Bespoke licence fees for aeronautical VHF communications frequencies

A statement

Statement

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Section 1

Summary

We have decided to implement bespoke fees broadly as we proposed in March this year

1.1 In this statement we are setting out our decision that fees for some aeronautical ground station licences should be derived on a bespoke basis which takes into account the service coverage and wider separation zone of each particular assignment. A proposal to make this change was set out in a consultation document which we published in March this year.

1.2 This approach is in contrast to the alternative “generic” methodology which underpinned the fees set out in a statement which we published on 14 December 2010. Under the generic approach the same fee, reflecting typical coverage of a particular licence type, is applied uniformly to all licences. Under bespoke pricing, licensees with a relatively small Designated Operational Coverage (DOC) and associated separation zone will pay less than licensees with relatively large DOCs.

We have decided to apply bespoke pricing to a wider range of service types than proposed

1.3 We proposed in March to apply bespoke pricing only to licences for frequencies used to support Air Ground, Aerodrome Flight Information Service, Tower, Approach and Automated Terminal Information Service. We selected these service types as coverage varies widely between assignments and fees which vary with coverage would provide incentives to reduce spectrum use where this is consistent with operational needs.

1.4 We noted that, in contrast, the coverage of frequency assignments used to support Area Control, VOLMET, VHF Data Links (VDL) and Aircraft Communications Addressing and Reporting System (ACARS) currently prevents any re-use of the frequency across the whole of the UK. Under the bespoke pricing proposals which we set out, all of these assignments would, therefore, attract the same bespoke fee. We therefore considered that there might be little value in notionally deriving fees on a bespoke basis. We acknowledged, however, that there may be a case for future proofing fees so that if sub national assignments of these service types became feasible, fees would reflect the variation. This latter view was supported by a number of stakeholders and we have decided to extend bespoke pricing principles also to Area Control, VOLMET, ACARS and VDL assignments.

1.5 We maintain the view that there would little value in attempting to apply bespoke pricing principles to other service types, including Operational Control (OPCs), Aerodrome Surface, Offshore assignments and Sporting frequencies as these are usually assigned on a very localised and/or non exclusive basis.

Fee increases will be phased in during the 5 years to May 2016

1.6 As proposed, we will phase in fee increases over the period to May 2016. During that time bespoke fees will be capped at the level of the equivalent generic fees set out in our statement published in December 2010. The first fee changes will be implemented from May 2012. Revised fees will apply from that date as and when

annual fees are payable for existing licences or new licences are granted. There will be no retrospective adjustment of fees already paid.

1.7 The overall impact of implementing bespoke fees instead of generic fees will be a reduction of about £450k per year in the fees payable by the aeronautical sector, when fees have been fully implemented in 2016. Over the medium term, we also anticipate that licensees will review their spectrum needs, reducing coverage where this is consistent with operational requirements. This is likely to reduce further the fees payable for the current population of assignments, while freeing up frequencies for assignments to support new uses within the sector.

Section 2

Introduction

The purpose of this statement

2.1 In this statement we are setting out our decision to revise the fees payable for certain aeronautical ground station radio licences issued under the Wireless Telegraphy Act 2006 (the "WT Act"). These relate to VHF communications frequencies typically used by aerodromes and providers of air traffic services. We are also making some administrative changes to the portfolio of licence products, so that these better align with the various kinds of aeronautical communications services.

Legislative framework for spectrum pricing

2.2 Ofcom has a general duty in Section 3 of the Communications Act 2003 to secure optimal use of the radio spectrum taking account of the interests of all who wish to access it.

2.3 Under section 13(2) of the WT Act, Ofcom may, if it thinks fit in the light of its duties under section 3 of the 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.

2.4 These enabling powers are exercisable by statutory instrument under section 12 of the WT Act.

2.5 In exercising these duties, as for all of its duties, Ofcom must, of course, fully respect international law relating to spectrum use and any other relevant matters.

Strategic framework for spectrum pricing

2.6 On 17 December 2010, we published the conclusions of a strategic review of spectrum pricing[1]. The document presented high level AIP principles and methodologies and as such, did not make specific fee proposals for individual licence sectors. We said that we would use the framework set out in that document as a guide to setting AIP fees and that it would inform how we develop AIP fee proposals in future, as well as how we will determine when a fee review is appropriate and how

[1] *SRSP: the revised framework for spectrum pricing*, published by Ofcom on 17 December 2010 at http://stakeholders.ofcom.org.uk/consultations/srsp/statement

we will undertake post-review evaluations. We believe the decision set out in the present statement, and the methodology used to determine fees, is fully consistent with the conclusions of the strategic review.

Background to this consultation exercise

2.7 In July 2008 we published an exploratory consultation document (the "July 2008 consultation")[2] which considered whether spectrum fees based on administered incentive pricing ("AIP") principles should be applied to aeronautical (and maritime) spectrum.

2.8 The purpose of applying AIP based fees is to highlight for licensees the costs associated with spectrum use, so that this can be taken into account in business planning. This facilitates improved decision making, by ensuring that the cost of spectrum is given appropriate weight alongside other costs when determining how operational needs can best be met. In turn, this will encourage more efficient use of spectrum, including investment in more efficient technologies in the long term. AIP based fees are applied to most WT Act licences.

2.9 A second, more detailed consultation document was published in December 2009 (the "December 2009 consultation")[3] and included detailed proposals for specific fees.

2.10 In December 2010 we published a statement (the "December 2010 statement") [4] in which we announced that we had decided to apply spectrum fees based on AIP principles to most types of aeronautical ground station VHF communications services. We set out the revised fee to apply to each class of licence and a timetable for phasing in fee changes gradually during the period to May 2016. However, responding to stakeholder comment, we said we would consult further on whether fees for some service types should vary between assignments, reflecting individual variations in the service coverage and surrounding separation zone deployed to prevent radio interference. We noted that bespoke fees might provide incentives for licensees to minimise their service coverage, thereby freeing up spectrum potentially for other users. These "bespoke" fees would be in contrast to the "generic" fees set out in the statement which would be common to all assignments of a particular type.

2.11 We published in March 2011 the further consultation (the "March 2011 consultation")[5] proposing algorithms for determining fees on a bespoke basis in some instances. In the present statement we are responding to stakeholder comments and setting out our conclusions.

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[2] *Applying spectrum pricing to the maritime and aeronautical sectors,* published by Ofcom on 8 July 2008 at http://stakeholders.ofcom.org.uk/consultahttp://stakeholders.ofcom.org.uk/consultations/bespoke-fees-aeronautical/tions/aip/

[3] *Applying spectrum pricing to the aeronautical sector,* published by Ofcom on 21 December 2009 at http://stakeholders.ofcom.org.uk/consultations/spectrum_pricing/

[4] *Fees for aeronautical radio licences,* published by Ofcom on 14 December 2010 at http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum_pricing/statement/statement.pdf

[5] *Bespoke licence fees for aeronautical VHF communications frequencies – A further consultation,* published by Ofcom on 10 March 2011 at http://stakeholders.ofcom.org.uk/consultations/bespoke-fees-aeronautical/

Next steps

2.12 We will publish towards the end of this year draft fee regulations setting out both the bespoke fees discussed in the present statement and those of the generic fees which will apply to the remainder of aeronautical ground station service types as discussed in the December 2010 statement. We will allow one month for interested parties to comment on whether the draft fee regulations accurately reflect the policy decisions taken, before formalising the new regulations. These will take the form of a statutory instrument.

Section 3

Summary of responses

Overview

3.1 Written responses to the March 2011 consultation were received from 10 stakeholders. These were the CAA, NATS, the Airport Operators Association, the Light Aircraft Association, Manchester Airports Group, Infratil Airports Europe, the International Air Transport Association, the British Gliding Association, the WLS Flying Group and Mr A Rolfe.

Responses to specific questions asked in the consultation document

3.2 In the following paragraphs we summarise responses to the specific questions asked in the consultation document and provide a summary of Ofcom's view.

Question 1
We propose to derive fees for Air/Ground, Aerodrome Flight Information Service, Tower, Approach and ATIS assignments on a bespoke approach, under which fees would reflect the geographic impact of each individual assignment. What is your view of the merits of this approach compared with the alternative generic fees approach set out in the December 2010 statement?. Do you take the same view about all of these service types?

3.3 NATS welcomed the more granular fee structure represented by bespoke pricing, noting that such fees would be of benefit and go some way towards providing an incentive for licensees to consider their use of these spectrum bands.

3.4 The Airport Operators Association expressed the view that bespoke pricing is a more just methodology than the generic pricing structure originally proposed. The Association said it would support the application of bespoke pricing, in place of generic pricing, as the methodology recognises that fee reductions should apply where an airport sterilises only a limited area.

3.5 Manchester Airports Group considered the bespoke proposals fairer than the generic fees, noting that bespoke fees are better aligned with what is possible and desirable in terms of efficient use of spectrum.

3.6 Infratil Airports Europe supported the introduction of bespoke fees, noting their view that it is equitable that localised services should attract a smaller fee than UK-wide services.

3.7 The Light Aircraft Association stated that it had no objections to the proposed change to bespoke pricing.

3.8 IATA observed that bespoke fees are a means whereby smaller airports and operations do not pay fees equivalent to larger airports, but considered that incentives to reduce Designated Operational Coverage ("DOC") can present safety concerns.

3.9 The CAA agreed that bespoke fees are an improvement on generic fees, noting that they go some way to addressing the potential for "unintended consequences", although the CAA advised that the risk will still need to be monitored.

3.10 The response from the British Gliding Association stated that the Association had no view on this question, and the WLS Flying Group did not respond to this question.

3.11 Mr Rolfe said he was strongly against pricing but his response appeared to relate to the wider principle of AIP based fees rather than the specific issue of the relative merits of bespoke and generic pricing. Other stakeholders also reiterated their opposition to the wider principle of AIP based fees, but acknowledged that the decision to apply AIP fees had already been announced in the December 2010 statement. We have focussed, therefore, on stakeholders' views on the relative merits of bespoke and generic pricing.

Ofcom's response

3.12 In view of the broad support from those who commented on the relative merits of bespoke and generic pricing, we have decided to implement fees for these five service types on a bespoke basis. We agree with the CAA that it will be important to monitor the impact of these changes on the way users plan and operate these service types, including, as IATA recommends, any impacts on safety.

3.13 The generic fees set out in the December 2010 statement, in respect of Air/Ground, Aerodrome Flight Information Service, Tower, Approach and ATIS, will not, therefore, be implemented. We will apply the bespoke pricing algorithms set out in the present statement instead.

Question 2
Where an assignments prevents re-use of a frequency across an area which is larger than the area of the UK land mass, it appears to make little difference to potential alternative UK users whether the affected area is only marginally greater or is several times greater than the area of the UK land mass. Do you take a different view? Are there any reasons why very large service areas and associated separation zones do have greater impact on the availability of frequencies than assignments which impact a smaller area equivalent only to the size of the UK land mass? If so, please provide a full explanation of how this effect operates.

3.14 NATS agreed with the proposition that very wide area assignments, which sterilise areas many times greater than the UK land mass, do not have a greater impact on other potential UK spectrum users than do smaller assignments which, nevertheless, prevent reuse across all of the UK.

3.15 The Airport Operators Association also agreed with this proposition, noting that it would resist any proposal to charge, for very wide area assignments, fees which are greater than those which would apply to an assignment which sterilises only the UK.

3.16 Infratil Airports Europe welcomed the proposed ceiling on fees, although observed that the question highlights the difficulty of applying fees on a stand-alone national basis where spectrum use has a transnational impact.

3.17 The Light Aircraft Association agreed that it makes little difference whether an assignment sterilises all of the UK or an area many times greater.

3.18 The Manchester Airports Group and the British Gliding Association stated that they had no view on this issue, and IATA, the CAA, WLS Flying Group and Mr Rolfe made no comment.

3.19 In the context of this question, NATS and Infratil Airports Europe both questioned the proposed methodology for treating sea areas when deriving fees. We explore these issues under Question 5 below.

Ofcom's response

3.20 As all stakeholders either actively supported or offered no objections to this approach, we will apply a ceiling of £9900 per 25 kHz channel. Frequency assignments with other bandwidths (typically 8.33 kHz and 50 kHz) will be subject to a fee ceiling in direct proportion to their bandwidth (ie £3300 per 8.33 kHz and £19800 per 50 kHz).

Question 3
We currently propose that there is little merit in notionally deriving fees for Area Control, ACARS, VOLMET and VDL assignments on a bespoke basis when fees will rarely, if ever, be other than £9900. However, we recognise that there may be merit in applying a bespoke approach to fee setting so that, if assignments are ever made which impact an area smaller than the area of the UK land mass, fees would be reduced proportionately. In your view, would a bespoke approach to fee setting for these service types have any practical value now or the near term?

3.21 In NATS' view bespoke pricing should, in principle, apply to all exclusive assignments. NATS specifically proposed that bespoke pricing should be extended to VOLMET and Area Control assignments.

3.22 Manchester Airports Group, too, expressed a preference for wider application of bespoke fees, noting that more limited DOCs might become feasible in future, even if the norm today, for certain service types, is UK-wide assignments.

3.23 Infratil Airports Europe agreed on balance with the Ofcom proposition that there is little merit in notionally deriving fees on a bespoke basis if this has no impact on the fees actually payable.

3.24 The Light Aircraft Association, too, agreed with the view presented by Ofcom that bespoke fees are not appropriate for these other assignment types.

3.25 The Airport Operators Association reported that, as its members make only limited use of these service types, it had no strong view on the merits of extending bespoke pricing more widely.

3.26 Mr Rolfe stated his view that the proposal might put smaller operators out of business, but provided no explanation of that view.

3.27 The CAA, IATA, British Gliding Association and WLS Flying Group made no comment.

Ofcom's response

3.28 We note with interest NATS' view that a wider application of bespoke pricing would provide incentives at all levels of the industry to consider frequency use. As NATS is currently the sole licensee of Area Control and VOLMET assignments, we consider

that some weight should be given to NATS' view about the merits of applying bespoke pricing to these assignment types. We also note the view of Manchester Airports Group that there is merit, more widely, in future proofing the fees algorithm.

3.29 ARINC and SITA, the only two holders of assignments for ACARS and VDL did not respond to this consultation. We note, however, that the application of bespoke pricing to these assignments would have no adverse financial impact on these licensees as we intend that bespoke fees would be capped at £9900 per 25 kHz channel (equivalent to the generic fee of £19800 for 50 kHz VDL channels and £9900 per 25 kHz ACARS channel). Bespoke pricing could, potentially, result in a lower fees liability for these licensees if, as NATS implied in respect of Area Control and VOLMET assignments, assignment and operating practices were to change in future. Although one of the VDL frequencies is shared between these two service providers, we consider that assignment practices used with ACARS and VDL have more in common with Area Control and VOLMET assignments which are made on an exclusive basis than they do with frequencies used on a private commons basis for which, we have argued, bespoke pricing would not be feasible.

3.30 We have concluded that fees for Area Control, VOLMET, ACARS and VDL should be derived on a bespoke basis, subject to a cap of £9900 per 25 kHz assignment.

3.31 The algorithm to determine the level of the bespoke fees for these four service types will be the same as for other equivalent service types. As set out in paragraph 2.49 of the March 2011 consultation, VOLMET is a Broadcast service and we intend that the reuse distance, for the purpose of calculating fees for VOLMET assignments, should be determined using the methodology set out in that paragraph 2.49. We set out in paragraph 2.50 of the March consultation that Area Control, ACARS and VDL assignments are almost always associated with polygonal DOCs. We proposed that, if these assignment types were to be subject to bespoke pricing, the area of the polygonal DOC should be converted to a circle for the purpose of calculating the reuse distance. We confirm that we will apply that methodology to Area Control, ACARS and VDL assignments. All other factors will be as set out in the March 2011 consultation in respect of Broadcast or Area services as the service type dictates. Detailed algorithms for determining fees are set out in more detail in Section 4 of this statement.

3.32 ACARS and VDL assignments are generally subject to a separate licence covering the use of each frequency at each site. We intend to rationalise these licences so that, in future, each licensee will hold just one licence and one letter of assignment for each frequency. The DOC will be specified as encompassing all of the UK Flight Information Region (UK FIR), unless the licensee requests a more localised DOC. As the area of the UK FIR is so much more extensive than the 71k square nautical miles to which the reference fee of £9900 per 25 kHz channel applies, fees will be subject to the cap of £9900 per 25 kHz assignment as set out in paragraph 3.20 above.

3.33 The generic fees set out in the December 2010 statement in respect of Area Control, VOLMET, ACARS and VDL will be superseded by the bespoke pricing algorithms set out in the present statement.

Question 4
Would there be any merit in fees for other assignment types being derived on a bespoke basis? If so, which other service types should be subject to bespoke fee and how should these fees be derived?

3.34 No stakeholders proposed that other service types should attract bespoke fees.

Ofcom's response

3.35 We maintain our view that there would be little benefit in attempting to derive fees for OPCs, Aerodrome Surface, Offshore and Sporting assignments on a bespoke basis for the reasons set out in paragraphs 2.25 to 2.30 of the March 2011 consultation. These service types will attract the generic fees set out in the December 2010 statement.

Question 5
We are proposing to rely on ICAO's EUR Frequency Planning Manual when determining the size of the area in which one assignment prevents others from using the same frequency. For the purpose of setting fees, we propose not to take into account ICAO separation distance variables relating to adjacent channel use or bandwidth (although bandwidth will be reflected in fees as fees for 8.33 kHz and 50 kHz channels will be derived pro rata to fees for 25 kHz channels). We also propose to take into account the CAA's practice of applying, in the case of smaller DOCs, rules which ensure that an aircraft within one DOC cannot cause interference to the ground station of another. Are there other factors which should be taken into account when determining the size of the geographic area impacted by a particular assignment?

General views on question 5

3.36 With the exception of the specific issues referred to in paragraphs 3.44 to 3.65 below, the proposed pricing methodology was generally supported by those stakeholders which commented on this question.

3.37 The Airport Operators Association described the proposal as a pragmatic approach to determining assignment areas for the purpose of deriving fees.

3.38 Manchester Airports Group agreed that the proposals were suitably pragmatic, noting their limitations.

3.39 Infratil Airports Europe stated that it generally supported the reasoning provided, with exceptions as discussed below.

3.40 NATS was in broad agreement with the principle of relying on the ICAO EUR Frequency Planning Manual and also supported Ofcom's proposals that ICAO rules in relation to adjacent channel use and bandwidth should not be taken into account when determining reuse distance, although agreed that bandwidth should subsequently be taken into account when determining fees. NATS also supported the proposal that polygonal DOCs should be converted to circular DOCs of the same area for the purpose of deriving fees. NATS, however, questioned a number of points of detail and also the proposed treatment of sea areas as discussed below.

3.41 The Light Aircraft Association reported that it had identified no additional factors which should be taken into account when deriving prices. The British Gliding Association reported that they were unaware of any other factors, apart perhaps from anomalous propagation. Mr Rolfe proposed that account should be taken of the number of operators in the area concerned.

3.42 The CAA, IATA, and WLS Flying Group made no comment on this question.

3.43 We address a number of specific issues raised in relation to the proposed fee algorithms in the following paragraphs.

Inclusion of sea areas in fee derivation algorithms

3.44 Infratil Airports Europe questioned the apparently inconsistent approach to dealing with sea areas. Infratil observed that the proposed "reference area" of 71k square nautical miles, to which the proposed "reference rate" (£9900) would apply, appears to exclude sea area whereas Ofcom had proposed that sea areas sterilised should be priced.

3.45 NATS, too questioned the proposed treatment of sea areas, and proposed that the "amount of land mass" (distinct from sea areas) sterilised should be taken into account when determining fees. NATS, recommended, therefore that the location of the area sterilised should be reflected in fees, by determining how much of this is over the UK land mass. However, NATS stopped short of arguing explicitly that sterilised sea areas have no opportunity cost, noting that Ofcom had set out its reasons for considering that sea areas sterilised can have an associated opportunity cost.

3.46 Separately, in its introductory remarks, NATS observed that an alternative, less complex, methodology to mapping sterilised areas onto the landmass might involve comparison of the total area sterilised (including both land and sea areas) with the total area of the UK Flight Information Region ("UK FIR").

Ofcom's response

3.47 As was noted in paragraph 2.57 of the March 2011 consultation, sea areas often form an essential part of a service area and/or wider separation zone. As such, use of a sea area by one operator can have a practical impact on other potential spectrum users. For that reason, we maintain the view that the size of sea area sterilised should be taken into account when determining the fee payable.

3.48 In the December 2010 statement we concluded that the opportunity cost of aeronautical VHF communications frequencies should be assumed to be £9900 per 25 kHz channel where the assignment prevents reuse by any other UK based licensee. If there remains scope for others to use the frequency, a lower fee should apply. Generic fees were derived on that basis. Whether there is scope for reuse, and how much, will depend on the nature and location of the assignment in question and of potential additional assignments, including for example the minimum useable territory. This factor, plus the requirement to take into account the value of adjacent sea areas means that a pricing algorithm for bespoke fees which reflects precisely the sterilisation impact of each assignment would be highly complex. The approach proposed by Ofcom, to compare the relative sizes of the sterilised area and a defined reference unit (71k square nautical miles) was intended to achieve a balance between precision and proportionality. Given the amounts involved, and the timescales over which incentive pricing is intended to inform decisions, increased precision in deriving fees would be unlikely to improve the general incentive effect.

3.49 We acknowledge, as Infratil Airports Europe and NATS observed, that there are many different factors which could be used to derive bespoke fees and these factors could be used in a variety of different combinations. Firstly, we agree that, in principle, the territory sterilised could be compared with any number of larger, or smaller, reference units, provided that the applicable reference rate is adjusted accordingly. We accept that the 71k square nautical miles which we proposed is not the only feasible reference unit. Secondly, we also agree that, in principle, the pricing algorithm could either require that the sterilised area be mapped onto a defined

reference area to determine the fee or, alternatively, as we proposed, be compared with the size of a reference unit to determine the fee.

3.50 NATS' proposal that we could define a reference unit which relates to the UK FIR is attractive in so far as this is a concept widely used in the aeronautical sector. However, as the UK FIR (262k square nautical miles) is nearly four times as large as the UK land mass (71k square nautical miles), the reference rate would need to be adjusted pro rata to ensure consistency with the opportunity cost underlying the generic fees announced in the December 2010 statement (£9900 where no UK reuse is feasible).

3.51 The case of a circular assignment with DOC of 45/245 illustrates this point. The total area sterilised is about 78k square nautical miles and, if the transmitter was situated centrally in the UK, would prevent reuse anywhere in the UK. However as the sterilised area equates to only about 30% of the UK FIR, an unadjusted reference rate of £9900 would generate a fee of £3300 which would erroneously imply that two further assignments of up 45/245 could be accommodated in the UK. A pro rata adjustment of the reference rate to £36,000 would be needed to correct this. All other factors remaining unchanged, fees would, therefore, remain the same as under the proposal set out in the March 2011 consultation. A similar process of pro rata adjustment would be required if, as proposed by Infratil Airports Europe, the reference area was redefined in some other way to include sea areas. The reference rate of £9900 (and its associated 71k square nautical miles reference unit) has merit as a signal in so far as it is expressed on the same basis as the underlying opportunity cost (£9900 per basic 25 kHz channel assuming full UK sterilisation).

3.52 We recognise the possibility that an assignment which sterilises 71k square nautical miles (an area equivalent to the ÚK land mass and therefore attracting a fee which assumes full UK sterilisation) may not completely prevent reuse at another transmitter somewhere in the UK, if the sterilised area is not fully aligned with the totality of the UK landmass where any further transmitter is likely to be situated. In practice, however, these scenarios are likely to arise only rarely as any further assignments will themselves require a reasonably large and contiguous area in which to operate. Re-use will tend, therefore, to be infeasible even where there are unsterilised areas of the UK land mass which, in principle, could host a transmitter serving another assignment. Proportionately, the same principle will apply where the sterilisation impact is more localised eg sterilisation of an area equating to the size of half the UK but mapping onto less than half of the UK land mass.

3.53 NATS' proposal, that the sterilised area could be mapped onto the UK FIR (instead of, more simply, being compared with the size of the UK FIR or some other reference unit) would fail to reflect in fees the opportunity cost of territory under FIRs operated by neighbouring states which may well form part of the DOC and wider separation zone required by many UK based transmitters. As such the approach would favour licensees in areas closest to neighbouring FIRs, such as south east England, where those parts of the licensee's service area and/or separation zone which lie over neighbouring FIRs would not be reflected in fees, even though the sterilisation of neighbouring FIRs excludes other UK (as well as non UK) based assignments from operating in adjacent areas. Similar assignments, with similar impact, elsewhere in the UK would attract larger fees. This approach to fee derivation (relying on mapping the sterilised area onto a defined reference area) would also present difficulties where, as we have determined, polygonal areas are required to be converted to circular areas of the same size to determine fees. In these cases, the circular proxy will not map onto the same territories as the polygonal DOC.

3.54 It is conceivable that a more precise pricing formula than that proposed by Ofcom could be derived. One such methodology was devised by Ofcom's consultants Helios Technology Ltd when exploring the possibility of varying fees to reflect geographical location of the transmitter[6]. In this analysis, the number of frequencies already sterilised in each 50kmx50km grid square (including those in areas of sea) was mapped to derive a proxy for varying levels of demand. The report highlighted the complexity of classifying such variations and underlined the fact that the conclusion reached about any location will vary depending on the assumptions about the nature of the hypothetical new service. This proposal, which is similar to that proposed by Mr Rolfe in response to the present consultation, was not popular with stakeholders and we concluded that it would have added a disproportionate level of complexity to the fee algorithms. Helios' analysis did, however, illustrate the importance of sea areas as the analysis demonstrated that even in offshore sea areas a large proportion of aeronautical VHF communications frequencies are already unavailable as re-use would adversely impact existing users in the UK and abroad.

3.55 We have concluded that the application of a reference rate of £9900 and a reference unit of 71k square nautical miles to the whole of the sterilised area will generate reasonable fee outcomes and appropriate incentives for a wide range of scenarios, including those where sea areas are more or less significant.

3.56 Importantly, these outcomes are broadly consistent with the generic fees set out in the December 2010 statement. We intend, therefore, to implement the methodology for deriving fees set out in the March 2011 consultation.

Bespoke fees which do not vary with variations in operating height

3.57 Infratil Airports Europe questioned why, in some instances, bespoke fees appear not vary with operating height. Infratil cited in particular Ofcom's examples, in Table 1 of the March 2011 consultation, which indicated that radial coverage of 25 nautical miles will attract the same fee irrespective of operating height and, hence, distance to the radio horizon.

Ofcom's response

3.58 The outcome cited by Infratil Airports Europe is a function of deriving fees using the ICAO rule that minimum separation distances should be based on the lesser of 5 times the service radius (with no reference to operating height) or the sum of the two radio horizons (ie of the service in question and the adjacent service). Reference was made to this effect in paragraph 2.60 of the March 2011 consultation. Some small differences in operating height (ie "small" when viewed relative to the service radius) are not reflected in fee differentials as the service radius, which is common to the services being compared, tends to influence the outcome of the fee derivation much more strongly than the operating height/radio horizon. That is to say, the distance represented by the formula "5 times the service radius" tends to be less than the distance represented by the radio horizon and, therefore, the factor which determines the minimum separation distance and, hence, the fee. Nevertheless, the pricing algorithm does cause larger differences in maximum operating height to be reflected in minimum separation distances and, hence, fees. The fee algorithm does,

[6] See the report *Administered Incentive Pricing for Aeronautical Communications 30 October 2009* by Helios Technology Ltd published by Ofcom at http://stakeholders.ofcom.org.uk/binaries/consultations/spectrum_pricing/aip.pdf

therefore, reflect variations in the size of sterilised areas where these are applied in practice.

Terminology used to specify the pricing algorithm for area services

3.59 NATS observed that the term “Polygonal DOCs“ might have been a better title, than “Area DOCs”, above paragraphs 2.50 and 2.51 of the March 2011 consultation, as it is the fact that the DOC is a polygon rather than a circle which determines that separation distances should be driven by radio horizon rather than service radius.

3.60 While NATS was content that polygonal/area DOCs should be converted to DOCs of circular shape for the purpose of determining fees, NATS commented that it would be more accurate to define the area sterilised by these services as an area with radius equal to its own service radius plus the radio horizon from its service edge. This was in contrast to Ofcom’s proposal that the area should be determined by reference to 50% of the minimum required distance between the edge of the service in question and the edge of the assumed adjacent service (derived using the 2 x radio horizon methodology) plus the radius of the service in question. In NATs’ view, it is unrealistic to assume that adjacent area/polygonal services tend to be similar, as Ofcom had proposed for the purpose of determining fees,

Ofcom’s response

3.61 The term “area service” is used in ICAO planning documentation and, for this reason, we used this term in the consultation document. Nevertheless, we agree with NATS that the term “polygonal service” would have helped to clarify the distinction between radial and polygonal/area services, particularly as some services which are not Area Control services (for example, some Air/Ground services) may occasionally have a polygonal DOC.

3.62 We agree with NATS that adjacent area/polygonal services often have very different DOCs. However, this is also the case with many other service types for which we have proposed to assume identical adjacent DOCs and service types for the purpose of determining fees. Indeed the adjacent service may well be a completely different service type or there may be several adjacent services each with different characteristics. Our proposal to assume that the adjacent service is always identical to the service being priced was a purely pragmatic response to the complexity of otherwise trying to reflect in fees the actual DOC of the adjacent service(s).

3.63 We acknowledge that, where the separation distance is calculated by ICAO by reference to the radio horizon alone (ie without reference to service radii), the text proposed by NATS to define this rule is simple as well as appropriate. However, in all such cases it generates the same fees as the slightly more complex text proposed by Ofcom. The advantage of the formulation presented by Ofcom is that it is the same formulation as that which we proposed should apply to circular services, with the exception that the additional test based on service radii is omitted. The judgement is, therefore, whether to retain consistency or to improve the syntax of the algorithm, which would have the effect of introducing additional complexity to the overall structure of fees. On balance, we have decided to retain consistency, but we are grateful to NATS for the suggestion.

3.64 As separately requested by NATS, we have included in Section 4 below the algorithms which we will use to calculate fees. We hope that this will serve to illustrate that, although perhaps less elegantly expressed, the outcome is the same of that which would be seen if the formula proposed by NATs was adopted.

3.65 Anomalous propagation effects, to which the British Gliding Association draw attention, would be very difficult to factor into fees as, by their nature, they are inherently difficult to forecast. They also tend not to be susceptible to control by the licensee and, therefore, pricing incentives may do little to reduce their impact.

Question 6
We are proposing that, until April 2016, bespoke fees should be capped at the level of the generic fees announced in December 2010. After that date, no bespoke fees will rise beyond £9900 per 25 kHz bandwidth, but some Air/Ground, Aerodrome Flight Information Service and Tower assignments with a relatively large DOC will attract bespoke fees in excess of the £2600 generic fee set out in December 2010. Does this timetable provide sufficient time for licensees to review their operational needs and, where appropriate, agree changes to their DOC, before fees, for some licensees, increase beyond the level announced in December 2010?

3.66 NATS and the Light Aircraft Association agreed with this proposition. Manchester Airports Group believed that the timetable would give sufficient time for licence holders to consider options and make adjustments, provided that the CAA is able to make available resources to meet the demand. In the light of this risk, Manchester Airports Group proposed that there should be a right of appeal against increases effective in April 2014 if delays can be shown to be beyond the control of the licence holder.

3.67 The Airport Operators Association noted that the approach is consistent with the proposals for generic fees, but said it would prefer all fees to be permanently capped at the level of generic fees.

3.68 Infratil Airports Europe stated that the reasoning appears sound. However, it warned that the acceptability of the approach was predicated on the suite of bespoke fees adopted.

3.69 Mr Rolfe said the fees may put the industry beyond their ability to operate. The British Gliding Association proposed that fees should be phased in over 10 years.

3.70 IATA, the CAA and the WLS Flying Group made no comment.

Ofcom's response

3.71 We recognise that some changes to operating practices, including changes to spectrum assignments, will take time to implement and, in some cases, timing may be dependent on third parties. However, we note that the first phased step change in the fee increases will not be implemented until May 2012 (which is 16 months after Ofcom announced in December 2010 its decision to apply AIP based fees), and the period of phasing-in will not be completed until a further four years after it has commenced. We share the view of the generality of stakeholders that these extended timeframes provide sufficient time to plan and implement any changes to operating practices.

3.72 Few licensees will face higher fees under the bespoke approach to fee derivation compared with the generic approach. We referred to the few exceptions in the Impact Assessment summarised in Section 4 of the December 2010 statement. The service types for which bespoke fees may be higher than generic fees, in some instances, are those for which the generic fee is less than £9900 ie Tower, Aerodrome Flight Information Service and Air/Ground. We observed in paragraph 2.62 of the March 2011 statement that if individual licensees were given the choice as to whether their

fees should be set on a generic or a bespoke basis, those with larger than average DOCs would choose the cheaper generic basis and, consequently, face no incentives to reduce coverage unless they believed they could reduce this to below average. The same effect would be seen if those with above average coverage had fees capped at the level of the generic fees which assumed average coverage. For these reasons we do not accept that, as a matter of principle, all bespoke fees should be capped at the level of the generic fees. We will however cap all fees at £9900 per 25 kHz channel as we consider the opportunity cost of these frequencies does not increase beyond the point where no reuse is possible.

3.73 Nevertheless we acknowledge, as set out in paragraph 3.33 of the March 2011 consultation, that Ofcom's impact assessment was predicated on an expectation that a substantial proportion of Air/Ground and Aerodrome Flight Information Service DOCs of 25 nautical miles radius and 4,000 vertical feet will be reduced to 10 nautical miles and 3,000 vertical feet before fees would otherwise exceed £2600 in May 2016. We proposed that if this expectation proved wrong we may implement further transitional arrangements. We maintain this commitment and will consult with stakeholders if less than half of these assignments have had their DOC reduced in this way by May 2015.

Question 7
We propose to introduce a new licence class for each of (a) Air/Ground, Aerodrome Flight Information Service and Tower, (b) Approach, (c) ATIS, (d) Area Control, (e) VOLMET, (f) ACARS, (g) VDL, (h) Aerodrome Surface, OPC and Offshore, (i) GA Sporting frequencies and (j) Fire and Emergency frequencies. Are there reasons why the portfolio of licence types should differ from this proposal?

3.74 NATS proposed that ATIS and VOLMET assignments should be made under a single "Broadcast" licence class. NATS also sought clarification of the status of "Area FIS" assignments, which are recorded separately by ICAO but are not proposed to be subject to a distinct licence type; NATS proposed that these should be covered by the Area Control licence.

3.75 The Airport Operators Association took the view that, if new licences are necessary, the proposals represent a practical classification.

3.76 The Light Aircraft Association was content with the proposed list of licence classes, as was Manchester Airports Group which considered the revised licence classes make clear their purposes better than the current list. Infratil Airports Europe commented that the proposals were sound.

3.77 The British Gliding Association proposed that just one licence type would suffice and would reduce bureaucracy.

3.78 IATA, the CAA, the WLS Flying Group and Mr Rolfe made no comment,

Ofcom's response

3.79 We agree with the British Gliding Association that, in general, it is preferable to keep to a minimum the number of different licence types. However, different service types sometime require different licence conditions and it is often simpler and clearer to reflect these differences in distinct licence classes rather than include detailed additional clauses within a single template licence. However, we agree with NATS that we should reduce the proposed portfolio of licence types by combining the two Broadcast service types, ATIS and VOLMET, in one licence type. We note NATS'

concern that some assignments may currently be recorded using terminology not explicitly referred to during this consultation exercise. These example are comparatively rare and the CAA will discuss with the affected licensees which licence class should apply. As the full range of fees is internally consistent (ie all are based on the same reference rate and reference unit), this exercise should not be contentious. We agree with NATS that where an assignment is referred to as an Area FIS this should fall under the Area Control licence.

3.80 We will, therefore, implement the licence types as set out in the March 2011 consultation, except that we will combine the two Broadcast services under a single licence to be known as "Aeronautical Broadcast".

Question 8
Do you have any specific additional information about the likely financial impact on licensees of these proposals to apply bespoke fees, instead of generic fees, for certain service types?

3.81 The Airport Operators Association reported that the bespoke approach to pricing will generally benefit its members compared with the generic approach and will go some way to reducing the additional regulatory burden experienced by airports.

3.82 Infratil Airports Europe, in its closing remarks, proposed that fees should be weighted to reflect the turnover of the licensee or the number of aircraft movements at the site. In Infratil's view this would make the burden of AIP fees fairer, better enabling small regional airports to compete. Infratil also referred in its opening remarks to a view that smaller providers of air traffic services are less able than NATS to pass on cost increases, as airlines (especially low cost operators) have bargaining power and the protection of long term contracts.

3.83 Mr Rolfe stated that some licensees might go out of business but provided no further explanation of this view.

3.84 IATA observed that airline taxes to the UK government are the highest in Europe, but made no comment on the impact of bespoke fees, which would in fact reduce the overall burden of AIP on the sector (relative to generic fees).

3.85 The British Gliding Association noted that plans to change to 8.33 kHz channels (currently being consulted on by the European Commission) could cost sporting aviation many millions of pounds.

3.86 Manchester Airports Group, the Light Aircraft Association, the CAA and the WLS Flying Group offered no further information.

3.87 NATS expressed concern that if the new licences make reference to the DOC in such a way that all ground station radio infrastructure must be wholly contained with the coverage area, this could require significant investment in new radio stations. This issue is further discussed under "Other issues" below.

Ofcom's response

3.88 We recognise that smaller operators do not enjoy the same economies of scale as large operators and, for this reason, may find fee increases more burdensome than larger operators. However, we concluded in paragraph 4.30 of the December 2010 statement that, even in respect of smaller airports, the impacts are small relative to overall costs in the aviation value chain. We also noted that phasing would mitigate

significantly any specific transitional issues. In the same statement, our analysis of impacts on competition, set out in paragraph 4.36, concluded that fees could be expected to have a negligible impact on final demand for services and that there would be a negligible reallocation of aeronautical activity away from the UK.

Other issues

Objections to the general principle of AIP based fees applied to aeronautical ground station licences

3.89 The Airport Operators Association reiterated its view that AIP based fees add an unnecessary cost to its members' businesses, for what appear to be marginal benefits in terms of spectrum management.

3.90 Mr Rolfe said he was strongly against the proposal, noting "only a small amount of money raised from GA against large safety issues".

3.91 The WLS Flying Group expressed the view that fees represent a cynical application of government power which should be opposed.

3.92 The response from IATA was concerned mainly with the view previously expressed by IATA in response to the earlier consultations on the wider principle of applying AIP based fees, that AIP based fees are a government tax which can have no beneficial impact on spectrum use and present safety risks.

3.93 The response from the British Gliding Association too focussed mainly on the principle of applying AIP and the perceived constraints on the ability of licensees to change their spectrum use.

3.94 The CAA stated that the changes could have an impact on its own resources, only some of which are covered by the Ofcom/CAA contract. The CAA warned that any further costs would inevitably fall to the industry.

Ofcom's response

3.95 The arguments for and against the principle of applying AIP based fees to the aeronautical sector were debated at length in the July 2008 consultation and December 2009 consultation. As was reiterated by Ofcom in those consultations, and in the December 2010 statement, the purpose of AIP based fees is to provide incentives for spectrum users to make efficient use of scarce spectrum resources. Ofcom may set fees higher than its costs only if doing so fits with its duties under Section 3 of the WT Act. We do not take into account other consequential effects of fee decisions, for example the potential effect on revenue raised for the UK Exchequer, in determining our proposals for fees.

3.96 Concerns that AIP based fees will impact safety were also discussed at length in the preceding rounds of consultation. In the December 2010 statement, Ofcom concluded that that fee increases on the phased schedule which we would implement would not have a detrimental impact on safety, as the CAA had confirmed that it had adequate powers to address any safety concerns. In the great majority of cases, the bespoke fees consulted on in the March 2011 consultation will either have no impact on fees payable or will reduce the level of fees payable compared with generic fees. The conclusion with respect to safety concerns arising from the application of generic fees is, therefore, equally valid for bespoke fees.

3.97 We also note that the introduction of bespoke fees will provide licensees with the additional option of reducing assignment coverage to reduce fees liabilities, whereas in the face of generic fees the only means by which licensees could reduce fees payable was to reduce the number of assignments. Bespoke fees can, therefore, be expected to reduce the likelihood (compared with generic fees) that some licensees will reduce radio services to an extent which may be considered unsafe.

3.98 The cost of implementing and administering bespoke pricing will fall to Ofcom under the terms of its contract with the CAA. We recognise that bespoke fees, or AIP based fees more widely, may cause users to seek changes to their current operating practices and, in the near term, this may generate an additional workload for the CAA in carrying out its own statutory duties. As noted in paragraph 3.100 of the December 2010 statement, we anticipate that any restructuring of assignments will be spread over the course of the five year period during which fee increases will be implemented. For this reason, it is our view that the CAA will not face an unmanageable increase in its workload which will require significant additional resources.

Availability of the pricing algorithms

3.99 NATS asked that the pricing algorithm should be made public. NATS also expressed some concern about administrative arrangements, including how payment mechanisms, will function.

Ofcom's response

3.100 The formulae which will be used to determine fees are set out in Section 4 below. When these are implemented in regulations, they will be publicly available on the Office of Public Sector Information website.

3.101 Bespoke fees (and generic AIP based fees) will start to be payable from May 2012. These fees will apply to the first payment due by a licensee after the implementation date. There will be no retrospective payment such as, for example, where fees are not due to be paid until some months after May. The CAA will write to licensees in the normal way before a payment is due, notifying the licensee of the sum which will fall due.

3.102 In addition, given the scale of the structural changes announced in the present statement and in the December 2010 statement, we will discuss with the CAA whether it would be helpful to write to all licensees, some time before the formal notification of fees payable, to seek confirmation that records held by the CAA, including the DOC which is being operated, are up to date. It is possible that in the past, in the absence of any financial incentives, some licensees may not have notified the CAA about decisions to cease using certain frequencies or operate with a more localised DOC.

Possible unintended consequences of incorporating the concept of a DOC within the WT Act licence

3.103 NATS expressed concerns about the proposal that the DOC should be specified or cross referred to in the WT Act licence. The DOC currently forms no part of the WT Act licence, which merely refers to the power, and other characteristics, of the transmitter. NATS warned that if used to enforce compliance with technical standards this could have wider and more costly implications for themselves and their customers. NATS specified two particular circumstances; (a) where secondary

transmitters supporting polygonal services are sited beyond the boundary of the DOC and (b) where air traffic controllers communicate with pilots at a point beyond the edge of the DOC

Ofcom's response

3.104 In proposing that WT Act licences should include the DOC, or make cross reference to the DOC, it was Ofcom's intention to provide a legally enforceable agreement (of benefit to licensees as well as Ofcom and the wider community) which would define the fee payable. It was not our intention to include within the WT Act licence additional technical compliance conditions. The WT Act licence will, therefore, refer to the DOC only in the context of setting out how the relevant fee will be calculated. Provided that the maximum power output of the transmitter, as defined in the WT Act licence, is not breached, neither scenario outlined above would be in breach of the WT Act licence. It will be for the CAA to judge whether either behaviour is acceptable practice in the context of the letter of assignment granted by the CAA or the safety case operated by the aerodrome.

3.105 The fee regulations, which we will make before May 2012, may also refer to the DOC and, here again, this will be solely for the purpose of defining the fee payable.

Section 4

Conclusions and summary of revised fees

Conclusion on derivation of fees

4.1 We have decided to implement bespoke fees as set out in this Section 4. The methodology for deriving fees is that set out in the March 2011 consultation. However, having taken into account stakeholders' views, we have decided to apply bespoke fees, instead of generic fees, to a wider range of service types than proposed. Those asterisked in the bullets in paragraph 4.2 below are additional to those consulted on.

The service types to which we will apply bespoke pricing

4.2 We will apply bespoke fees to the following Aeronautical Ground Station service types;

- Air/Ground
- Aerodrome Flight Information Service
- Tower
- Approach
- ATIS
- Area Control*
- VOLMET*
- ACARS*
- VDL*

Fees will reflect the area sterilised by the assignment

4.3 In all cases, bespoke fees will reflect the size of the area sterilised by the assignment, including (a) the service area defined by the DOC and (b) the wider separation zone defined, predominantly, by the ICAO frequency planning rules as set out in ICAO EUR Doc 011-EUR[7].

4.4 In practice, separation distances between assignments defined by ICAO rules reflect the nature of the adjacent services as well as the service in question. For example, the minimum distance required to separate a circular Air/Ground service from a polygonal Area Control service will differ from the minimum distance between two circular Air/Ground services. A bespoke pricing formula which tries to take into account the nature of the existing or potential adjacent services in each case would be highly complex to administer and inherently unstable, as fees payable would need

[7] EUR Frequency Management Manual at http://www.paris.icao.int/documents_open/show_file.php?id=275

to change as adjacent assignments change. For the purpose of deriving fees, therefore, we will always assume that the adjacent assignments are identical and we will then apportion the calculated separation distance equally between the two services. This assumption will ensure that the notional apportioned distance reflects the sterilisation impact of the assignment in question.

4.5 In deriving bespoke fees, no account will be taken of ICAO planning rules in relation to adjacent channel use (ie the neighbouring use of different frequencies which are so similar that there may be a risk of interference). The impact is too small to warrant being reflected in fees. Similarly, no account will be taken of ICAO frequency planning rules in respect of proximate 25 kHz and 8.33 kHz channels. These exceptions were set out in the bullet points below paragraph 2.42 in the March 2011 consultation.

4.6 The means of determining the area sterilised will differ between Broadcast, Circular and Area assignments, reflecting differences in ICAO frequency planning rules[8]. VOLMET and ATIS are always to be treated as Broadcast services. ACARS, VDL and Area Control are always to be treated as Area assignments. The remaining service types to which bespoke pricing will apply (as listed in paragraph 4.2 above) are generally to be treated as Circular services unless, very exceptionally, the DOC is defined by reference to the geographic co-ordinates of a polygon. In these instances, the process set out in paragraph 4.11 below will be applied.

Calculating the area sterilised by a Circular service

4.7 When calculating the area sterilised by a circular service we will determine the radial distance from the transmitter to the edge of the sterilised zone using two distinct tests, and then use the identified radius to calculate the area of the sterilised circle in the usual way; $A = \pi r^2$. Under Test 1, we will calculate the outcome of a comparative test (ie determining the lesser of two values) defined by ICAO and under Test 2 we will calculate the outcome of a further test which is deployed by the CAA. We will then take the larger of the two outcomes from Tests 1 and 2 to determine the relevant radius for the purpose of deriving fees. This is the procedure also used by the CAA in its frequency planning.

4.8 Test 1 reflects the ICAO frequency planning rule that the minimum separation distance between *the edges of two circular service areas* should be the lesser of (a) 5 times the service radius or (b) the sum of the two radio horizons (assuming ground antenna heights of 20m). As set out in the March 2011 consultation, half of this distance will be attributed to each service for the purpose of deriving fees. However, to calculate the radius of the total area sterilised by one of these assignments (which includes its service area as well as half of the wider sterilisation zone) it is necessary to add the radius of the service area to the half share of the minimum distance between the two service edges (the latter defined by whichever part of the rule generates the lesser outcome).

4.9 Test 2 is based on a further planning rule which is deployed by the CAA to ensure that the ground station of the circular service (as distinct from an aircraft at the service edge) will not be subject to interference from an aircraft transmitting from anywhere within the adjacent DOC. This requires that the distance between the ground station (as distinct from the edge of the service area) and the edge of the

[8] It may be helpful to note, in particular, that differences between the methodologies often relate to the way in which the two ends of the separation distance are defined. For example, a multiple of 5 times the service radius is relevant in several calculations but this is applied variously as the distance between the two adjacent service edges (as distinct from between the two transmitters) or as the distance between the service edge of one service and the transmitter of another service.

adjacent service area should not be less than the radio horizon (assuming a ground antenna height of 20m) plus the radius of the service area in question. As noted in the March 2011 consultation, this further test has an impact on the minimum necessary separation distance in the case of smaller DOCs only, where the "5 times service radius" rule, referred to in paragraph 4.8 above, trumps the "sum of the radio horizons" rule radio (because smaller) but, nevertheless, fails to protect the ground station in the way described in this further rule. For this reason, if the output of this Test 2 is larger than that of Test 1, the Test 2 radius will be used to calculate the sterilised area.

4.10 We have created an Excel model (open hyperlink here) which illustrates the methodology for deriving fees. Row 8 sets out the methodology for determining fees for Circular services. Test 1[9] is shown in column F and Test 2 is shown in column G. Column H assesses which of the two tests generates the larger radius, and that radius is used in subsequent columns to calculate the area and fee. It should be noted that, in the model, the service radius is expressed in nautical miles, the maximum operating height is expressed in 100 feet units and the area sterilised is expressed in square nautical miles.

4.11 Where, very exceptionally, the DOC of an Air/Ground, Aerodrome Flight Information Service, Tower or Approach assignment is defined by reference to the geographic co-ordinates of a polygon instead of a circle, separation distances, for the purpose of deriving fees, will based on a service circle of identical area to the polygon. The CAA will advise the licensee of the separation rules actually applied when planning the particular assignment. The appropriate pricing formula, either that based on the lesser of the radio horizon test and service radius test (Circular service methodology as set out in paragraphs 4.7 to 4.9 above) or that based on the radio horizon alone (Area service methodology as set out in paragraph 4.15 below) will then be used to derive the fee.

Calculating the area sterilised by a Broadcast service

4.12 In the case of Broadcast services, ICAO requires that the minimum distance between the edge of one service and the ground station of the adjacent service should be not less than the lesser of (a) 5 times the service range or (b) the radio horizon (assuming a ground antenna height of 20m).

4.13 In the Excel model, Row 11 illustrates the methodology for deriving fees for Broadcast services. The formula for calculating the sterilised area is set out in Row 11 Column F[10]. As with the Excel illustration in respect of Circular services, the service radius is expressed in nautical miles, the maximum operating height is expressed in 100 feet units and the area sterilised is expressed in square nautical miles.

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[9] The first part of the Excel formula for Test 1 (highlighted here in red) =MIN(((3.5*D2)^2)*PI(),(((1.23*SQRT(E2*100))+D2)^2)*PI()) calculates the minimum separation distance by reference to the service radius while the second part of the formula (in black) calculates this by reference to the radio horizon (as explained in paragraph 4.8 above). It may be helpful to understand that, even though the first part of the formula reflects the "five time service radius" part of the test, it is appropriate to use a 3.5 multiple of the service radius in this formula. This is because the "five times service radius" rule relates to the distance between the two service edges (distinct from the transmitters) to which the radius of each of the two services must be added (totalling 7 times service radius), half of which (3.5) is attributed to each service.

[10] It will be noted that, in this instance, a multiple of 3 times the service radius is applied in the first part of the Excel formula which relates to that part of the test concerned to establish the minimum separation distance by reference to a multiple of the service range. A multiple of 3 is used here as the "five times service radius" rule relates to the minimum distance between the edge of the service in question and the ground station of the adjacent service. The radius of the overall sterilised area includes also the radius of the service area itself, resulting in a separation distance of 6 times the service radius, half of which is attributable to the service being priced.

Calculating the area sterilised by an Area service

4.14 As the sterilised area relates to two adjacent polygonal service areas, their relative orientation will affect re-use distance. As proposed in the March 2011 consultation, for the purpose of deriving fees, we will overcome this variability by basing pricing calculations on circles of identical area to the two polygons.

4.15 We will then apply the ICAO rule which requires that the distance between the edges of the two Area services should be no less than the sum of the two radio horizons (assuming ground antenna heights of 20m). Half of this separation distance will then be attributed to each of the assignments, to which must be added the radius of the service area in question.

4.16 In the Excel model, Row 14 illustrates the methodology for deriving fees for Area services. In this part of the model, the area of the relevant polygon must first be calculated and entered in Cell F14. Cell D14 then calculates the radius of a circle of the same area. Using that radius and the maximum operating height (Cell E14) derived from the DOC, the radius of the overall sterilised area can be determined using the test set out in paragraph 4.15 above. The formula for calculating the sterilised area is set out in Cell H14. As with the Excel illustration in respect of Circular services and Broadcast services, the service radius is expressed in nautical miles, the maximum operating height is expressed in 100 feet units and the area sterilised is expressed in square nautical miles.

The reference rate

4.17 Fees will be based on a reference rate of £9900 per 25 kHz channel. This reference rate will apply to an area sterilised of 71,000 square nautical miles. Where the area sterilised is less than 71,000 square nautical miles the fee will be reduced pro rata. For example, where the area sterilised is 7,100 square nautical miles, the fee for a 25 kHz assignment will be £990. However, where the sterilised area is greater than 71,000 square nautical miles, the fee will be capped at £9900 per 25 kHz channel as set out in paragraph 3.20 above.

4.18 In the Excel model, Column I expresses the sterilised area as a proportion of the 71,000 square nautical miles reference unit. Column J then calculates an unadjusted fee by applying the proportion to the reference rate of £9900. Column K applies a cap of £9900 per 25 kHz channel. Column L applies any adjustment required to reflect a bandwidth other than 25 kHz (the bandwidth of the assignment is shown in Column C). Finally, Column M rounds the fee down to the nearest £50 to minimise administrative complexity.

Phasing in of fee increase

4.19 Fee changes will be implemented from May 2012. The precise date will be set out in the fee regulations on which we will consult. As proposed in the March 2011 consultation, during the period to May 2016, we will cap bespoke fees at the level of the generic fee for the particular service type set out in the December 2010. These are set out in Table 1 below, and are expressed in terms of fee maxima for 25 kHz channels and, therefore, the cap on fees for 50 kHz VDL channels will be twice the level set out in this table. Bespoke fees which outturn at below these maxima will be charged at the level at which they outturn, without any discount.

Service type	Fee today	2012/13	2013/14	2014/15	2015/16	Subsequent
Air/Ground, Aerodrome Flight Information Service and Tower with DOC up to 10nm/3000ft	£150/£100	£350	£500	£650	£650	£650
Other Air/Ground, Aerodrome Flight Information Service and Tower	£150/£100	£350	£500	£1200	£1900	£9900 (rare cases)
Approach, ATIS, ACARS, VOLMET, VDL	£150	£1000	£2000	£3000	£6000	£9900

Table 1 Maximum level of bespoke fees (per 25 kHz channel) during the period when fee increases are being phased in.

Generic fees applicable to other service types

4.20 WT Act licences for aeronautical VHF communications ground station service types not included in the bullets in paragraph 4.2 above, will attract the fees set out in the December 2010 statement, which were as follows;

- Licences to use frequencies on a private commons (shared) basis associated with gliding, parachuting, hand gliding and microlight flying will attract a single generic fee of £75 per block of frequencies assigned to each licensee

- Licences to use Operational Control (OPC), Aerodrome Surface Communications and Offshore stations will attract a generic fee of £350 per 25 kHz frequency. Any additional mobile transmitters associated with an Offshore assignment, and using the same frequency, will attract an additional fee of £75 as a contribution to spectrum management costs.

- Licences to use the Fire and Emergency frequencies will be issued free of charge.

4.21 The implementation timetable for these generic fees will be that set out in the December 2010 statement.

4.22 The generic fees set out in the December 2010 statement in respect of the service types to which we have decided to apply bespoke pricing (ie those bulleted in paragraph 4.2 above) will no longer apply. There will be no option to have fees for these service types set on a generic basis.

Conclusions on impact assessment

4.23 In Section 7 of the December 2009 consultation, we presented a comprehensive impact assessment in support of our proposals to apply AIP based fees to aeronautical VHF communications ground station licences. We reviewed our analysis in the light of stakeholder views and summarised our conclusions on impacts in the December 2010 statement. We concluded that the wider societal benefits of applying AIP, ie greater efficiency, output and welfare, outweighed the small risks of inefficient transition arising from the immediate financial impacts on licence holders, customers and end-users.

4.24 In Section 3 of the subsequent March 2011 consultation, we assessed the impact of modifying the conclusions of the December 2010 statement by deriving fees for some service types on a bespoke basis instead of the generic basis set out in the December 2010 statement. Given that we had already concluded that AIP based fees should apply, the options which we considered were;

- (a) to implement bespoke fees as described in the March 2011 consultation or
- (b) do nothing and leave unchanged the policy decision set out in the December 2010 statement, to apply generic AIP based fees.

4.25 No stakeholders provided further substantiated information, in response to the March 2011 consultation, about the impact of bespoke fees, as distinct from generic fees, on licensees or on downstream users of spectrum dependent services. We continue to rely, therefore, in large part on the analyses in Section 3 of the March 2011 consultation and in Section 7 of the December 2009 consultation on the wider question of applying AIP based fees to aeronautical VHF communications frequencies used by ground stations.

The incremental benefits of bespoke pricing compared with generic pricing

4.26 We noted in the March 2011 consultation that the objective of applying bespoke pricing, instead of generic pricing, to some types of aeronautical radio licences, was to provide more effective incentives for licensees to use spectrum efficiently. We explained that, the more closely charges reflect opportunity costs, the larger the gains from more efficient usage are likely to be. We reiterated that generic fees will cause spectrum users to review the volume of each assignment type that they require, potentially releasing frequencies for other aeronautical users who place a higher value on that resource. However, we observed that bespoke fees which vary according to the geographic impact of different assignments can provide additional incentives for licensees to consider using the minimum DOC consistent with their operational and regulatory requirements, thereby potentially releasing spectrum for other aeronautical users, and making it easier over time for the CAA to accommodate current and future demand for assignments.

4.27 We also noted that bespoke pricing may have the advantage over generic pricing in so far as it may help to ensure that some users may decide to continue using spectrum which, otherwise, at generic prices, they would have given up, rationally (in response to the price set) but inefficiently (in relation to the value they derive from the use).

4.28 Our decision, announced in the present statement, to extend bespoke fees also to VOLMET, Area Control, ACARS and VDL assignments is unlikely to have a significant impact on spectrum use in the near term as the services supported by

these assignments tend to require very extensive coverage which would attract a capped fee of £9900 per 25 kHz channel. It is likely, however, that, over the medium term, the application of bespoke pricing will cause users to review the way these services are delivered, potentially resulting in the use of less extensive assignments.

4.29 As summarised in paragraphs 3.3 to 3.9 above, stakeholders broadly agreed that the bespoke approach presents users with incentives which are better aligned with spectrum management objectives. Stakeholders, generally, also considered that bespoke pricing is more equitable than generic pricing in so far as those who sterilise a smaller area pay less than those who sterilise a larger area.

Incremental costs of bespoke pricing compared with generic pricing.

4.30 The March 2011 consultation recognised that bespoke pricing may be more complex and costly to administer than generic pricing. We forecast that most of the additional costs would take the form of one-off up-front costs incurred in implementing the IS system needed to calculate bespoke fees. We estimated that the ongoing costs of the two schemes would be similar as licence records would need to be maintained and invoices generated under either arrangement.

4.31 Recent discussion with the CAA has confirmed that the implementation cost of the change to AIP based fees, irrespective of whether generic or bespoke, will not exceed £75k. This ceiling also includes work which will be carried out simultaneously to implement changes to aircraft radio licences, which in future will be payable every three years instead of annually. (That change was announced in the December 2010 statement.) The CAA estimates that the introduction of bespoke fees, instead of generic fees, for the nine service types listed in the bullets at paragraph 4.2 above, has had only minimal impact on its estimate of implementation costs. Furthermore, there is unlikely to be a material incremental cost to applying bespoke pricing to the additional four services as set out in paragraph 4.2 above, as the pricing algorithms which will apply to these service types will be substantially the same as those which apply to the other service types.

4.32 The CAA carries out the WT Act licensing function under contract to Ofcom and, therefore, the set-up and ongoing costs will be payable by Ofcom. These costs would need to be funded through Ofcom's grant in aid from general government funds, the level of which was fixed well before any decision was taken on applying bespoke pricing.

4.33 The CAA reiterated, in its response to the March 2011 consultation, that bespoke pricing could increase the financial cost of carrying out its own functions. In particular, the CAA noted that requests for changes to DOCs, consequent on the introduction of bespoke pricing, may increase the CAA's workload in carrying out its own statutory duties. We forecast, as set out in paragraph 3.98 above, that any restructuring of assignments will be spread over the course of the five year period during which fee increases will be implemented. For this reason, it is our view that the CAA will not face an unmanageable short term increase in its workload which will require significant additional resources and, therefore, aeronautical stakeholders are unlikely to face significant additional costs, if any.

4.34 Furthermore, as we noted in paragraph 4.26 above, if bespoke pricing achieves its objective of releasing spectrum for other aeronautical users, this should make it easier over time for the CAA to accommodate current and future demand for assignments. We will work closely with the CAA during the months leading up to

implementation of these changes to devise an efficient communications programme for advising individual licensees of the impending changes.

4.35 In the light of the analysis summarised in 4.26 to 4.34 above, we have concluded that the cost of implementing and operating these changes is outweighed by the benefits in terms of more efficient use of scarce frequencies

Financial impacts on individual stakeholders and on various stakeholder groups

4.36 We noted in paragraph 7.61 of the December 2009 consultation that a key aspect of the impact assessment presented in that document related to the distributional impacts on individual stakeholders arising from the proposals to apply AIP based fees. We explained that we considered it important to identify whether there may be any inefficient adjustment responses to the fee proposals which could arise in the short term. We presented a comparable analysis, in respect of bespoke pricing, in the March 2011 consultation and invited stakeholders to present any specific additional information.

4.37 The overall impact on the aeronautical sector, of applying bespoke pricing to the nine service types listed in paragraph 4.2 above, will be a reduction of about £450k per year in the fees payable at the end of the 5 years during which fee increases will be phased in. We set out in Table 4 of the March 2011 consultation a more granular analysis of the impact of bespoke fees on different segments of the aeronautical sector. The more granular analysis indicated that, with one possible exception, all segments would pay less under bespoke pricing. The possible exception would arise if small operators with moderately large DOCs chose not to, or were unable to, reduce their DOC. As set out in our conclusions at paragraph 4.44 below, our assessment of the impact of bespoke fees on this segment assumes that the great majority of this group are able to reduce their DOC to a level (10 nautical miles radius and 3,000 vertical feet) which would warrant a fee of only £650, compared with a generic fee for the current assignment of £2600.

4.38 As was set out in Section 3 of the March 2011 consultation, bespoke pricing will have no financial impact on most (88%) of assignments as these will either be not subject to bespoke fees or the bespoke fee will be the same as the fee which would have applied had we implemented generic pricing.

4.39 This analysis is materially unchanged by our decision to extend bespoke pricing also to VOLMET, Area Control, ACARS and VDL as, in almost all cases, bespoke fees for these assignment will outturn at the same level of £9900 per 25 kHz channel, irrespective of whether priced on a bespoke or generic basis. Assignment records indicate that a very small number of Area Control assignments may sterilise an area smaller than the 71,000 square nautical miles reference unit and would, therefore, attract a bespoke fee which is lower than the generic fee which would otherwise have applied. The DOCs currently recorded against those exceptional assignments will be checked with the licensees to ensure that they reflect current operating practices. We can be confident, however, that bespoke pricing will not cause any VOLMET, Area Control, ACARS or VDL assignments to attract larger fees than would be the case if generic pricing was applied. This is because we have decided to apply, more broadly, a cap on bespoke fees of £9900 per 25 kHz channel, which is equivalent to the generic fee payable for these service types.

4.40 We noted in the March 2011 consultation that a minority of assignments will attract larger fees under the bespoke approach to pricing than they would under the generic

approach. These, however, will be capped at the level of the equivalent generic fee during the period to May 2016 when fee increases are being phased-in. Therefore our decision to apply bespoke fees instead of generic fees will have no adverse financial impact on any licensees before May 2016. Conversely, about 150 assignments, out of a little over 600 which will be subject to bespoke pricing, will attract fees which, by May 2016, will be lower than the generic equivalent. The smallest bespoke fees, relative to equivalent generic fees, will stabilise at their full rate relatively soon during the period of phasing-in, thereby advantaging the licensees relatively soon.

4.41 We reviewed in some detail, in the March 2011 consultation, the nature of the assignments which, after May 2016, could face larger fees under the bespoke approach to pricing. The volume of these assignments (a little under 140) will not change as a consequence of our decision to extend bespoke pricing also to VOLMET, Area Control, ACARS and VDL assignments, as none of those assignments will attract higher fees under the bespoke approach. Expressed as a *proportion* of all assignments subject to bespoke pricing, the percentage figures in respect of fees which will increase will, of course, reduce (from 36% to 22%) with the inclusion of VOLMET, Area Control, ACARS and VDL assignments in the wider pool of assignments subject to bespoke pricing.

4.42 A little over 40% of assignments for which bespoke fees will be higher than generic fees are Tower assignments to licensees who will benefit overall from bespoke pricing. This is because fee increases for the Tower assignments held by those licensees are fully offset by fee reductions (relative to generic prices) for the Approach and/or ATIS assignments held by those licensees.

4.43 The remainder of assignments potentially facing fee increases under the bespoke approach are Air/Ground and Aerodrome Flight Information Service assignments. Almost all of these (95%) have a DOC with a service radius of 25 nautical miles, and usually with a 4,000 vertical feet maximum operating height. Almost all of these will face a bespoke fee of £3350 in place of a generic fee of £2600. We reported in the March 2011 consultation (paragraph 3.19) that many of these are long established assignments which, if made today, would be likely to have a DOC of 10 nautical miles radius and 3,000 vertical feet, which would attract a fee of just £650.

4.44 In our analysis of impacts we have assumed that the great majority of licensees holding Air/Ground and Aerodrome Flight Information Service assignments which would attract a bespoke fee of £3350 will opt to reduce their DOC and reduce the fee to £650. We confirm the proposal set out in the March 2011 consultation that if, in practice, a substantial proportion of these licensees are unable to reduce their fees liability in this way, we will consult on implementing additional transitional arrangements before bespoke fees would otherwise exceed the equivalent generic fee of £2600. As noted in paragraph 3.73 above, we will consult with stakeholders if less than half of these assignments have had their DOC reduced in this way by May 2015.

4.45 We do not believe this commitment to further consultation will weaken the incentive properties of bespoke fees as licensees will continue to have a strong incentive to reduce their DOC to a level which will take the fee liability well below the level of the £2600 generic fee and to achieve this at an early stage in the five years during which fee increases will be phased in.

4.46 We continue to take the view that bespoke fees should be phased in gradually over the five years to May 2016 to give licensees sufficient time to review their operational

and regulatory needs before fees increases take full effect. We acknowledge that changes to operating practices can take time to plan and some licensees will need to discuss their plans with the CAA before any changes can be implemented. By capping bespoke fees at the level of the equivalent generic fees announced in December 2010, we can ensure that, in the period before May 2016, no licensees are financially disadvantaged relative to their position had generic fee been implemented. However, the cap will enable some licensees to benefit financially from bespoke fees as soon as the first changes are implemented in May 2012 as, where bespoke fees are lower than generic fees, the fee payable will be determined solely by the bespoke approach.

4.47 We conclude that, on balance, the benefits of bespoke pricing, both in terms of more efficient use of spectrum and in terms of reduced fees payable by a significant volume of licenses, outweigh the disbenefits to the minority of licensees which are likely to pay fees larger than those set out in the December 2010 statement.