OFFICE OF COMMUNICATIONS

Modifications to spectrum pricing

Statement

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Section 1

Summary

1.1 This Statement follows the publication of the Modifications to Spectrum Pricing Consultation document ("the Consultation") on 6th July 20061 concerning proposals for setting Wireless Telegraphy Act ("WT Act") licence fees.

1.2 The Consultation focused on proposed changes to licence charges (fees) payable under the Wireless Telegraphy Act for Business Radio, Satellite, Community Radio, Fixed Links together with some other minor changes. The Consultation closed on 15 September 2006 and Ofcom received a total of 51 responses.

1.3 The main fee changes proposed in the Consultation were:

- To support the reform and rationalisation of Business Radio licences from twenty one licence products to five, Ofcom set out new mechanisms for calculating fees. These fee changes were also designed to support associated changes to introduce more trading and liberalisation as set out in a parallel consultation document on Business Radio Trading and Liberalisation published on the same day[2].

- Satellite Earth Station fees to be updated through revised formulas and increased to be comparable with the level of administered incentive pricing (AIP) paid by other sectors (notably Fixed Links, which mostly use the same spectrum range).

- Community Radio licence fees to be simplified to a single rate of £250 per licence per year.

- Programme Making and Special Event fees to be increased as the second step of two increases to meet a continuing shortfall in the costs of managing these licences.

- Other administrative changes and new fees for new services required.

1.4 The new fee proposed for Community Radio was strongly supported. Satellite Earth Station fee proposals generated quite a degree of discussion and some concerns. There were three responses in relation to programme making which raised some specific objections. In relation to Business Radio, respondents showed some support subject to detailed points and clarifications, but more general concern was voiced about how the changes would be introduced - especially where changes would lead to sharp increases. A fuller analysis is set out in summary below.

1.5 Ofcom has considered all these responses carefully, and whilst it has made some changes to its proposals, Ofcom largely intends to proceed with its proposals as planned. However the timescale for some changes will be longer than originally proposed.

1.6 The following table summarises Ofcom's proposals, respondents' comments and Ofcom's decisions in relation to each of the licence sectors affected.

[1] http://www.ofcom.org.uk/consult/condocs/pricing06/
[2] http://www.ofcom.org.uk/consult/condocs/brtrading/

Table 1: Summary of decisions

Licence sector	Proposals	Responses	Ofcom Decisions
Business Radio	New pricing structures to reflect proposed new simplified licence class structure (see Business Radio Trading and liberalisation consultation document[3]). New classes proposed are: • Business Radio (Area Defined) licence class to cover all national or regional uses. • Business Radio (Technically Assigned) licence class to cover local uses ranging from on-site to wide area uses. • Business Radio Light licence class including three products to cover all self coordinated uses. The new pricing structures for the Technically Assigned and the Area Defined licences will be derived from the current AIP value applied to BR licences – reflecting the opportunity cost of these bands. The new simpler pricing structures will result in a significant proportion of existing licensees paying less or the same and a minority paying more although they will have opportunities to mitigate these increases. These changes reflect the removal of a number of historical disparities and anomalies in fee levels.	Some understanding of why rationalisation would require changes, but concern where changes may lead to immediate large increases. Some doubts whether population is a good method of defining congested areas but no alternatives suggested. Some concerns about whether divisions by grid square are sufficiently granular in some areas which cut across key locations like central London or Bristol. Calls for new licence charges for Common Base stations to be introduced as soon as possible. Requests to phase in pricing reforms over a number of years.	Ofcom has decided to implement pricing proposals largely unchanged but on a longer timescale and to keep some aspects under review. One change has been not to have congestion charging for less popular bands. Otherwise, Ofcom believes that some increases are necessary to introduce a fairer approach to pricing based on value of spectrum used. Ofcom will keep under review whether in future more granular partitioning is needed. We have further clarified our proposals in some areas but made no changes to overall policy (see section 3 for more details). The timetable for introducing the new licence fee for Business Radio is discussed in the Business Radio Trading and Liberalisation statement.
Satellite Earth	Pricing updated to match other AIP-based fees for services	Different views on whether AIP should	Ofcom agrees with the suggestion that

[3] http://www.ofcom.org.uk/consult/condocs/brtrading/

Stations	using same bands, resulting in higher fees. Introduction of new fee for new licence class - Earth Stations on Trains. Update to ensure current licence charges reflect the opportunity costs of spectrum used. Proposals for new Administered Incentive Pricing licence charges based on values derived from Fixed Links largely using same frequency bands.	apply to Satellite Earth Station licences. Some suggested it should not apply because there is a parallel market for transponder capacity in space. No strong objections to updated formula proposed but suggestions to use the 14 GHz rather than the 6 GHz band as the benchmark for prices. Some misconceptions about fees increasing much higher than Ofcom has proposed. Suggestions were made for phasing implementation.	fees be based on those for the 14 GHz band. We would point out some of the new fees were heavily overestimated by respondents and we have provided updated examples in this statement. Ofcom believes it is wholly appropriate to implement AIP irrespective of the transponder market. Ofcom is prepared to phase the introduction of high fee increases in two annual steps. Initial implementation is not anticipated to be practical until the latter half of 2007/early 2008.
Programme Making and Special Events	Increase of fees for certain licences to bring fees more in line with external costs (20% overall increase). Change intended to help recover the costs of managing PMSE spectrum by JFMG.	Small number of responses, one raising detailed objections to proposals for increasing fees and one pointing out an anomaly for the calculation of an area covering Wales	Ofcom agrees to resolve the anomaly for the fee covering Wales, but does not accept the reasons for not increasing fees to cover external costs
Public Wireless and Fixed Wireless networks in Channel Isles and Isle of Man	Licence class extended to cover new network licences for the Channel Islands and Isle of Man. To be charged on same basis as other existing network licences (in the Islands and pro rata to the UK).	No concerns raised	Ofcom to proceed with proposals
Fixed Links	Surrender of Fixed Link licences (which allows reutilisation of spectrum) to be rewarded if pre-notified as opposed to charging until next	Proposals for rewarding surrender supported and request to implement as soon	Will implement the mechanisms for licence surrender and for the Channel Islands proposals at

	renewal period. New bands to be made available for licence applications, to be charged at same rate as existing self coordinated bands. Removal of link length factor in calculating fees in the Channel Islands and Isle of Man to simplify.	as possible. No comments on Islands. Further issue (from last fee round) raised about rural discounts	suitable opportunity. Ofcom does not currently believe that the added complexity of introducing rural discounts is justified at present.
Radio Broadcasting	Introduction of simplified fee for Community Radio licence class. To provide greater simplicity and to avoid Community Radio services in urban areas (especially those broadcasting on the AM (medium wave) band) being charged disproportionately more for their WT Act licences than services in non urban areas.	Respondents strongly agreed with proposals	Ofcom has decided to implement proposals unchanged as soon as practicable.
Science and Technology	New fee for ground probing radar and for some scientific uses.	No comments received.	Ofcom has decided to implement proposals unchanged.
Maritime	Reduction of the Coastal Station Radio fee for training school use of ship radio on land. To bring into line with new Ship Radio licence charges.	Only one response - general agreement with proposal	Ofcom has decided to implement this proposal as soon as practicable.

1.7 Ofcom proposes to make separate statutory instruments (i.e. regulations) to implement these proposals to take effect during 2007/2008. The first regulations will implement changes that can be implemented quickly and are not dependent on factors such as the need to undertake substantial system changes. We expect to issue the statutory notice for these regulations in the first quarter of 2007 and this will clarify the exact scope.

1.8 Further regulations will deal with the remaining licence classes, including Business Radio, Satellite Earth Stations and Fixed Links. The statutory notice relating to these Regulations will be issued at a suitable time prior to the implementation of the new licensing system which will allow implementation of our decisions in relation to these licence classes. Ofcom will issue a further statement in the coming months detailing

the anticipated timing of implementation of the changes relating to Business Radio, Satellite and Fixed Links.

Section 2

Introduction

2.1 Ofcom remains committed to continue the implementation of a more dynamic and market-oriented approach to spectrum management, through the inter-related projects of spectrum pricing, spectrum trading and liberalisation.

2.2 This statement sets out Ofcom's decisions in respect of its proposals for setting fees for licences granted under the Wireless Telegraphy Act 1949 ("Wireless Telegraphy licences") by exercising its powers under sections 1 and 2(2) of the Wireless Telegraphy Act 1998 (the "1998 Act"). From 8 February 2007 these Acts are replaced by the Wireless Telegraphy Act 2006 but the effect of granting licences under section 8 and charging fees under section12 will remain the same. The statement follows a consultation on Spectrum Pricing "Modifications to spectrum pricing" published on 6 July 2006. In that consultation, Ofcom proposed to continue the use of administered incentive pricing ("AIP"), where appropriate, in setting annual fees for wireless telegraphy licences; made proposals for amending the methodology for determining AIP; and made some proposals for removing Wireless Telegraphy Act licence charges.

2.3 In the Consultation, Ofcom proposed to introduce a new pricing regime for Business Radio licences in order to support the proposed reforms and changes to the administration of Business Radio licences. Taking Business Radio licences as a whole, the total fees paid will remain virtually unchanged although there will be a rebalancing. Most licensees would pay the same as or less than at present. A minority will face higher fees but will have opportunities to mitigate these by taking steps to use the spectrum more efficiently. The proposed increases concern licence classes that use high power over a wide area for which current fees are anomalously low. The purpose of the increases is to encourage licensees to use their spectrum more efficiently.

2.4 Ofcom also proposed re-calculating Satellite Earth Station licence charges in order to make fees more comparable with Fixed Link licences which mostly use the same spectrum bands. For programme making and special events licences, Ofcom proposed a 20% increase to the overall level of pricing as the second step increase of two, the first being introduced in 2005. This is consistent with proposals detailed in the 2004 spectrum pricing consultation4. Other changes were proposed to the way that Fixed Links licence charges are administered and a number of other minor changes in other areas.

2.5 Ofcom received a total of 51 responses to the Consultation which closed on 15 September 2006. One of the respondents requested confidentiality; the remainder are available on the Ofcom website[5].

2.6 The following section of this statement looks at the responses in detail. Each sector is examined in a separate section to facilitate navigation of the document. Section 4 explains Ofcom's decisions in detail and next steps for the implementation of proposals. The Impact Assessment relating to the decisions is contained in section 5.

[4] http://www.ofcom.org.uk/consult/condocs/spec_pricing/statement/statement.pdf
[5] http://www.ofcom.org.uk/consult/condocs/pricing06/responses/

Legislative and policy framework

2.7 As explained in paragraph 2.2 above, Ofcom has powers under section 1 of the 1998 Act to prescribe in statutory regulations fees payable for Wireless Telegraphy licences on issue or subsequently at such times during the term of the licence as prescribed therein. Those powers also enable Ofcom to prescribe in regulations such sums as Ofcom determines in any particular case.

2.8 Current regulations[6] therefore contain provisions to both specific fees for certain wireless telegraphy licence classes and to other licence charges that may be decided in a particular case.

2.9 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. Under section 2(2) of the 1998 Act, Ofcom may, if it thinks fit in the light of its duties under section 154 of the 2003 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 154, 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.

2.10 The above-mentioned enabling powers are exercisable by statutory instrument under 1998 Act (as amended by the 2003 Act, which transferred responsibility for making regulations to Ofcom- but after 8 February 2007, under section 12 of the 2006 Act). Ofcom will be making new regulations in 2007 to implement these measures and will issue advance notice of each.

2.11 The Statement refers in various places to the legislation governing the management and use of the radio spectrum. From 8 February 2007, provisions on radio spectrum from a number of statutes, including the Wireless Telegraphy Act 1949, the Wireless Telegraphy Act 1998 and the Communications Act 2003, are being consolidated without substantive change in the Wireless Telegraphy Act 2006. After that date, this Statement should be read as referring to the corresponding provisions of the new Act. For further details about the Wireless Telegraphy Act 2006, see the notice at http://www.ofcom.org.uk/radiocomms/ifi/wtact2006/ .

Economic approach to using AIP

2.12 As mentioned above, Ofcom has duties under the 2003 Act to secure optimal use of the radio spectrum and to promote the efficient use of spectrum. AIP is an important mechanism for fulfilling this duty. This is because, under a system of AIP, spectrum fees reflect the value of the spectrum resource that licensees are currently using or could potentially make use of. Ensuring that users pay AIP for the spectrum they occupy creates the proper incentive for them to use it more efficiently. If the value of

[6] http://www.opsi.gov.uk/si/si2005/20051378.htm

the spectrum is less to them than the AIP, they will have an incentive to transfer it to another user that can generate greater value from it or to relinquish it to Ofcom to re-assign. Hence, AIP will promote optimal use of spectrum by creating incentives that result in access being granted to those users who can generate greater benefits from it and who value it more highly.

2.13 In determining appropriate spectrum prices under AIP, fees are set to equal the marginal value of spectrum based on its opportunity cost. In utilising spectrum, the current user excludes other potential users from the opportunity to use that spectrum. The opportunity cost of spectrum therefore reflects the value to a user that is deprived of the use of that spectrum, and is based on the user that places the most value on that being able to use a particular band of spectrum out of the potential users currently excluded from its use. Importantly, the user that places the most value on the use of the spectrum may not be the current licensed user of a particular band. If this were indeed the case, then AIP is intended to provide an incentive to reallocate spectrum to a user that values the use of that band more highly than the current user.

2.14 Since 1998, the use of AIP has been progressively rolled out to the majority of licence classes. The first spectrum valuation exercise was conducted by NERA and Smith Systems. Actual fees were set at 50% of the recommended levels. In 2002, an independent review of spectrum management (the Cave Review) urged AIP to be applied at more realistic levels, and more comprehensively across spectrum uses. The Government agreed with these recommendations, and hired a consortium led by Indepen to update NERA and Smith System's original spectrum valuation work. This new study concurred with the Cave Review that AIP be applied to an increasing range of spectrum uses, and provided a new set of illustrative values for setting AIP based prices.

2.15 Ofcom has considered these study recommendations and agrees there is a continuing role for AIP. In line with Indepen's recommendations, Ofcom has applied an amended methodology for determining AIP, setting each AIP fee in relation to both the value of the spectrum in existing uses and its value in other potential uses for each band. Thus, AIP will give incentives for spectrum to move to the most valuable uses. Ofcom believes that AIP should continue to be applied despite the introduction of spectrum trading, as AIP can continue to promote greater efficiency. Provided AIP fees are set conservatively, trading should not be impaired.

2.16 In some licence classes , AIP is not presently applied, so licence fees have historically been set to cover Ofcom's direct costs (only partly achieved in the case of PMSE).

Implementation issues

2.17 The policy decisions explained in this statement need to be implemented by a Statutory Instrument. Ofcom proposes to introduce the new licence charges in two stages. The first Statutory Instrument, to be made in early 2007, will introduce new licence charges for Community Radio, programme making and special events, a new miscellaneous class for science and technology licences, Channel Islands and Isle of Man public wireless networks, 70/80 GHz self co-ordinated Fixed Links, Maritime Coastal Station Radio (Training School), National Public Safety and National Analogue Television Networks.

2.18 The rest of the changes relating to Business Radio, Satellite and Fixed Links are intended to be made later in 2007/early 2008 by one or more statutory instruments to

take effect in early 2008. The implementation of these decisions is dependent on the introduction of a new licensing system. We are still in the process of developing this system and it will not be ready for implementation until early 2008. This will allow licensees which will see a significant change in licence fee extra time to adjust to the changes.

Pricing proposals

2.19 Ofcom agrees with the basic approach for setting AIP fees as outlined by Indepen – that is, that the opportunity cost of spectrum should follow a least-cost alternative method, updated periodically over time. In addition, Ofcom agrees in many cases with Indepen's recommendations about which spectrum uses AIP should apply to. Finally, Ofcom agrees with many of the illustrative examples of how values should be calculated using the methodology – though in some cases Ofcom has modified the models in the light of further analysis since the Indepen report.

2.20 In line with Ofcom's overall approach to spectrum pricing – i.e. continuing and widening the application of AIP where appropriate – Ofcom made detailed proposals for changes in spectrum fees in several licence classes. However it is worth re-emphasising that in many classes Ofcom also proposed to retain all other fees at current levels. The proposals that drew most reaction in the Consultation related to:

- Business Radio, where Ofcom proposed fee increases in specific areas;
- Satellite fees;
- Programme making.

2.21 Ofcom has carefully considered all the responses received to the Consultation. Most respondents focussed on the questions directly relating to them. Therefore the responses are grouped according to sector to which they relate in order to help readers to more easily find the relevant parts of the statement. The proposals remain largely unchanged with the exception of Satellite Earth Station licence charges, where some modifications to the proposals have been made and Business Radio licence charges where Ofcom has amended proposals to remove the congestion factor for less popular bands.

Section 3

Business Radio

3.1 In the Consultation Ofcom outlined a range of proposals aimed at implementing a pricing regime which would fully support proposed changes to the way that Business Radio licences are administered and managed. These changes were presented in a separate document "Business Radio Trading and Liberalisation" available at: http://www.ofcom.org.uk/consult/condocs/brtrading/. The statement on Trading and Liberalisation is available at http://www.ofcom.org.uk/consult/condocs/brtrading/statement

3.2 In order to support the trading and liberalisation proposals, we suggested a new pricing approach. The proposals set out in the Consultation document were focused on implementing a consistent rationalised pricing approach across the entire Business Radio sector rather than changing the underlying level of pricing. To this end, Ofcom proposed to continue to apply the overall AIP rate of £9,900 per 2 x 12.5 kHz channel across the UK. This decision was previously confirmed in Ofcom's pricing statement of April 2005. Where appropriate, this has formed the basis of the proposals across the entire sector and other fees have been derived from this underlying value.

3.3 The new pricing approach involved decreases in Light licensing charges and in some Area Defined and Technically Assigned licence charges but increases for a minority of Area Defined and Technically Assigned licensees.

3.4 As a result of the Consultation exercise Ofcom has made one significant change to the proposals. The responses raised a number of concerns about congestion charging and consequently Ofcom has reconsidered the proposed fee levels. This amendment has resulted in a reduction in licence charges for most licensees in less popular bands. These changes are explained in paragraphs 3.7 and 3.15 below. We have also made a number of small policy changes to the trading and liberalisation proposals which are referred to in this document and covered in more detail in the Business Radio Trading and Liberalisation statement.

3.5 The first part of this section explains the proposals detailed in the Consultation. This is followed by a summary of the main points from the Consultation and by Ofcom's analysis of these main points.

Technically Assigned licence class proposals

3.6 The Consultation identified a need to modify our proposals in order to recognise bands that are less congested. Some bands are less popular because of propagation characteristics which are less suitable for urban areas, the large antenna size of mobile equipment, and the lower availability of suitable equipment for these bands. Currently Ofcom has unused spectrum available (suitable for Area Defined or Technically Assigned use) in these bands and believes that the lack of congestion should be reflected in our licence charges. Taking congestion into account in the pricing formula is consistent with Ofcom's duty in section 154 of the 2003 Act to have regard in particular to availability of, and demand for, spectrum. For these reasons, Ofcom therefore proposes to reduce the fees significantly in less popular bands to encourage more use of these bands and thus help secure optimal use of the spectrum.

3.7 Highly popular bands for which spectrum is most in demand and congestion is greatest (High band, UHF1 and UHF 2) will be charged at a rate based on the AIP rate of £9,900 per 2 x 12.5 kHz channel identified for Business Radio spectrum (see table 3). Medium popular bands in which congestion is less (Mid Band and Band III) will be charged at the current rate of 83% of the full AIP rate (see table 4) and less popular bands that are uncongested (Paging, Band I and Low Band) will be charged a flat rate of £75 for each assignment per 2 x 12.5 kHz channel per annum (see table 5). See table 2 below for more information on the band categorisation.

Table 2: Band categorisation for Technically Assigned and Area Defined licence classes

Band categorisations	Bands	Frequency range (MHz)	Description
Highly Popular Bands (HPB)	High Band	165.04375 – 173.09375	These bands are classified as being in high demand and are heavily congested.
	UHF 1	425.00625 – 449.49375	
	UHF 2	453.00625 – 466.0875	
Medium Popular Bands (MPB)	Mid Band	137.9625 – 165.04375	These bands are in demand and congested, though less so than highly popular bands
	Band III	177.20625 – 207.49375	
Less Popular Bands (LPB)	Paging	26.225 – 49.49375	These bands are in less demand because of the propagation characteristics and are uncongested.
	Band 1	55.75 – 68.0	
	Low Band	68.08125 – 87.49375	

3.8 The Indepen report published in 2004 recommended taking a number of factors into account in determining administrative incentive prices for Business Radio spectrum. One of the factors had relation to whether the spectrum was shared between users or exclusively used by one user. In order to encourage spectrum users to share spectrum, a fee modifier of 0.5 will be applied to assignments categorised as shared. Users who require exclusive access to spectrum will be charged at the full rate for

their assignment, as this reflects the opportunity denied to others to use that spectrum. More details on this can be found in Annex 3.

3.9 Indepen also recommended taking the coverage area of a transmitter into account when defining licence fees. We proposed a simple implementation of this concept by defining typical coverage in three categories. The advantage of this approach is that the parameters are readily available to all licensees as they form part of their existing licence schedules. The categories proposed were as follows;

- Category 1 which refers to a relatively small coverage area, with an ERP of 5W or below and antenna height of 10m agl or less, or an operational area with a radius of 3km or less;
- Category 2 which refers to a medium sized coverage area, with antenna heights up to 30m, or an operational area with a radius of up to 15km;
- Category 3 which refers to a large sized coverage area, with high antennas and powers, or an operational area with a radius of up to 30km.

3.10 Indepen recommended an approach which distributed the national rate for a particular channel by the proportion of the national population covered by a particular transmission. This led to the identification of the 3 population categories shown below (a map depicting these categories is available at Annex 3):

- Category A - High population category - representing a population of greater than 3 million (London);
- Category B - Medium population category -representing a population of between 300,000 and 3 million (e.g. Leeds);
- Category C - Low population category –representing a population less than 300,000 (e.g. rural areas).

For full details of the parameters related to these categories, please refer to Annex 3.

3.11 A combination of all these factors produces the fee figures shown in tables 3 to 5 laid out below. The fees shown are in relation to a 2 x 12.5 kHz duplex channel assignment.

3.12 The fees set out below are further modified according to the channel bandwidth of the assignment. For example, if a user has a 1 x 12.5 kHz simplex channel assignment, the fee figures shown would be halved, subject to the minimum licence fee of £75. Where a user is using 2 x 25 kHz, the fee figure would be doubled.

Table 3: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in Highly Popular bands

Coverage area	Category 1		Category 2		Category 3	
Assignment Type	**Exclusive**	**Shared**	**Exclusive**	**Shared**	**Exclusive**	**Shared**
Population category A	£200	£100	£740	£370	£1480	£740
Population category B	£100	£75	£200	£100	£300	£150
Population category C	£75	£75	£95	£75	£110	£75

Table 4: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in Medium Popular bands

Coverage area	Category 1		Category 2		Category 3	
Assignment Type	**Exclusive**	**Shared**	**Exclusive**	**Shared**	**Exclusive**	**Shared**
Population category A	£100	£75	£370	£185	£740	£370
Population category B	£85	£75	£170	£85	£250	£125
Population category C	£75	£75	£80	£75	£90	£75

Table 5: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in Less Popular bands

Coverage area	Category 1	Category 2	Category 3
Assignment Type	**Exclusive or Shared**		
Population category A	£ 75		
Population category B			
Population category C			

Area Defined licence class proposals

3.13 Licences which will fall under this licence class will typically cover the whole of the UK or a specific nation within the UK. The fee calculation for the nations will apportion the UK channel rate with reference to the percentage of the UK population which resides in that Nation. For example approximately 83.6 % of the UK population resides in England. Therefore the fee for England will be 83.6 % of the UK channel rate (0.836 x £9900 = £8275 per 2 x 12.5 kHz channel).

3.14 In future, as licensees start to take advantage of new flexibilities created by the division of the UK into 50 kilometre square coverage units (by trading or surrendering areas that they do not require), new licences will be created with geographical boundaries that are defined at a trading unit level rather than a national border level. These trading units will be charged with reference to the proportion of the UK population residing within the trading unit. As with the Technically Assigned licence class, the population proportion is split into three categories: high, medium and low population density and bands are categorised as Highly Popular, Medium Popular and Less Popular (a map depicting these categories is included at Annex 3) and Ofcom proposes to reduce the fees in the less popular bands.

3.15 Highly Popular bands (High band, UHF1 and UHF 2) will be charged at the full AIP rate of £9,900 per 2 x 12.5 kHz channel identified for Business Radio spectrum. Medium Popular bands (Mid band and Band III) will be charged at the current rate of 83% of the full rate. In a modification to the proposals set out in the consultation document, the fees for Less Popular bands (Paging, Band I and Low band) will be charged at 33% of the full rate. See table 1 above for more information on the band categorisation.

3.16 Charges for individual nations and trading unit areas for a 2 x 12.5 kHz channel under the Area Defined licence are shown in the table below:

Table 6: Charges for Area Defined licences

Area	Fee (£) for Highly popular bands	Fee (£) for Medium popular bands	Fee (£) for Less popular bands
UK	9900	8250	3300
England	8275	6895	2758
Wales	490	410	163
Scotland	855	710	285
Northern Ireland	280	235	93
GB (England, Wales and Scotland)	9620	8015	3206
Trading unit within high population category (A)	1185	990	395
Trading unit within medium population category (B)	150	125	50
Trading unit within low population category (C)	14*	12*	5*

* subject to a minimum licence fee of £75 per annum

Light licensing classes

3.17 The fee for the three Light licence products will be a flat rate of £75 for five years (for Simple Site licences the fee will be £75 per site). This simple fee reflects the administrative cost of issuing a licence, is a fixed amount and is payable in full on

issue of the licence. It is not refundable in part for early surrender and licences will not be transferable to another user.

Table 7: Light Licensing fees

Light Licensing class	Licence fee
Business Radio Simple UK licence; and Business Radio Suppliers licence	£ 75 per 5 years
Business Radio Simple Site licence	£ 75 per site per 5 years

Summary of responses

3.18 There were 11 responses concerning the Business Radio proposals. The responses were largely favourable towards the general concepts being applied to the sector but there was some initial confusion about what was proposed and a number of specific concerns were raised. In order to clarify this confusion, Ofcom invited respondents to discuss the issues raised in more depth at two workshops held on 10th and 16th October 2006. Ofcom also discussed issues raised in the responses at the BRIG (Business Radio Interest Group), and held meetings with individual organisations as part of its regular contacts with industry. Going forward, Ofcom plans to communicate further with stakeholders, particularly smaller spectrum users, in order to explain fully the changes and their implementation. The responses themselves and the points raised at the workshops covered a number of detailed issues relating to;

- Use of population as a measure of congestion;
- Pricing consistency between different licence classes;
- Charging for Technically Assigned licences;
- Trunked systems;
- Size of increases for some Technically Assigned licences;
- Requests for price capping and phasing;
- Measure of economic benefit;
- Spectrum segmentation;
- Level of AIP for tradable Area Defined licences;
- Band III;
- Operational Area licences;
- Overall length of the consultation period; and
- Length of the consultation period.

3.19 These points are discussed below and further analysed in annex 2. Overall, the main concerns related to the proposed increases to a minority of users.

Use of population as a measure of congestion

3.20 As recommended in the Indepen review of spectrum pricing, Ofcom proposed to adopt population density as the way of identifying specific geographical areas where spectrum use is congested and to apply this approach to all relevant licence classes. In order to provide a simple and transparent categorisation of congested areas we have divided the UK into a grid (50 km squares) and categorised the population in each square into one of three categories.

3.21 FCS, AirRadio and Intellect questioned the use of population as a measure of spectrum use. They noted that airports and oil rigs are not in areas of high population. However, none of the respondents suggested an alternative means of measuring spectrum congestion. It is necessary to have a measure to differentiate geographic areas for the purpose of setting licence fees. While recognising that population density is not perfect, Ofcom believes that it is a good measure of spectrum use and that the advantages of its use outweigh the drawbacks on balance. This is because many business services are dependent on urban populations to deploy services and, consequently, demand for spectrum in these areas is much greater. This has been borne out by our monitoring surveys, and overall we believe there is a close correlation between Business Radio use and population density. Furthermore, population density data is readily verifiable following each 10 year census and makes a good point of reference. Therefore Ofcom has concluded that population is a good measure to use as a proxy for spectrum demand and intends to proceed on that basis.

Pricing consistency between licence classes

3.22 Ofcom is committed to introducing a fairer and more transparent pricing structure. One respondent commented that Technically Assigned licences seem to be cheaper than Area Defined licences on a like for like basis. The hypothetical example quoted in the response stated that by buying thirty 60km radius exclusive Technically Assigned licences to cover the UK, a licensee could effectively obtain the same coverage as one Area Defined licence at a lower price. However, this comparison is not valid. The 60km radius for a Technically Assigned licence which is used to calculate Technically Assigned fees and reflects the area denied to adjacent users rather than the actual service coverage. Actual service coverage is considerably smaller – 60km radius sterilisation is broadly consistent with a 30km radius coverage area. On that basis, if a licensee wished to get full coverage of the country in this way (so as to replicate the national channel allocation) then they would need approximately four times the number of assignments suggested.

3.23 There are also a number of important differences between the nature of Area Defined and Technically Assigned licences which make the like for like comparison invalid. Although our basic approach is the same (the same national AIP rate of £9900 per 2 x 12.5 kHz channels is to be applied and the interference levels permitted for Area Defined licences will be the same as those used in the MASTS assignment process for Technically Assigned licences), there are important differences between the two licence classes. For example, Technically Assigned licences are modelled with reference to specific technical parameters. If certain of these parameters are changed, the licensee would need to apply for a licence variation. Area Defined licences are much more flexible in that licensees can use the spectrum for a much wider range of uses without varying their licence provided that they do not breach

their technical parameters at the geographic and frequency boundary of their assignments. This gives Area Defined licensees much more flexibility for planning their networks and managing their spectrum. Like Technically Assigned licensees, Area Defined licensees can share their spectrum but, by managing their own spectrum, the quality of shared spectrum is more quantifiable.

3.24 Similarly, another respondent commented that licence charges for the Light licensing classes do not compare well with those for an Area Defined licence. The licence charges for these licence classes are difficult to compare because the licence classes have fundamentally different properties. Light licensing shares a pool of spectrum channels and does not offer the same technical characteristics as Area Defined licences. For example, there is no technical coordination by Ofcom and little or no scarcity value attached to Light licensing. This is reflected in the licence fee that will be charged.

Pricing for Technically Assigned licences

3.25 BAA thought that the pricing proposals for the Technically Assigned licence class significantly over-valued the spectrum in relation to the AIP benchmark. Ofcom does not consider that this is the case. The fee levels for Technically Assigned licences are derived from the underlying level of AIP e.g. (£9,900 per 2 x 12.5kHz channel for Highly Popular Bands, with the fees for individual Technically Assigned licences derived by calculating the proportion of the UK population that reside within the typical coverage areas described at 3.10). However BAA was strongly supportive of the overall liberalisation proposals for the Technically Assigned licence class. BAA also agreed that the factors used to determine the price of a spectrum licence, i.e. bandwidth, exclusivity, population coverage and congestion/popularity of the frequency band are necessary and sufficient.

3.26 While one respondent agreed that the creation of coverage categories for the Technically Assigned licence class was a simple way to calculate licence fees, they felt that the proposed categories did not map very accurately to actual coverage of a radio system. As explained in 3.22, the size of the radii associated with the coverage categories actually relates to the size of the area sterilised by a particular transmission rather than the actual coverage area. The actual coverage area is likely to be a lot smaller. Also, as mentioned in our consultation document, the power and antenna height values used to define the new coverage categories reflect the current planning assumptions for existing services with similarly sized coverage areas.

3.27 One respondent was concerned that Ofcom did not propose to introduce a fourth 90km coverage category[7] for charging purposes at this stage. The respondent felt that all coverage categories should be introduced as soon as possible and phased in as necessary. Category 3 refers to a large sized coverage area, with high antennas and powers, or an operational area with a radius of above 15km. Category 4 would add an additional fee for licences with very high power and antenna heights. Ofcom is aware that the AIP value calculated for the fourth coverage category would represent a substantial increase on current fee levels. Consequently, as we said in the consultation, we do not propose to introduce this charging coverage category at this time (instead fees will be set based upon an assumption of 60 km coverage). Ofcom recognises that licensees using very high power and antenna heights do deny large areas of spectrum to other users and we may consider introducing the fourth coverage category at some point in the future.

[7] This is the geographic area of sterilisation

3.28 A couple of respondents requested that topography and other factors be taken into account in the fees algorithm. Ofcom agrees that there are many other factors, e.g. topography, frequency band etc, that can affect a users actual coverage. The MASTS tool has been designed as an advanced spectrum planning and assignment tool to manage assignments more effectively and it will take account of topography, frequency band and other factors in making assignments. This will improve the efficiency of the assignment process and enable more efficient use of spectrum to the benefit of all Business Radio licensees. However it would be very complex to build the technical analysis of spectrum use into the fee calculation and we think the proposals to charge by typical coverage area will strike the best balance between fairness and simplicity.

3.29 Another respondent suggested that perceived problems with coverage categories could be dealt with by using MASTS to calculate the licence fee as part of the online application process while, at the same time, retaining 'indicative' licence costs for different coverage categories. However, Ofcom is required to publish the fee payable for each licence product in fees regulations. It would not be possible for Ofcom to include only indicative fees in fees regulations.

Trunked systems

3.30 Most of the comments concerning the Technically Assigned licence class related to how the proposals would work in practice. Several respondents commented that the Technically Assigned licence class fee proposals for evaluating spectrum use did not take into account spectrally efficient trunked systems, used by the utilities and transportation industries. The fee proposals were based on a single-site coverage model, i.e. a fee is attached to each base station frequency assignment. It is important to note that this is the same model that is used for the majority of the current licence classes which will fall under the new Technically Assigned licence class. Ofcom accepts that this model may not be ideal for large multi-site trunked systems. However, it is appropriate for the vast majority of licences and is simple to understand and administer. Ofcom recognises that trunked systems use spectrum efficiently and has therefore modified the BR licensing proposals by allowing users to convert from a Technically Defined licence to an Area Defined licence in these situations, subject to certain conditions. (See section 3 of trading and liberalisation statement for more details).

Size of increases for some Technically Assigned licences

3.31 Some respondents including FCS and JRC were concerned by the amount of increases proposed for some Technically Assigned licences, particularly those where the increase is likely to be over 100%. The Consultation had forewarned that major restructuring of fees would lead to a minority of fees rising by more than 50% and in a few cases by a much higher percentage. For historic reasons some licence charges are currently set very low and Ofcom believes that it is no longer justifiable to keep them at these levels. Ofcom believes that overall, the changes are necessary to ensure sufficient incentives are in place to promote efficient spectrum use and to ensure that those using spectrum where it is in most demand pay a fee which reflects this proportionately. Moreover, licensees affected by fee increases will have options to mitigate their fees. Further information on this is contained in the Business Radio Trading and Liberalisation statement being published in parallel with this Statement.

3.32 Some respondents questioned the reasons for the increases in licence charges for certain Technically Assigned licences. Ofcom has removed some discounts such as "choice and diversity" modifiers which were previously introduced to encourage

certain types of use. These discounts were removed to support a more liberalised and transparent approach to spectrum licensing. In general, Ofcom considers that AIP should not be used to promote particular applications or technologies. A study conducted by Indepen to review the current AIP level and underlying methodology indicated that Ofcom was undercharging in the frequency bands subject to greatest demand. It is Ofcom's intention to continue to keep the level of AIP under review and to consult on any changes that it considers appropriate (whether to increase or decrease AIP).

3.33 The purpose of the proposal to charge with relation to coverage was to reflect the opportunity cost of spectrum denied to other users in the price paid for spectrum. Under current arrangements, some users have antenna heights and powers that are greater than necessary to cover their assigned operating area. This results in sterilisation of spectrum outside of their operating area and denies access to other users. Ofcom believes that including coverage categories in the fee algorithm is a suitable and effective way of encouraging users to make more spectrum efficient frequency assignments.

3.34 We considerably modified our proposals before consultation in order to minimise the impact on stakeholders whilst continuing to provide incentives for more efficient spectrum use. Some additional measures such as the introduction of a 90km coverage zone could be implemented at a later date. To promote more efficient spectrum use, licensees are encouraged to consider handing back unused spectrum to Ofcom, adjusting technical parameters where possible to reduce the amount of spectrum they used and other options such as sharing spectrum.

3.35 The significant increases for certain Technically Assigned licensees led some respondents to comment that they did not perceive any accompanying increase in deliverables provided by Ofcom. Ofcom has designed the pricing proposals for the new licence class to better reflect the underlying value of the spectrum and promote optimal use of the limited spectrum resource. Also, fees are not being increased overall for Technically Assigned but are being re–distributed in a way that is fairer, more proportional to use in areas of greatest spectrum demand and will provide more effective incentives for spectrum efficiency in areas and frequency bands in which they are most necessary. As stated elsewhere in this Statement, licensees will have opportunities to mitigate their fees by using spectrum more efficiently.

Requests for price capping and phasing

3.36 A number of respondents commented that, given the size of the increases for certain licensees, the increases should be capped at inflation or phased in over a number of years. Ofcom recognises that the increases for a small proportion of users will be significant when expressed in percentage terms. However, there is no overall increase in the level of licence charges for Technically Assigned licences. The increases for certain licensees are necessary to address artificially low licence charges which can no longer be justified. For this reason the increases can not be linked to inflation. The proposed licence charges will bring all Technically Assigned licences onto the same charging basis. For the majority of licensees this will mean a substantial decrease in licence charges.

3.37 The necessary IT systems to support the new licensing regime will not be ready for implementation for another year; therefore, licence charges will not increase for a year to 2 years depending upon individual renewal dates. This should give licensees time to prepare for the increases.

Measure of greatest economic benefit

3.38 Some respondents questioned how Ofcom defined the greatest economic benefit of spectrum use in determining its charging proposals and, in particular, the way that this takes into account the social benefits of spectrum usage. In short, Ofcom considers that it is desirable to reflect the proper opportunity cost of spectrum use through the application of AIP to all users without adjustments to take account the specific consumer or citizen service for which spectrum use is an input. The reason for this is that spectrum is just one input to the provision of services and it would be economically inefficient to distort the pricing of this one input to seek to achieve a particular social objective. For one thing, distorting spectrum pricing for this reason would mean that service providers would not be given the right incentives to optimise their use of spectrum (eg. it might be economically efficient to invest in more spectrally efficient radio equipment which is slightly more expensive: but if the service provider were faced with an artificially low spectrum price then they would not have the financial incentive to do this).

Spectrum Segmentation

3.39 We received a number of queries in relation to how licence charges would be operated where spectrum is segmented. Ofcom intends to allow spectrum segmentation down to 6.25 kHz. For Technically Assigned licences we have amended our proposals and intend to require spectrum segmentation to proceed through licence variation rather than through a partial trade as stated in the Consultation document. This is in response to concerns about the risk of interference and will allow Ofcom to assess the impact on current users and interference between the two channel spacings (6.25 kHz and 12.5 KHz) before changes are made. If licensees want to segment their 12.5 kHz channels into two 6.25 kHz channels, the fee will be the same; but if they return or trade one of the 6.25 KHz assignments we will only charge them for one 6.25 kHz channel subject to a minimum fee. If licensees continue to use the same centre frequency they will not be offered the discount.

Level of AIP for tradable Area Defined licences

3.40 One respondent commented that the price of a national channel would have to fall to encourage trading. Ofcom does not believe this to be the case. Ofcom considers that use of AIP and trading are complementary for reasons set out in its Statement on spectrum trading http://www.ofcom.org.uk/consult/condocs/spec_trad/statement/sts.pdf.

Band III

3.41 Network Rail objected to the fee increases for their national licences situated in Band III. They stated that this was because they would need to work closely with Ofcom to manage their exit from spectrum of gradually worsening quality. Generally, Ofcom does not expect any degradation of spectrum quality until after 2012 when sub band 2 will be significantly constrained and licensees will need to relocate. In the meantime Ofcom considers that it is appropriate to charge Band III users on the same basis as other Business Radio licensees. The fee increases for Network Rail, which are modest, are caused solely by the geographical redistribution of the UK channel rate with reference to the population proportion in individual Nations rather than any increase to the overall UK channel rate.

Operational area licences

3.42 Our proposals detailed in the Consultation document did not make any explicit provision for operational area licences (i.e. which do not permit the use of a base station). To resolve this issue, we have revised the original table to incorporate operational area under the Technically Assigned licence class for pricing purposes. More details are available at annex 3.

Overall length of the consultation period

3.43 Respondents including FCS and JRC expressed concern that the Business Radio sector was given insufficient time to consider the proposals prior to the deadline of 15 September 2006. They objected for two main reasons: firstly the sector had to consider two very important consultation documents in a relatively short period of time; and secondly, the consultation period included the summer holidays. In the light of these concerns, Ofcom held meetings with industry at the beginning of October to explain proposals further and discuss the issues raised in the responses. It also discussed issues raised in the responses at the Business Radio Interest Group, and held further meetings with certain individual organisations as part of regular meetings with industry. Going forward, Ofcom plans to further communicate with stakeholders, particularly smaller spectrum users, in order to explain fully the changes and their implementation.

Conclusion

3.44 Following its analysis of the responses, Ofcom intends to go ahead with the proposals modified in accordance with this Statement. In particular, we will reduce the charges for less popular bands (paging, band 1 and low band). We will implement new charging mechanisms for Area Defined licences and for Technically Assigned licences to replace the current charging mechanisms for existing equivalent licence classes. We will also implement a simple £75 fee for 5 years for Light licences. We will continue to work with industry groups to ensure that they are able to benefit from the additional flexibility offered by the new licensing system in relation to licence charges.

3.45 The proposals outlined in our consultation document and discussed again here represent major changes and it will not be possible to implement them quickly. Ofcom currently estimates that these decisions in relation to Business Radio pricing will be implemented in 2008. Ofcom will undertake further communication over the course of 2007 to explain our changes and provide updates on expected implementation dates. We will also need to further consult on the regulations before they are made.

Section 4

Satellite Earth Stations

Overview of consultation proposals

4.1 In the Consultation, Ofcom proposed updated and revised formulas for calculating fees for each Satellite Earth Station class. Satellite Earth Station and Fixed Link licences are awarded on a first-come, first-served basis. They share many frequency bands, or could potentially use the same bands. Therefore the value factors in the proposed Satellite algorithms are derived from comparable AIP-based value factors that were introduced into Fixed Link licence fee algorithms in 2005. The proposed Satellite Earth Station algorithm is structured in a similar way to the existing algorithm. However, some years ago the value factors in the existing algorithm were set considerably too low so that current Earth Station charges do not reflect the AIP value (or even the cost of licensing).

4.2 Ofcom also proposed to introduce a new single algorithm which will form the basis of fees charged for the following licence classes;

- Permanent Earth Station (PES)
- Transportable Earth Station (TES)
- Earth Station Network
- Transportable Very Small Aperture Terminal (T-VSAT) (proposed new licence class)
- Earth Station on board Train (EST)

4.3 Ofcom proposed new Beta (β) and band factor (BF) values in the algorithm set out in the Consultation. This is to ensure that fees for Satellite Earth Stations are set on an equitable basis with other services which share or use similar frequency bands. In addition, the method for providing a discount for co-located earth stations has been adjusted to better encourage spectrum efficiency. Currently, all co-located earth stations, irrespective of frequency band, receive a discount. We proposed to provide a discount for co-located earth stations which operate in the same frequency band. This improvement will encourage more co-frequency band sharing at the same location, thus reducing the impact to other spectrum users.

4.4 Ofcom did not propose any changes to the following licence classes and a flat fee of £500 will continue to apply:

- Earth Station Non-Geostationary
- Earth Station Non-Fixed Satellite Service

4.5 This is because demand for spectrum for these licence classes is expected to remain low and the associated licence administration costs should remain low. As stated in the Consultation, Ofcom will keep this decision under review.

4.6 The current fee algorithm will continue to be applied to the following licence products:

- Aircraft Earth Station
- Earth Station on board Vessel (ESV)

Ofcom intends to review the applicable regulations and fees for these types of earth stations in the near future and therefore cannot justify making changes which may only be a short term measure.

Summary of responses

4.7 Twelve respondents provided detailed comments on the proposed modifications to spectrum pricing for Satellite Earth Station WT Act licences. Many respondents were concerned with the estimated increases in proposed licence fees and the potential impact on UK businesses. Some respondents also expressed the view that the application of AIP to Satellite Earth Station licences is not wholly appropriate. A number of specific comments on the derivation of the fee algorithm were also provided.

4.8 Most respondents agreed that earth station fees should be linked to the fees charged for Fixed Links although not all agreed with some of the original assumptions used in the derivation of the proposed earth station fee algorithm. For this reason, Ofcom has reconsidered the derivation of the proposed fee algorithm, resulting in the adjustment of the constant Beta (β), which reflects value, and in the adjustment of the band factors (BF). The revised algorithm and its application to the relevant licence products are explained in this section along with an outline of how Ofcom intends to introduce the changes. This section also addresses some other key comments raised by respondents to the Consultation. A detailed explanation of the derivation of the new algorithm is given in Annex 5 and some examples of its application are given in Annex 6. Annex 2 provides responses to some of the more specific comments raised by respondents to the Consultation.

Adjustment of Satellite (Permanent Earth Station) fee algorithm

4.9 Ofcom intend to press ahead with most of the proposals set out in the Consultation for implementing the new Algorithm, including the provision of a discount for co-located stations. However in the light of responses some adjustments are outlined below.

4.10 Ofcom used the 6 GHz band as the basis for deriving Beta (β) and the band factors (BF) in the proposed fee algorithm in the Consultation. This was because this is the lowest fixed satellite service uplink frequency band that is shared with the fixed service and represents the most value and largest potential for denial. Respondents suggested using the 14 GHz rather than the 6 GHz band as the benchmark for deriving the β and BF values in the formula because the 14 GHz band is more representative of earth station use in the UK. A review of the distribution of licensed earth stations in the UK shows that the 14 GHz band is the most heavily used and therefore better reflects typical commercial earth station use in the UK. In light of this, Ofcom agrees with the responses, and has decided to use the 14 GHz band as a benchmark, resulting in adjustments to the β and BF values in the algorithm. On average, the adjustments result in fee increases of 10 to 15% less than those which were proposed in the Consultation.

Table 8: Impact of increases in licence charges

Licence type	% increase in licence fee
Earth Station Network operating in the 14 GHz range	≅ 90%
Transportable Earth Station Category 1	= 50%
Transportable Earth Station Category 2	= 40%
Transportable Earth Station Category 3	≅ 43%
Permanent Earth Station teleport operating in the 6 GHz range	≅ 130%
Permanent Earth Station teleport operating in the 14 GHz range	Up to ~90%
Permanent Earth Station teleport operating in the 6 and 14 GHz ranges	Up to ~200%
Permanent Earth Station teleport operating in the 6, 14 and 18 GHz ranges	Up to ~228%

4.11 Some example calculations using the adjusted fee algorithm are given in Annex 6.

4.12 The basic structure and application of the revised permanent earth station algorithm remains unchanged from the one originally proposed in the Consultation. The only changes are to the constant β and the band factors as follows:

B = 28 (a constant)

BF = band factor, for the applicable frequency band within the following ranges:

Table 9: Band factors for Permanent Earth Stations

Frequency Range (GHz)	Band factor BF
< 5	2.33
5 to < 10	1.72
10 to < 16	1.00
16 to < 24	0.70
≥ 24	0.60

4.13 An explanation of the derivation of the above values is given in Annex 5.

Consequential adjustment of Satellite (Transportable Earth Station) fees

4.14 To ensure that fees are consistent with other earth station types, the permanent earth station (PES) fee algorithm is used as a basis for setting fees for transportable earth stations (TES). The changes to β and BF in the PES fee algorithm therefore result in the following adjustments to the fees for TES:

Table 10: Transportable Earth Station licence charges

	F = P × BW	Existing fee per terminal	New fee per terminal
Category 1	F ≤ 100	£200	£300
Category 2	100 < F ≤ 2500	£1,000	£1,400

Category 3	F > 2500	£3,000	£4,300

4.15 An explanation of the derivation of the new fees for TES is given in Annex 5.

Consequential adjustment of other Satellite Earth Station licence fees

4.16 The changes to β and BF in the PES fee algorithm will also result in adjustments to following licence products:

- Earth Station Network
- Transportable Very Small Aperture Terminal (T-VSAT) (proposed new licence class)
- Earth Station on board Train (EST)

Implementation of new fees

4.17 By way of this statement, Ofcom is giving a general notice period of approximately one year for the introduction of the changes to licence fees for Satellite Earth Station licences. The licence fee changes for all Satellite Earth Station products apart from satellite (permanent earth stations) will be introduced in full immediately following the notice period. The fee increases for the satellite (permanent earth station) licence product are expected to be relatively high in percentage terms (see paragraph 4.18 and table 11). In response to comments Ofcom is therefore planning a phased increase. This will be in two approximately equal steps, the first step immediately following the notice period and the second step one year after that. It is expected that this would be achieved by reducing the value of β in the first step. The intended timetable for the implementation of the fee changes is summarised in the following table. It should be noted that the notice period will depend on the availability of upgraded Ofcom licensing systems. If the notice period extends beyond two years, the fee increases will be implemented in full for all Satellite Earth Station licence products.

Table 11: Expected implementation of new licence charges for Satellite Earth Stations

Licence type	**31 Dec 2007**	**1 Jan 2008**	**1 Jan 2009**
Permanent Earth Station	notice period ends	1st phased step (~50% of increase)	2nd phased step (100% of increase)
All other Satellite earth station types	notice period ends	Full increase introduced	
NOTE - The introduction of the fee increases will take place at the first licence renewal date following the dates specified above.			

Impact of fee increases

4.18 Many respondents raised concerns that the proposed modifications to licence fees for Satellite Earth Stations could result in large fee increases which could be damaging to businesses providing satellite services in the UK.

4.19 Ofcom does not expect that the introduction of these increases would significantly impact on businesses operating Satellite Earth Stations in the UK. Wireless Telegraphy licence fees make up a small proportion of the overall running costs of the business, which includes high space segment costs. Moreover before the last modifications to satellite earth station charges in 2002, fees were actually set at a higher level than we are now planning to implement. Since changes were made in 2002 (prior to Ofcom being established) fees have remained at relatively lower levels. The reason for the reduction in fees in 2002 arose because the introduction of AIP for satellite earth stations was made on a basis which did not correctly reflect the opportunity value of the spectrum. As a result users have been benefiting from an artificially low fee level since then and that can no longer be justified.

4.20 One respondent commented that Ofcom had not considered the level of fees charged by other European administrations. Whilst Ofcom does not consider the level of fees in other countries to be of any particular relevance to its decisions, we have checked a sample of fees and believe that the new fees will be relatively comparable to those in other European countries.

4.21 With regard to transportable earth stations, some respondents incorrectly calculated that the originally proposed increase in fees could be as much as 450%. In fact, the originally proposed increase in TES fees was 50% for all three categories of TES licence. For example, a Category 2 TES licence currently costs £1,000 and it was proposed to increase this to £1,500. The adjusted fees for transportable earth stations represent a 40-50% increase depending on the category of earth station. Many respondents also miscalculated the percentage increase in licence fees for other earth station types.

4.22 Ofcom notes the error made in the example licence fee calculation for a satellite (earth station network) in Annex 8 of the Consultation. In the calculation of the existing fee, the modifier factor of 0.5 is missing from the algorithm. The calculation using the existing fee algorithm should have read as follows:

$$Fee = \sqrt{433.4 \times \left[\left(350 \times 2 \times 0.300 \times 0.5\right) + \left(250 \times 3 \times 3.6 \times 0.5\right)\right]} = £794$$

4.23 Given that the fee algorithm resulted in a fee of £1,627, this represented an increase of about 105%, not 206%. The actual increase will now be slightly smaller (about 90%) because of the adjustments now being made to the β and BF values.

4.24 The example fee calculation for a Satellite (Permanent Earth Station) licence in Annex 8 of the Consultation document also contained an error. All operations in the 12.5-14.5 GHz range should have been grouped under a single square root. The calculation using the originally proposed fee algorithm should be as follows:

$$Fee = \left[52 \times 0.58 \times \sqrt{\left(800 \times 36\right) + \left(300 \times 72\right) + \left(300 \times 72\right)}\right] + \left[52 \times 1.0 \times \sqrt{200 \times 500}\right] = £24{,}537$$

4.25 Given that the existing fee algorithm results in a fee of £8,265, the increase is 197%.

4.26 Annex 6 provides some revised example calculations of fees based on the adjusted fee algorithm (after it has been fully phased in).

Application of AIP

4.27 Many respondents argued that the application of AIP for Satellite Earth Station pricing was not wholly appropriate. The underlying reason given was that earth

station operators operate in two markets: spectrum availability on the ground and transponder capacity in space, the latter being an international constraint which is outside the direct control of Ofcom or earth station operator. It was claimed therefore that satellite services are self-regulating in that earth station operators are already encouraged to make efficient use of the radio spectrum, partly due to the high costs associated with acquiring transponder capacity.

4.28 Ofcom does not consider this to be a valid argument. The economic costs of the two types of spectrum access that satellite earth station operators require (spectrum access on the ground and transponder capacity in space) are essentially independent of each other. Ofcom has responsibility for managing use of the radio spectrum in the UK. The application of AIP is intended to optimise use of the radio spectrum in the UK and thus fees are set according to the opportunity cost of the radio spectrum to encourage the most efficient use of spectrum. The opportunity cost of spectrum used by Satellite Earth Stations is estimated with reference to the value of this spectrum to a Fixed Link user. This is because the bands available to earth stations are, or could potentially be, used by Fixed Links.

4.29 A number of respondents expressed the view that the opportunity cost for some bands, such as 14.0-14.25 GHz, should be set to zero because they are "exclusive" to the fixed-satellite service. The table of frequency allocations in Article 5 of the Radio Regulations sets out which radiocommunications services are allocated to use which frequency bands. Each sovereign state is free to deviate from these allocations, but only to the extent that harmful interference is not caused to any member state which is using the spectrum in accordance with the Radio Regulations. Ofcom could feasibly allow the 14.0-14.25 GHz band to be used by Fixed Links in the UK without causing harmful interference to services operating in accordance with the Radio Regulations in other countries. Therefore, the opportunity cost for the band 14.0-14.25 GHz is considered equal to the opportunity cost for 14.25-14.5 GHz.

Derivation of Fee Algorithm

4.30 Some respondents suggested that the derivation of β should be based on a bi-directional Fixed Link rather than a unidirectional Fixed Link. A unidirectional link is charged an additional premium (50% more per MHz than a bi-directional link) because it is difficult for Ofcom to assign the return half of the link. It is appropriate therefore to charge the same rate for an earth station because its transmission will also make it difficult for Ofcom to assign the 'return half' of that transmission to a Fixed Link.

4.31 A number of other specific points raised by respondents regarding the derivation of the fee algorithm are addressed in Annex 2.

General matters

4.32 Some respondents encouraged Ofcom to move towards a licence-exempt regime for earth stations as far as is practicable in the interests of promoting light-touch regulation. Ofcom is already making steps to licence exempt certain high-density fixed-satellite service terminals (HDFSS) operating at around 28 GHz. In line with its spectrum management objectives, Ofcom continues to consider ways of reducing regulation for Satellite Earth Stations in other frequency bands where possible.

4.33 In the trading statement published in August 2004, Ofcom referred to longer term plans on spectrum trading for satellite services. Ofcom has no immediate plans to

introduce trading for Satellite Earth Stations, and would need to carry out a full detailed consultation before doing so.

4.34 With respect to rebates and abatements for surrendering services, Ofcom intends to apply the same principles as proposed for Fixed Link licences in section 6.3 of the Consultation document, i.e. to abate the fee paid in respect of the surrendered period as a discount at the next renewal.

Conclusion

4.35 After a general notice period of approximately one year, Ofcom plans to implement the new fee charges to ensure that Satellite Earth Station users face the same opportunity costs as other users of spectrum in the UK. We have adjusted the original proposals in the Consultation by using the 14 GHz band, rather than the 6 GHz band, as the benchmark for deriving the β and BF values in the earth station fee algorithm. This will result in slightly lower increases (typically 10 to 15 %) in licence fees than originally proposed in the Consultation. We will also phase-in the fee increases for Permanent Earth Stations over two successive years. In percentage terms, the increases are not as large as estimated by some respondents, and new examples have been provided to help clarify the extent of changes. The new scale of fees to be introduced is still lower than the fees paid for satellite earth station licences prior to 2002.

Section 5

Other Proposals

5.1 The Consultation included a number of changes for fees in Programme Making, Community Radio, Fixed Links, Channel Island Networks and some more minor changes and these are set out below.

Programme Making and Special Events

5.2 Ofcom proposed an overall increase of 20% to programme making and special events (PMSE) licence charges. This increase was proposed to help meet the shortfall in the direct costs by JFMG in managing these licences and will contribute to meeting some, but not all, of the total costs to Ofcom associated with them, and follows a first set of increases introduced in 2005. The increase proposed would be higher for some exclusive-spectrum use licences, particularly in the 65 - 470 MHz frequency range in order to reflect the exclusive nature of these licences and consequently the increases in less heavily used bands would be lower than 20%. Ofcom also proposed to:

- simplify the fee structure by consolidating some frequency ranges;
- freeze the fees for online radio microphone licences (to encourage online applications); and
- introduce an online 12 hour booking system at a discounted fee for digital wireless cameras (to introduce a new payment method for these licences).

5.3 Ofcom received four responses concerning the proposals for PMSE licence charges. A couple of respondents said that because PMSE charges are on a cost recovery basis, they should not go up by more than the rate of inflation. However, as Ofcom explained in the Consultation, for the past few years we have not been covering all the costs in relation to our contractor JFMG who manages PMSE licences.

5.4 The BBC was concerned that increasing licence charges provided no incentive to JFMG to reduce costs where the demand for licences and assignments is increasing. However, in the year ended 31st March 2006, demand for PMSE licences was up by 13% and since 1st April 2005 JFMG's baseline costs have reduced by 8%. Therefore JFMG have continued to reduce their costs even where demand has increased.

5.5 Intellect disagreed with the proposal to increase PMSE fees in bands sharing spectrum with the Ministry of Defence (MOD), especially in the 450 – 470 MHz frequency ranges. The purpose of the increase in spectrum fees in all the 65-470 MHz frequency range is to reflect the exclusive nature of these bands to PMSE users. Ofcom recognises that these users do not have much choice as to the frequency band that they use because of geographic restrictions on spectrum use and at times may suffer interference. However, at present, the proposed increase in fees for 65 - 470 MHz spectrum is only to help fund a cost shortfall, and PMSE fees remain substantially lower than comparable spectrum where AIP is applied. For instance a UK wide PMR licence in UHF spectrum currently costs in the region of £9,900 but an equivalent PMSE licence would cost around £2,700 per year. Despite full AIP rates being applied for Business Radio users, demand from them in these adjacent channels continues to be high. Therefore Ofcom believes that it is

reasonable to reflect the exclusive nature of these licences in setting the fees for PMSE despite them only being aimed at recovering costs.

5.6 Ofcom plans to introduce the new licence charges early this year. One respondent requested extra time to plan for the proposed increases. Ofcom first consulted on increasing licence charges to cover costs more fully in September 2004. In that Consultation document, Ofcom explained that for this to happen it would be necessary to increase fees by 20% in both 2005 and 2006. Therefore Ofcom does not think that it is appropriate to extend the notice period for the implementation of these increases.

5.7 Two respondents objected to the unequal application of PMSE fees in Wales. Respondents objected to the relatively high fees applied to PMSE Area licences compared to equivalent Business Radio licences. Ofcom has considered this point and agrees there is an unintended distortion, and now propose to adjust the population threshold point in the fee table in order to address this specific concern.

5.8 The BBC also raised its concerns about spectrum supply generally for PMSE spectrum use, particularly for wireless cameras but this issue is not directly related to pricing and beyond the scope of our current proposals. We have already said there will be a need to review future longer term arrangements for PMSE spectrum management.

Community Radio

5.9 Ofcom proposed to introduce a flat fee of £250 for all wireless telegraphy Community Radio licences. This proposal greatly simplifies the existing fee structure and avoids Community Radio services in urban areas (especially those broadcasting on the AM (medium wave) band) being charged disproportionately more for their WT Act licences than services in non-urban areas.

5.10 The proposal was met with enthusiasm by all 24 respondents to this question. Respondents were pleased with the simplification of the fee as well as the reduction in the fee.

5.11 Respondents said that licence fees can represent a large proportion of the budget of Community Radio stations and the simplification of the licence fee will help them to plan their costs more effectively giving them a fixed target for fund raising activities. Respondents envisage that the changes will be highly beneficial to Community Radio licensees. Therefore, Ofcom proposes to implement proposals unchanged.

Fixed Links

5.12 Ofcom proposed making an adjustment to the billing arrangements for Fixed Links. If a licensee pre-notifies Ofcom when they surrender a link, Ofcom proposed to refund the fee paid for the period up to the next payment date as a discount on the next annual payment due. The licensee will be offered a credit equal to the fee paid for the complete number of calendar months from the date of notification to the date when their next annual fee is due. Ofcom will not make repayments for surrendered links if there is no continued licensing from which such abatement can be made because the transactional cost of the refund is likely to be higher than the refund itself. Furthermore Ofcom can not give any abatement for links notified as having been surrendered after the event as Ofcom will have had no opportunity to re-assign them. By introducing this proposal, Ofcom aims to encourage licensees to surrender their licences when they are no longer required. This will enable the spectrum to be

quickly re-assigned and thus help to improve the efficiency of spectrum use in the band.

5.13 Ofcom received 5 responses relating to this proposal. All fully supported the proposal to offer a credit against future licence charges to those who notify Ofcom of their intention to surrender a Fixed Link. There was also a suggestion to apply the same principal more widely to other licence sectors. Ofcom is pleased that the adjustment to the billing arrangement was well received and will implement this amendment accordingly. If this system works well, we may consider applying this principal to other licence sectors in future.

5.14 One respondent expressed concerns about the existing Fixed Links pricing algorithm and requested further revisions to be made. The respondent called for licence charges for bands such as 65 and 80 GHz to be reduced along with guarantees that they will remain low for some time in order to encourage investment in these relatively unused bands. The respondent also requested further refinement of the Fixed Links algorithm in order to address use of automatic power control. The current algorithm does not take ATPCs into account and gives no incentive to use this technology. Further, the current model charges the same cost for a Fixed Link in central London and Scottish Highlands. Ofcom is unable to address these queries at present because the current arrangements for Fixed Links were only introduced a year ago and are still bedding in, although early indications are that fees have not increased overall. Nevertheless, apart from the very limited changes in this consultation, we do not propose to make any further changes at present. Ofcom does not currently believe that the added complexity of introducing rural discounts is justified.

5.15 We have decided to charge for the 71-76GHz & 81-86GHz at the same rate as the existing 65GHz band. The statement on making spectrum available in these bands was published on 8 November 20068.

5.16 Ofcom also proposed to make a small change in the pricing formula for application in the Channel Isles and Isle of Man. Because of constraints in the Islands it is proposed to set the link length factor at unity. This will remove an anomaly in some fees charged in the islands that was causing some fees to be higher than necessary due to abnormal link lengths having to be set. We received no adverse comments in relation to this proposal and therefore intend to implement as described.

Channel Island and Isle of Man Public Wireless and Fixed Wireless Network licences

5.17 In the Consultation document Ofcom proposed to clarify the fee structure in the current licence charges regulations for the Channel Islands and Isle of Man public wireless network (PWN) licence class for mobile telephony use. This change will incorporate both paired and unpaired spectrum charges for 3G licences which will be charged on the same basis pro-rata as the 2G licences.

5.18 Ofcom also proposed to extend the current fixed wireless access licences for 3.4, 3.6 - 4.2 GHz to include the 10 GHz band. The same rate would be used as for existing licences, £5,000 for each licence for a duration of five years.

5.19 Ofcom received no adverse comments relating to these proposals and will implement them unchanged.

[8] http://www.ofcom.org.uk/consult/condocs/71-86ghz/statement/

Other proposed amendments to WT Act licence charges regulations

5.20 Ofcom proposed to publish a number of spectrum licence charges in the WT Act licence charges regulations which are currently in force but not included in the current Regulations. We made this proposal to improve transparency by including the national public safety licence (see the Business Radio section) above, and the national analogue television networks licences, at current rates.

5.21 Ofcom has a requirement to license some miscellaneous uses in the Science and Technology sector which do not generally interfere with commercial networks or services. We proposed to issue licences for ground probing radar and for scientific uses such as the transmission of time signals at 50 kHz. For these licence we proposed a standard licence charge for all such types of use of £20 for temporary uses up to one year, or £50 for any period up to five years for longer term use of over 1 year.

5.22 We received no comments on either of these proposals and intend to proceed to implement them unchanged.

Coastal Station Radio fee for training schools using VHF radio sets

5.23 Ofcom also proposed to bring coastal station training school fees in line with ship radio licences.

5.24 The Royal Yachting Association (RYA) supported Ofcom's proposal but highlighted what they considered to be an anomaly in relation to training schools which use VHF equipment that has been modified for training purposes. Such licences are charged an annual licence fee, whereas Ship Radio licensees using the same equipment operationally can obtain free lifetime licences online and paper-based lifetime licences for a one-off fee of £20.

5.25 Ofcom thanks the RYA for bringing these issues to our attention. We recognise that Coastal Stations are subject to restricted emission limits and essentially use a subset of ships' equipment on land. Hence we intend to ensure that the fee for Coastal Station Radio (Training School) licences will be changed to reflect the new Ship Radio fee (£20 for lifetime licences- assuming these will initially be paper based licences).

5.26 Ofcom intends to implement the change before the end of 2007. The licensing arrangements for this will be issued in a separate statement prior to implementation.

Payment arrangements

5.27 In the Consultation document, Ofcom proposed to encourage licensees to pay by direct debit. One respondent requested that Ofcom give a discount to those who pay by direct debit to reflect the reduction in cost to Ofcom. Unfortunately, Ofcom does not currently have facilities in place to offer such a discount. Licensees would benefit from a reduction in cost by paying by this method in comparison to other payment methods. We propose to revisit this issue again at a future date when our systems are more developed.

Section 6

Decisions, next steps and timetable

6.1 This Statement explains Ofcom decisions in relation to the proposals it made in the July consultation document. In general the proposals remain largely unchanged, although we have amended the proposals where relevant to take comments and concerns into account. In this section we discuss briefly the timetable and next steps for implementing the changes.

Timetable for implementation

6.2 The timetable for implementing the new fee arrangements is dependent in large part on the delivery of new IT systems within Ofcom. The new systems requirements, and the way that these fit within a much larger IT project being undertaken by Ofcom, differs between the various sectors. Accordingly, we have decided to implement the necessary changes to licence charges in two main phases.

- The first set of licence charges regulations will implement the revised fees in mid 2007 in relation to; Community Radio, Fixed Wireless Access, PMSE, Public Wireless Networks in the Channel Islands and as many of the changes as our systems can support as explained in paragraph 6.4 below . We will also include in the Regulations existing charges which are currently not set out in the existing Regulations.

- The second phase of revised fees will be implemented from early 2008 and will include Business Radio, Satellite and Fixed Link licence sectors, together with any remaining licence classes not covered in the first phase. We will be able to clarify this timescale when we consult on the Regulations in the first phase.

6.3 The timetable for the second phase relating to the Business Radio, Satellite and Fixed Link licence sectors is indicative only because of the high degree of dependence on delivery of new IT systems to:

- enable the simplification of licensing processes and removal of current usage distinction set out in this document for Business Radio licensees;

- Improve our current assignment process and interference management for Business Radio;

- facilitate the trading flexibility such as geographical segmentation for Business Radio Area Defined licences;

- support Ofcom's variation process – variation of all Business Radio licences on issue (about 50,400) to the new licence classes (Area Defined, Technically Assigned and Light licence);

- enable credits to be issued for Fixed Link licences to be issued against future invoices where licensees have surrendered links at least one month in advance of their renewal date; and

- Facilitate the calculation and administration of Satellite and at a later date, many other licences.

6.4 Ofcom will clarify the timetable for the other changes including science and technology and Coastal Station Radio (Training School) licences when we consult on the first set of set of Licence Charges Regulations.

6.5 As Ofcom has now reached a decision to go ahead with the changes presented in this statement, we can now finalise the design specifications for the IT systems.

6.6 For most licences, the new licence charges will come into force at the renewal date following the date at which the licence charges regulations come into force. As described in the Business Radio Trading and Liberalisation statement, Ofcom is still examining the options for when the new licence charges will become payable following conversion of assignments from the current Business Radio licence products to the new Business Radio licence products.

6.7 Some additional information is given in the Business Radio trading and liberalisation Statement on the process and indicative timing for the introduction of the new Business Radio licence products.

Regulations

6.8 To give the changes legal effect we will need to make new licence charges regulations.

6.9 The WT Act requires us to publish regulations in draft before they are made. We will publish these under a Statutory Notice and consult on them for one month during the course of 2007, once we have clearer view of the IS delivery dates.

Next steps

6.10 As discussed above the next steps following this statement are:

- Ofcom will consult during this year on the licence charges regulations;
- The new fees will be charged at the next renewal date of the licensees (with the possible exception of Business Radio where we are still considering options);

6.11 Implementation and timing will become more defined and may change. We will keep stakeholders informed via the Ofcom website and through other channels. We are also developing a more targeted communication plan aimed at the Business Radio community.

Annex 1

List of respondents

A1.1 Ofcom received 50 non-confidential responses and one confidential response to the Consultation document published on 6 July 2006. The non-confidential respondents are listed below, their responses can be viewed at: www.ofcom.org.uk/consultations/past/spec_pricing/responses/.

Table 12: List of Respondents

7E	Hope FM	Prince Bishop Community Broadcasting
AirRadio	Hughes Network Systems	Redwing Satellite Solutions
Arquiva	Intellect	Ribble Valley Community Radio Group
Ashfield Community Radio and Media training	Ipswich Community Radio	Royal Yachting Association
BAA	JFMG	SAP REG
BBC	Joint Radio Company	Scottish and Southern Energy
Ben Wood Commedia Sheffield	Leedseleven FM	SNG
Blackhand Media Trust	Link FM	Sound Radio
Brian Ashman	Magaret Dunn	St Martin's College
BT	Mr D.J.Goodes	TAUWI
Cable & Wireless	Mr J P Harston - Tinopolis	The Community Media Association
Cheshire FM Ltd	Network Rail	The Wright Trust
Denis Glaser - Camden Central Radio	NR5 Project	TSG London Bus Services
Department for Communities and local government	Orange	UK UP
FCS	Paul Golder	Western Power Distribution
Gateway Community Media CIC	Plenexis	
Gravity FM	Preston FM	

Annex 2

Summary of Responses

A2.1 Ofcom received 1 confidential response and 50 non-confidential responses to the Consultation document published on 6 July 2006. Most respondents agreed with Ofcom's general approach to pricing, although there were a number of detailed comments.

A2.2 This Annex sets out a summary of stakeholders' submissions and Ofcom's responses to these. The main issues are addressed in detail in section 3 of this Statement. The comments are grouped by sector and issue.

Table 13: Business Radio

Issue raised in response to the consultation document	Ofcom response
Ofcom received a number of queries relating to how coverage categories would be applied to certain types of use.	In our consultation document, we provided a table which showed how fees would be split into three Coverage Categories. The category that any given system would fall into would depend on the antenna height in metres and power (ERP) in watts. For pricing purposes, Ofcom will categorise any use of Indoor, Underground, Downfire antennas or Leeky Feeders into the lowest Coverage Category (Category 1). We intend to work with Industry to develop best practice and clear definitions in relation to Downfire and Indoor antenna use.
The JRC agreed with proposals for the Light licence class but expressed concern that the licence class would be cross subsidised by other licence classes.	In response Ofcom points out that the Light Licence class should be very much cheaper to administer than Technically Assigned licences and the new fee has been set to reflect this. The other Business Radio fee levels are determined by incentive pricing to reflect the assignments offered, not the cost of licensing, and there is therefore no issue of cross subsidy arising between them.
One respondent questioned whether licence charges for Business radio are inclusive or exclusive of Value Added Tax (VAT).	The quoted licence fees are exclusive of VAT. However Ofcom does not currently charge VAT on licence fees.
Request for an invoice as opposed to a notification of licence charges.	Ofcom is unable to change the way that it issues invoices at present. In future we will look to address this concern.
UHF1 fees should continue to be lower than UHF2 in order to reflect sharing	UHF1 is only available for duplex channels in major conurbations. The new licences will permit users to hand back 50 km gridsquares that they are unable to use. The same level of pricing has been applied to both bands because the pricing calculation is based on population density and most of the UK population reside in areas permitted for civilian use.
Will topographical features of the land be taken into account?	Topographical features will not be taken into account in the fee proposals because they were

Issue raised in response to the consultation document	Ofcom response
	considered too difficult to incorporate. This would have added too much complexity and not permitted a transparent way of calculating licence charges. However, they will be taken into account in MASTS for the Technically Assigned assignment process.
Reduction in licence charges for downtilt antennas requested.	It would be too complex to incorporate these into the pricing algorithm.
One stakeholder was concerned about the application of the Light licensing proposals to on-site speech and data Business Radio licences.	Existing on-site speech and data licences will move to the new Technically Assigned licence class and not the Light licence class.
One respondent submitted that the increase in licence charges would prevent him from implementing a more spectrally efficient technology.	More efficient spectrum technologies would be beneficial to spectrum users in the long term under the proposed new licence charges.

Table 14: Satellite

Issue raised in response to the consultation document	Ofcom response
Unlike Fixed link transmissions, Satellite Earth Station transmissions don't deny spectrum to other earth station operators with regard to spectrum use in the UK	Whilst this is true between satellite earth stations (because an earth station transmitter cannot cause interference into another earth station transmitter), an earth station transmission does deny spectrum to alternative user of spectrum in the UK such as Fixed Links.
Satellite earth station operators do not have similar agility to move transmission frequency bands as other potential users of the spectrum in the UK and so cannot mitigate price increases in this way.	The UK is well served by satellite network operators using the 6/4 and 14/11 GHz bands. A number of new networks are planned to become available in the frequency bands around 18 and 28 GHz over the next few years. AIP is being applied to provide incentives for licensees to use spectrum more efficiently where it could be used for other purposes (e.g. Fixed Links).
Algorithm is not transparent.	During initial discussions with industry, a large number of factors were identified for possible inclusion in a pricing algorithm. The proposed algorithm was developed in the interests of striking the best balance between keeping it as simple as possible while adequately reflecting the amount and value of spectrum used.
The movement of β and the band factor (BF) outside the square root factor will not encourage co-location of earth stations.	β is derived with its placement outside the square root. If it had been derived with its placement inside the square root, its value would have been β^2. The effect on the fee is identical, whichever way it is derived. The placement of BF outside the square root is intended to directly mirror the band factor for a

	Fixed Link. The band factor in the Fixed Link fee algorithm is not square rooted and so it is not square rooted in the earth station fee algorithm. The proposed and adjusted algorithms will encourage co-location of earth stations operating in the same frequency band. Take, for example, 10 permanent earth stations each with an input power of 200 W and bandwidth of 8 MHz operating at 14.4 GHz. Using the adjusted algorithm the fee is £3,542 if the 10 earth stations are co-located and £11,200 if the earth stations are geographically separated.
The availability factor of a Fixed Link should be set to 1.0, not 1.16, to represent a fair comparison with Satellite Earth Stations.	An 'average' Fixed Link was used as basis for deriving the earth station fee algorithm to ensure that the appropriate opportunity cost is charged for an earth station licence. The Fixed Link availability factor of 1.16 represents the average value for the 6 GHz band, as does the average bandwidth of 37.37 MHz, etc. However, an availability factor of 1.0 is now used in the derivation of the adjusted algorithm because this is the average value for a Fixed Link in the 14 GHz band.
The area of denial of a earth station transmission is also dependent on the height of the installation and any shielding provided by buildings, trees etc.	Factors such as local shielding are specific to each earth station location and are therefore not appropriate for inclusion in a generic pricing algorithm. A factor for height is not included because it is not included in the Fixed Link algorithm and is therefore difficult to set accordingly.
The 6 GHz band factor of 0.74 shouldn't be arbitrarily normalised to 1.0, with knock on effect to other bands.	In the derivation of β, the earth station band factor must be arbitrarily normalised to any non-zero number. A value of 1.0 was chosen for simplicity. The earth station band factors for the other frequency ranges are then set according to the Fixed Link band factors. If the earth station band factor for 6 GHz had been arbitrarily set to say, 0.74, the derived fee algorithm would result in exactly the same level of fees.

Annex 3

Steps to calculate fees for the Technically Assigned licence class

A3.1 The following steps determine the assignment fee under the new fee approach.

Step 1: Determine the band category

A3.2 Frequency Bands are classified into three categories.

Table 15: Band categorisation

Band categorisations	Bands	Frequency range (MHz)	Description
Highly Popular Bands (HPB)	High Band	165.04375 – 173.09375	These bands are classified as being highly popular due to high demand and are heavily congested.
	UHF 1	425.00625 – 449.49375	
	UHF 2	453.00625 – 466.0875	
Medium Popular Bands (MPB)	Mid Band	137.9625 – 165.04375	These bands are classified as medium popular as demand is less than for Highly Popular Bands
	Band III	177.20625 – 207.49375	
Less Popular Bands (LPB)	Paging	26.225 – 49.49375	These bands are considered less popular. Demand is low because of the propagation characteristics (not suitable in urban area) and equipment size (longer antenna
	Band 1	55.75 – 68.0	

	Low Band	68.08125 – 87.49375	

A3.3 Users with assignments in Less popular bands should skip to Step 5.

Step 2: Determine the assignment category

A3.4 Assignments will be classified into two simple categories: Shared or Exclusive.

A3.5 The majority of existing assignments will fall into the Shared category apart from those licensees which have users with safety critical activities - in which case Ofcom will contact them to discuss their future spectrum and exclusivity requirements with the option to move to shared use and assignments with special technical requirements that have an overall impact on how the radio system is used (these include trunked radio and TETRA systems).

Table 16: Exclusive or shared band categorisation

Current Products	**Exclusive or shared assignment category under Technically Assigned Products**
• Business Radio (Analogue PAMR)	Exclusive
• Business Radio (Common Base Stations)	
• Business Radio (Band 1 and Band III CBS)	
• Business Radio (IR2008 Data)	
• Business Radio (Wide Area One-Way Paging and Speech Systems)	Shared
• Business Radio (Remote Meter Reading Operator) - Shared channels	
• Business Radio (Wide Area Distress Alarms)	
• Business Radio (On Site Hospital Paging and Emergency Speech Systems)	
• Business Radio (Wide Area Speech and Data Systems)	Shared*
• Business Radio (On-Site Speech and Data Systems)	

*The majority of assignments within these two classes will be considered as shared, except:

1. licensees that have users with safety critical activities;

Ofcom will contact these to discuss their future spectrum and exclusivity requirements.

2. assignments with special technical requirements that have an overall impact on how the radio system is used (eg trunked radio and TETRA systems).

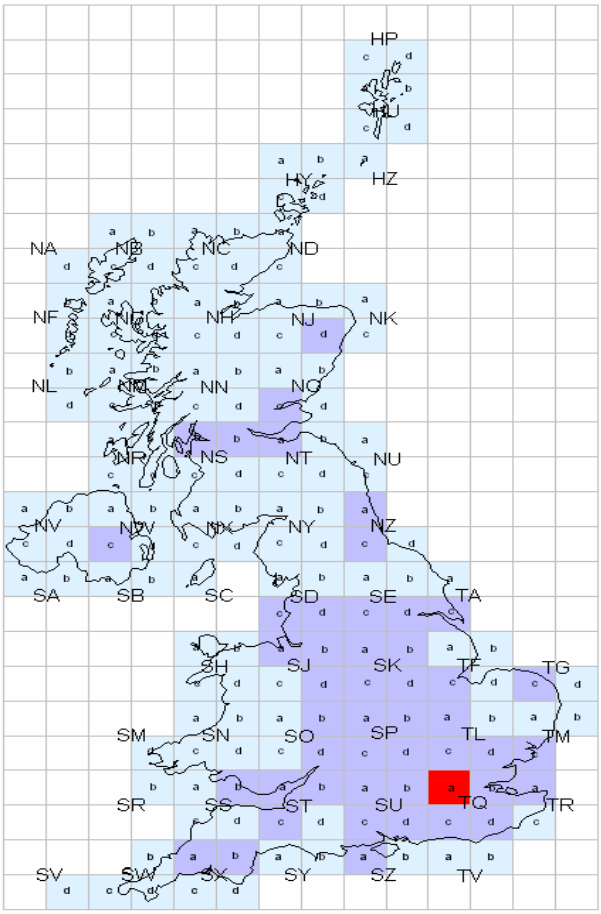
Step 3: Determine the Population category

A3.6 The location of the base station (or centre point of the operational area) determine the population category.

A3.7 Population is classified in three predefined categories as shown in figure 1:

- Category A – High Population (red);
- Category B – Medium Population (purple);
- Category C – Low Population (light blue).

Figure 1 Map to show population categories



Step 4: Determine the Coverage category

A3.8 The combination of antenna height and transmitter power (or the radius of the operational area) determine the coverage category. Coverage is classified in three predefined categories:

Table 17: Business Radio coverage categories

Coverage categorisations	Combinations of ERP Power (P) in Watts, and Antenna height above ground level (A_h) in metres – For base stations	Operational Area Radius (R) in km for mobile to mobile systems
Category 1	$P \leq 5$ and $A_h \leq 10$	$0 < R \leq 3$
Category 2	$P \leq 5$ and $10 < A_h \leq 30$	$3 < R \leq 15$
	$P > 5$ and $A_h \leq 10$	
Category 3	$P > 5$ and $A_h > 10$	$15 < R \leq 30$
	$P \leq 5$ and $A_h > 30$	

Please note that if an antenna is located indoor or underground or if it is a downfire or leaky feeder antenna type, the assignment will fall into category 1.

Step 5: Check the fee reference table

A3.9 Once the four categories described in steps 1 to 4 have been determined (or just step 1 in the case of less popular band assignments), these can be checked against the fee reference tables (tables 27 to 29 below) and a fee figure can be derived.

A3.10 The fee figures shown in the fee reference tables are based on a 2 x 12.5 kHz duplex channel.

Table 18: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in highly popular bands

Coverage area	Category 1		Category 2		Category 3	
Assignment Type	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared
Population category A	£200	£100	£740	£370	£1480	£740
Population category B	£100	£75	£200	£100	£300	£150
Population category C	£75	£75	£95	£75	£110	£75

Table 19: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in medium popular bands

Coverage area	Category 1		Category 2		Category 3	
Assignment Type	Exclusive	Shared	Exclusive	Shared	Exclusive	Shared
Population category A	£100	£75	£370	£185	£740	£370
Population category B	£85	£75	£170	£85	£250	£125
Population category C	£75	£75	£80	£75	£90	£75

Table 20: Business Radio Technically Assigned Licence Class fee for 2 x 12.5 kHz channel in less popular bands

Coverage area	Category 1	Category 2	Category 3
Assignment Type	Exclusive or Shared		
Population category A	£ 75		
Population category B			
Population category C			

Step 6: Spectrum (channel bandwidth) adjustment

A3.11 The bandwidth of the channel assignment can affect the fee. Where a user is using a different channel bandwidth, an adjustment needs to be made. If a user is using 1 x 12.5 kHz (a simplex channel), the fee will be halved, subject to the minimum licence fee of £75. Where a user is using 2 x 25 kHz, the fee will be doubled.

Annex 4

Example fee calculations for the Business Radio Technically Assigned licence class

(Please note that the examples below do not represent actual licensees but are examples of typical Business Radio assignments)

Example 1 - Business Radio (Wide Area Speech & Data)

A4.2 A taxi company currently has a Business Radio (Wide Area Speech & Data) licence using a duplex channel with one base station in London. They use 120 mobiles. Their base station location is considered to be in a Highly Congested area under current arrangements. Their geographical usage area is shared with other taxi companies.

A4.3 Their current annual licence fee is £1,640 and under the new approach it will reduce to £740.

Licensee's technical details

- Operating frequency: Base - 453.5MHz/Mobile - 460.0MHz (UHF2 band)
- Channel Bandwidth: 2 x 12.5kHz
- Antenna height above ground level: 50 meters
- Transmitter power (ERP): 25 Watts
- Location of base station (NGR): TQ 250 750

Step 1: Determine the Frequency Band category

A4.4 The base frequency of the duplex channel used (453.5MHz/460.0MHz) is in the UHF2 band which falls into the **Highly Popular Band** category (see figure 2).

Step 2: Determine the assignment category

A4.5 The assignment category is **Shared** (Wide Area Speech and Data licence class + non-safety critical/no special technical requirements - see figure 2).

Step 3: Determine the Population category

A4.6 The base station location is TQ 250 750, which is located in TQa (based on the UK map in figure 2) and falls into **Category A – High Population** (see figure 2)

Step 4: Determine the Coverage category

A4.7 The antenna height and power combination falls in **Category 3** (see figure 2)

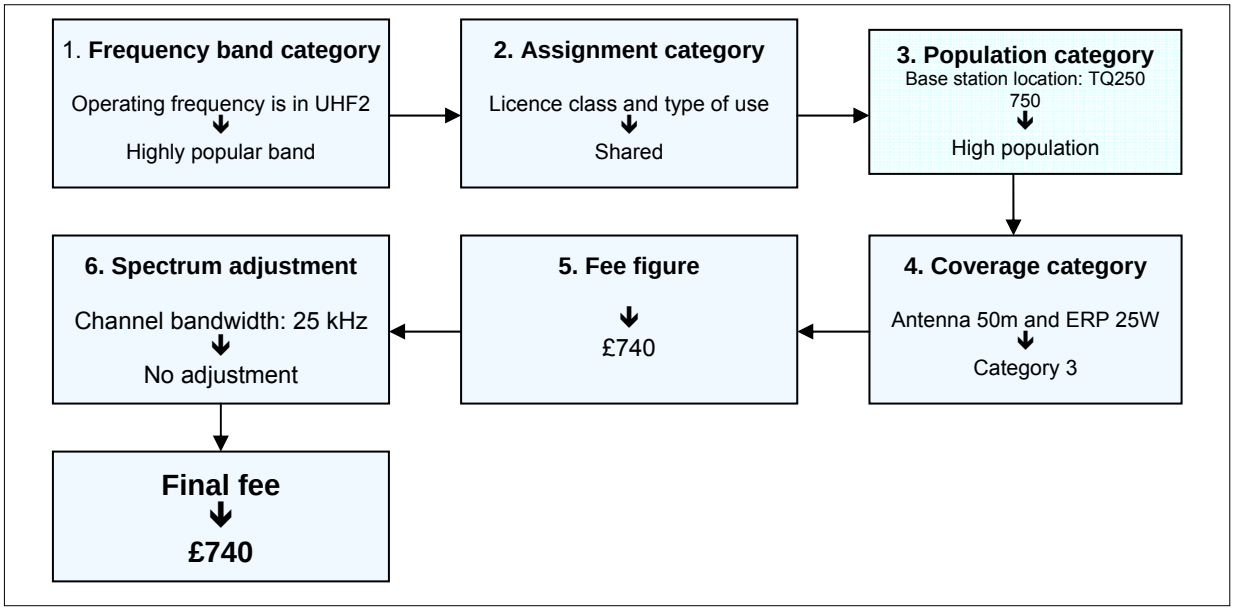
Step 5: Check the fee reference table.

A4.8 According to the fee reference table, the fee figure for this licence is £740 (see figure 2).

Step 6: Spectrum adjustment

A4.9 The channel bandwidth is **25 kHz** (2 x12.5 kHz). Therefore, no adjustment is required and the final fee figure is **£740**.

Figure 2: Fee calculation for wide area speech and data licence



Example 2 - Business Radio (On-site Speech & Data) - Operational Area

A4.10 A leisure centre currently has a Business Radio (On-site Speech & Data) licence operating on one channel without a base station near Sheffield. The geographical area in which they operate is considered to be Non Congested under current arrangements.

A4.11 Their current annual licence fee is £75 and will remain the same under the new fee approach.

Licensee's technical details

- Operating frequency: Base and Mobile - 446.3 MHz (UHF1 band)
- Channel Bandwidth: 12.5 kHz (1 x 12.5 kHz)
- Operational area with a radius of 3km
- Location of the centre of the operational area (NGR): SK 250 950

Steps to calculate new fee

Step 1: Determine the Frequency Band category.

A4.12 The simplex frequency 446.3 MHz is in the UHF1 band which falls into the **Highly Popular Band** category (see figure 3).

Step 2: Determine the Assignment category.

A4.13 The assignment category is **Shared** (On site Speech and Data licence class + non-safety critical/ no special technical requirements - see figure 3)

Step 3: Determine the Population category

A4.14 The location of the centre of the operational area is SK 250 950, which is located in SKa, and falls into **Category B – Medium Population** (see figure 3).

Step 4: Determine the Coverage category.

A4.15 The radius of the operational area which is 3 Km falls in **Category 1** (see figure 3).

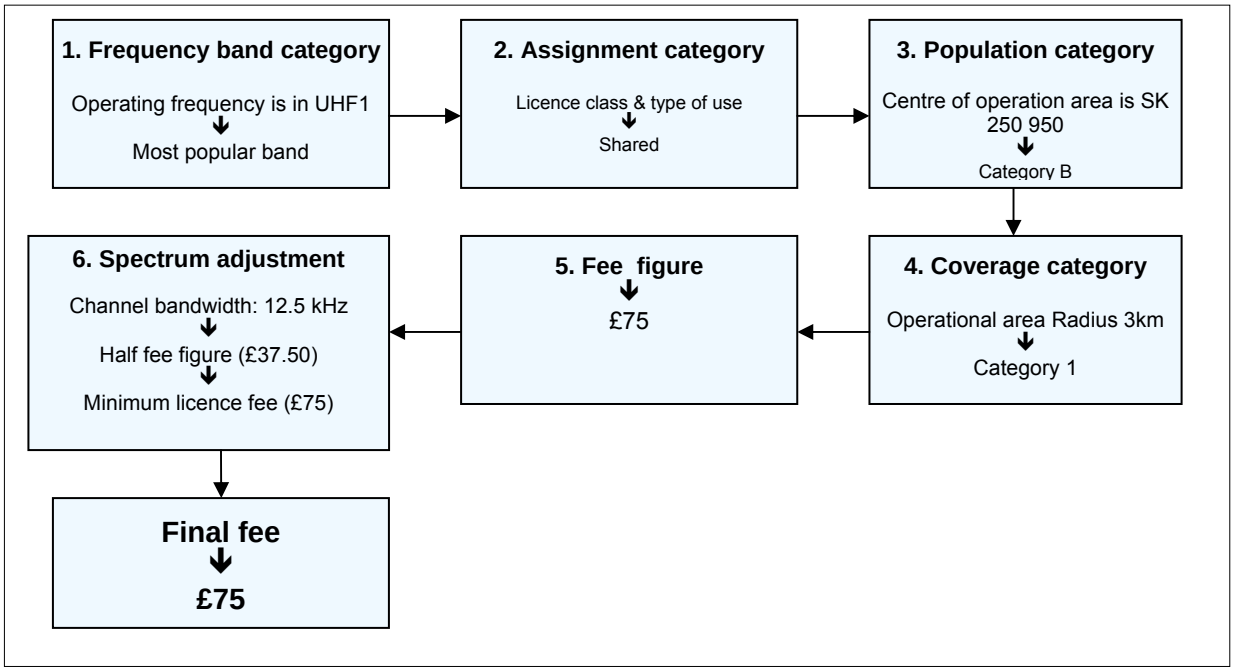
Step 5: Check the fee reference table.

A4.16 According to the fee reference table, the fee figure for this licence is £75 (see figure 3).

Step 6: Spectrum adjustment

A4.17 The channel bandwidth is **12.5 kHz** (1 x 12.5 kHz). Therefore, the fee figure should be halved which would bring the fee down to £37.50. However, this would bring it below the minimum licence fee of £75. The final fee figure is therefore the minimum licence fee of **£75.**

Figure 3: Fee calculation for on-site speech and data licence



Example 3 - Business Radio (On-site Speech & Data) – with Downfire antenna

A4.18 A bank currently has a Business Radio (On-site Speech & Data) licence using one channel with one base station in West London. Their base station location is considered to be in a Congested area under current arrangements.

A4.19 Their current annual licence fee is £100 and will reduce to £75 under the new fee approach.

Licensee's technical details

- Operating frequency: Base and Mobile -164.025 MHz (Mid Band)
- Channel Bandwidth: 12.5 kHz
- Antenna height above ground level: 25 meters
- Transmitter power ERP: 2 Watts
- Location of base station (NGR): TQ 100 700

Steps to calculate new fee

Step 1: Determine the Frequency Band category.

A4.20 The simplex frequency 164.025MHz is in Mid Band which falls into the **Medium Popular Band** category (see figure 4).

Step 2: Determine the Assignment category.

A4.21 The assignment category is **Shared** (On site Speech and Data licence class + non-safety critical/no special technical requirements - see figure 4)

Step 3: Determine the Population category

A4.22 The base station location is TQ 100 700, which is located in TQa (based on the UK map in figure 4), and falls into **Category A - High Population** (see figure 4).

Step 4: Determine the Coverage category.

A4.23 The antenna height and power combination fall into Category 2. However, because they are using a downfire antenna, the assignment will fall into **Category 1** (see figure 4).

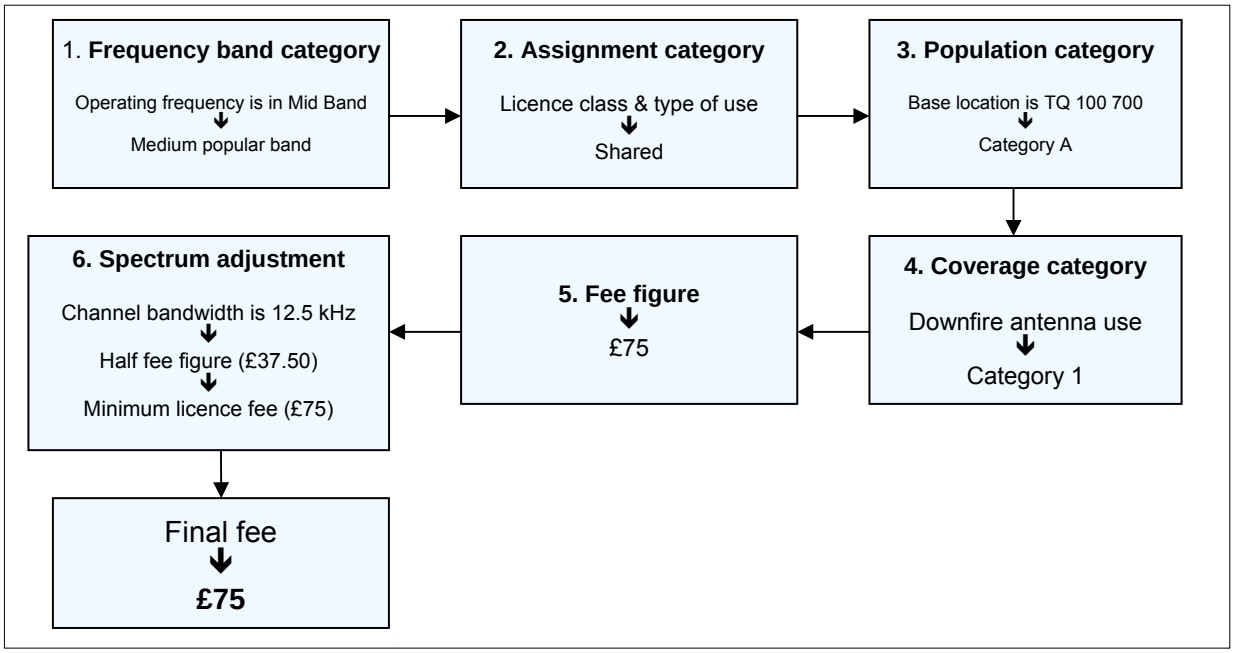
Step 5: Check the fee reference table.

A4.24 According to the fee reference table, the fee figure for this licence is £75 (see figure 4).

Step 6: Spectrum adjustment

A4.25 The channel bandwidth is **12.5 kHz**. Therefore, the fee figure should be halved which would bring the fee down to £37.50. However, this would bring it below the minimum licence fee of £75. The final fee figure is therefore the minimum licence fee of **£75.**

Figure 4: Fee calculation for on-site speech and data licence with down fire antenna



Example 4 - Business Radio (Wide Area Speech & Data)

A4.26 A taxi company currently has a Business Radio (Wide Area Speech & Data) licence using a duplex channel with one base station around Hounslow in London. They use 50 mobiles. Their base station location is considered to be in a Congested area under current arrangements. Their geographical usage area is shared with other taxi companies.

A4.27 Their current annual licence fee is £410 and it will increase to £740 under the new fee approach.

Licensee's technical details

- Operating frequency: Base - 442.875MHz/Mobile - 428.375MHz (UHF1 band)
- Channel Bandwidth: 2 x 12.5kHz
- Antenna height above ground level: 70 metres
- Transmitter power (ERP): 5 Watts
- Location of base station (NGR): TQ 150 750

Steps to calculate new fee

Step 1: Determine the Frequency Band category.

A4.28 The base frequency of the duplex channel used (442.875MHz/428.375MHz) is in the UHF1 band, which falls into the **Highly Popular Band** category (see figure 5).

Step 2: Determine the assignment category.

A4.29 The assignment category is **Shared** (Wide Area Speech and Data licence class + non-safety critical/no special technical requirements - see figure 5).

Step 3: Determine the Population category

A4.30 The base station location is TQ 150 750, which is located in TQa (based on the UK map in figure 3), and falls into **Category A – High Population** (see figure 5)

Step 4: Determine the Coverage category.

A4.31 The antenna height and power combination falls in **Category 3** (see figure 5)

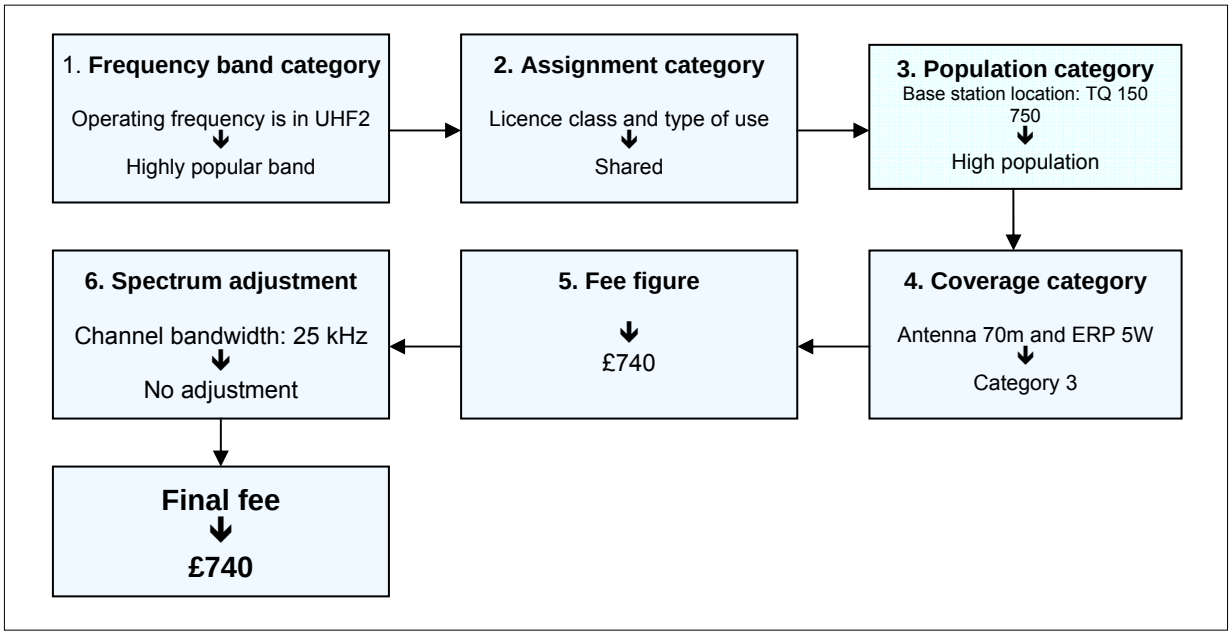
Step 5: Check the fee reference table.

A4.32 According to the fee reference table, the fee figure for this licence is £740 (see figure 5).

Step 6: Spectrum adjustment

A4.33 The channel bandwidth is **25 kHz** (2 x 12.5 kHz). Therefore, no adjustment is required and the final fee figure is **£740.**

Figure 5: Fee calculation for wide area speech and data licence



Annex 5

Derivation of Satellite Earth Station Fee Algorithm

Derivation of Beta

A5.1 The derivation of Beta (β) in the satellite permanent earth station algorithm follows the same principles as set out in the Consultation, except that the 14 GHz band is now used as the benchmark because this band is more commonly used by earth stations in the UK. To ensure consistency with fixed links, the value of β in the permanent earth station algorithm is derived from the equivalent fee for a unidirectional fixed link in the 14 GHz band.

A5.2 The algorithm for deriving Fixed Link fees : AS = Sp x Bwf x Bf x Plf x Avf which multiplies the spectrum price (£88 per 2 x 1MHz assuming a bidirectional link), the bandwidth (here we take the average bandwidth of the Fixed Link assignments in the 14 GHz band, which from the Ofcom database is 20.78 MHz), the band factor (0.43 for 14 GHz), the path length factor (the average of all 14 GHz Fixed Links in the database is 1.0) and the availability factor (the average of all 14 GHz Fixed Links in the database is 1.0). This is then multiplied by 0.75, since a unidirectional Fixed Link is charged at 75% of the cost of a bidirectional link. This results in a reference fee of £589.74.

A5.3 This is then used as the basis for deriving β in the earth station fee algorithm by applying bandwidth scaling. The average authorised bandwidth in the 14 GHz uplink band is 207 MHz, so the appropriate earth station reference fee is £ 589.74 x (207/20.78) which is £5,874.70.

A5.4 The average authorised power in the 14 GHz uplink band is 210 watts. The reference fee of £5,874.70 is that given by the PES algorithm with bandwidth of 207 MHz and power of 210 W, with the band factor normalised to 1.0, i.e.:

$$£5{,}874.70 = \beta \times 1.0 \times \sqrt{(210 \times 207)}$$

A5.5 β can thus be derived as 28.

Derivation of band factors

A5.6 As described above, the derived beta value of 28 is applicable to the 14 GHz band when the earth station band factor is set to 1.0. In order to reflect the opportunity cost of the other spectrum bands applicable to earth stations, the band factor is varied in conjunction with the band factors applied to the various Fixed Link spectrum bands. The Fixed Link band factor for 14 GHz is 0.43, but this has been normalised to 1 for the earth station band factor applicable to 14 GHz. The remaining earth station band factors are therefore calculated by normalising the appropriate Fixed Link band factor. For simplicity, the earth station band factors are defined by frequency range which reflects the variation of band factor with frequency for a Fixed Link.

A5.7 For example, the Fixed Link band factor for the band 5.92-7.13 GHz is 0.74. The appropriate earth station band factor for the 5.725-7.075 GHz band is calculated as 0.74 x 1/0.43 = 1.72.

Derivation of TES fees

A5.8 The proposed PES fee charging algorithm is used as a basis for calculating the appropriate fee for a TES. For simplicity, it is proposed to have three broad categories of TES licence according to different ranges of the product of the maximum power and bandwidth used by the TES. As shown in the table below, the fee for each category of terminal is calculated by substituting the appropriate values for β (28), Bf (1.0 for the 14-14.5 GHz band available to TES) and the product of maximum power and bandwidth into the PES fee algorithm. For category 1 and 2, the figure for P $\times$ BW used is 100 and 2,500 respectively. For a category 3 terminal, the figure for P $\times$ BW used is 23,400. This represents a likely maximum power supplied to the input of the antenna of 650 watts and a maximum modulated bandwidth of 36 MHz.

Table 21: TES licence charges

	F = P x BW	Derivation of fee per terminal	Proposed fee per terminal
Category 1	F ≤ 100	$28 \times 1.0 \times \sqrt{100} = £280$	£300
Category 2	100 > F ≤ 2,500	$28 \times 1.0 \times \sqrt{2{,}500} = £1{,}400$	£1,400
Category 3	F > 2,500	$28 \times 1.0 \times \sqrt{23{,}400} = £4{,}283$	£4,300

Annex 6

Example calculations of Satellite Earth Station fees

Example 1 - Satellite (Permanent Earth Station)

A6.1 Three permanent earth stations located within 500 metres of a specified site centre have the following characteristics:

A6.2 Earth station 1 has flexibility to operate two emission carriers of bandwidth 36 MHz and 8 MHz on a centre spot frequency of 14.20 GHz working to a single satellite. The maximum power into the antenna is 800 watts.

A6.3 Earth station 2 has flexibility to operate two emission carriers of bandwidth 192 kHz and 8.5 MHz anywhere over a transponder bandwidth of 72 MHz which is centred on 13.10 GHz to two separate satellites. The maximum power into the antenna is 300 watts.

A6.4 Earth station 3 has flexibility to operate three emission carriers of bandwidth 64 kHz, 3.5 MHz and 15 MHz anywhere over a frequency range of 500 MHz between 5,925 MHz and 6,425 MHz. The maximum power into the antenna is 200 watts.

A6.5 Using the existing fee algorithm, the licence charge would be:

$$Fee = \sqrt{433.4 \times \left[(800 \times 36 \times 0.5) + (300 \times 72 \times 1.0) + (300 \times 72 \times 1.0) + (200 \times 500 \times 1.0)\right]} = £8{,}265$$

A6.6 Using the new fee algorithm, the licence charge would be:

$$Fee = \left[28 \times 1.0 \times \sqrt{(800 \times 36) + (300 \times 72) + (300 \times 72)}\right] + \left[28 \times 1.72 \times \sqrt{200 \times 500}\right] = £22{,}743$$

A6.7 This is an increase of about 175%.

Example 2 - Satellite (Transportable Earth Station)

A6.8 Two transportable earth stations have the following characteristics:

A6.9 Earth station 1 operates with a maximum power of 60 watts and maximum bandwidth of 3.5 MHz in the 14 – 14.5 GHz band.

A6.10 Earth station 2 operates with a maximum power of 200 watts and maximum bandwidth of 36 MHz in the 14 – 14.5 GHz band.

A6.11 The product of power and bandwidth for earth station 1 is 60 x 3.5 = 210 which falls within the range applicable to a category 2 TES licence. The annual fee payable for earth station 1 according to the existing and new pricing method is as follows:

$$Existing\ Fee = £1{,}000$$
$$New\ Fee = £1{,}400$$

A6.12 This is an increase of 40%.

A6.13 The product of power and bandwidth for earth station 2 is 200 x 36 = 7200 which falls within the range applicable to a category 3 TES licence. The annual fee payable for earth station 2 according to the existing and new pricing method is as follows:

$$Existing\ Fee = £3{,}000$$
$$New\ Fee = £4{,}300$$

A6.14 This is an increase of about 43%.

Example 3 - Satellite (Earth station network)

A6.15 It is estimated that the number of terminals in a network is not expected to exceed 600 throughout the course of a year. 350 of these terminals operate with a maximum power of 2 watts and bandwidth of 300 kHz. The remaining 250 terminals operate with a maximum power of 3 watts and bandwidth of 3.6 MHz. All transmissions take place in the 14.0-14.25 GHz band.

A6.16 Using the existing fee algorithm, the licence charge would be:

$$Fee = \sqrt{433.4 \times \left[\left(350 \times 2 \times 0.300 \times 0.5\right) + \left(250 \times 3 \times 3.6 \times 0.5\right)\right]} = £794$$

A6.17 Using the proposed fee algorithm, the licence charge would be:

$$Fee = 28 \times 1.0 \times \sqrt{\left(350 \times 2 \times 0.300\right) + \left(250 \times 3 \times 3.6\right)} = £1{,}510$$

A6.18 This is an increase of about 90%.

Annex 7

Impact Analysis

Introduction

A7.1 This section of the document when read in conjunction with the rest of the Consultation document sets out an Impact Assessment (IA) as defined by section 7 of the Communications Act 2003. IAs provide a valuable way of assessing different options for regulation and justifying the decisions taken. They form part of best practice policy-making and are commonly used by regulators.

A7.2 Section 7 of the Communications Act 2003 sets out that Ofcom must 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. In accordance with this section, in producing the IA in this document, Ofcom has had regard to such general guidance as it considers appropriate, including Cabinet Office guidance. We have carefully considered all responses to the "Modifications to Spectrum Pricing consultation Document" ("the Consultation") issued on 15th July 2006 in coming to our final conclusions.

A7.3 Radio spectrum is an important asset to the UK economy. 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:

a) the extent to which the electro-magnetic spectrum is available for use;

b) present and future demand for use of that spectrum for wireless telegraphy;

c) the desirability of promoting:

i) efficient use and management of the electro magnetic spectrum;

ii) economic and other benefits arising from the use of wireless telegraphy;

iii) the development of innovative services; and

iv) competition in the provision of electronic communications services.

A7.4 In order to encourage the efficient use of spectrum, Ofcom is increasingly relying on market forces and market mechanisms such as auctions and trading. In addition, Ofcom believes that efficiency can be promoted by setting spectrum fees with desirable incentive properties.

A7.5 Within this general background, in the Consultation document, Ofcom made a series of proposals to:

a) rationalise the structure of some licence classes;

b) ensure that spectrum management costs are met; and

c) encourage the efficient use of spectrum by charging fees that reflect the opportunity cost of the spectrum.

Identification and assessment of options and the impacts on stakeholders

Business Radio

A7.6 Ofcom is proposing to make changes to the pricing structures for Business Radio to support the replacement of 21 current licence classes with three licence classes and five licence products:

- Business Radio Technically Assigned Licence Class. The proposed fee will take into account where a transmitter is sited, the typical coverage from a transmitter operating at certain powers and will reference population tables reflecting such factors (except for the less popular bands where there will be a lower single rate fee);

- Business Radio Area Defined Licence Class – the proposed fee will use predefined boundary areas derived by dividing the UK into trading units to apportion the national channel rate by population, and will also reflect harmonisation of the fee rate used. For less popular bands there will be fee reductions;

- Business Radio Light licence class – the proposed simple 5 year fee will be based on the cost to Ofcom of managing the spectrum

Table 22: Business Radio Technically Assigned Licence Class

Option	Benefits	Costs/risks
Licensee will be charged differential rates depending on location of transmitter and its power and antenna height (affecting radio coverage) • Population density is used as a proxy for value of spectrum • Transmitter power (ERP) and antenna height used as a proxy for coverage • The less popular bands	Improves efficiency in use by ensuring that users pay a fee based on their valuation of the spectrum. This is also a technology neutral approach. Demand for Business Radio applications is highly correlated with population density and the use of this measure is likely to provide the closest approximation to a true valuation and provides incentives for efficient use. Simpler and transparent – allows fees to be generated from data held in the licence schedule (power, antenna height, frequency , location and assignment type)	By removing the technology restriction and the impact of the corresponding pricing, some technologies currently in use may have to give way to those that can generate higher value. It may underestimate the true value of spectrum use in some low population areas (for eg, motorways etc).

will be charged at a single lower rate	Supports trading by having consistent conditions applied at a local level. The lower fees for the less popular bands should help encourage more use of bands where there is available capacity	

Table 23: Business Radio Area Defined Licence Class

Option	Benefits	Costs/risks
UK to be divided into trading units of 50 × 50 km • population in each trading unit based on three categories • fee for each trading unit based on apportionment of national harmonised rate for % of recorded population within each trading unit in a category.	Allows geographical categorisation within which licences can be assigned on an exclusive basis and for business user base. Simplifies the calculation of the licence fees on the broad basis of the types of uses that might serve such population segments. Also allows such units to be traded in future. Is in keeping with Indepen's recommendation and Ofcom's own spectrum pricing proposals and signals transparency in setting of fees. Simple and provides licensees with information of value of spectrum to be traded. The fee reductions for the less popular bands should help encourage more efficient use of these bands.	Population categories may be considered too broad to meaningfully capture the value to the user – for example, new technologies with limited initial coverage may pay a lower fee than may be justifiable from an efficiency perspective based on the value of the business and the willingness to pay. This may result in inefficient use of spectrum. But these effects may be minimised by the impact of introducing opportunities for trading.

Table 24: Business Radio Light Licence Class

Option	Benefits	Costs/risks
Charge a 5 year flat fee to reflect Ofcom's costs of managing spectrum.	Easier compliance and cheaper licences. Simpler for Ofcom to administer.	Risk that less contact with licensees may result in database containing less accurate data. 5 years renewal period is a

		judgement aimed at getting the right balance.

A7.7 The impact on different users of Business Radio spectrum is as follows:

Business Radio Technically Assigned licence class

A7.8 The impact on the current licensees in this licence class is as follow:

- for 72% of licences fees will not change, or will decrease;
- for 21.5% of licences, the annual licence fee will increase, but will not exceed £150 per annum;
- for 6.5% of licences, fees will increase by more than this, in some cases by more than 100%.

A7.9 Although some current licence users are likely to face an increase in licence fees, and some substantially so, a significant proportion of licensees will face no increases in fees or benefit from a decrease. The overall impact is the same amount of total fees collected by Ofcom. Given that the increase in fees for some licensees reflects the congestion factor or the coverage, Ofcom believes that the fee changes will better reflect the opportunity cost of the spectrum and therefore enhance efficiency of use of the spectrum. Those licensees facing bigger increases may want to re-examine their coverage requirements or consider opting for shared status. These and a number of other possible mitigation measures are discussed in Annex 5 of the Business Radio Trading and Liberalisation statement. Some Business Radio users may have more than one assignment and in these cases, it is possible that the fee increases for some of their assignments will be offset by fee reductions for others.

A7.10 On balance therefore, Ofcom is of the view that the fee changes carry more benefits to users than the costs.

Business Radio Area Defined licence class

A7.11 The impact on the current channels associated with this licence class is as follows;

- for 60% of channel fees will not change, or will decrease.
- for 23 % of channel fees will increase by up to 8%;
- for 17 % of channel fees will increase by up to 25 %.

Business Radio Light licence class

A7.12 All current licensees within the existing classes that will transfer into the proposed Light licence class will benefit from a reduction in fees and from fees being collected less often.

Summary

A7.13 Ofcom believes that revising the current approach to Business Radio fees is necessary for several reasons:

- to enable the licensing changes whereby 21 licence products are to be collapsed into 5 new licence products;
- to help to rationalise fees across the Business Radio sector and make them more intrinsically flexible, efficient and service neutral;
- to encourage efficiency by providing incentives to ensure spectrum users face the opportunity cost of spectrum they seek to use, in particular with respect to:
  - using congested bands; and
  - to promote incentives for spectrum trading.

Satellite

A7.14 The impact assessment of the revision of earth station fees considered three options:

- Revising the current fee structures for earth station licensing in order to align them with the recent revisions to Fixed Link fees, thus reflecting the opportunity cost of the spectrum;
- Retaining the status quo with no regulatory intervention; and
- Fee exemption for all earth stations.

A7.15 The following table analyses the options, the benefits, costs and risks and mitigating measures associated with these three proposals.

Table 25: Satellite impact analysis

Option	Benefits	Costs/risks
To revise the licence fees in line with Fixed Link fee revisions	Ofcom recovers spectrum management costs Consistency of AIP for users sharing the same spectrum Creation of efficient incentives for the use of spectrum and for spectrum trading when available (the Spectrum trading Consultation indicated that trading for satellite services is to become available in 2007, although it is not yet decided when or how trading might be introduced for satellite service licences).	Financial impact to industry: analysis of the impact to earth station licence fees shows on average a ratio increase of 150% across the whole sector.
To retain the status quo	Industry see no change in fee appropriation	Fees do not reflect opportunity cost - conflicts with AIP principles and does not promote efficient use of

		the spectrum Does not promote efficient incentives for spectrum trading Ofcom fails to recover spectrum management costs.
To licence exempt earth stations	No financial costs to industry Can promote availability and access to communications services – particularly in the case of ubiquitous, low power earth stations.	Fees do not reflect opportunity cost of the spectrum. Does not promote efficient use of the spectrum conflicting with AIP principles. Ofcom needs to coordinate Satellite Earth Stations to ensure against interference between licensees, particularly other types of fixed service users. National coordination and site clearance still required for many earth stations. Ofcom is nevertheless trying to get government agreement to reduce the restrictions for requiring site clearance and if successful this could lead to more deregulation or exemption of certain types of earth station licensing requirements.

A7.16 Ofcom believes that revising the current approach to earth station fees is necessary for several reasons:

- to enable Ofcom to recover its costs relating to satellite services spectrum management functions;
- to encourage allocative efficiency by providing the incentive for ensuring spectrum users face the opportunity cost of spectrum they seek to use, in particular with respect to Fixed Links, upon which the opportunity fees for earth stations are based;
- to encourage productive efficiency by reflecting the cost of using the spectrum to other users and creating efficiency in spectrum use to minimise costs for a given level of productive output; and

- to encourage dynamic efficiency by re-aligning market prices with recent amendments to the fees applied to Fixed Links.

PMSE

A7.17 Ofcom is proposing to increase PMSE spectrum fees as specified in Annex 10 of the Consultation document. The increase is necessary in order to allow Ofcom to recover the costs of managing PMSE spectrum. In the Consultation, Ofcom proposed that the increase should be higher for annual licences in high-demand frequency ranges. This is expected to improve the efficiency of spectrum use and provides an option for many users to mitigate the increases.

A7.18 The impact assessment of the revision of PMSE fees has considered three options:

- revising the current fees;
- increasing all current fees by the same percentage;
- retaining the current fees.

Table 26: Business Radio Technically Assigned Licence Class

Option	Benefits	Costs/risks
To increase the fees as detailed in Annex 10 of the Consultation document.	Fees would reflect the cost of managing PMSE spectrum. The increase would allow Ofcom to recover PMSE spectrum management costs. The differential increase will allow keep fees for temporary use below the average level. In the congested 65 – 470 MHz band, the differential increase would provide users with a stronger incentive to consider the requirement of an exclusive annual licence.	The increase for exclusive annual licences in the 65 – 470 MHz frequency range is higher than the average fee increase. PMSE users will incur additional costs. However, the increase for small users, and especially for users of low-power applications is minimal. Risk that the level of costs recovered may be excessive. However, costs can be precisely identified since Ofcom uses a contractor as band manager. Risk that users of spectrum in congested areas will not face the opportunity cost of the spectrum they use and therefore may use spectrum inefficiently.
To increase all PMSE fees by the same proportion.	Fees would reflect the cost of managing PMSE spectrum. The increase would allow Ofcom to recover its full administrative spectrum	Occasional users would have to pay higher fees. Risk that the level of costs recovered may be excessive. However, costs can be

	management costs. Exclusive annual licences would be subject to a lower fee increase.	precisely identified since Ofcom uses a contractor as band manager. Risk that users of spectrum in congested areas do not face the opportunity cost of the spectrum they use and therefore may use spectrum inefficiently.
To apply AIP to PMSE spectrum in demand from other services.	PMSE users would face the opportunity cost of the spectrum they intend to use, which would promote economic efficiency	Ofcom is considering how PMSE bands should be managed in the longer term. Consideration of the introduction of AIP would be better undertaken in that context. Introducing AIP would increase the costs of the industry. If there is no viable alternative to spectrum for PMSE users, broadcasting and other output may be impaired. If there is no viable alternative demand for PMSE spectrum, given the constraints placed on its usage, the efficiency foregone will be small.
To retain current fees.	Licensees would not incur additional costs.	PMSE licence fees would not be sufficient to cover PMSE spectrum management costs.

Other changes

Table 27: Fixed links

Option	Benefits	Costs/risks
To financially reward surrender of links if prenotified.	Licensees will be encouraged to surrender their licences when they are no longer required. This will enable the spectrum to be quickly re-assigned and thus will improve the efficiency of spectrum use in the band.	Since licensees anticipate that they will be able to surrender links, demand for annual licences may increase.

To retain the status quo.		Licensees do not have incentives to surrender spectrum that they no longer require.

Table 28: Community Radio

Option	Benefits	Costs/risks
To charge a flat fee of £250 per annum.	Most Community Radio broadcasters will pay less than they are currently paying. The fee structure for Community Radio licences would be greatly simplified. Community radio services in urban areas would not be charged disproportionately more for their WT Act licences than services in non-urban areas.	Risk that the level of fees will not be sufficient to recover relevant spectrum management cost. If fees do not reflect costs, inefficient demand for Community Radio licences could be encouraged.
To retain current fees.	Ofcom may recover a larger proportion of spectrum management costs.	Community radio services in urban areas may be charged disproportionately more for their WT Act licences than services in non-urban areas.

Table 29: Fee payment mechanisms

Option	Benefits	Costs/risks
Encourage payment by direct debit	Licensees will pay by credit card or direct debit thereby reducing the costs of processing the application and speeding up the process. Ofcom would not have to incur the cost of not having to handle payments by cash or postal orders.	There is the risk that some users may not be able to pay by cheque, credit or debit card.
Discourage payments by cash or postal orders in the future.	Ofcom would not have to bear the costs of handling these forms of payment.	Risk that some users may not easily pay licence fees by other means.

Table 30: Other changes

Option	Benefits	Costs/risks
Extension of fees for network licences for the Channel Isles and Isle of Man.	Licensees for additional public communication services in the islands to benefit from services similar to those on the mainland, including 5 year fee for Fixed Wireless use.	Have consulted Island providers to ensue this aims to meet needs on a consistent basis as far as practicable.
Addition of new fee scale for scientific uses and ground probing radar	New simple licensing fee to reflect costs of light licensing	Fees may encourage unlicensed use, but designed to minimise this by providing 5 year fee.
Coastal Station Radio (Training School) licences	Amended fees to reflect the new Ship Radio fee (£20 for lifetime licences- assuming these will initially be paper based licences). Simplified and more equitable fee structure when compared with ships' radio licensing.	Introduction of a lifetime licence will reduce costs for licensees and long term administrative costs for Ofcom. Risk that licence records are not kept up to date.

Conclusion

A7.19 This Impact Assessment developed the analysis of the impact of the proposals put forward in this consultation only in qualitative terms since in general the quantification of the benefits and costs of each proposal has not been possible.

A7.20 Nevertheless, Ofcom is satisfied that the qualitative analysis undertaken shows that the benefits of its proposals outweigh the costs and that the net benefits of its decisions in relation to the proposals appear greater than those of the alternative options considered.

A7.21 Ofcom has decided to introduce the majority of its proposals unchanged. Licence charges in relation to Business Radio will increase in some areas in order to better reflect spectrum value. Satellite earth station charges will increase in order to reflect the level of opportunity cost identified for the spectrum. PMSE licence charges will increase by 20% overall to recover the cost of managing the spectrum. A number of other changes will be implemented as explained in the Consultation document.

A7.22 In particular, the decisions explained in this statement are expected to;

- enable Ofcom to recover its costs;
- encourage efficiency by ensuring that spectrum users face the opportunity cost of the spectrum they intend to use;
- promote incentives for spectrum trading; and

- simplify the structure of licence fees where possible.

Annex 8

Glossary

AIP
Administered Incentive Pricing or spectrum pricing: fees charged for access to spectrum to reflect its value. AIP applies in bands for which significant demand exists for that spectrum either in its current use, or for an alternative radio service, and acts as an incentive to users to use their spectrum as efficiently as possible. AIP is currently set at a level which reflects the value of the spectrum to the user using a methodology reviewed by NERA and Smith System in July 1998, available at: http://www.ofcom.org.uk/static/archive/ra/topics/spectrum-price/documents/spec_rev/ha129.doc

A further study to review spectrum pricing, undertaken by Indepen, Aegis, and Warwick Business School, was published in February 2004. It can be found at: http://www.ofcom.org.uk/research/radiocomms/reports/independent_review/

agl
above ground level

Antenna
A passive device designed to radiate and receive electromagnetic energy.

Assignment
Authorisation given by a licensing authority for a radio station to use a specific radio frequency or 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.

Common Base Stations
A single channel base station for BR shared by users (also known as a community repeater); or a PBR installation giving wide area coverage under the control of one or more operators offering mobile communications on a commercial basis to a number of independent (usually business) users.

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

ERP
Effective Radiated Power.

ETSI
European Telecommunications Standards Institute.

GHz
Gigahertz, a frequency of one thousand million Hertz (cycles per second).

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.

IR: Interface requirements
In accordance with Articles 4.1 and 7.2 of the R&TTE Directive, UK Radio Interface Requirements (RIRs or IRs) set out the relevant high-level assignment, frequency occupation rules and planning assumptions for licensed equipment. They are referenced in Exemption Regulations and licences.

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
KiloHertz, a frequency of one thousand Hertz (cycles per second).

Liberalisation
Removal of restriction on use of spectrum (eg technology employed or service provided) including change of geographical coverage, power or frequency bandwidth occupied.

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, for example On Site BR with 26,000 licensees.

Licence exempt
Under regulations made previously by the Secretary of State and now by Ofcom, some types of radio equipment are exempted from the requirement for a licence. The current regulations, the Wireless Telegraphy (Exemption) Regulations 2003 (SI 2003 No. 74), are available at: http://www.legislation.hmso.gov.uk/si/si2003/20030074.htm

MASTS
Mobile Assignment Technical System, an electronic assignment system currently under development for Ofcom and planned to enter service in 2007.

MHz
MegaHertz, a frequency of one million Hertz (cycles per second).

Ofcom
Office of Communications, responsible for spectrum management in the UK and international representation since 29 December 2003.

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.

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

Reconfiguration
The redefinition of a right to use spectrum, for example, by separating one licence into two or amalgamating two licences which are adjacent in terms of geography or frequency.

Remote meter reading
The reading of meters from a distance using radio.

Safety of life services
Services provided by organisations who use radio spectrum to protect the lives of individuals, such as the emergency services.

Site Clearance
Permission to install or operate a radio transmitter at a particular site.

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

Spectrum Licensing Portal
This System provides a range of information about spectrum licences and authorisations that is useful to spectrum users and in particular those interested in Spectrum Trading and Ofcom's other initiatives for liberalising the use of the radio spectrum, available at:
http://www.ofcom.org.uk/radiocomms/isu/ukpfa/intro

Telemetry
Transmission of data by radio for remotely indicating or recording measurements.

Trunked radio
A system in which users share or pool a number of radio channels. Frequencies are distributed by the system according to demand and traffic levels. Trunking can enhance spectrum efficiency in some circumstances.

Undue interference
Interference that is harmful, defined by section 183 Communications Act 2003 to include interference that creates dangers or risks to the functioning of any radio communications service used for navigation or safety, or that degrades, obstructs or repeatedly interrupts broadcasting or other radio communications.

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

WT Acts

Wireless Telegraphy Acts 1949, 1967 and 1998 as amended by the Communications Act and due to be replaced on 8 February 2007 by the Wireless Telegraphy Act 2006. They regulate use of UK radio spectrum.

WT Act licences
Licences issued under the Wireless Telegraphy Act 1949 (as amended).

WT Register
Part of the licensing system portal system which provide basic information about individual licences such as contact names and address details, class of licence, band(s) of frequencies and where relevant geographic area of operation. At present information is limited to the classes that became tradable in December 2004, available at:
http://www.ofcom.org.uk/radiocomms/isu/ukpfa/intro