that there can be a degree of uncertainty surrounding any such estimated costs of equipment replacement in the relevant spectrum. In particular Indepen state the following:

"There is considerable uncertainty concerning the [£618,000] value (because the numbers of radios that need to be replaced and the cost of new radios and refits is uncertain) and this suggests ... applying a 40% downward adjustment."⁴¹

- 6.47 We consider that it is appropriate to take a conservative approach to determining a reference rate, to reflect this uncertainty regarding the national value of the spectrum.
- 6.48 This is because fees based on technically-assigned licences for national coverage can tend, in aggregate, to exceed the fee set for national area-defined licences over the short run since such fees do not take account of the possibility of spectrum reuse within a given area by a single user. In such a scenario, there would be incentives for users to seek area-defined licences where their assignments are in a single channel, and potentially to seek to co-ordinate channel "swaps" with other users, effectively consolidating their holdings into fewer channels, to ensure they had the maximum flexibility over the type of licence they held. As such a change would increase the ability of users to use their channels intensively, and could potentially

³⁹ Indepen 2007

⁴⁰ See Indepen 2007 for a detailed explanation for estimating this opportunity cost.

⁴¹ Indepen 2007 paragraph 6.5.2

lead to the release of assignments in "leftover" channels at the margin, in our view this effect also contributes to the potential incentive benefits of our proposals to make area-defined licences available (subject to spectrum availability), and of our proposals on the relative fees for area-defined and technically-assigned licences.

- 6.49 We therefore consider that, taken together, both the uncertainty in valuing the spectrum as identified by the Indepen analysis and the potential for future bias in some technically-assigned licenses, resulting in potential over-recovery of the national value of spectrum, could both result in the spectrum being overvalued if a national rate is used directly to derive technically-assigned licence fees. We therefore propose that the technically-assigned licence fees incorporate a downward adjustment to reflect these factors.
- 6.50 Applying such an approach could suggest a 40% downward adjustment to fees relative to the underlying estimate of the national opportunity cost in current international maritime use, suggesting a reference rate for fee-setting of £371,000 per 1 X 1 MHz simplex.^{42,43}
- 6.51 We note that we previously consulted in July 2008 on initial AIP estimates based on the business radio AIP rate of £396,000 per 1 X 1MHz channel (based on highly popular use).
- 6.52 We note that we no longer consider the Business Radio AIP rate the directly appropriate benchmark, since Business Radio is not a short term alternative use of the international maritime spectrum given the constraints which have been identified and confirmed in response to our previous consultation, albeit that there are some limited substitution possibilities between UK and international simplex maritime VHF channels.

Preferred approach for international maritime VHF channels

- 6.53 Given the above, we consider that Approach 1 should be rejected for simplex international maritime VHF channels 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 excess demand likely in current or alternative use.
- 6.54 Approach 1 is therefore appropriate for duplex international maritime VHF channels only. Conversely, since there is already congestion in current use for simplex international maritime VHF channels, Approach 1 should be rejected for these channels.
- 6.55 In weighing up these alternatives, we have also had regard to possible distortions arising from substitution from UK to international maritime VHF (see paragraph 6.32). We consider that the approach to setting differential reference rates for UK and international spectrum, to reflect differences in underlying opportunity costs, is appropriate. This results in the reference rate for international spectrum being different to that for UK spectrum. This could, other things being equal, tend to discourage users of currently less congested spectrum (e.g. UK maritime users) from

⁴² See Indepen (2007)

⁴³ We note that for UK maritime VHF no adjustment factor for uncertainty was applied, because at the prevailing Business Radio AIP rate there was no evidence of Business Radio spectrum being left fallow. This suggested that for similar UK maritime VHF spectrum, a similar AIP level would not run the risk of causing spectrum to be left fallow.

using higher-priced spectrum which could risk exacerbating existing congestion in those frequencies.

6.56 We conclude that it is therefore appropriate that the AIP reference rate for international simplex VHF be set at £371,000 per national 1 X 1 MHz. We conclude that in relation to international duplex channels Approach 1 is the appropriate basis for fees, because this spectrum is uncongested in current use and there is no feasible alternative use at this time.

Impact of setting fees based on opportunity costs for safety

- 6.57 An important question for this consultation to address is whether setting fees for the use of maritime spectrum based on opportunity cost would have any adverse impact on safety in this sector, and if so, what should be the appropriate policy response.
- 6.58 We note that, in the maritime sector, there are mandated regulatory requirements to carry radio equipment on commercial vessels.
- 6.59 We note that port and harbour authorities are expected to adhere to the Port Marine Safety Code, under which ports do not have discretion to compromise safety in response to commercial pressures. We note that Indepen have suggested the following policy response with regards to the impact of AIP on the use of mandated equipment in the maritime sector:

"If there were concerns that imposition of AIP would lead to cost-cutting measures that compromised safety unacceptably, the remedy would be to tighten the Code or provide a direct subsidy. Providing an indirect subsidy in the form of discounted spectrum disguises the problem, leads to inefficient spectrum use and does not seem an appropriate or effective way to maintain safety standards."⁴⁴

6.60 Non-commercial vessels use radio equipment on a discretionary rather than a mandated basis. If spectrum charging discouraged such use it could have an impact on safety at the margin. In this situation Indepen suggest the following:

"However, we do not expect this concern to arise in practice either because these vessels do not make payments for the use of these systems (e.g. light dues) and/or the payments they do make (e.g. mooring fees) are not linked to their use of radio. In this regard it should be noted that WT Act licences for ships radios have been issued on a lifetime basis from December 2006 and if issued on-line are free. This policy will not be affected by decisions concerning the application of AIP to maritime bands. Again, if it was considered desirable that non-commercial/light vessels to have to carry radar, this would be better achieved by making it a regulatory requirement rather than by making spectrum available freely or excessive reductions.⁴⁵

6.61 We confirm that we do not propose to charge ships AIP fees, and the proposed changes to fees to ports and harbours are very modest relative to the scale of the operations concerned. Therefore Ofcom considers that the risk of discouraging use of safety critical equipment is very low.

⁴⁴ Indepen 2007, page 48

⁴⁵ Indepen 2007, page 48

Section 7

Detailed fee proposals for WT Act licensees

Introduction

- 7.1 In this Section 7, we set out detailed proposals for fees to apply to maritime VHF communications licences. We are proposing that these fees should be paid by WT Act licensees. As noted in Section 5 above, we are proposing different management arrangements to apply to spectrum used for radar (and racons) and aeronautical navigation aids, and for some maritime VHF communications channels which are used on a private commons basis. Those other spectrum management proposals are explored in Section 8 below. In this document we are not making revised proposals in respect of aeronautical VHF communications frequencies but expect to publish proposals later this year.
- 7.2 Our fee proposals for maritime use of VHF communications have been substantially revised since we set out illustrative fees in the initial consultation. Our revised proposals distinguish between channels allocated for maritime use on an international basis and channels allocated for maritime use within the UK alone. They also distinguish between simplex channels and duplex channels, and between channels which are shared on a private commons basis and those which are not.
- 7.3 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

- 7.4 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.
- 7.5 In drawing up our specific proposals, we have had regard to both these objectives.

VHF communications channels allocated for maritime use internationally by the ITU

Background and overview

7.6 There are 59 internationally allocated maritime channels, many of which are allocated for specific purposes, such as distress/calling, search and rescue, AIS data and inter ship communications. Of these channels, 33 are duplex (ie each utilising 2 x 25kHz frequencies), which are not extensively used. Channels 24, 62, 63, 64 and

85, which are used for Land Search and Rescue, sit outside the scope of this consultation exercise.

- 7.7 Fees for the use of international maritime channels are currently set at £100 per assignment, except for certain channels (10, 16, 67, 70, and 73), which are used for search and rescue and other emergencies, and which attract no fee when used solely to assist HM Coastguard and/or the Secretary of State. An exception also applies to the international channel which is allocated for marinas in the UK, with two UK allocated marina channels, and attracts a fee of £75 for the package of three channels. The two AIS channels and channel 70 (156.525 MHz) attract a fee of £40 (for the package) and licences for training schools and suppliers/demonstrators attract a fee of £50 per licence.
- 7.8 In the July 2008 consultation, we proposed an underlying reference rate of £396k per national MHz (£9,900 per national 25 kHz channel), with specific indicative licence fees varying with both transmitter coverage (3 coverage classes proposed) and the density of maritime VHF assignments in the area of the transmitter (3 bands proposed). On this basis, the indicative licence fees for standard simplex channels ranged from £1,480 for high coverage installations in areas with a high density of assignments to £75 for low coverage installations in areas with a low density of assignments.
- 7.9 The scheme of coverage categories, and the proposed structure of fees, proposed in the July 2008 consultation replicated those which currently apply to Business Radio. However categorisation by reference to the relative "density of maritime assignments" was proposed instead of the (land-based) population density variable which currently applies to Business Radio.
- 7.10 We proposed that the distress and calling channels (16 and 70) should not attract any fees, that the shared marina channels should attract fees of half the standard simplex level, and that duplex channels should attract double the standard simplex fee. No special arrangements were proposed for any other channels.
- 7.11 Having considered responses to the initial consultation, which generally expressed views that the initial indicative proposals did not give sufficient consideration to the different constraints which apply in practice to the use of different maritime channels, we are proposing a revised fee structure to apply to the sub set of internationally allocated maritime channels which are available for port operations. In response to concern expressed by stakeholders about aspects of the charge structure, such as the steep gradient between fees proposed to apply in adjacent areas, we have revisited the charge structure for these channels. The fee structure we are now proposing for port operations channels has a flatter gradient between categories. Proposed fees now fall within a narrower range, between £500 and £75.
- 7.12 We are now proposing not to set end-user fees for a larger number of channels which are used for maritime search and rescue than in the initial consultation. We are also proposing that current fees for marina channels should remain unchanged.

Revised proposals for simplex internationally allocated port operations channels

- 7.13 There are just 8 simplex channels in which licensees can obtain exclusive⁴⁶ assignments for use with core port operations work, such as enabling ports to communicate with visiting ships. The frequencies concerned are 156.425 (channel 68), 156.450 (channel 9), 156.475 (channel 69), 156.550 (channel 11), 156.575 channel 71), 156.600 (channel 12), 156.700 (channel 14) and 156.725 (channel 74). We refer to these as the "core set of eight simplex international port operations channels").
- 7.14 As discussed in previous sections, demand for these channels exceeds supply in some parts of the UK, so that it is becoming increasingly difficult for Ofcom to meet requests for new assignments. These channels are essential for communication between (amongst others) ports and ships. About 800 such assignments are in force at any time. We propose to apply AIP fees for the use of any of the core set of eight simplex international port operations channels, to help manage the existing and expected continuing excess demand.
- 7.15 Having considered responses to the July 2008 consultation, we propose that fees should be based on a national reference rate of £371,000/MHz as set out in Section 6 above.
- 7.16 We continue to propose a fees structure which includes differentials to reflect both variations in transmitter coverage and excess demand in different locations.
- 7.17 However, in light of responses to the July 2008 consultation and additional analysis, we propose a revised fees structure to that set out in the initial consultation, and to apply it only to the core set of eight simplex international port operations channels. International restrictions which restrict, for example, the use of channels allocated for duplex use to meet the demand for simplex assignments, imply that this excess demand in existing use is unlikely to disappear over the medium term.
- 7.18 We are proposing only small changes to the coverage definitions set out in the July 2008 consultation, except that we now propose that the height of the antenna (which contributes to the coverage classification) should be measured from Mean Sea Level rather than ground level.
- 7.19 We are also proposing that the congestion map proposed in the July 2008 consultation should be revised to better reflect patterns of congestion in the core eight port operations channels as illustrated in the map at Figure 3 below. The larger number of areas now proposed to be classified as High density reflects the level of demand for this relatively small number of core channels. While there are more squares now included in this category, the fees for assignments in these squares are lower than in our initial consultation. This map is reproduced in a larger size in Annex 6.

⁴⁶ Where possible, channels are assigned on an exclusive basis. However, where this is not possible, subject to local arrangements and agreements, some sharing will take place.



Figure 3 Proposed congestion map to apply to internationally allocated maritime channels

- 7.20 The fee relativities we are now proposing between different coverage classes directly reflect the relative areas of territory typically impacted by each transmitter class, and the fee relativities between areas of different densities reflect an assessment of the relative probability of encountering congestion in each class of area. That is, at locations where more than 8 assignments have been made in the 8 available channels, we consider that this indicates a relatively high level of demand, such that in these locations there is a high chance that a new assignment would exclude another user, or even that it could not at present be made. At locations where 5 to 8 channels are currently assigned, we consider that there is a medium chance that new assignments would exclude other potential users and in particular, that a highcoverage assignment is likely to exclude other users, and where 3-4 channels are currently assigned, we have identified a material but relatively low chance. Finally, at locations where fewer than 3 channels are currently assigned, we consider that there is effectively no likelihood of excess demand for assignments. (These are colour coded white on the map in Figure 3)
- 7.21 Under our revised proposals, annual fees per channel for each transmitter in the core set of 8 international port operations channels would be as follows. In all cases the maximum permissible effective radiated power ("erp") would be 25 watts. The fees set out would apply to 25 kHz simplex channels with pro rata adjustment for different bandwidths should these become available:

	High coverage (Watts erp/Antenna metres) P>=24 and A>=10 P>=10 and A>=20 P>=5 and A>=30	Medium coverage (Watts erp/Antenna metres) P>10 and A<10 7 <p<24 5<a<20<br="" and="">3<p<10 10<a<30<br="" and="">1.5<p<5 a="" and="">20 P<5 and A>30</p<5></p<10></p<24>	Low coverage (Watts erp/Antenna metres) P<=10 and A<=5 P<=7 and A<=10 P<=3 and A<=20 P<=1.5 and A<=30
Geographic area			
High density area	£500	£400	£300
Medium density area	£200	£150	£125
Low density area	£100	£75	£75
Areas with no congestion	£75	£75	£75

Table 8 Proposed fees to apply to the core eight maritime simplex port operations channels

Question 1: Do you consider that the fee rates set out in Table 8 for assignments in the eight core international maritime simplex channels are appropriate?

Revised proposals for international channels other than the core eight port operations channels

- 7.22 Some of the remaining 51 internationally allocated maritime channels include channels used for more specific purposes including search and rescue related activity, weather and other navigational safety broadcasts, inter-ship communications, distress and calling, AIS, and marina/leisure use.
- 7.23 Search and Rescue, and calling and distress channels are all currently used on a private commons basis. Since there is no scope for individual users to have exclusive use of geographic spectrum there is no increase in availability to other users if any individual user reduces his use in response to price signals. As a consequence, we do not consider that there is value in charging fees to individual end users for these channels. Furthermore, given that no attempt is made to co-ordinate exclusive geographic use in these channels, and given that authority to use these channels is generally associated with licences to use other channels, we do not propose to apply an administrative fee in respect of these channels either.
- 7.24 There is however a channel management role for the MCA for a number of the channels concerned. This is discussed further in Section 8 below.
- 7.25 Users other than the MCA also may access some of the MCA's weather reporting channels, on a basis co-ordinated and authorised by the MCA, for search and rescue or other emergency purposes. As this use does not have any additional impact in terms of the availability of these channels for other uses, we are not proposing to set AIP fees in respect of this access. Nor, since MCA carries out the co-ordination and management of this access, are we proposing to set administrative cost-based fees.
- 7.26 Marina channels are used on an unprotected basis by a large number of clubs and marinas. We propose that the three marina channels (including the international duplex channel 157.025/161.625 used by marinas in the UK) should together continue to attract a single fee of £75.

- 7.27 The two AIS channels are capable of being used by a large number of co-located licensees relying on time slot sharing; decisions by individual users will not increase the availability of this spectrum for other users. For these reasons, we do not propose to apply AIP fees, or fees intended to recover any administrative costs. However, there is a channel management role for MCA. Our proposals for enhancing this role are set out in Section 8.
- 7.28 Among the 51 channels is another particular subset of 33 duplex channels which can be used for a wide variety of purposes but there is generally little demand for these channels for general communications with the word-wide fleet of ships. As a result international duplex channels are generally underused (implying an allocation by the ITU which exceeds demand, given the radio technology commonly used in the global maritime sector). There is not a sufficient, nor a sufficiently close, prospect of either patterns of radio use by the global shipping community, or of this international allocation to duplex use, changing, as to imply a significant likelihood of excess demand for these channels emerging in the medium term. Therefore only fees to contribute to recovery of administrative costs are appropriate. We propose to apply a £75 administrative fee to these internationally allocated duplex channels.

Application	Frequency MHz	Proposal
6 calling and distress channels	156.525,156.750,	Free of charge to
and associated guard bands	156.775, 156.800,	licensees(not generally
	156.825, 156.850	licensed to shore stations)
3 search and rescue channels	156.375, 156.500,	Free of charge to authorised
	156.675,	end users; also see Section 8
		for recommended
		management arrangements.
Maritime weather reporting	157.150/161.750,	Free of charge to users
channels	157.225/161.825,	accessing these channels for
	157.325/161.925	search and rescue purposes.
Marina channel (part of	157.025/161.625	£75
package of 3 channels		
including 2 UK channels)		
2 AIS channels (plus channel	161.975, 162.025	Free of charge to authorised
70)		end users: also see Section 8
		for recommended
		management arrangements.
A further 27 International	All	£75
Duplex channels		
Intership channels (very limited	156.300, 156.400,	Free of charge to licensees
shore based use)	156.625, 156.650,	(not generally available to
	156.875,	shore stations)

7.29 These proposals are summarised in the following table;

Table 9 Proposed fees for international maritime channels other than the core eight port operations channels

Question 2 Do our revised proposals reflect appropriately the distinctions between the different uses of particular internationally allocated maritime channels, as set out in Table 9

Question 3: Do you agree with our proposals not to set any fees for use of the calling and distress channels, the search and rescue channels, the AIS channels, or for exceptional shore-based use of the intership channels?
Question 4: Do you agree with our proposals to set administrative cost-based fees for licences to use the package of 3 marina channels?

Question 5: Do you agree with our proposal to set administrative cost-based fees for licences to use the internationally-allocated duplex channels? Channels allocated by the ÚK for maritime use

- 7.30 There are 45 channels in total (although duplex channels can also be used as simplex channels) which the UK has currently allocated for maritime use, in addition to those allocated internationally for maritime use by the ITU. In general these currently attract an annual licence fee of £180, although DGPS channels currently attract a fee of £250 per VHF channel per transmitter. As noted above, the two UK allocated marina channels (with the third, internationally allocated, marina channel) currently attract an annual licence fee of £75 for the package of three channels. VHF DGPS licences attract an annual licence fee of £250 per channel and the search and rescue channels 156.000 MHz ("channel 0") and 160.600 MHz ("channel 00") are licensed free of charge when used solely to assist HM Coastguard.
- 7.31 In the July 2008 consultation, we proposed a basic fee structure similar to that proposed for internationally allocated maritime channels, in so far as this included variables reflecting the density of maritime assignments in different geographic locations and the coverage of each installation. Fees ranged from £740 for High coverage installations in areas with a high density of maritime assignments to £75 for low coverage installations in areas with a low density of maritime assignments.
- 7.32 The proposed fee rates replicated those which currently apply to Medium Popular Business Radio channels. The proposed coverage classifications also replicated those which apply to Business Radio. However we proposed a different approach to determining whether an area should be considered High, Medium or Low density for fee purposes, this being based on the relative density of maritime assignments rather than relative population density which applies to Business Radio.
- 7.33 These channels are generally underused (there are in total about 1600 geographical assignments across these 45 channels, some for the offshore oil industry). These UK-allocated maritime channels are not likely substitutes in general for the internationally allocated maritime channels, as the international fleet of ships does not use them, but they have technical properties which makes them suitable for alternative use by land-based UK VHF applications such as Business Radio.
- 7.34 Of the 45 UK allocated channels, two are used for maritime search and rescue and 2 are currently allocated to marinas and clubs. In our view, the nature of the use made of these channels indicates a different approach to fee setting from that which we are proposing for other UK allocated maritime channels. This is discussed further at paragraphs 7.35 to 7.37 below. In making these proposals, we are envisaging that these channels would remain allocated for existing purposes, and would continue to be used on the current basis.

Revised proposals for the generality of UK allocated maritime VHF channels (other than those used for search and rescue related activities or for marina/leisure use)

7.35 Demand for the channels designated by the UK for maritime use is relatively low, with use generally restricted to intra-company or closed user groups, as international ships are rarely equipped to communicate on these UK-specific channels.

- 7.36 As explored in Section 6 above, because there is little excess demand in current maritime use, the opportunity cost can be considered zero in this use. However it is feasible, even in the short term, for these channels to be used to meet excess demand for Business Radio channels. It is accordingly feasible for the UK to redesignate some or all of these channels for alternative, Business Radio, use as well as maritime use, in line with our move towards service-neutral licensing where international restrictions and market circumstances permit.
- 7.37 As such, the opportunity cost in Business Radio is highly relevant. This was the basis of the fees proposed in July 2008. Given that the remaining spectrum could (subject to Ofcom's decision) be readily used for non-maritime purposes, we now confirm our proposal that the level and geographical structure of fees for these channels should correspond to those charged to the highest value alternative uses, Business Radio. Our current Business Radio fees seek to reflect the level and pattern of excess demand in the adjacent VHF channels which are already used by Business Radio licensees. The fees proposed in the July 2008 consultation remain appropriate as they match the existing fees for Medium Popular Business Radio channels.
- 7.38 We are therefore proposing that the following AIP fees should apply to all UK maritime VHF channels with the exception of those referred to in paragraph 7.34 above.
- 7.39 The fee relativities between different coverage classes directly reflect the area of territory typically impacted by each transmitter class, which is similar to the impact of Medium Popular Bands in Business Radio, and the fee relativities between areas of different densities reflect the probability of encountering congestion in each class of area where population is used as the indicator of relative excess demand (for Business Radio).
- 7.40 The following proposed fees would apply to 25 kHz simplex channels (with pro rata adjustments for different bandwidths).

	High coverage (Watts erp/Antenna metres) W> 5 and A > 10 or W ≤ 5 and A > 30	Medium coverage (Watts erp/Antenna metres) $W \le 5$ and $10 < A \le 30$ or $W > 5$ and $A \le 10$	Low coverage (Watts erp/Antenna metres) W ≤ 5 and A ≤ 10
Geographic area			
High density area	£740	£370	£100
Medium density area	£250	£170	£85
Low density area	£90	£80	£75

Table 10 Proposed fees for UK simplex maritime channels

7.41 Fees would be doubled for duplex channels, as these consume double the spectrum of simplex channels and hence impose double the opportunity costs concerned:

	High coverage (Watts erp /Antenna metres) W> 5 and A > 10 or W ≤ 5 and A > 30	Medium coverage (Watts erp/Antenna metres) $W \le 5$ and $10 < A \le 30$ or $W > 5$ and $A \le 10$	Low coverage (Watts erp/Antenna metres) W ≤ 5 and A ≤ 10
Geographic area			
High density area	£1480	£740	£200

Medium density area	£500	£340	£170
Low density area	£180	£160	£150

Table 11 Proposed fees for UK duplex maritime channels

Question 6: Do you consider that the fee rates set out in Tables 10 and 11 for assignments in the UK-allocated working channels (that is, not including the search and rescue or marina channels) are appropriate?

7.42 We propose that whether a transmitter serving a UK allocated maritime channel is considered to be situated within a High, Medium or Low density area should be determined with reference to the same congestion map which currently applies to Business Radio, as set out in Figure 4 below. This reflects varying densities of population rather than densities of maritime VHF assignments, with only transmitters in the London area attracting the High density charges. We also propose that, as with Business Radio, the height of an antenna should be measured from its base, and not from sea level, as the relevant opportunity cost is driven by the feasible alternative use in Business Radio, where height above sea level is not a relevant consideration in network planning. This map is reproduced in a larger size in Annex 6.



Figure 4 Proposed congestion map to apply to UK allocated maritime channels

Revised proposals for UK allocated maritime channels used by search and rescue and related organisations and marinas/leisure users

7.43 The two UK specific search and rescue channels (156.000/160.600 and 161.225 MHz) are used on a private commons basis, so there is no scope for individual users acting alone to affect the availability of this spectrum for other users. Therefore there is no likely efficiency benefit from charging opportunity cost based fees to individual end users, even though the spectrum allocation to these uses collectively has an opportunity cost at national level. For these channels we are proposing an enhanced management role for MCA, as set out in detail in Section 8.

- 7.44 As noted in the context of internationally allocated maritime channels, marina channels are used on an unprotected basis by a large number of clubs and marinas. The existing £75 fee for a group of three marina channels already contributes to the administration costs concerned, and we do not propose to change this fee.
- 7.45 We are also proposing that at least one UK channel should be made available for use on a private commons basis by organisations whose object is the safety of human life in an emergency. This spectrum would be used for routine communications. Eligibility to use it would be determined by the MCA. We are proposing that, for the reasons given in paragraph 1.17 above, no fees would be applied to users of such capacity.
- 7.46 In summary, we propose that the following fees should apply to these UK maritime channels which have specific applications:

	Frequency MHz	Proposal
2 search and rescue channels	156.000/160.600, 161.225	Free of charge to licensees; see also Section 8.
Package of 3 marina channels (including the 2 UK channels specified here)	157.850, 161.425	£75
A dedicated working channel to be used by organisations whose sole or main objective is the safety of human life in an emergency	To be determined	Free of charge to end users; see also Section 8.

Table 12 Proposed fee to apply to UK maritime channels used on a private commons basis

Question 7 Do our revised proposals correctly identify all of the UK allocated maritime channels which are assigned to specific applications which require a specific approach to fee setting, as set out in table 12

Question 8: Do you agree with our proposal to set no fees to licensees for use of the two UK-allocated search and rescue channels?

Question 9: If you are a maritime organisation with the safety of human life in an emergency as your sole or main objective, would you be interested in accessing spectrum for working purposes (ie other than SAR or other emergency response uses) under a private commons basis, shared with other users with the same objectives and co-ordinated by the MCA, and free of any spectrum fee?

Area defined licences for maritime VHF communications

7.47 As noted in the July 2008 consultation, area-defined licences are available to users of Business Radio, and we propose that they should also be available to users of maritime VHF channels (where spectrum is available). Area defined licences can be a more spectrally efficient way for users with multiple transmitter sites to plan their networks. Such users are likely to be more able than Ofcom or another external body to judge, in the light of their own operational needs, how closely spaced they are able to place their transmitters. Area defined licences permit the licensee to transmit on the licensed channel(s) from any number of sites within the defined area. The greater scope for spectrum efficiency this licensing arrangement affords is also reflected in

the AIP fees payable, which generally work out lower than they would be if priced on a per-assignment basis.

- 7.48 This is because the technically-assigned licence approach does not allow for operators to co-ordinate spectrum usage themselves, or internalise interference externalities. On the other hand, area-defined licences⁴⁷ encourage 'intensive use'. Essentially, the single operator using multiple sites within the defined area can coordinate their usage within the relevant frequencies and therefore can use the spectrum more intensively. Area defined licences therefore allow for the internalisation of interference externalities, where all the sites are licensed to a single operator
- 7.49 We propose that, where spectrum is available, UK-wide area-defined licences for Internationally allocated simplex channels would be available for £9,275 per year (the national rate from which our proposed technically-assigned licence fee rates were derived), with lower fees payable for licences covering smaller areas weighted to reflect the density of demand for such channels in the given area specified in the licence as follows:

Area	Fee
UK-wide	£9,275
50x 50km unit in a High congestion area	£220
50x 50km unit in a Medium congestion area	£85
50x 50km unit in a Low congestion area	£45 (subject to a minimum of
	£75 per licence)

Table 13 Proposed fees for area-defined licences applicable to simplex internationally allocated maritime channels

Question 10: Do you consider that our proposed fee rates for area-defined licences (where feasible) in the eight core internationally-allocated maritime simplex channels are appropriate?

- 7.50 We recognise that, given the existing levels of excess demand, it may not be possible to assign frequencies for any of these channels for the exclusive use of one user (or a group of co-operating users) across the whole of the UK or even in particular areas. In practice, area-defined licences covering smaller areas may be more feasible, but given the nature of use such smaller areas may still be of value to licensees.
- 7.51 As internationally allocated duplex channels are uncongested in current use and currently unsuitable (because of international treaties) for alternative use, we propose that area-defined licences for these channels should attract administrative cost-based fees, in line with technically-assigned licences in these channels.
- 7.52 We propose to offer users the choice of area-defined licences in these channels, because this affords them flexibility to plan and co-ordinate their own re-use of a frequency at a number of transmitters, and can therefore increase their scope to get the best use out of their licence while reducing our administrative effort relative to assigning numerous licences to the same user.
- 7.53 We have therefore considered appropriate administrative cost-based fees for such area licences. The use of maritime assignments creates slightly different co-

⁴⁷ An area-defined licence would allow a licence holder with multiple sites that re-use spectrum frequencies to pay fees reflecting once only for the sterilisation of spectrum concerned.

ordination and hence administration requirements than for Business Radio. Where assignments are used at the coast (as most are), the requirement to co-ordinate for other users reflects the fact that such other users are likely to be along the coast and not, for example, much further inland (nor at sea). However, each assignment is co-ordinated according to the specific circumstances and geography: there is not a standard "average" amount of co-ordination and administration needed.

- 7.54 However, overall we propose to employ a working assumption that a technicallyassigned licence of average coverage would require us to co-ordinate with other spectrum use across at least four 50kmx50km grid squares. We are therefore proposing that, should a user seek an area-defined licence for internationally allocated duplex channels, a sensible approach to fees would be to charge a minimum fee of £75, but to charge a higher fee that reflected additional administration and coordination requirements, reviewed on a case-by-case basis for any such area licences requested that comprised more than four 50kmx50km grid squares.
- 7.55 For example, the MCA may find it efficient to take national area-defined licences for the internationally allocated duplex weather channels that it uses, and if so we would expect to agree a suitable charge with the MCA that was consistent with both the above principle and the wider spectrum charging arrangements applicable to the MCA.

Question 11: Do you agree that area-defined licences in the international duplex channels should be based on a minimum cost of £75 for 4 squares, with larger areas priced on a case by case basis?

7.56 We propose that area-defined licences for UK allocated channels should be made available on the same terms as area-defined licences for Medium Popular Business Radio⁴⁸, as our proposed fees assessed on the alternative per transmitter ("technically-assigned") basis are also identical to those already applicable to Medium Popular Business Radio. A UK-wide licence for a simplex channel would therefore be available for £8,250 per year (and twice that for duplex), and licences covering areas less than the UK for a proportionately smaller fee as follows:

Area	Fee
UK	£8,250
50x 50km unit in a High congestion area	£990
50x 50km unit in a Medium congestion area	£125
50x 50km unit in a Low congestion area	£12 (subject to a minimum of
	£75 per licence

Table 14 Proposed fees for area-defined licences applicable to simplex UK allocated maritime channels

Area	Fee
UK-wide	£16,500
50x 50km unit in a High congestion area	£1,980
50x 50km unit in a Medium congestion area	£250
50x 50km unit in a Low congestion area	£24 (subject to a minimum of
	£75 per licence)

⁴⁸ See Modifications to spectrum pricing published by Ofcom on 10 January 2007 http://www.ofcom.org.uk/consult/condocs/pricing06/statement/statement.pdf

Table 15 Proposed fees for area-defined licences applicable to duplex UK allocated maritime channels

Question 12: Do you consider that our proposed fee rates for area-defined licences in the UK allocated working channels (that is, not including the search and rescue channels or the marina channel) are appropriate?

Proposals with respect to particular maritime users of spectrum

Ships' licences

7.57 We noted in the July 2008 consultation that we had no plans to review the decision implemented in 2006 to issue lifetime WT Act licences for ships free of charge if applied for on-line or for a small administrative fee if applied for by post. This remains our position.

Training schools

- 7.58 Although training schools require the use of a full range of channels, their use is unprotected, and has little impact on other users given the low power radiated and restricted field strength imposed as a licence condition. Such transmissions therefore result in minimal opportunity costs being imposed on other spectrum users.
- 7.59 In our Spectrum Pricing Statement in January 2007⁴⁹, we indicated that we planned to implement a proposal to make these licences indefinite in duration ("lifetime licences"), and free of any charge if issued on-line, with a £20 fee for licences applied for by post.
- 7.60 In our initial consultation in July 2008, we proposed that it would not be appropriate to apply AIP to these licences. We still hold that view, and we would hope to be able to implement the change decided on in 2007 as part of any licence structure and fee changes implemented following the conclusion of this consultation.
- 7.61 As we are not making any changes to a decision previously consulted on, we are not formally consulting on this proposal in this consultation.

Maritime radio (Suppliers and demonstration) licences

- 7.62 In the case of Maritime Radio (Suppliers and demonstration) licences, power can, where appropriate, be radiated at normal levels and the full range of maritime VHF channels is available e.g. for tests. However use of the spectrum concerned is for non-operational purposes and is subject to not causing interference to other users.
- 7.63 In the July 2008 consultation we proposed that AIP would be applicable to these licences. Following further consideration of the risks of sterilising spectrum for other users and hence the materiality of any potential opportunity costs, we are now proposing an administrative cost-based fee of £75 per annum. This reflects the non-interference constraint on the use authorised by these licences and our revised assessment of the potential materiality of the opportunity costs associated with spectrum use under these licences.

Question 13: Do you agree with our proposal to set an administrative fee of £75 for maritime radio (suppliers and demonstration) licences?

⁴⁹ Modifications to Spectrum Pricing, a Statement, <u>http://www.ofcom.org.uk/consult/condocs/pricing06/statement/statement.pdf</u>

Temporary maritime licences

- 7.64 Currently the fees payable for short-term licences (where a licence is issued for a period of less than a year) in the maritime sector differs slightly from those payable for other types of licence issued by Ofcom. For reasons of consistency and administrative clarity we now propose to bring the arrangements for maritime licences in line with other sectors.
- 7.65 For this purpose we propose that the fee for a short-term maritime licence would be one-twelfth of the annual fee for that licence multiplied by the number of complete and part-complete months covered by the licence subject to a minimum fee of £20. These short-term licence fees would only be available for licences where the annual fee otherwise payable was greater than £75.
- 7.66 We also propose to remove the current minimum time requirement of 28 days for the duration of a short-term maritime licence, in order to improve flexibility for stakeholders and promote consistency with other sectors.

Question 14: Do you agree with our proposal to bring the arrangements for temporary maritime licences into line with those in other sectors?

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

- 7.67 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 maritime and aeronautical 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.
- 7.68 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. Our reasons for this were set out in more detail in Section 4, where we discussed the various points raised by stakeholders in relation to this issue.
- 7.69 We have given careful consideration to the proposal 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 Annex 5 below.

- 7.70 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.
- 7.71 *I*n relation to channels used specifically for search and rescue operations, in the main these channels are co-ordinated by the MCA for use in maritime emergencies, and used by rescue organisations on a private commons basis. As noted in Section 5, we are proposing that these should be managed by MCA and that no licence fees should be charged to end users when using them for specified search and rescue purposes.
- 7.72 As noted in paragraph 7.45 above, we are also proposing that additional spectrum should be made available, under the same private commons basis, for working use by maritime rescue organisations. As a result, we anticipate that most maritime charities whose sole or main objective is the safety of human life in an emergency will not face licence fees at all. In any case, where a charity wished to use spectrum on an exclusive basis and thereby incur licence fees, the 50% discount would apply.
- 7.73 We therefore confirm that the current 50% discount will continue to apply to exclusive allocations of spectrum to charities whose sole or main objective is the safety of human life in an emergency.

Review and phasing

7.74 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

VHF communications

- 7.75 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 reestimate 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 to licensees to support efficient investment and other resource allocation decisions, avoiding unnecessary disruption.
- 7.76 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 around 3 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.

- 7.77 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.
- 7.78 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.

Radar (and racons) and navigational aids

- 7.79 Ofcom has proposed that Government should in future have a formal role as the strategic manager of these bands for civilian use, supported by the CAA if appropriate. If that happens, it would be for Government to consider appropriate incentive and operational frameworks to facilitate efficient decisions about long-term spectrum requirements and use.
- 7.80 Review of any associated incentive arrangements in this context would, therefore, in the first instance consist of review by Government of how the wider strategic management arrangements are working and whether, how and when they should be changed. As part of Ofcom's overall responsibility for spectrum management, Ofcom would be ready to contribute to such reviews any new evidence and analysis about the likely value of these bands for alternative users, and the issues associated with changing existing operational spectrum management arrangements, including licensing.

Phasing

When phasing is appropriate

- 7.81 We recognise that users of maritime VHF spectrum would, for the first time under our proposals, be paying fees for spectrum that reflect its underlying opportunity costs. In some cases, where underlying opportunity costs are materially above the current administrative cost-based fees, the associated fee levels will represent a material increase in the financial cost of spectrum to some users in the context of normal variations in business costs,
- 7.82 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.

- 7.83 A key approach which we use in our fee policy to avoid risks of such adverse short term economic 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.
- 7.84 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 efficiently 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.⁵⁰ 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.
- 7.85 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 delayed or weaker incentives to review their spectrum and other associated resource use (and hence may potentially 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.
- 7.86 In considering these two potential, opposite 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 relatively more weight on the risks of disruption from phasing in fees too quickly.
- 7.87 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

- 7.88 We also note that, in some cases under the proposals in this document, fees paid are likely to fall relative to their present levels, in particular by one of two means:
 - where users can reduce their fee exposure by exercising the option to hold area-defined licences;

⁵⁰ We note that this argument for the phasing-in of fees may rely in part on the presence of imperfect capital markets, This is because, under an assumption of perfect capital markets, businesses could, in theory, be expected to obtain financing to cover short term transitional costs where the affected business was viable in the long run (eg profitable on a forward looking NPV basis).

- Where our proposals represent an absolute decrease in the individual fee rates from the current levels.
- 7.89 Where users have the option of area-defined licences, as we are proposing for the maritime VHF channels, choosing to hold these may offer immediate financial savings compared with paying a large number of per-assignment fees at the current rates, or compared with paying per-assignment fees at the new rates.
- 7.90 Equally, where we are proposing to introduce new, area-defined licences, there is no comparable current fee rate.
- 7.91 We do not consider that the ability to secure the financial benefits of area-defined licences early will have any countervailing cost in terms of incentives for efficient use of the spectrum. The ongoing incentives for efficient use are contained in our proposed structures and rates of area-defined fees.
- 7.92 In light of that, we consider that it is justified to introduce the proposed fees for these licences at the full rates from the first year, and we are not proposing any phasing. Users will be free to assess the costs and benefits to them of holding area-defined licences, against the new fees we are proposing for technically-assigned licences, and any phasing for the latter which we decide to apply following our consideration of responses to this consultation.
- 7.93 Where our proposals would lead to an absolute reduction from current fee levels, such as the proposed licence fees for some types of maritime VHF assignments, we would see no merit in delaying such fee structure changes. Introducing these changes early would have benefits for existing users of those licences, and it would also marginally increase the incentive benefits for any users who are currently holding higher-value assignments, for example with higher coverage, but would be able 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

- 7.94 We have identified five new basic maritime fee rates which we consider would be suitable candidates for phasing in:
 - two proposed annual rates for technically-assigned licences in the UK allocated maritime channels (£740 and £370); and
 - three proposed annual rates for technically-assigned licences in the international maritime channels (£500, £400 and £300).
- 7.95 All of these rates represent increases of more than £100 per licence from the current fee base, and would therefore in our view be candidates for phasing in the increases concerned.
- 7.96 In some similar spectrum pricing cases, 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, where they were relatively small in absolute terms in the context of the businesses

affected. For example, we introduced 100% increases in the comparator Business Radio⁵¹ rates, paid by taxi-cab companies etc, in one step.

- 7.97 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.
- 7.98 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 modest increases proposed for maritime users might suggest relatively short phasing in periods. We are seeking views on proposals for phasing in periods, set out later in this Section.

Linear vs non-linear phasing

- 7.99 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.
- 7.100 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 hence would typically be passed on (alongside other cost changes) in price adjustments or result in other resource cost adjustments and hence not affect efficient output.
- 7.101 However where increases are larger (relative to the business affected by them, rather than large as a total %) 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 year; and
 - A non-uniform phase-in, to reflect the greater ability of businesses to adjust as time passes.
- 7.102 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

⁵¹ 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

- 7.103 The overall impact on the maritime sector of the full proposed fee package set out in this section is expected to result in little change to the total fees paid for licences by licensees in the sector. However, particular users will face larger percentage increases, and others much larger absolute increases in total fees paid (relative to their scale of business operations), because of their particular use of spectrum and locations.
- 7.104 In one such extreme example, where a licensee uses the most expensive channels in the part of the UK where excess demand is greatest, it will see a 300%+ increase in consequence to just under £10k. However there are other smaller users also more affected by the proposed changes to both levels and structures of fees.
- 7.105 While the changes are typically very small in the context of the licensees' total annual variations in business costs, they represent sufficiently sharp signals that some users may wish to make efficient marginal changes in business structure (including spectrum usage) over time.
- 7.106 For this reason, phasing the larger fee rate increases would be less likely to lead to disruption as it gives affected stakeholders more time to adjust. Noting that the existing fee rates are currently £100 per assignment in an internationally-allocated channel, and £180 in a UK-allocated channel, we are proposing that an absolute increase of around £100 per assignment per year would be a reasonable increase in the first year.
- 7.107 Under this proposal, three of the international simplex assignment rates, and two of the UK simplex assignment rates, would need to be phased. A £100 annual increase in any single year would also mean that the low and medium coverage high density simplex rates could be fully phased in over 3 years. However the top high density high coverage simplex rates (£500 for international and for London only £740 for UK specific) would require higher annual increases over two years. There is therefore a case for making the final increase for these 2 rates in years 2 and 3 bigger than in year 1.
- 7.108 On this basis all other simplex rates would not be phased, and would be implemented in full in respect of all licences granted or renewed after 1 April 2010. This would imply for the affected high density rates (£pa):

	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)
International low	200	300	300
coverage			
International med	200	300	400
coverage			
International high	200	350	500
coverage			
UK med coverage	270	370	370
UK high coverage	280	510	740

7.109 Duplex rates in the UK channels would be double those set out in the above table. In making these proposals, we note this would imply a temporary reduction or delay in the coverage incentives and other incentives expected to result from setting AIP-based fees. However, as one key response that would directly influence spectrum availability for other users, transmitter adjustments, may take time to assess and implement, this temporary reduction appears proportionate in comparison with our wish to avoid unnecessary disruption.

Question 15 Do our proposals for phasing in some of the proposed fee increases provide sufficient time for you to accommodate the additional costs, without undue disruption to your operations which could reasonably be avoided by a phasing arrangement? We would like to be able to publish all responses to this question. However, if you wish your response to this question to remain confidential, please provide your response on a separate sheet clearly marked to that effect. Your request for confidentiality will be respected so far as we are able compatible with UK law.

Question 16: Do you consider that our phasing proposals for the maritime licences for which we propose to set AIP-based fees 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.

Summary

7.110 In summary, we are inviting comments on proposals for:

- A straight-line phase-in of two years for UK and international maritime channels in areas of High density and medium coverage.
- A non-uniform phase-in of three years for fees for maritime assignments of UK and international maritime channels in areas of High density with High coverage.

Radar (and racons) and navigational aids

7.111 Under the proposed new strategic management framework, in which DfT has a formal co-ordination and management role, we are not proposing to change any of the current licence fees charged to users of these bands until any review of the existing management arrangements suggests this would be appropriate. The question of phasing in fee changes therefore does not arise at this time.

Conclusions on the Impact Assessment for maritime VHF fees proposals

- 7.112 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 identity of the citizen or consumer interest (see sections 2, 3 and 4)
 - the policy objective (see sections 3, 4 and 5)
 - the broad fees options (see section 6).
 - the impacts on different types of stakeholders (see this section 7 and Annex 7)

- any impacts on competition (see Annex 7)
- the impacts and choice of best option (see sections 6 and 7 and Annex 7)
- 7.113 We conclude on each of these factors below.
- 7.114 **First**, we have identified the citizen and consumer interest which underpins our proposal to apply AIP fees to the maritime sector.
- 7.115 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 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 some of the spectrum used by the maritime sector.
- 7.116 Some of the excess demand comes from within this sector. For example, it is often very difficult to meet new requests for internationally recognised VHF simplex channels required by ports.
- 7.117 In other instances, the excess demand comes from other sectors of the economy which face shortages of spectrum which could be overcome if spectrum currently used by the maritime sector was made available to them.
- 7.118 We consider that AIP licence fees based on opportunity costs could help manage excess demand for spectrum in the maritime sector in the UK, potentially leading to release of spectrum for other users, resulting in net benefits for UK citizens and consumers (see sections 2, 3 and 4).
- 7.119 **Second**, we consider that the proposal to apply AIP licence fees to the use of spectrum in the maritime 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 sections 2 and 3)
- 7.120 **Third**, we have set out why we believe AIP licence fees should be applied to the maritime sector (sections 3 and 5). We have previously set out the case for applying opportunity cost based AIP licence fees for spectrum in our Strategic Pricing Review (see paragraphs 2.26 and 2.29), our July 2008 consultation (paragraphs 2.33-2.39) and by Professor Martin Cave in the Cave Audit 2005 (paragraphs 2.30-2.32).
- 7.121 We have identified two broad options for setting licence fees: administrative (including zero) based fees and to set AIP fees based on underlying opportunity costs (see section 6).
- 7.122 Under the broad option for setting fees based on opportunity costs where there is excess demand (i.e. Option 2), we have considered a number of possible reference rates to reflect the equivalent value of a 1 X 1 MHz national channel for UK maritime and international maritime spectrum frequencies, including adjustments to reflect uncertainty regarding spectrum release (taking a conservative approach) (section 6). Our proposed reference rate proposals are:

UK Maritime VHF:

£330,000 per 1 X1 MHz national channel;

International Maritime VHF:

£371,000 per 1 X1 MHz national channel;

- 7.123 We consider that 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.
- 7.124 In cases where there is no excess demand in either current or alternative use, we have proposed administrative fees (e.g. shared marina channels).
- 7.125 Where frequencies are used on a private commons basis, often for safety of life purposes, Ofcom has proposed zero rated fees (for end users) (eg international distress calling and national SAR channels).
- 7.126 In line with these conclusions we have proposed detailed AIP based fee structures to apply to individual licensees to recover an appropriate share of the opportunity costs of the relevant national channels. This is to reflect the fact that licensees typically operate at less than national scale and assignments sterilise spectrum in different geographic areas with different assignment or population densities and relative levels of excess demand (see this Section 7).
- 7.127 In this Section 7, we have also considered phasing-in options for detailed fees structures.
- 7.128 Based on the above analysis, we therefore proposed 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).
- 7.129 **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:
 - In aggregate the impact on the sector is modest around £96k per year. In • light of the proposed licence fees it would be expected that organisations in areas of greatest demand making use of CSR(UK) channel allocations and simplex CSR(International) channels would see the greatest increases in fee costs. Of the case study organisations examined in more detail by Helios technology, the one facing the highest financial impact under our proposals (ie the Port of London Authority) would experience increases of around £8k a year following phasing, while other licenses would see much smaller increases (Aberdeen Harbour Board about £200 and Portsmouth Commercial Port about £1100). We estimate that 33% of licensees will see overall decreases, 40 % (mainly those using the marina channels) will see no overall change, and 26% will see overall increases. Of those facing overall increases, half will see overall increases of not more than £400 per year. Overall, the fee increases for specific maritime users are modest in absolute terms, and small relative to comparators including turnover, donations and conservancy, berthing or other charges (see Annex 7). There were no examples observed amongst the case study organisations of a rise due to licence fee changes that would be likely to lead to a significant change in output or profitability

(note that at the margin, the charges do however provide incentives upstream for ports and harbours to use spectrum more efficiently).

- 7.130 Based on this analysis, Ofcom has considered specific phasing-in options for detailed fees structures (see paragraphs 7.103 to 7.110) 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, even from the smaller organisations which are proportionately more affected.
- 7.131 **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.
 - In the maritime sector limited information is available, although European price elasticity of demand estimates range from -1.1 for Le Havre to -4.4 for Bremen Ports.⁵²
 - A negligible reallocation of maritime 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).
 - The proposed fee changes can be compared with other port related costs such as conservancy dues. For example Helios estimate the cost of AIP relative to other costs as modest, at around £129 per vessel on average for the Port of London which can be contrasted with the estimated other port related costs for a single typical 5,500 tonne vessel calling at a UK deep sea container port of £142,600 (including a cost of vessel estimate of £28,000 for one day).

Question 17 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 to the extent that we are able compatible with UK law.

Conclusions on other considerations

Health and safety

7.132 In our July 2008 consultation we noted that:

- Providers of safety critical services generally have to acquire inputs on the open market;
- Ports generally have specific legal duties concerning safety
- 7.133 We consider that such points remain relevant in considering the specific revised proposals in this consultation. 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 health and safety arising from our proposals.

⁵² Delft. December 2006. Greenhouse gas emissions for shipping and implementation guidance for maritime fuel sulphur directive. Table 41. http://ec.europa.eu/environment/air/pdf/transport/final_report.pdf

Environmental and social impacts

7.134 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.

Equality Impact Assessment

- 7.135 As discussed above, the direct financial impacts of applying AIP licence fees to licensees in the maritime sector may vary between groups or classes of UK consumers and citizens, depending on the geographic area in which they consume maritime services (e.g. shipping services) 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.
- 7.136 The impact on maritime users is very small relative to relevant comparator values including organisation turnover, charitable donations and/or harbour/port fees (including berthing fees).
- 7.137 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 port related services for these aforementioned groups of consumers and citizens relative to consumers and citizens in general.
- 7.138 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

- 7.139 We have made a set of fee proposals in this document for the maritime use of VHF spectrum in light of the objectives we identified for setting fees in Section 1 and in paragraph 7.4 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.
- 7.140 For the reasons set out in this Section, we consider that 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 spectrum used by the maritime sector, we consider that where there is excess demand for one or more uses of the spectrum, it is appropriate to set AIP licence fees to reflect underlying opportunity costs (Option 2). Where there is no excess demand in current use nor excess demand from alternative

uses, Ofcom assesses that it is appropriate to set fees based on administrative based costs (Option 1). Where channels are used on a private commons basis and administration 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.

- 7.141 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 risk of setting fees too high is greater than the risk of setting fees to 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 equilibrium fee rates of 40%.
- 7.142 In addition, recognising the risk from setting fees too high, we propose that where fee increases are significant, fee increases 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
- 7.143 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.
- 7.144 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.

Question 17: 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.

7.145 It will be helpful for the majority of responses to this consultation to be able to 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 on 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.

Section 8

Proposals for spectrum to be managed by government

- 8.1 In this section, we set out proposals for the efficient management of spectrum allocations in which the actions of end users are, in the current circumstances, unlikely to have material effects on spectrum use and availability.
- 8.2 In the cases set out in this section, we do not consider that AIP-based fees for end users would be the most likely way of securing benefits for citizens and consumers given the current circumstances concerned. This is because any changes of use that would release spectrum for new users or new uses cannot be, or are very unlikely to be, realised as a result of individual users' responses to a price signal. This is, generally, because making spectrum available for new users (for the same or a different purpose) would require some central management and co-ordination. Additionally, in some cases, the existing arrangements for access to and use of spectrum mean that use by one user does not effectively exclude another user from accessing the spectrum.
- 8.3 We do consider that there are potential benefits from the public authority responsible for the sector in this case, DfT taking a strategic management lead in decisions about the use of this spectrum.
- 8.4 This spectrum falls into two broad groups:
 - spectrum used for radar and aeronautical navigation aids; and
 - VHF spectrum used on a private commons basis for maritime applications such as search and rescue.
- 8.5 We set out these cases, and the reasons for our assessment that these new management arrangements would be appropriate, below. We start by considering spectrum used for radar and aeronautical navigation aids (paragraphs 8.6 to 8.14), and then consider VHF spectrum used on a private commons basis, typically to assist with maritime search and rescue activity (paragraphs 8.23 to 8.35).

Maritime and aeronautical radar/racons and other aeronautical navigation aids

- 8.6 We maintain our view in the July 2008 consultation that spectrum bands used for radar/racons and aeronautical navigation aids are not generally congested in their current use. It follows that there is no need to use AIP fees to help manage existing excess demand for spectrum for these purposes (although views from consultation respondents on the prospects for future excess demand were mixed). However, much of this spectrum, which includes a variety of different bands, is well suited to other applications which currently face spectrum shortages. If the spectrum needed for existing radar and aeronautical navigation aids was used more efficiently, some spectrum could be used to meet excess demand for spectrum for other maritime and aeronautical applications and more widely.
- 8.7 Many of these bands are internationally allocated for specific aeronautical and maritime applications. As such, they are subject to international obligations placed on the UK to ensure that any other uses of this spectrum in the UK do not cause

interference with the uses which have been internationally recognised, within the UK and beyond. Nevertheless, subject to appropriate technical safeguards, the UK does have discretion to share this spectrum with other applications – be this by frequency sharing, geographic sharing, time sharing or otherwise.

- 8.8 The existence of excess demand from alternative uses might suggest that users of radar and aeronautical navigation aids should face AIP based spectrum fees, to provide incentives to ensure efficient use of spectrum, making spectrum available for other users where this is feasible. However, in these spectrum bands, early action by individual spectrum users is unlikely to have a material impact on spectrum efficiency.
- 8.9 This is because a co-ordinated approach, involving agreement of new technical standards or UK-wide replanning of the way certain bands are used, would be necessary before any material amounts of spectrum could be made available for other purposes.
- 8.10 Each radar assignment has been co-ordinated to fit with the existing network of other assignments. In many cases these networks include assignments in both civil aeronautical and transport sectors, and military installations. To create a useable block of spectrum (in geographic and frequency terms), it may be necessary to replan the way the complete block of spectrum is used, perhaps resulting in investment to enable radar users to occupy a smaller part of the overall spectrum band. The costs, benefits and risks of a replanning exercise like this would need to be considered in the round by Government in order to take into account the various public interests at stake.
- 8.11 In the absence of prior co-ordination under the strategic oversight of the public authorities in this way, it is likely that any spectrum vacated by individual licensee responses to AIP fees would be only in small packages at particular locations, which might not be useful to new users in either sector, or to new uses in other sectors. Such a coordination failure might well, as a result, mean that the affected spectrum remained vacant or inefficiently used, generating no or reduced benefits for citizens and consumers.
- 8.12 It is conceivable that AIP licence fees which collectively signalled the opportunity costs of the complete band (including any vacant spectrum) via the existing end users could provide sustained incentives for them to co-operate amongst themselves, and take the necessary collective action to optimise spectrum use for the long term (e.g. devising any technical standards required, and/or re-planning the band). However, in practice, the very large number of spectrum licence holders and the diffuse nature of this group (including the MOD, regulated infrastructure providers such as the BAA, MAG and NATS, and other private infrastructure providers in different sectors), suggests that co-ordination may be difficult to achieve. Stakeholders have also stressed to us the important role of the sectoral regulators in facilitating the integration of any UK changes with the development of international industry frameworks. In our view, this diversity of public and private interests seriously weakens the potential for the incentive properties of individual AIP licence fees in these bands to lead to major changes in spectrum efficiency for new users or new uses.
- 8.13 In our view, it would be more effective if UK public authorities, led by the DfT with policy responsibility for the maritime and aeronautical sectors, had a strategic management role in relation to the ongoing use of these bands. Ofcom has filled this role in recent years, but as it is not the sectoral regulator for the industries that

currently use the spectrum, it is not well placed to take decisions which may impact long term transport-specific policy considerations, still less to take decisions in the round which reflect both public safety and defence interests. For example, Ofcom has worked closely with DfT, the CAA and MCA to commission a programme of research to investigate scope for sharing the radar bands but, ultimately, whether a particular technology or technical standard is acceptable, given the investment which may be needed for it, is a matter for Government and the CAA to determine.

8.14 If DfT takes this strategic management role in relation to transport use of these bands, it would then be for Government to consider any incentive structures that would be appropriate to inform decisions as to whether, and when, to carry out any re-planning for assignments in those bands.

We are therefore proposing a new strategic management role for Government in managing radar and aeronautical navigation aids.

- 8.15 Because a managed longer term transition would be more likely to achieve optimal use for material amounts of spectrum, we consider that this route would be better to pursue at present, than for Ofcom simply to apply AIP pricing to existing end user licensees.
- 8.16 We have discussed this question in detail with Government and we are now proposing that the DfT takes strategic responsibility for planning and agreeing changes of use of spectrum in the radar and navigational aids bands, along with a strategic role in assessing the current and future spectrum requirements for its sectors. Some of this role could be discharged, where appropriate, with support from the MCA or formally delegated to the CAA.
- 8.17 If the DfT were to assume this role, and to define how best it wished to discharge it, It would then be for Government to consider any associated incentive structures that would be appropriate to inform strategic and management decisions regarding these bands. Such decisions would include whether and when to conduct further research to determine scope for band sharing and replanning.
- 8.18 The precise nature of these incentives, and the processes by which all of the relevant public interests are taken into account in taking decisions, would of course be matters for Government, not Ofcom.
- 8.19 We are making these proposals for spectrum used for radar and aeronautical navigation aids in light of the current circumstances, in which there is no current use excess demand, and there is a clear advantage in co-ordinated and managed changes in achieving more efficient use of spectrum in the long term, in comparison with the alternative of end-user AIP-based fees.
- 8.20 If circumstances change for example at the end of any co-ordinated and managed transition to new technologies or new assignments it may in future become appropriate for consideration to be given to incentives for end users, if it is apparent that these could inform individual decisions that would lead to more efficient use of spectrum. How this should be achieved would be a matter for the relevant public authorities at the time, in the light of the strategic management decisions taken.
- 8.21 Such incentives could for example take the form of sector specific legislation or regulation (including perhaps sector specific fees), or AIP-based spectrum fees (as applied to end users in other sectors). If a sector specific approach was adopted, this would be implemented by Government. Some of these options were explored in the

2005 Cave Audit (see, for example, paragraph 6.7). If an approach that involved changes to licence fees was preferred, these would be set by Ofcom under the current legal framework, and would need to be subject to a new public consultation.

8.22 Users of radar systems operating in the 2.7GHz band (2.7-3.1GHz) should note that they may be required to upgrade their equipment to ensure that it does not suffer harmful interference from future mobile broadband systems operating in the 2.6GHz band (2500-2690MHz) in line with the requirements of EC Decision 2008/477/EC. Ofcom is currently working with HMG, the CAA, MCA, and stakeholders to identify the upgrades that may be necessary and the timescales over which those upgrades could be implemented. Further information will be published in due course.

Question 18 If the Government were to assume the strategic management role for the radar and aeronautical navigation aids spectrum that we propose, do you agree that we should not develop proposals for AIP licence fees?

VHF maritime channels used on a private commons basis

Search and rescue channels

- 8.23 As detailed in previous sections, international channels 10, 67 and 73, UK channels 156.000 MHz (channel 0), 160.600 MHz (channel 00) and 161.225 MHz (the UK Beach Lifeguard channel) are all used on a shared basis by search and rescue organisations. Here, again, we do not believe that action by any one user can result in more efficient use of this spectrum. We do not propose to apply AIP fees to end users. Furthermore, because there is no ongoing requirement for Ofcom to plan or co-ordinate this spectrum use, we do not propose to apply administrative fees to end users either.
- 8.24 We suggest that the UK public authorities should take a strategic role in considering how many such channels are required in future, and considering whether and when the sectors might change the way they use this spectrum (for example, in transitioning to new technologies). We are proposing that DfT take on formal planning and co-ordination responsibility for these VHF channels, discharged as appropriate by its agency the MCA.
- 8.25 Within such a framework it would be for the search and rescue community, including MCA as co-ordinator, to judge whether these 6 channels are either insufficient or excessive in relation to their intended use and to liaise with the DfT over the strategic implications as necessary. This judgement would have an impact on other spectrum users both within the maritime sector (in the case of the international channels) and more widely (in the case of the UK channels).
- 8.26 Under this new management arrangement, it would be for Government to consider any incentive structures that would be appropriate to inform decisions in relation to the ongoing use and management of these channels

Working channels used by maritime search and rescue organisations

8.27 We are also proposing that one or perhaps two UK channels should be made available for use on a private commons basis by maritime organisations (whether registered charities or not) whose sole or main objective is the safety of human life in an emergency. These channels would be used as working channels by such organisations for their routine communications between boats and shore stations. Maritime search and rescue organisations currently use a multiplicity of different channels for this purpose, which is not spectrally efficient. We are proposing that the MCA should manage the use of the new dedicated channel(s) and determine organisations' eligibility to use it. We anticipate that most such eligible users are likely to be maritime search and rescue charities. However, unlike eligibility for the 50% charity discount, we are not proposing that use of this channel should be limited exclusively to charities.

- 8.28 We are proposing that Government should determine appropriate incentive arrangements to inform decisions in relation to the ongoing use and management of these channels, for example in considering whether one channel (and whether simplex or duplex) is sufficient, and in time, whether it would be appropriate for users to deploy new technology which could increase the benefits from the existing spectrum, or use less spectrum to achieve them.
- 8.29 We are also consulting on an option of making more than one channel available to be managed in this way, in order to accommodate all of the existing community of search and rescue users (and possibly more in future). Our decision on this issue will reflect responses to this consultation, in particular from users as to their preference for using an MCA-managed channel or retaining exclusive use rights under a licence, for which fees would be applied as in our general pricing proposals subject to the 50% discount for safety of life charities where appropriate.

AIS channels

- 8.30 The two channels used for AIS rely on time slot sharing co-ordinated by the MCA. The channels are used by the worldwide fleet of ships and a relatively small number of coastal stations (mainly operated by the lighthouse authorities) and Aids to Navigation stations. Additionally Channel 70 is used for channel management purposes. We see little scope for UK shore based end users acting alone to influence how much spectrum is used. If channel occupancy was starting to reach saturation point, when pressure might build for international allocation of further channels for AIS use, there might be merit in charging fees to end users to manage demand. However we have no evidence that this is a concern at this stage.
- 8.31 We therefore currently see little value in applying AIP fees to end users. However, as the UK's stance on how many channels should be internationally allocated for AIS is determined by the MCA, we are proposing that government should take a strategic role leading decisions about how these channels are accessed and used, alongside the existing day-to-day co-ordination role that MCA already carries out.
- 8.32 It would then be for Government to consider any incentive structures that would be appropriate to inform decisions in relation to this channel. Such decisions would include determining which shore based stations should be licensed to use AIS and whether the UK would support or oppose moves to increase or reduce the number of channels allocated for AIS use.

Access by users other than MCA to the weather channels

8.33 The MCA uses three international duplex channels (channels 23, 84 and 86) to broadcast weather and information to aid shipping. (Search and rescue channels 67 and the oil pollution control channel 10 are also used for this purpose). As noted in Section 5 above, duplex international maritime channels are not congested in their current application and it is not feasible in the medium term to make these available to other applications.

- 8.34 Users accessing these channels currently do so under the authorisation of the MCA, and their use has no direct effect on the availability of this spectrum for other users or uses. In light of this, we propose not to set any fees for end users who are authorised to use these channels by the MCA, for search and rescue or any other purpose as determined by the MCA. Nor, since MCA co-ordinates and manages this access, do we propose to set any administrative cost-based fees.
- 8.35 As this management role is already established, we are not proposing any changes to strategic or operational management arrangements, but we are reflecting these existing arrangements in our fee proposals.

These proposals are for Government to decide

Implementing these spectrum management proposals would not be in Ofcom's hands, so it is not for us to conclude whether they are the right way forward. Accordingly, we are not consulting on them, apart from testing the likely demand from search and rescue organisations for one or more private commons working channels. Implementing such a new arrangement would involve new technical planning work for Ofcom, before we could "hand over" the new dedicated channel to MCA, should Government agree to these proposals.

8.36 However, our views on the appropriateness of AIP based licence fees in a number of the affected bands have been influenced by our proposals for the future management of the spectrum concerned. Accordingly if stakeholders have any other views on these proposals, it could be helpful for other stakeholders, and Government, to know these. We would therefore welcome any comments, and would expect to publish any non-confidential comments along with the other responses to this consultation, in order to improve information for all stakeholders.

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 13 November 2009.**
- A1.2 Ofcom strongly prefers to receive responses using the online web form at <u>http://www.ofcom.org.uk/consult/condocs/aip maritime/howtorespond/form</u>, 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 <u>aeromar2ndconsult@ofcom.org.uk</u> 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, <u>www.ofcom.org.uk</u>, 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 <u>http://www.ofcom.org.uk/about/accoun/disclaimer/</u>

Next steps

- A1.10 Following the end of the consultation period, Ofcom intends to publish a statement before the end of 2009.
- 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 <u>consult@ofcom.org.uk</u>. 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

A2.1 Ofcom has published the following seven principles that it will follow for each public written consultation:

Before the consultation

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

During the consultation

- A2.3 We will be clear about who we are consulting, why, on what questions and for how long.
- A2.4 We will make the consultation document as short and simple as possible 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.
- A2.5 We will consult for up to 10 weeks depending on the potential impact of our proposals.
- A2.6 A person within Ofcom will be in charge of making sure we follow our own guidelines and reach out to the largest number of people and organisations interested in the outcome of our decisions. Ofcom's 'Consultation Champion' will also be the main person to contact with views on the way we run our consultations.
- A2.7 If we are not able to follow one of these principles, we will explain why.

After the consultation

A2.8 We think it is important for everyone interested in an issue to see the views of others during a consultation. We 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

- A3.1 In the interests of transparency and good regulatory practice, we will publish all consultation responses in full on our website, <u>www.ofcom.org.uk</u>.
- A3.2 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.
- A3.3 The quality of consultation can be enhanced by publishing responses before the consultation period closes. In particular, this can help those individuals and organisations with limited resources or familiarity with the issues to respond in a more informed way. Therefore 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.
- A3.4 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 <u>www.ofcom.org.uk/consult/</u>.
- A3.5 Please put any parts of your response you consider should be kept confidential in a separate annex to your response and include your reasons why this part of your response should not be published. This can include information such as your personal background and experience. If you want your name, address, other contact details, or job title to remain confidential, please provide them in your cover sheet only, so that we 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
Part of the response In 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 the fee rates set out in Table 8 for assignments in the eight core international maritime simplex channels are appropriate?

Question 2 Do our revised proposals reflect appropriately the distinctions between the different uses of particular internationally allocated maritime channels, as set out in Table 9

Question 3: Do you agree with our proposals not to set any fees for use of the calling and distress channels, the search and rescue channels, the AIS channels, or for exceptional shore-based use of the intership channels?

Question 4: Do you agree with our proposals to set administrative cost-based fees for licences to use the package of 3 marina channels?

Question 5: Do you agree with our proposal to set administrative cost-based fees for licences to use the internationally-allocated duplex channels?

Question 6: Do you consider that the fee rates set out in Tables 10 and 11 for assignments in the UK-allocated working channels (that is, not including the search and rescue or marina channels) are appropriate?

Question 7 Do our revised proposals correctly identify all of the UK allocated maritime channels which are assigned to specific applications which require a specific approach to fee setting, as set out in table 12

Question 8: Do you agree with our proposal to set no fees to licensees for use of the two UK-allocated search and rescue channels?

Question 9: If you are a maritime organisation with the safety of human life in an emergency as your sole or main objective, would you be interested in accessing spectrum for working purposes (ie other than SAR or other emergency response uses) under a private commons basis, shared with other users with the same objectives and co-ordinated by the MCA, and free of any spectrum fee?

Question 10: Do you consider that our proposed fee rates for area-defined licences(where feasible) in the eight core internationally-allocated maritime simplex channels are appropriate?

Question 11: Do you agree that area-defined licences in the international duplex channels should be based on a minimum cost of £75 for 4 squares, with larger areas priced on a case by case basis?

Question 12: Do you consider that our proposed fee rates for area-defined licences in the UK allocated working channels (that is, not including the search and rescue channels or the marina channel) are appropriate?

Question 13: Do you agree with our proposal to set an administrative fee of £75 for maritime radio (suppliers and demonstration) licences? Question 14: Do you agree with our proposal to bring the arrangements for temporary maritime licences into line with those in other sectors? Question 15 Do our proposals for phasing in some of the proposed fee increases provide sufficient time for you to accommodate the additional costs, without undue disruption to your operations which could reasonably be avoided by a phasing arrangement? We would like to be able to publish all responses to this question. However, if you wish your response to this question to remain confidential, please provide your response on a separate sheet clearly marked to that effect. Your request for confidentiality will be respected

Question 16: Do you consider that our phasing proposals for the maritime licences for which we propose to set AIP-based fees 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.

Question 17 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.

Question 18 If the Government were to assume the strategic management role for the radar and aeronautical navigation aids spectrum that we propose, do you agree that we should not develop proposals for AIP licence fees?

Annex 5

Glossary

AIS

AIS (Automatic Identification System) is a broadcast transponder system operating in the VHF maritime mobile band. It is capable of sending ship's navigation information to other ships and to shore. The channels allocated are AIS 1 (161.975MHz) AIS 2(162.025MHz) and VHF channel 70 (156.525MHz).

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.

Antenna

A passive device designed to radiate and receive electromagnetic energy.

Area Defined licence

A licence which defines the area in which, subject to the boundary conditions, the licensee may transmit rather than at a specific location

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.

Base station

A radio transmitter and receiver installed by an operator, usually at a specific location, to provide a communications service, typically used in mobile telecommunications.

Communications Act

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

DGPS

Differential Global Positioning Systems provide enhanced accuracy for GPS systems, typically used by port authorities and surveyors.

Duplex

Operating method in which transmission is possible simultaneously in both directions of a telecommunication channel. In general, duplex operation requires two frequencies.

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.

Net welfare effect

Net welfare effect refers to the net change in combined consumer and producer surplus arising from a policy or regulatory decision (i.e., net of any gross transfers between these groups

PAMR

Public Access Mobile Radio

PBR

Private 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.

PMR

Private Mobile Radio (PMR), see PBR.

PMSE

Programme Making and Special Events – a class of radio application that supports a wide range of activities in entertainment, broadcasting, news gathering and community events.

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.

Recognised Spectrum Access

A spectrum management instrument created by the Communications Act which enables spectrum rights to be defined where it is not feasible to grant a licence (for example to the Crown).

Simplex

Operating method in which transmission is made possible alternately in each direction of a telecommunication channel, for example, by means of manual control.

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

Maps defining proposed geographic differentiation between AIP fees



Applying spectrum pricing to the maritime sector, and new arrangements for the management of spectrum used for radar and aeronautical navigation aids

Proposed geographic definitions for International maritime channels



Proposed geographic definitions for UK maritime channels

Annex 7

Further analysis of the impact of VHF fees

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 al⁵³ 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 1/6th⁵⁴ 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 above cost benefit assessment ("CBA") did not look individually at AIP reforms, nor at AIP applied specifically to the maritime 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.

⁵³ 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_stud y/secontrad_final.pdf.

 $^{^{54}}$ The estimate assumes that the benefits to the UK equate to approximately $1/6_{th}$ of the benefits to all Europe based on relative GDP.

Applying spectrum pricing to the maritime sector, and new arrangements for the management of spectrum used for radar and aeronautical navigation aids

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 We note that some of the services which are provided using spectrum 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 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).
- 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 studies⁵⁵, at an aggregate level, of the potential benefits of market-based approaches to allocating spectrum, which have found these to be large (see paragraphs A5.2 to A5.3 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 A5.10 to A5.12 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 this 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 The remainder of this Annex reproduces a report commissioned by Ofcom from independent consultants Helios Technology Ltd

⁵⁵ See, for example, Indepen 2007 section 2.3

Maritime 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 maritime 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 maritime 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 maritime 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. 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.
- 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

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

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 transhipment 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).
- 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 it magnitude relative to end user prices or costs. The reason for this is that spectrum is one among many inputs in the value chain

1.3 Structure of this Document

This document has been structured as follows:

- Section 2 details the existing spectrum licence fee structures within the maritime industry and discusses Ofcom's proposed AIP fee structure.
- Section 3 discusses the structure of the UK maritime industry as it is affected by AIP, identifies the different categories of users and details the flow-through of spectrum fees.
- Section 4 presents a number of case-studies in which the specifities of the impact of AIP on particular organisations are explored.
- Section 5 provides an economic analysis of the impact of AIP in the maritime industry.
- Annex A details the economic framework used to consider the impact of AIP.

2 Ofcom's AIP Proposals

2.1 Introduction

This section identifies the existing licence fee structure for maritime 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, taking into account the outcome 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 Maritime Sector

2.2.1 Existing Fees

The table below details the fees 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
Coastal Station Radio (Marina)	£75 for each base station in respect of channels M (157.850 MHz), M2 (161.425 MHz) and channel 80 (157.025 MHz).
Coastal Station Radio (International)	£100 for each international maritime channel (except channel 80 (157.025 MHz)) per base station, provided that channels designated for emergency use shall not be taken into account.
Coastal Station Radio (UK)	£180 for each channel in respect of non- international maritime channels per base station (including associated mobile stations).
Differential Global Positioning System	(a) £250 for each channel per VHF station.
	(b) £1,000 for each channel per MF or UHF station.
Maritime Navigational Aids	(a) £40 for each frequency per navigational aid (or radar station), except for the use of a pair of VHF channels AI51 and AI52.
	(b) £40 for each pair of VHF channels AI51 and AI52.

Table 2-1: Existing Maritime Licence Fee Structure

2.2.2 Proposed Fees under AIP

Ofcom's published proposals for maritime fees for VHF communications varied depending on:

- the coverage of the station,
- whether the frequency in use is international or UK-specific;
- and whether or not the station is located in a high, medium or low density zone;

Having considered responses to the initial consultation, Ofcom asked us to base the current report on the following assumptions about the level of fees for maritime VHF communications. These too are based on the parameters of the station in question, the area in which the station is located and whether the channels concerned are UK specific or international. These are set out in the tables below. The figures below vary somewhat from those of the initial consultation and represent Ofcom's latest view on how it might apply AIP for maritime VHF services.

For the 8 international simplex 25 kHz maritime channels² where the demand for location specific port transmitter assignments exceeds supply, the following fees are proposed:

	High Coverage	Medium Coverage	Low Coverage
High Density	£500	£400	£300
Medium Density	£200	£150	£125
Low Density	£100	£75	£75
No congestion ³	£75	£75	£75

Table 2-2: Proposed Fees for subset of International Simplex Channels

For the other international channels the following fees are proposed:

² Roughly equivalent to existing CSR (International) channels

³ A 50km x 50km grid square with 2 or less assignments in the core charged international simplex port operations channels.

Channels	Proposed fee
6 calling and distress channels and associated guard band	Free of charge
8 search and rescue channels	Free of charge to end users
3 maritime weather reporting channels	£75
Package of 3 marina channels	£75
Training schools, suppliers and demonstrators	£75
AIS	Free of charge to end users
Charities with "safety of life in an emergency" objective	50% discount
Duplex channels	£75
Area defined licences	£9,275 per channel for all-UK licences in simplex channels with fees reduced pro-rata for sub-UK areas.
	Admin based fees for duplex.

Table 2-3:Proposed Fees for other International channels

For the 41 UK simplex 25 kHz maritime channels⁴ that are not currently allocated for search and rescue or marina channels, the following fees are proposed:

	High Coverage	Medium Coverage	Low Coverage
High Density	£740	£370	£100
Medium Density	£250	£170	£85
Low Density	£90	£80	£75

Table 2-4: Proposed Fees for subset of UK Simplex Channels

For the exceptions to the above table the following Fees will apply:

Channels	Fees
3 search and rescue channels	Free of charge to end users
Package of 3 marina channels	£75
Charities with "safety of life in an emergency" objective	50% discount
Duplex channels	Double the stated fee
Area defined licences	£8,250 per channel for all-UK licences in simplex channels with fees reduced pro-rata for sub-UK areas.

Table 2-5: Proposed Fees for other UK channels

⁴ Roughly equivalent to existing CSR (UK) channels.

With respect to international simplex frequencies, we were asked to assume that the following definitions apply (where 'P' represents transmitter power and 'A' represents antenna height):

Coverage Level	Definition
High	P>=25 and A>=10
	P>=10 and A>=20
	P>=5 and A>=30
Medium	P>10 and A <5
	P>5 and 5 <a<10< td=""></a<10<>
	P<25 and 10 <a<20< td=""></a<20<>
	P<10 and 20 <a<30< td=""></a<30<>
	P<5 and A>30
Low	P<=5 and A<=10
	P<=10 and A<=5

Table 2-6: Coverage definitions for International Simplex channels

With respect to UK maritime frequencies, the following definitions, as per the standard Business Radio definitions, apply (where 'P' represents transmitter power and 'A' represents antenna height):

Coverage Level	Definition
High	P>5 and A>10
	P<=5 and A>30
Medium	P<=5 and 10 <a<=30< td=""></a<=30<>
	P>5 and A<=10
Low	P<=5 and A<=10

Table 2-7: Coverage definitions for UK maritime frequencies

In respect of the relative 'density' of different areas, we were asked to make the following working assumptions:

- The density of UK-specific channels to be defined as per map the map which currently applies to Business Radio use,
- The density of international channels to be defined as per the map provided to us by Ofcom.

These two maps are reproduced in Figure 2-1 below.



Business Radio 'Density'

International Maritime Radio 'Density'

Figure 2-1: Business and Maritime Radio Density Maps

As a comparison, the cost of the whole band in use for maritime communications would, based on a figure of £371,000 per national MHz, be £1.25 million per annum⁵. There are approximately 4,400 maritime VHF licences on issue implying an average per-licence fee of £283 per annum based on equal sharing of the cost of the band in use. Some of this spectrum is not fully occupied, and Ofcom has also asked us to assume that any fees for the following channels used for search and rescue would be paid centrally by Government:

- International channels 10, 15, 16, 17, 24, 62, 63, 64, 67 70, 73, 75 and 76;
- UK channels 0 and 00, and AIS1 and AIS2.

In addition, Ofcom have asked us to assume that the existing charging structure for the three Marina channels will remain unchanged.

2.2.3 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 maritime users. As such, it is to be expected that the fees will be introduced over a number of years, typically three.

We have therefore assumed that the profile of fees will begin, in the first year of implementation with 33% of the figures calculated above. Year 2 the fees will increase to 66%, and in year 3 the full amount will be charged.

⁵ In reality, some of this spectrum is not heavily used in some parts of the country and as such the total level of fees assumed is less than this sum – see for example Figure 4.3 below.

3 Cost Structures within the Maritime Industry

3.1 Overview

The provision of safe navigation, vessel traffic management, search and rescue, security and environmental protection at sea and on waterways inland drives a need for spectrum for maritime communications, surveillance and navigation systems. Particular frequency bands are internationally allocated for these purposes (although not always on an exclusive basis).

Ofcom issue three different licence types for Coastal Station Radio – International, UK and Marina. All VHF channels are currently 25kHz wide and can be simplex or duplex. International assignments are co-ordinated with neighbouring states, although known interference problems still exist. UK assignments are specific to the UK and are not designated internationally. Marina licences cover two simplex UK channels, known as M and M2 as well as a duplex international channel 80. VHF Licences are also issued for DGPS data-links and for AIS stations and beacons. Typical usage of these assignments is illustrated below.

Licence	Usage	Example Systems
Coastal Station Radio	Port operations, shipping movement services, vessel traffic management, safety communications.	VHF communications.
Coastal Station Radio	Port operations, shipping movement services, private commercial channels.	VHF communications, data services.
Coastal Station Radio	Marina operations, race control, club safety.	VHF communications.
Maritime Navigational	Tracking of vessels, marking of channels and hazards, safety communications.	AIS, DSC.
Differential GPS	Port survey and positioning.	Local area VHF DGPS.

Table 3-1:Usage of maritime VHF licence types

There are more than 4,500 individual channel assignments covering the licences above alone to approaching 900 licensees. However, there is a clear polarisation between large and small licence holders. A few organisations dominate the assignments, as can be seen in Figure 3-1 below. The Maritime and Coastguard Agency is by far the largest user of maritime VHF spectrum, followed by the RNLI, the individual lighthouse authorities, Associated British Ports and BP Offshore Exploration. The top 10 organisations hold approximately 33% of all assignments between them whereas 52% of all licensees have 10 or fewer assignments.

Notably a large number of assignments are held by charities or non-governmental organisations involved in the discharge of public safety activities, that otherwise could place a significant cost burden on the government such as the RNLI, National Coastwatch Institution and many smaller search and rescue operations.



Figure 3-1: Assignments per organisation for the top 50% of all assignments

There are a wide variety of radio spectrum users in the maritime domain covering a broad range of industries, services and applications. The sector is significantly more diverse than for example the aeronautical domain and in comparison is not subject to as much regulation. Furthermore, there are a range of flows of funds and charges with a number of end-users impacted by costs passed on by the organisations utilising spectrum. An illustration of the variety is shown in the figure below.



Figure 3-2: Flow of maritime funds and charges

The largest spectrum user, the Maritime and Coastguard Agency (MCA) is directly funded by government through the Department for Transport (DfT). The lighthouse authorities are funded through light dues on vessels arriving at UK ports. Inland waterways are part funded by government grant and in part by charges on the users. Ports charge fees on vessels for the maintenance of a safe navigable waterway. Marinas charge pleasure vessels for berthage and sailing clubs typically charge membership fees. All of these classes of user typically have alternate sources of income of varying levels. A typical commercial vessel arriving at a UK port could expect to pay a variety of port charges, light dues as well as the costs associated with loading and unloading the vessel.

The figure below illustrates what proportion of the total VHF AIP charges each group of maritime users is likely to share. UK ports incur by far the greatest share of AIP costs for VHF communications.



Figure 3-3: Incidence of AIP charges per user group

As is indicated in the figure below the majority of VHF AIP costs arise from CSR (international) allocations being both those typically used for port operations and the MCA's coastal network as well as generally being operated at higher power levels more often than UK or marina channels.



Figure 3-4: Incidence of AIP charges per licence category

Under AIP the costs associated with the CSR (International) allocations falls primarily onto UK ports, the MCA and industry (mostly the offshore industry). Marina charges will fall predominantly onto sailing clubs and marinas.



Figure 3-5: Incidence of VHF AIP charges by user and type

The following sections describe the main categories of spectrum user in more detail and outline how they charge users for the services that they provide.

3.2 Maritime and Coastguard Agency

Maritime and Coastguard Agency – Current Assignments				
Automatic Identification System 153				
Coastal Station Radio (International)				
Simplex 593				
Duplex 52				

Source: Ofcom licences

Table 3-2:Assignments held by the MCA

The MCA is the body tasked with supporting the DfT in developing and implementing the Government's maritime safety and environmental protection strategy. It does this by promoting safety at sea and on the coast, providing a 24-hour maritime Search and Rescue co-ordination service, preventing pollution from ships and minimising the effects of pollution incidents by reacting quickly and effectively, maintaining the quality of ships on the UK Ship Register through regular surveys and inspections and promoting high levels of maritime safety and security. There are approximately 1,160 coastguard staff stationed around the UK. There are 19 coastguard stations and 19 search and rescue centres.

The MCA is funded directly by the DfT under a 3-year grant programme with further income obtained from the registration of ships on the UK ship register, certification of seafarers and through the undertaking of marine surveys. The organisation's net operational cost for the year 2006-07 was £130.2M. In the same period £13.9M of external income was obtained.

The MCA is the UK National Competent Authority for the Automatic Identification System (AIS) and operates an AIS infrastructure of 51 base stations around the coastline of the UK. These stations provide information about ships on passage with coverage out to a minimum of 30 nautical miles around the UK coastline. AIS helps to increase the safety of ships at sea through enhancing MCA's capabilities for the co-ordination of both search & rescue and marine pollution control, as well as supporting enforcement, hydrographic, security, environmental and regulatory activities.

The MCA are the responsible organisation for the provision of Traffic Separation Schemes (TSS) around the UK and maintain an active watch on the busy Dover Straight TSS through the Channel Navigation Information Service (CNIS). The infrastructure supporting the CNIS includes two MCA radar stations, AIS base-stations and VHF communication channels. The MCA also has overall responsibility for vessel traffic services but delegates responsibility for provision of these services in and around ports to port and harbour authorities and on inland waterways to British Waterways.

There are two types of VTS; Port and Coastal. A Port VTS is mainly concerned with vessel traffic to and from a port or harbour, while a Coastal VTS is mainly concerned with vessel traffic passing through the area and usually only an Information Service is rendered. In the case of ports the provision of services is generally undertaken by the local port or harbour authority. The MCA is competent authority for the provision of VTS in UK coastal waters.

In a few situations coastal VTS are provided by third party organisations on behalf of the MCA. These include the eastern Solent, where services are provided by

Southampton VTS (operated by ABP Southampton) on behalf of the MCA and Queens Harbour Master Portsmouth and in the Bristol Channel where Severn VTS services are provided by ABP South Wales on behalf of the MCA. Both of these VTS are provided on the basis of a MoU between the VTS provider and the MCA. To ensure that safety and environmental standards are maintained, these agreements provide for auditing and monitoring of the service provider and the service provided.

In mid 2007 a new TSS was in the process of being implemented in the Sunk. The implementation required the extension of current VTS arrangements and the provision of the associated VTS facility was offered by the MCA on a competitive tendering basis in accordance with Government procurement rules. However, no contract was ultimately awarded. This would have represented the first example of VTS provision on behalf of the MCA with an associated revenue stream. Currently, the services are planned to be provided by the MCA themselves.

The CSR (International) infrastructure is operated by the MCA to provide complete coastal coverage out to 30NM from the shore on a number of frequencies. A large number (151) of base stations are deployed, each of which typically operates four or more VHF channel assignments. Maritime Safety Information (MSI) broadcasts are made every four hours on VHF channels 10, 23, 73, 84 or 86 and exceptionally on VHF Channel 67. Some of these broadcasts can be in excess of 20 minutes. Channels 10, 67 and 73 are the typical working channels of the MCA. Channel 16 is used internationally as an emergency calling channel; however no licence fees are levied for the use of this channel.

In addition to the assignments that the MCA uses in its day to day operations it also obtains the necessary assignments for many of the land search and rescue organisations within the country. The SAR organisations are not charged for channels that the MCA obtains on their behalf.

The services provided by the MCA using the spectrum utilising infrastructure are not charged to maritime users. Furthermore, as many of the vessels in receipt of the services are transiting UK waters without a scheduled stop there is no practical mechanism available through which to charge them anyway. As a consequence of this, together with the MCA's role and remit for other aspects of marine operations including safety and environmental response the infrastructure is not driven solely by traffic levels, but by the need to provide total coastal coverage.

3.3 General Lighthouse Authorities

General Lighthouse Authorities – Current Assignments		
Automatic Identification System 69		
Coastal Station Radio (International)	48*	
Coastal Station Radio (UK)		
Simplex	40	
Duplex	1	

Source: Ofcom licences

Note: A number of CSR assignments in Ofcom's data relate to AIS stations.

Table 3-3:Assignments held by the GLAs

The General Lighthouse Authorities (GLAs) are tasked with the provision of an appropriate Aid to Navigation (AtoN) infrastructure around the coast of the UK and Ireland. They are comprised of three organisations:

- Trinity House covering the coastline of England, Wales, the Channel Islands and Gibraltar;
- Northern Lighthouse Board covering the coastline of Scotland and the Isle of Man;
- Commissioners of Irish Lights covering the coastline of Ireland and Northern Ireland.

The GLAs deploy a range of AtoNs around the coast of the British Isles that include AIS base stations, Radar Beacons (Racons) and radar stations. The GLAs also have a significant number of Coastal Station Radio licences. Deep sea pilotage services are also provided by Trinity House for vessels traversing the English Channel. It should be noted that both Trinity House and the Commissioners of Irish Lights are registered charities and currently receive a discount on their radio licences.

CSR (International) assignments are primarily held by NLB for communication links to/from lighthouses. CSR (UK) assignments are variously used for communication from lighthouses and for quay operations at the organisations depots.

The GLAs receive funding for their activities through the General Lighthouse Fund (GLF) that is administered by the UK Department for Transport. The GLF is funded predominantly from Light Dues levied on vessels entering UK⁶ and Irish ports. In addition, the Irish Government provides an annual grant. The GLF income therefore depends upon the maritime trading pattern of the UK and Ireland together with Parliament's willingness to agree appropriate changes to both the light dues regulations and the rates charged. The fees are collected from vessels by light dues collectors in each port.

Light dues are levied at the rate of 35p per ton, with a tonnage ceiling at 35,000 tons making the maximum charge £12,250. These rates have now been held constant since 2006. In any year, a vessel is not required to pay light dues for more than seven voyages in total. Hence, the cost per actual visit for frequent visitors such as cross channel ferries, is minimal, see Table 3-4 below.

⁶ No charges are levied on traffic that passes the UK coast utilising the infrastructure, but which do not stop at a UK port.

Vessel Type	Dues Paid	Chargeable Visits	Av. Dues per Ch. Visit	%	Total Visits	Av. Dues per Visit
Tanker	£16,385,496	4,605	£3,558	23	22,034	£744
General Cargo	£7,889,805	9,738	£810	11	33,307	£237
Dry Bulk Carrier	£8,286,092	1,356	£6,111	12	3,095	£2,677
Container	£27,556,058	3,816	£7,221	39	8,630	£3,193
Passenger	£1,092,555	237	£4,610	2	1,922	£568
Other	£5,406,032	3,591	£1,505	8	21,683	£249
Ro-Ro Ferry	£3,757,218	1,610	£2,334	5	85,106	£44
Total	£70,373,256	24,953			175,777	

Source: Adapted from MDS Transmodal & DTZ Pieda (2004) Table 2.2.

Table 3-4:Light dues paid in 2002 by vessel type

UK-registered fishing vessels and tugs also pay an annual charge based on the length of the vessel. The minimum payment for a 10-metre vessel is £202 with a payment of £21 per additional metre. Vessels under 10 metres in length are exempt. Foreign fishing vessels and tugs are also charged a proportion of the annual charge if a call is made in a UK port. Pleasure craft with a net tonnage of more than 20 tons are required to make a payment of £77 per annum.

Income to the GLF from dues in the year ended 31st March 2007 amounted to some £70M⁷, including £3.1M collected in the Irish Republic. In the same period the operating costs of the 3 GLAs totalled £66M. Income to the GLF has been declining over a long period as a result of both maintaining historic charges as well as due to the change in the number and size of vessels entering UK ports.

The GLA's are currently engaged in the development of the IMO e-Navigation concept through which an opportunity to further improve service standards is envisaged. e-Navigation is likely to be strongly dependent upon enhanced shipshore communications, so it is clear that the need for VHF radio spectrum is likely to increase. This concept is being developed by the IMO, so there is a potential impact on the GLAs use of radio spectrum if at some point the IMO choose to mandate the carriage of e-Navigation equipment.

In addition to e-Navigation the GLAs are looking to develop the use of AIS as an Aid to Navigation by equipping buoys, light-vessels, etc. with AIS transponders as a complement, or potentially replacement to Racons.

⁷ *The General Lighthouse Fund* 2006 – 2007, Department for Transport, HC161, 28 January 2008.

3.4 Ports

Ports – Current Assignments				
	Commercial	Trust	Municipal	
Automatic Identification System	18	21	0	
Differential GPS (VHF)	5	3	2	
Coastal Station Radio (International)				
Simplex	258	198	172	
Duplex	45	19	28	
Coastal Station Radio (UK)				
Simplex	27	26	16	
Duplex	10	13	5	
Coastal Station Radio (Marina)				
Simplex	13	16	28	
Duplex	7	8	14	

Source: Ofcom licences

Table 3-5:Assignments held by the Ports

The port industry in the UK can be broken down on the basis of ownership of the primary operating organisation, be it a port or harbour authority. There are three main categories:

- Commercial and Private Ports being those ports operated primarily to generate an adequate return on investment for the owner (typically a public listed company), or else being operated for the benefit of a single organisation or a specific sector of the maritime industry (e.g. a ferry operator).
- Trust Ports being 'independent statutory corporations, governed by their own unique local legislation and controlled by an independent board⁸. A key feature of trust ports is that they do not distribute profits to investors: instead they are recycled for the benefit of the port. Often non-financial objectives of the port and its stakeholders can be prioritised over profit generation, for example by investment in infrastructure with limited return potential or by setting charges below the level which would maximise profits.
- Municipal Ports being those ports operated by a local authority and therefore subject to local government rules and financing requirements. Ports accounts can be 'assured', that is protected from having surplus funds or receipts from assets sales transferred to other parts of the local authority not connected with the port. However, this is not the case everywhere and in some locations any surplus can be used to contribute to the local authority's budgets. It is clear that the autonomy provided to an individual port can vary significantly from being under direct control, to being more akin to a trust.

Ports provide both AtoNs, port information, pilotage service and vessel traffic services that are dependent upon VHF voice and data communications as well as,

⁸ Price Waterhouse Coopers for the Department for Transport, Trust Port Advice, Final Report, 18 May 2007

in some instances, AIS. In maintaining a navigable waterway a number of ports also utilise other spectrum utilising technologies such as DGPS data-links. The extent of the deployment of the port infrastructure is not purely driven by traffic. Instead it is a function of a number of factors including traffic density, complexity of the port environment (e.g. hazards, number and location of berths, etc.), the geographic scope of the ports responsibilities as well as other factors related to navigational safety.



Source: Ofcom licences, DfT port statistics, Helios analysis

Figure 3-6: Port radio assignments vs. port tonnage handled

Figure 3-6 shows the number of VHF radio assignments held by the UK's 10 largest ports (on the basis of tonnage) in 2007. The figures include the assignments to the port and harbour authority that in most cases includes those used by the local VTS service. It is clear that there is no direct correlation between being busy and the levels of infrastructure required. Figure 3-7 illustrates the total assignments held by each port in the UK on the basis of vessel movements. This figure reinforces the fact that it is local specifics rather than traffic levels alone that drive spectrum requirements. Other factors such as port layout, geographic area covered and proximity of other ports can have a much more significant impact, see for example the Port of London case study. This could result in the costs of AIP falling upon a port being a consequence of geography and location rather than any commercial or traffic related concerns.

Allocations held vs. movements



Source: Ofcom licences, DfT port statistics, Helios analysis

Figure 3-7: Assignments held vs. vessel movements for all ports

On occasion a harbour authority may provide these services on behalf of a number of ports and/or docks in a given area – for example the Harwich Haven Authority that serves the Port of Harwich, Felixstowe and ABP Ipswich. VTS provision can range from a purely informational service⁹ through a traffic organisation¹⁰ service to direct navigational assistance¹¹. Only the larger port and harbour authorities such as Harwich, Humber, London, Southampton and Shetland provide a navigation assistance service. The complexity of the infrastructure increases significantly under a navigation assistance service as a surveillance picture must be provided to the port authorities.

In two cases, Southampton and Severn, local ports provide coastal VTS on behalf of the MCA. In the case of Southampton, ABP Southampton operate the Solent VTS out to the Eastern Solent. Vessels en-route to Southampton, Portsmouth, Cowes, Fawley, Gosport, Langstone and Chichester will avail themselves of this VTS. However, under the terms of the agreement with the MCA the costs of this service are recovered solely from vessels berthing at Southampton. Similarly ABP South Wales provides the Severn VTS for vessels travelling to and from Barry, Swansea, Port Talbot, Cardiff and Newport. However, in this case ABP provides

⁹ Defined by IMO as 'a service to ensure that essential information becomes available in time for onboard navigational decision-making'. May include for example : Reports on the position, identity and intentions of other traffic; Waterway conditions; Weather; Navigational hazards.

¹⁰ Defined by IMO as 'a service to prevent the development of dangerous maritime traffic situations and to provide for the safe and efficient movement of vessel traffic within the VTS Area.' Includes for example : Forward planning of vessel movements; Congestion and dangerous situations; The movement of special transports; Traffic clearance systems; VTS sailing plans; Routes to be followed; Adherence to governing rules and regulations.

¹¹ Defined by IMO as 'a service to assist on-board navigational decision-making and to monitor its effects, especially in difficult navigational or meteorological circumstance or in case of defect or deficiencies.' This is a service that is intended to assist in the navigational decision making process on board and to monitor its effects.

services at all of these ports, so the VTS costs can be recovered from most participating vessels.

Ports typically provide a range of services to visiting vessels and as a consequence levy a variety of charges upon them. Charges can vary substantially from port to port depending upon the nature of the vessels that visit as well as on the services provided. Typically - at the larger ports - the costs associated with maintaining a navigable waterway including maintenance of up-to-date charts, the provision of aids to navigation and vessel traffic services will be passed to vessels through harbour conservancy dues. This charge is set on the basis of gross tonnage, but there is no standard and charges can be varied by vessel type, purpose and on the basis of other attributes such as vessel length.

Radio licensing costs typically relate to the AtoN infrastructure, port information and to VTS, therefore the AIP costs will form an element of the conservancy charge. In addition, pilotage services are generally charged separately to conservancy charges and AIP costs will be incurred here too (see section on pilots below). Typical charges for various container vessels at a number of ports are illustrated in Table 3-6 below. Port traffic statistics are presented in Annex B.

Port	Harwich Haven	Southampton	Aberdeen
Туре	Trust	Commercial	Trust
Applicability	All vessels over 50 GT	All merchant vessels	All vessels
Conservancy charges	Banded from	16p per GT (UK)	23p to 37p
	1.73p to 13.41p per GT	25p per GT (foreign)	depending upon type and purpose
Example 10,000 GT vessel	£202	£1,600	£370
Example 25,000GT vessel	£2,855	£6,250	£9,250
Example 117,000GT vessel	£15,093	£29,250	£43,290

Table 3-6:Example conservancy dues at a number of ports

All port dues are paid by the vessels master upon arrival and typically cover both arrival and departure.

Other typical sources of income to ports include:

- pilotage dues, for the provision of pilots to aid safe navigation through the harbour environment,
- berthage dues and/or rent, for the provision of a secure berth and access to/from it,
- wharfage dues, for the loading/unloading of cargo. Sometimes separate charges are made for craneage and also rental charges can be levied on stored goods,
- passenger dues, associated with the provision of facilities for passenger ferries,
- towage charges, for the provision of tugs to move or tow a vessel,

• waste disposal charges and the sale of water.

Ports and harbours are free to establish whatever level of charging is appropriate for their given customer base as well as for their scale and scope of operations. In the case of Trust Ports the total income from all sources is capped so as not to make a profit in the longer term. They can therefore set charges that do not necessarily maximise profits.

A decision by the Office for National Statistics (ONS) in 2001 resulted in the new borrowings of the seven largest trust ports¹² being accounted for within DfT's budget. Each of these ports have since applied for Harbour Revision Orders (HROs) that would remove certain controls that DfT has over them with the result that they would cease to be classified as Public Corporations. To date only the Port of London Authority's HRO has been granted. The other six remain outstanding. Hence, borrowing within these six ports falls is subject to Government rules on public sector borrowing. This may influence the investments made by these ports.

There are various reasons why a shipping company would choose one port over another beyond purely the cost element including port facilities, proximity to market, etc. Within the UK ports compete for traffic with each other subject to appropriate facilities and proximity to the cargo's destination, but in the South and South East ports also compete with the continent. There are a number of factors driving this competition including the cost effectiveness of transporting containers by road to/from Europe as well as the growth in the transhipping market whereby the contents of large container vessels are offloaded and redistributed onto smaller vessels for direct transport to a port near their destination. Shipping agents will take into account the cost differential between shipping directly to a UK port, as opposed to shipping to a port on the continent and then transhipping to the UK destination (and vice versa). This produces a greater competitive effect in the south-east of the UK where there is close proximity to continental Europe (particularly between container ports such as Felixstowe-Southampton and Rotterdam). The effect can be seen through the tiered charges that some ports offer to make UK based transhipment more attractive (see for example the Port of Southampton).

¹² Dover, Harwich, Milford Haven, Poole, Shoreham, London and Tyne.

Marinas – Current Assignments				
Coastal Station Radio (International)				
	Simplex	9		
	Duplex	5		
Coastal Station Radio (UK)				
	Simplex	8		
	Duplex	3		
Coastal Station Radio (Marina)				
	Simplex	261		
	Duplex	130		

Source: Ofcom licences

Table 3-7:Assignments held by Marinas

There are in excess of 100 dedicated commercial marina operators around the country excluding those operated by yacht clubs. These organisations are predominantly commercial operations. The vast majority of which utilise a single set of 3 CSR (Marina) channels. There are however four larger companies who specialise in the operation of marinas: Premier Marinas, Quay Marinas, Marina Developments Ltd and Dean & Reddyhoff Ltd. Between them they hold more than 20% of all assignments.

Marinas typically provide boat owners with a wide range of services including berths, fuel, power, telephone and Internet communications, maintenance, water and many more. All marinas charge a fee for berthage that, depending upon location, may incorporate some of the other services. Often the add-on services are charged on a usage basis.

Berthage fees are usually levied on the basis of the size of the vessel and duration of stay although discounts are often provided for regular users. Fixed annual rates are also common for vessels for whom the marina represents a home base.

As an example, Premier Marinas operate eight south coast marinas. Daily berthing rates are some £2.65 per metre of vessel length. Annual berths cost between £5,900 and £12,400 for a 20 metre vessel depending upon the marina chosen and between £2,150 and £3,800 for a 7.5 metre vessel. At Brighton alone there are 1,600 berth holders. To operate these marinas Premier have 8 CSR (Marina) licences with 3 assignments each, 4 CSR (International) assignments and 3 CSR (UK) assignments.

For a typical operation with a single CSR (Marina) licence providing duplex Channel 80 for marina operations, together with two simplex channels M and M2 a marina is charged £75 per annum. These three channels are known as shared marina channels, they are uncoordinated and no protection is afforded between the transmissions from other marinas even if there are many in the vicinity. There is little opportunity for efficiency gains in an individual CSR (Marina) licence unless it becomes more affordable to request a single assignment from within the licence. Ofcom asked us to assume that there would be no changes to the current administrative fees for these channels.

3.6 Inland Waterways

Inland Waterways – Current Assignments				
Coastal Station Radio (Inte	rnational)			
	Simplex	62		
	Duplex	2		
Coastal Station Radio (UK)				
	Simplex	3		
	Duplex	3		
Coastal Station Radio (Marina)				
	Simplex	10		
	Duplex	5		

Source: Ofcom licences

Table 3-8:Assignments held by Inland Waterways

A number of organisations utilise radio spectrum whilst providing services and managing infrastructure on the UK's inland waterways.

British Waterways is the largest user in their operation of many of the UK's canals and non-tidal rivers. British Waterways is a public corporation responsible to the UK and Scottish Governments to maintain and manage the waterways. They receive an annual grant from Department for Environment, Food & Rural Affairs in England and Wales, and in Scotland, from Minister of Transport, Infrastructure and Climate Change. In 2006/07 this grant accounted for approximately 30% of operational costs. The balance is funded by commercial income (property rents and boat licences) with the remainder from third party contributions to works from e.g. local authorities, businesses and house boat owners. The organisation made a small loss in 2006/07.

Leisure boat fees range from around £200 p.a. to £800 p.a. depending upon boat size, geographic scope of the licence and payment terms. Various discounts are available and shorter duration licences are possible for the infrequent user. Commercial licences range from around £350 to in excess of £2,300 depending upon vessel size, purpose and geographic scope. In the 2007/08 British Waterways had a total of 32,566 licences issued in England and Wales producing an average per licence revenue of £398, with a further 565 licenses in Scotland producing average per licence revenues of £112.

Other organisations using radio spectrum in the inland waterways include statutory bodies such as the Broads Authority as well as a number of local authorities together with Transport for London and the Environment Agency who use VHF communications for bridge, lock and barrier control purposes. None of these organisations seeks to recover costs from maritime operators.

3.7 Sailing clubs and training establishments

Sailing Clubs and Sail Training – Current Assignments				
Coastal Station Radio (Inter	rnational)			
	Simplex	7		
	Duplex	1		
Coastal Station Radio (UK)				
	Simplex	22		
	Duplex	5		
Coastal Station Radio (Marina)				
	Simplex	417		
	Duplex	200		
Class Training 198				
Source: Ofcom licences				

Table 3-9: Assignments held by Sailing Clubs and Sail Training

There are a large number of sailing clubs and sail training establishments around the country. Many of these clubs hold CSR (Marina) licences. The licence covers communications concerning the movement and berthing of pleasure craft and the control of races. The licence may also allow a number of associated hand held VHF radio sets to operate on the channels e.g. at the slipway, or quayside. However, if these radios have access to other international maritime channels, then it will be necessary to obtain a Ship Portable Radio licence set.

The use of the channels within a CSR (Marina) licence varies; if the club also operates a marina then Channel 80 will typically be used for marina operations and management. Most clubs use one of the other channels M and M2 to support – typically safety related - communications during club racing and training events. Two channels may be used if multiple events are on-going, or else if two clubs in close proximity agree to use particular channels to avoid interference. CSR (Marina) assignments are unprotected and not coordinated. Hence, there could be many users of the same channel in the local area.

Most clubs are affiliated to the Royal Yachting Association (RYA) and offer RYA approved training for people of all ages. This training includes maritime radio training, hence the large number of class training licences held by clubs. Many clubs also offer RYA Sailability facilities for encouraging disabled sailors to take part in sailing events.

Sailing clubs are typically funded by membership subscriptions. They may also have various other sources of income such as fees on training courses, marina operations as well as hospitality services in their clubhouses.

3.8 Industry

Industry – Current Assignments			
Automatic Identification Sys	tem	33	
Coastal Station Radio (Interr	national)		
	Simplex	184	
	Duplex	19	
Coastal Station Radio (UK)			
	Simplex	255	
	Duplex	106	
Coastal Station Radio (Marina)			
	Simplex	22	
	Duplex	11	
Equipment Supplier		81	
Source: Ofcom licences			

Table 3-10:Assignments held by Industry

There is a broad array of industrial users of VHF technology in the maritime environment. These users include amongst others:

- Offshore renewables, oil & gas exploration and production,
- Docks, berths, terminals and boatyards,
- Shipping agents,
- Military ranges,
- Fishing organisations,
- Commercial research and development organisations,
- Equipment and boat supply companies.

The category is dominated by the offshore energy industry who are heavy users of the VHF radio spectrum.



Figure 3-8: Organisation types within industry category

All of these commercial operators utilise the spectrum primarily for voice communications. The oil & gas industry also deploys a number of AIS beacons for the purposes of navigational safety in the vicinity of offshore platforms. Currently 9 AIS stations are deployed on platforms in the North Sea, 8 by BP and 1 by NPower.

The offshore industry makes use of a small number of CSR (International) simplex allocations – located on 3 platforms belonging to Shell. Each platform in the group has the same two channels. Much wider use is made of CSR (UK) channels, both simplex and duplex.





Figure 3-9 above illustrates that where particular offshore operators run a field of platforms in vicinity of each other it is possible that the CSR(UK) allocations will be shared between that operators platforms. Clearly there are a significant number of platforms for which no significant channel planning takes place. However about a quarter of platforms are within a group that share a number of simplex and/or duplex channels on a collective basis. In the extreme case a field of 18 platforms belonging to the same operator share the same 3 simplex channels. There would appear to be no sharing of allocations between operators.

Overall, the industrial users of the radio spectrum recover the costs of radio licensing through their normal commercial activities.

Shipping Companies – Current Assignments				
Coastal Station Radio (International)				
	Simplex	33		
	Duplex	12		
Coastal Station Radio (UK)				
	Simplex	109		
	Duplex	44		
Coastal Station Radio (Marina)				
	Simplex	8		
	Duplex	3		

3.9 Shipping companies

Source: Ofcom licences

Table 3-11: Assignments held by Shipping Companies

In addition to being the customers for many of the maritime organisations outlined in this report, shipping companies are also a user of the VHF radio spectrum and as such hold a number of CSR licences proposed to be subject to AIP. Such shipping companies include international operators, coastal and port ferry services, tugs as well as services on inland waterways. The frequencies are used predominantly for business operations necessitating shore-to-ship communication.

These companies are commercial concerns of varying sizes ranging from large ferry operators such as Stena and Caledonian MacBrayne through to pleasure cruise companies with only one or two vessels.

3.10 Commercial Pilots

Commercial Pilots – Current Assignments	
Coastal Station Radio (International)	21
Coastal Station Radio (UK) duplex	2
Source: Ofcom licences	

Table 3-12: Assignments held by Commercial Pilots
Pilotage services are provided to vessels in ports around the UK. Depending upon the location pilotage may be compulsory. Pilots board arriving vessels at sea, and departing vessels in port and together with the bridge crew ensure safe passage through the port and harbour environment. Pilot organisations can be both a part of the local port company or authority, or may be private commercial organisations as is the case with this category.

The costs associated with pilotage services are passed on directly to those vessels that utilise the service. Exemptions from pilots are available for masters who frequently visit a particular port. In order to achieve such an exception the master must be certificated and the pilot services receive payment for this process. Pilotage charges typically vary on the basis of vessel gross tonnage¹³.

3.11 Search and Rescue

Search and Rescue – Current Assignments				
Coastal Station Radio (International)				
	Simplex	28		
	Duplex	1		
Coastal Station Radio (UK)				
	Simplex	152		
	Duplex	71		
Coastal Station Radio (Marina)				
	Simplex	10		
	Duplex	5		
Source: Ofcom licences				

Table 3-13: Assignments held by Search and Rescue organisations

There are a wide range of organisations engaged in both land and sea search and rescue throughout the UK. The majority of these organisations do not receive from central government despite their essential role in public safety and depend entirely on donations from the public. The larger national operators include the Royal National Lifeboat Institute and the National Coastwatch Institution who between them hold 72% of all of the assignments to search and rescue organisations.

S&R activities that utilise the VHF spectrum are wide ranging and include:

- Maritime search and rescue (inshore and offshore)
- Coastal (e.g. cliff and beach) search and rescue
- Beach lifeguards
- Mountain rescue
- Dog rescue teams
- Dive teams

¹³ For example per visit charges at Harwich range between £340-£1335, at Portsmouth between £211-£1056 and at Sullom Voe 4p per gross tonne with a minimum charge of £86.

The organisations providing these services are a diverse mix of charities, clubs, emergency services and local authorities. The majority of S&R organisations hold few or single VHF assignments. Notable exceptions are the RNLI who are a significant user of the radio spectrum and the National Coastwatch Institution

3.12 Other users

Current Assignments	Research Institutes	Charities	Government	Individuals, Societies & Club	Outdoor Sport Centres
Automatic Identification System	3	-	-	-	-
Coastal Station Radio (International)					
Simplex	1	-	9	-	-
Duplex	-	1	3	-	-
Coastal Station Radio (UK)					
Simplex	2	9	8	6	16
Duplex	-	-	4	2	1
Coastal Station Radio (Marina)					
Simplex	-	4	2	12	20
Duplex	-	2	1	7	9

Source: Ofcom licences

Table 3-14:Assignments held by other users

There are various other small scale users of the VHF spectrum in the maritime domain such as:

- Scientific research institutes undertaking maritime and marine environment research work primarily for academic purposes.
- Individuals, societies and clubs such as angling clubs and water sport clubs who undertake waterborne recreational activities typically funded by the membership.
- Governmental users ranging from the MoD who have assignments for marine range control, through local government (e.g. port health or fisheries departments) to local police ports units.
- Miscellaneous charities such as the Princes Trust and Sea Cadets who are encouraging young people to partake in recreational activities on the water to various ends.

4 Case Studies

4.1 Introduction

Below are presented a number of specific case studies relating to the maritime industry.

4.2 Port of London Authority

The Port of London Authority (PLA) is a large self-financing trust port authority concerned with the movement of vessels on the tidal Thames. It provides: pilotage services, VTS services along the river and out into the estuary, harbour patrols, marine services (salvage, diving, etc.), undertakes hydrographic surveys and dredging. It receives its income from conservancy charges, pilotage dues, river works licensing and rents for facilities in, under or over the river.

In 2007 the Port of London had a turnover of £40.7M and made an operating profit of £198,000 compared with a profit of £1.79M the previous year. The PLA employs approximately 350 staff in conduct of its operations. The port also has a share in a joint venture company Estuary Services Ltd that provides a boarding and landing service for pilots joining and leaving ships trading to London and Medway ports.

In support of its operations the PLA deploys a complex VTS system underpinned by a significant AIS, radar surveillance and VHF communications infrastructure. The PLA's port control centre uses the largest vessel control system in the UK to manage over 30,000 commercial vessel movements within the port each year. An additional 200,000 leisure craft movements a year are also monitored.

The driver for the scope and scale of the infrastructure is predominantly the large geographic area covered by the PLA, together with the built up environment around the Thames that drives the need for multiple stations to ensure total river coverage. The surveillance infrastructure has been developed in support of port safety and is deemed necessary to ensure safe movement of vessels along the river in all weather conditions. The VHF communications infrastructure has been designed to offer redundant coverage along the river to ensure the continuity of VTS operations in the event of the loss of a single station.

5 AIS base stations are deployed along with 15 radars to provide a full surveillance picture with correlated AIS and radar from the estuary to Greenwich with AIS coverage to Teddington Lock. 27 simplex Coastal Station Radio (International) transceivers on 8 channels, and 3 duplex Coastal Station Radio (International) transceivers on 2 channels are deployed in support of port operations including VTS channels and various docks and piers and 3 simplex Coastal Station Radio (UK) channels are used, 1 for trials and 2 for communication with PLA vessels. Furthermore, 2 VHF DGPS datalinks are also used for port survey and hydrography.

No additional installation of AIS stations are envisaged, unless developments within London and down the estuary, through the Government's Thames Gateway development impact on the services employed. The same is true for VHF.

The PLA charge maritime users for the costs associated with their communication, navigation and surveillance infrastructure through conservancy charges. Conservancy charges are levied upon all vessels operating in the Thames Estuary to/from London and the Medway ports on the basis of tonnage. Further charges are levied upon vessels loading or unloading within the port limits on the basis of

tonnage and type. Finally, specific charges are levied upon each tonne of cargo and vary depending upon the type of cargo such as trailers, containers, oils, etc¹⁴.

On the basis of currently held licences shown in Ofcom's database, upon renewal the total licence fee for the Port of London Authorities VHF allocations would be \pounds 3,640. Under the proposed AIP scheme we estimate their annual licence fees to be \pounds 12,370. Eight of the CSR(Int) allocations held by PLA would not be charged for.

	Current Fees	AIP Fees	Delta	% Increase
VHF allocations	£3,640	£12,370	£8,740	240%

Table 4-1:Fees payable by the PLA

The initial implementation of AIP charging on VHF channels would increase the PLA's licensing costs by some £8,740. This constitutes less than 0.1% of conservancy dues received in 2007. If passed directly onto maritime customers in 2007 without being offset by any other internal efficiencies it would have represented an average conservancy dues increase of £0.41¹⁵ per commercial vessel movement, which in the PLA's case would be spread reasonably evenly across conservancy charges on vessels and cargo.

The following Table provides a sense of perspective on a conservancy dues increase per vessel due to AIP in relation to other port related costs for a typical 5,500 tonne vessel calling at a UK deep sea container port.¹⁶

Port cost item	
Port charges on vessel	£2,500
Cost of vessel (estimate for 1 day)	£28,000
Port chargers on cargo	£2,500
Stevedoring (1,100 moves)	£88,300
Light dues	£12,000
Total	£133,300

Table 4-2:Make up of PLA conservancy fees

It is apparent that due to the relatively small proportion that port costs constitute, even a large increase in their level is unlikely to significantly impact the overall costs incurred by the vessel operator. It should however be noted that in this scenario the light dues could also increase due to AIP, so the cost impact would be greater than that due to port costs alone. However, it is reasonably safe to say that the economic impact of AIP charges on the VHF spectrum would be largely insignificant.

¹⁴ Port of London Authority Schedule of Charges, <u>http://www.pla.co.uk/pdfs/pp/6612.pdf</u>

¹⁵ For information the average per movement conservancy charge paid to the Port of London in 2007 was £1,350.

¹⁶ Amended from MDS and LTZ. 2004. Study of effect of light dues. Report for Department of Transport.

http://www.dft.gov.uk/pgr/shippingports/ports/coll_studyofeconomiceffectofligh/studyof

The VTS provided by the PLA in the Thames estuary also benefit vessels operating to/from the Medway Ports. As such these ports also contribute toward the costs of the VTS operation in the estuary. An impact of AIP charge increases will be for the PLA to effectively increase the costs to vessels operating to the Medway Ports too. This has not been reflected in the estimates shown above.

4.3 The Gosport and Fareham Inshore Rescue Service

The Gosport and Fareham Inshore Rescue Service (GAFIRS¹⁷) is a small search and rescue operation based in Hampshire. The service operates three rescue boats in addition to a canoe section and two vehicles. GAFIRS provides free maritime rescue cover in the Solent, along the coast from Portsmouth Harbour to Titchfield Haven. Furthermore, the service is also available to respond to inland emergencies such as rescuing people trapped by floods. In recent years the service has averaged 109¹⁸ calls per year for GAFIRS assistance in rescues.

All GAFIRS lifeboat crews are volunteers and the organisation has no funded employees, all those involved do so purely on a voluntary basis. The crews are on call with the MCA around the clock.

GAFIRS is established as a limited company, but is also a registered charity. It also operates training activities to teach its own lifeboat crews and as a fully approved RYA Training Centre, undertakes training of local Fire Officers, yachtsmen, Scuba divers and fishermen. All donations to the service go directly to funding operating costs and future investment.

GAFIRS state that their annual fundraising income must reach some £35,000¹⁹ to cover short term operating costs. Furthermore, this does not include capital projects, such as fund raising for a new lifeboat (estimated at £150,000) or the replacement of equipment.

The organisation holds 2 radio licences, one for a simplex Coastal Station Radio (UK) VHF channel used for shore-ship communication with the lifeboats (call-sign 'Gosport Rescue'), the other for a radar used together with an AIS display to develop a surveillance picture of the Eastern Solent.

Currently the annual GAFIR VHF licence fees amount to £90 (£180 for the VHF channel but with a 50% discount for a charity).

For the purposes of establishing the AIP charges for the VHF CSR (UK) channel, Gosport is located in a 'low density' zone and the transmitter is classed as 'medium coverage'. This implies an annual fee of £80.

Under the proposed AIP charging scheme, GAFIRS as a registered charity with the safety of human life as their primary objective will continue to be entitled to a 50% discount on fees. Therefore, on this basis the cost of the CSR (UK) licence would be £40 (a £50 or 55% decrease).

GAFIRS also receives an annual grant of the order of £2,000 from the Solent Sea Rescue Organisation a part of Hampshire County Council established to coordinate the 8 independent search and rescue organisations at work in the

¹⁷ http://www.gafirs.org.uk

¹⁸ Annual Report 2007, GAFIRS.

¹⁹ Ibid, at 17

Solent. SSRO also holds licences for 9 CSR (UK) channels that it allows the SAR organisations to utilise. Under AIP the cost of licences to SSRO is also likely to decrease, therefore there is unlikely to be any negative impact of AIP a reduction in this grant to GAFIRS.

4.4 Aberdeen Harbour Board

Aberdeen Harbour is managed by the AHB and is a trust port. In 2007 the port handled 8,481 vessel arrivals and a record 5.13million tonnes of imports and exports. The marked trend for larger ships to call was ongoing, adding up to 24.02 million gross tonnes. In 2007 the turnover of the port was £20.9M with £6.6M retained profit (up from £6M the preceding year). The board employs 117 staff.

In providing port operations and VTS (traffic organisation and information services) the AHB utilises two simplex Coastal Station Radio (International) VHF channels. The annual licensing costs are therefore £200.

Under the proposed AIP charging scheme, Aberdeen is located in a "medium density area". Therefore the potential VHF AIP licensing costs will represent £200 each (assuming a high coverage service) making a total of £400. This constitutes a £200 or 200% increase.

4.5 Portsmouth Commercial Port

Portsmouth Commercial Port is a Municipal Port located in Hampshire owned in its entirety by Portsmouth City Council. It is mainly a specialist freight (fruit) and passenger ferry port providing connections to France, Spain and the Channel Islands. It is run by a small port authority of around 100 direct employees. In 2007 the port had a turnover of £19.3M and returned a surplus of £6.6M to the city council that was used predominantly to offset council tax charges.

Portsmouth Port currently operates four simplex Coastal Station Radio (International) assignments under one licence. Current licensing costs are therefore £400 per annum.

Under the proposed AIP charging scheme Portsmouth Municipal Port is in a 'high density' zone. The CSR (International) transmitters are categorised as high coverage, therefore the per licence cost under AIP will be £500 per station. One of the allocations held by Portsmouth Port is not charged for. The total licence fee will therefore be £1500, an £1100 or 275% increase in fees.

This AIP increase is very small in comparison to the achieved surplus and would translate to a totally insignificant figure on a per car, per passenger or per tonne of freight basis.

It should be noted that vessels approaching Portsmouth benefit from a Vessel Traffic Service provided by Southampton VTS on behalf of the MCA in the Solent. The costs of the related infrastructure and their AIP dues are only incurred by vessels that berth in the Port of Southampton itself. It could therefore be argued that Portsmouth traffic is benefitting from a service and infrastructure towards which it does not contribute. Additionally, with Portsmouth having a significant military presence the traffic into and out of the port is controlled by the Queens Harbour Master – effectively a Royal Navy position. As such an element of the port VTS cost is not charged to the commercial traffic.

4.6 Conclusions

The case studies have considered a range of maritime organisations - from the large to the small - and have assessed the impact of AIP upon them and their end users. In light of the proposed AIP charging scheme it would be expected that organisations in more heavily congested areas making use of CSR (UK) allocations would see the greatest increase in costs. In practice the results were as expected. In the most extreme of the case study organisations (the Port of London - holding a number of UK and International allocations) we have seen a near two and a half times increase in licence fees, in others a much smaller increase - or even a decrease - have been observed. There were no examples observed amongst the case study organisations of a rise due to AIP that would be likely to lead to a change in end customer behaviour or else to substantive fiscal challenges.

5 Economic Analysis

5.1 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.

5.1.1 Impact spectrum demand

In relation to spectrum demand, in some areas demand is growing in the absence of AIP, for example, maritime 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.

5.1.2 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 maritime sector little information is available, although European price elasticity of demand estimates range from -1.1 for Le Havre to -4.4 for Bremen Ports.

However, the magnitude of final price increase involved with the application of AIP for VHF, assuming full pass through, is very modest In the maritime sector AIP on use of VHF can be compared to other port related costs. The conservancy dues increase due to AIP is extremely modest compared to estimated other port related costs for a typical 5,500 tonne vessel calling at a UK deep sea container port of £142,600 (including a cost of vessel estimate of £28,000 for one day). A negligible reallocation of maritime activity away from the UK is anticipated as a result (see Appendix for details).

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.

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. 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 efficiently 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 ports than they are of overall maritime 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"). 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%. 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.

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.
- 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 communicationsn). 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.



Quantity

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 maritime VHF communications, which in turn would raise the price of port services, which in

turn would raise the price of ferry services²⁰. 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. The reason for this is that where other inputs 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 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 spectrum²¹.

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*

²⁰ 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.

²¹ Indepen-Aegis. April 2007. "Aeronautical and maritime spectrum pricing." Appendix E. <u>http://www.ofcom.org.uk/research/radiocomms/reports/spectrumaip/aipreport.pdf</u>

aware of the informational issues in setting AIP and has a policy of setting AIP conservatively for that reason"²².

A.4 Contractual Issues

In a 2007 spectrum pricing study for Ofcom²³ 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. 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 2002²⁴, and might be expected to make contractual provision for the change, if they thought it material.

A.5 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 the 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 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 maritime 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.

²² <u>http://www.ofcom.org.uk/consult/condocs/futurepricing/statement/statement.pdf</u>

²³ Indepen-Aegis, April 2007, "Report on Radio Spectrum Administered Incentive Pricing for Aeronautical and Maritime sectors"

²⁴ Martin Cave. March 2002. "Review of radio spectrum management." <u>http://www.ofcom.org.uk/static/archive/ra/spectrum-review/2002review/1_whole_job.pdf</u>

 Changing the nature of end use, for example, utilising larger vessels which increase passengers, cargo and revenue per MHz.

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.

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.6 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 maritime fuel prices²⁵.

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.7 Final Demand Elasticities

A European study reports estimates suggesting that the price elasticity of demand varies considerably between ports with a range from -1.1 for Le Havre to -4.4 for Bremen Ports.²⁶

²⁶ Delft. December 2006. Greenhouse gas emissions for shipping and implementation guidance for maritime fuel sulphur directive. Table 41.

http://ec.europa.eu/environment/air/pdf/transport/final_report.pdf

In relation to maritime sector, there is also a possibility of substitution away from the UK. However, the estimated cost of AIP relative to other costs reported earlier in this report is very modest at around £129 per vessel on average for at the Port of London compared to total port costs including vessel costs for a 5,500 tonne vessel for one day of £142,600.

Further, the study of Lighthouse Dues for the Department of Transport concluded that the routing impacts of the abolition of light dues would be unlikely to be significant. Further, the magnitude of light dues (£71.6 million in 2002/03) is considerably greater than the likely magnitude of AIP applying to the maritime sector.

A.8 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.