



A Statement on Spectrum Liberalisation

Implementation in 2005

Statement

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Section 1

Summary

- 1.1 This Statement presents Ofcom's conclusions on spectrum liberalisation following a public consultation published on 17 September 2004 and available at [Ofcom Website | Spectrum liberalisation](#). It focuses on plans for 2005. Liberalisation beyond then is the subject of separate consultation on the Spectrum Framework Review and associated Implementation Plan, available at <http://www.ofcom.org.uk/consult/condocs/>.
- 1.2 Ofcom's proposals received general support. Ofcom has therefore decided to proceed with the first phase of liberalisation across a range of licence classes in the Business Radio (BR), Fixed Wireless Access (FWA) and Fixed Links (FL) sectors from the publication of this statement. This first phase represents a significant step forward but we recognise the need to go further if we are to reap the full benefits of liberalisation. We remain committed to early progress to make liberalisation broader and deeper by extending it to other licence classes and making licences more generically flexible. This next stage will begin later this year when we begin to introduce our new advanced spectrum planning tool.
- 1.3 Guidance on the technical parameters that will be applied and the procedures Ofcom will follow in applying liberalisation are being published separately at http://www.ofcom.org.uk/licensing_numbering/radiocomms/trading/libguide/?a=87101

What is liberalisation?

- 1.4 Radio spectrum is a resource of considerable importance and value. A wide range of applications – commercial, public safety, national security, cultural, social and scientific – depend on access to spectrum. It is crucial that the spectrum is managed effectively to meet these demands.
- 1.5 In the past, this tended to be done by specifying – often in considerable detail – how spectrum should be used. Licences issued under the Wireless Telegraphy Act 1949 stipulate the use to which the spectrum can be put and the technology that can be deployed. This is often referred to as 'command & control'. Given the pace of change and growing demand for spectrum, this way of managing spectrum is no longer sustainable. Liberalisation is the removal and reduction of restrictions on spectrum use.

Liberalisation will benefit citizen-consumers

- 1.6 Ofcom expects that spectrum liberalisation and trading will make it easier for entrepreneurs and innovators to enter the market, deploy new technologies and applications, and compete with existing players; they will make it easier for spectrum to migrate from relatively low value uses to higher value ones. This is a key part of Ofcom's Spectrum Vision for moving away from 'command & control' in spectrum management towards market mechanisms.
- 1.7 Those engaged in using spectrum to provide services generally have better information than a central regulator about the value of their service to consumers and are better placed to decide how to use spectrum efficiently to provide it. Liberalisation empowers them to take more decisions themselves on how to use spectrum. This complements other elements of Ofcom's

strategy to make more use of market mechanisms: *spectrum trading*, which allows spectrum to be bought and sold in the same way as other goods, and *incentive pricing*, which provides incentives for efficient use by setting licence fees to reflect the value of spectrum.

Two ways of liberalising spectrum

- 1.8 Ofcom has identified two ways of liberalising spectrum. The first involves requests from licensees to Ofcom to vary wireless telegraphy licences individually to reduce or remove restrictions. The second involves Ofcom changing licences generically to make them less usage and technology specific.
- 1.9 Of these two mechanisms, the first allows Ofcom to exercise control over interference (and other issues) on a case-by-case basis and to minimise the risk of unacceptable interference. However, licensees (and the industry more generally) will not have certainty about what will be permitted until Ofcom has given its consent to a specific change. This mechanism is also administratively burdensome.
- 1.10 The second mechanism is superior to the first in that it provides more certainty and is less burdensome administratively. However, implementation is more challenging as spectrum usage rights need to be defined generically in a way that is more technology and usage neutral while maintaining the necessary degree of control over interference.
- 1.11 Ofcom plans to begin with individual variation and then moving to more generic flexibility later in 2005 when a new advanced assignment tool is expected to enter service. In time, Ofcom hopes to undertake a more radical redefinition of spectrum rights and is consulting on this in the Spectrum Framework Review.
- 1.12 Under our proposals, licensees will also have additional flexibility to negotiate between themselves changes to technical parameters. For example, a licensee wishing to increase transmitter power could negotiate with neighbours to accept the higher emissions that would result. The licensees would then apply to Ofcom for a licence variation to reflect their agreement.

There will be effective safeguards against interference

- 1.13 Ofcom recognises that removing restrictions has the potential to lead to an increase in interference that could destroy the value of spectrum. We will remain actively engaged in interference investigation and vigilant against this risk. Our objective, which our proposals are designed to achieve, is to maintain sufficient control to prevent undue interference and meet other objectives and obligations while allowing as much flexibility as possible.
- 1.14 Ofcom will apply spectrum quality benchmarks (SQBs) as a key criterion in deciding whether or not to agree to a requested licence variation. SQBs will be based on existing technical frequency assignment criteria (TFAC) or, for some services, on existing coordination requirements. Consequently, liberalisation should not cause spectrum quality to reduce below the level allowed for in Ofcom's existing metrics for spectrum use.
- 1.15 However, we cannot give a guarantee that we will never allow any variation that reduces spectrum quality below a benchmark. We believe the

arrangements we are putting in place strike a fair and reasonable balance between flexibility and certainty, especially given our commitment to be vigilant in investigating interference and taking appropriate enforcement action where necessary.

How liberalisation will be rolled out

1.16 The first phase of liberalisation in early 2005 will involve individual licence variation. Later in 2005, with the introduction of an advanced assignment tool, we plan to move towards making BR licences more intrinsically flexible. We will provide more information about this in due course and seek views of interested parties. Ofcom has also made certain proposals to extend liberalisation and introduce more radical reforms to make licences more flexible and technology-neutral. For the most part, these would come into effect after 2005. Ofcom's Spectrum Framework Review and associated Implementation Plan give further details. This programme is summarised in the following table.

Phasing and timescale	Liberalisation	Comment
Phase 1: early 2005	Any change of licence class by licence variation between the following licence classes within each of the following sectors: <ul style="list-style-type: none"> • BR sector: analogue PAMR, Data Networks, National Paging, National and Regional PBR classes • FWA sector (all classes) • FL sector (all classes) Other proposals welcome <ul style="list-style-type: none"> • But it may take longer to assess whether they will cause excessive interference to other legitimate users 	Introduced immediately from publication of this Statement. Guidance being published in parallel with this Statement.
Phase 2: late 2005	Greater flexibility in BR within fewer but broader licence classes <ul style="list-style-type: none"> • Extend liberalisation to wide-area PBR and CBS 	Additional liberalisation to be introduced when new assignment tool is operational and following further consultation
Phase 3: beyond 2005	<ul style="list-style-type: none"> • Change within 2G/3G bands • Change to 3G use in bands other than those allocated to 3G • Change to mobile in FWA bands 	Under consideration in consultation on SFR:IP
	<ul style="list-style-type: none"> • Radical reform of licences to be technology-neutral and flexible 	Under consideration in consultation on SFR

Section 2

Background

Ofcom's approach to managing the radio spectrum

- 2.1 This Statement is one of a series of documents setting out Ofcom's new approach to management of the radio spectrum and follows a public consultation published on 17 September 2004. This section sets out Ofcom's approach to spectrum management and liberalisation. Following sections give Ofcom's response to the comments that were received and conclusions.
 - 2.2 Radio spectrum is a key raw material for communications sector. The new approach to managing spectrum is intended to promote innovation and competition in wireless services across the UK by responding more quickly to technological and market change, and so to maximise the benefits derived from spectrum. Consumers, equipment manufacturers and network operators all stand to gain.
 - 2.3 Ofcom's overall vision for spectrum management is set out in the Spectrum Framework Review (SFR), which was published on 23 November 2004.
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The Ofcom Spectrum Vision

1. Spectrum should be free of technology and usage constraints as far as possible. Policy constraints should only be used where they are justified.
 2. It should be simple and transparent for licence holders to change the ownership and use of spectrum.
 3. Rights of spectrum users should be clearly defined and users should feel comfortable that they will not be changed without good cause.
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- 2.4 The SFR seeks views on the balance between three models for spectrum management:
 - *'command & control'*, in which the regulator plans and controls in detail how spectrum is used, specifying which frequencies are reserved for which applications;
 - *market forces*, in which such decisions are devolved to users through auctions, trading and incentive pricing with a minimum of restrictions on spectrum use; and
 - *licence exemption*, in which users have free access to spectrum although normally subject to restrictions, for example on power output.
- 2.5 It also contains proposals for a radical redefinition of licences to make them technology-neutral with a minimum of technical restrictions. In parallel, Ofcom is consulting on a Spectrum Framework Review: Implementation Plan (SFR:IP), published on 13 January 2005, which makes proposals to extend liberalisation in various frequency bands suitable for mobile and broadband services,

including 2G, 3G and FWA at 3.4 and 3.6 GHz. The SFR:IP is available electronically at [Ofcom Website | Spectrum Framework Review: Implementation plan](#).

2.6 To achieve its vision, Ofcom is taking forward reform through three interrelated projects. These are:

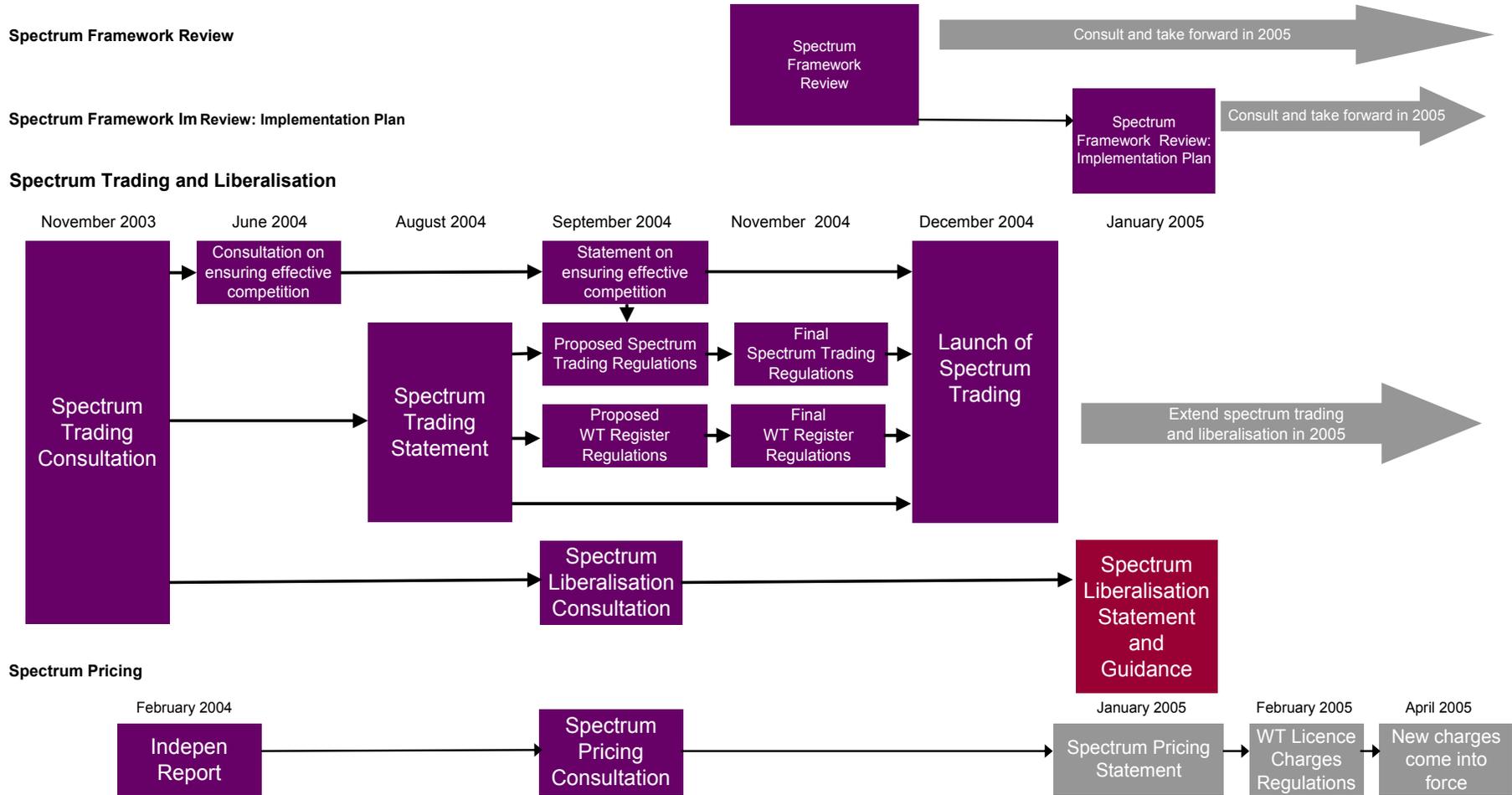
- *spectrum trading* – mechanisms for allowing spectrum to change hands;
- *spectrum liberalisation* – removal or reduction of restrictions on spectrum use;
- *spectrum pricing* – updating annual fees for spectrum not acquired through auction.

2.7 This Statement concerns *liberalisation*. This is the term used to denote the removal or reduction of restrictions on the use of radio spectrum.

2.8 Ofcom's approach to trading and incentive pricing is set out in a series of complementary documents as illustrated in the following chart. This Statement should be read in particular in conjunction with the consultation document on *Spectrum Liberalisation* at [Ofcom Website | Spectrum liberalisation](#) and with Ofcom's statement on *Spectrum Trading: Implementation in 2004 and Beyond* published on 6 August 2004 at [Ofcom Website | A Statement on Spectrum Trading](#), which sets out Ofcom's policy on a number of important and related issues, including licence terms and periods of notice.

2.9 The relationship between the various workstreams is illustrated in the following chart.

Spectrum Strategy : Ofcom Roadmap of Activities



Reasons for spectrum liberalisation

- 2.10 The radio spectrum is a finite resource of considerable economic and social value. Ofcom has statutory duties under the Communications Act 2003 to further the interests of citizen-consumers in relation to communications matters, to further the interests of consumers in relevant markets, where appropriate by promoting competition, and to secure optimal use of the radio spectrum. In exercising its spectrum functions, Ofcom must have regard to the availability of spectrum to meet current and future demand from all users and to the desirability of promoting efficient management and use, economic and other benefits, innovation and competition.
- 2.11 Use of spectrum is authorised by licensing installation or use of radio equipment under the Wireless Telegraphy Act 1949. Historically, these licences have tended to impose restrictions on how spectrum is to be used, for example on:
- the application to which the spectrum is to be put, eg mobile, point-to-point terrestrial links and type of business;
 - use to be made of the spectrum;
 - technology to be employed;
 - transmitter power and location and antenna height;
 - frequency and bandwidth.
- 2.12 Some restrictions are necessary to prevent harmful interference that would destroy the value of spectrum for users. Others are imposed to ensure compliance with international obligations or to secure wider public policy objectives.
- 2.13 In accordance with the policy articulated in its Spectrum Vision, Ofcom intends where possible to move away from 'command & control' to market-based mechanisms, including trading and liberalisation, that empower spectrum users to take more decisions on spectrum. Ofcom believes that this is more likely than 'command & control' to lead to optimal use of the radio spectrum. Generally speaking, the market is considered to be better than regulation at distributing a limited resource like spectrum to achieve maximum benefits because:
- users themselves have better knowledge than a central regulator can have of their own costs and preferences and strong incentives to respond to market signals to use spectrum efficiently;
 - the market is better than regulation at directing spectrum to the application that generates greatest economic benefit and provides a mechanism for spectrum to flow from lower to higher value uses;
 - market forces can react faster than regulation to redistribute spectrum to higher value uses as technology and consumer preferences change and make it available for innovation;
 - the disciplined pluralism of the market promotes innovation and efficiency. New ideas can be tried and only the successful survive.

2.14 Liberalisation, the removal or reduction of restrictions, is central to the move towards market mechanisms. Together with incentive pricing, auctions and spectrum trading, it makes spectrum available on a more flexible and dynamic basis for new wireless applications. It is also consistent with Ofcom's aim to operate as a 'light touch' regulator with a bias against intervention, deregulating or simplifying regulation wherever possible.

2.15 In particular, Ofcom believes that liberalisation will contribute towards a number of objectives.

- *Optimal spectrum use:* liberalisation will improve the efficiency of spectrum management and use. Markets are in general considered to be better than regulators at allocating finite resources such as spectrum to achieve optimal use. Those directly engaged in the market have better information about the value of alternative applications and have a commercial incentive to make decisions that will generate benefits for themselves and their customers. Markets can also respond to changing circumstances more dynamically than regulation. Combined with the incentives provided by spectrum trading and pricing, liberalisation provides the means to empower spectrum users to adopt new services and technology and to have stronger commercial incentives to utilise spectrum rights as efficiently as possible and release spectrum for higher value applications.

- *Economic benefits.* Liberalisation will deliver substantial economic benefits, especially when combined with spectrum trading. Businesses will have greater scope to use spectrum for higher value applications or to sell it in the market to those that can use it better. Increased innovation and competition will drive benefits for consumers (see below) and make the UK communications market more competitive and dynamic. A report produced for the European Commission in May 2004 (available electronically at:

http://europa.eu.int/information_society/topics/radio_spectrum/highlights/what_new/index_en.htm)

estimates that the annual benefits to the European Union of introducing liberalisation and trading would amount to around €9bn whereas those from trading alone would be just 10% of that amount. The study also estimates that the additional costs of liberalisation, for example in terms of additional interference coordination, would amount to just €100m a year, far smaller than the potential benefits.

- *Innovation and competition.* Free from unnecessary restrictions, entrepreneurs will have increased scope to use spectrum in different ways to introduce innovative services and technologies. Shortage of spectrum can act as a significant barrier to entry and innovation in the wireless communication market. Liberalisation combined with trading will reduce this barrier. Entrepreneurs will gain easier and faster access to spectrum, accelerating innovation, promoting competition and benefiting consumers.
- *Light-touch regulation.* Liberalisation will progressively remove restrictions that in Ofcom's view have become unnecessary or disproportionate. Ofcom's approach to spectrum liberalisation reflects its view that the very prescriptive regime historically imposed by spectrum managers is no longer appropriate, given the benefits of market-based tools such as trading. Ofcom also considers that the removal or reduction of unnecessary

restrictions is consistent with its wider duty to keep regulatory burdens to a minimum.

- 2.16 Ofcom intends to apply liberalisation principles also to new licence products. When granting these, whether by auction or otherwise, we will consider the extent to which it is possible, given our legal duties and international obligations, to avoid imposing restrictions that are prescriptive of technology, service or use.

Effective safeguards against interference

- 2.17 As the consultation acknowledged, reduction or removal of restrictions could increase the risk of interference. The consultation set out Ofcom's plans for a framework of effective and proportionate regulation to guard against this risk by:

- requiring prior clearance of requests for individual licence variations;
- using spectrum quality benchmarks based on current spectrum planning assumptions. These will be used in assessing requests for licence variations and investigating and resolving interference. Ofcom would not normally expect to grant a request to vary a licence if the change would reduce the estimated spectrum quality of neighbouring assignments below their benchmark level.
- phasing liberalisation so that experience can be gained before proceeding further;
- delaying the introduction of more flexible licences in the business radio sector until an advanced spectrum planning and assignment tool, known as MASTS, is available to plan assignments more effectively.

- 2.18 The consultation made clear that Ofcom has no intention of allowing an interference free-for-all to develop and would continue to investigate and resolve interference, although users would be expected to assume greater responsibility for planning their use of spectrum in accordance with the enhanced freedom that liberalisation would give them.

- 2.19 The consultation also explained the other constraints within which liberalisation would operate, including obligations under international law or to meet European commitments, Ofcom's statutory duties under the Communications Act 2003, any directions from the Secretary of State, general principles of administrative law and the existence of any domestic policy objectives that might make it necessary to delay liberalisation, although these would be exceptional and likely to be transitional in nature.

- 2.20 This Statement sets out Ofcom's conclusions on spectrum liberalisation following the consultation. We are publishing separately practical user guidance on the liberalisation process at http://www.ofcom.org.uk/licensing_numbering/radiocomms/trading/libguide/?a=87101.

Summary

2.21 This section recaps how liberalisation fits into Ofcom's broader spectrum vision and will support Ofcom's duties and objectives. It also outlines safeguards against risk of increased interference. In the following sections, we analyse the response to the consultation and present Ofcom's conclusions.

Section 3

Introducing liberalisation

Ofcom's approach to liberalisation

3.1 This section gives an overview of the responses and Ofcom's conclusions on some key aspects of liberalisation. Section 4 provides a more detailed summary in tabular form. Non-confidential responses have been placed on Ofcom's website at [Ofcom Website | Responses](#).

Overview

3.2 Thirty-five responses were received from a wide variety of respondents (listed in Annex 3). There was broad agreement on the potential benefits of liberalisation and the direction of policy towards greater liberalisation, although there were a number of concerns on particular aspects of implementation and two responses expressed more fundamental reservations about the general approach.

3.3 The great majority supported Ofcom's proposals, which were described as a steady and pragmatic approach to the complex issues associated with liberalisation that strikes a reasonable balance between the demands of spectrum users desiring more spectrum and the concerns of incumbents. Others, while commenting that the initial proposals were relatively cautious and that the opportunities would be correspondingly limited, accepted the reasons for caution but added that further reforms should follow fairly soon and that it would be important for Ofcom to consider innovative proposals for change of use in a fair and transparent manner.

3.4 Most respondents agreed that the proposed safeguards against interference are realistic, workable and likely to be effective.

3.5 A number of responses made useful suggestions for improving the procedure for considering requests for licence variations. We have considered these carefully and taken several of them on board. They will be reflected in the guidance on liberalisation that we are publishing.

3.6 In view of the overall support for Ofcom's liberalisation proposals, we intend to proceed with the phased implementation of liberalisation as proposed in the consultation document and summarised in Annex 1. Phase 1 involving individual licence variations will commence from the date of publication of this Statement.

3.7 Ofcom also reaffirms its commitment to further reform to make licences more generically flexible so that licensees have greater freedom to change use without applying for a variation. This will be taken forward later in phase 2 in late 2005 in the Business Radio (BR) sector. Beyond that, Ofcom has outlined in the SFR its proposals for more radical changes to licences; and the SFR:IP presents proposals for extending liberalisation for mobile services.

Costs and benefits of liberalisation

- 3.8 A few respondents queried Ofcom's regulatory impact assessment (RIA) on the grounds that it overstated the benefits, understated the costs, in particular the risk of loss of benefits of spectrum harmonisation, and failed to take account of all relevant factors.
- 3.9 We have carefully analysed and considered the points made in relation to the RIA. Although there are undeniably uncertainties in the estimates of costs and benefits, the difference between the two is so large that it seems improbable that the costs would exceed benefits, especially given the steps Ofcom will be putting in place to mitigate the risks as explained in this Statement. These include the need for prior Ofcom approval in phase 1 and use of SQBs based on current planning criteria.
- 3.10 Some respondents suggested that liberalisation might in some cases result in loss of benefits of harmonisation. This is a factor Ofcom would take into account in deciding whether or not to proceed with liberalisation in particular cases and this assessment will include any potential network externalities. But evidence suggests that industry is itself able to coordinate standard-making activity to secure the benefits of harmonisation without the need for mandatory imposition. In executing liberalisation policy, Ofcom will, of course, also comply with any constraints imposed by international obligations that harmonise the use of radio frequencies.
- 3.11 Ofcom has carefully considered the comments made on the RIA. They do not change our view that liberalisation is far more likely than not to be beneficial and that we should proceed with the phased introduction of liberalisation. We are encouraged in this by the large majority of responses that support our liberalisation proposals. However, we accept there is a need to consider each case on its merits. Annex 2 contains fuller details of the analysis underlying our conclusion.

Competition

- 3.12 Some responses suggested that the effect on competition should be taken into account in assessing licence variations and queried whether liberalisation might have a detrimental effect on competition. Ofcom is of the view that liberalisation should, in general, be inherently pro-competitive as it involves the lifting of restrictions to allow licensees to enter and exit markets in response to market forces. In general, we would not expect liberalisation to distort competition. Operators can be expected to seek to move to new applications and markets where there are higher returns so the benefits of such moves would outweigh the cost of reduced competition in the alternative service. Generally speaking, consumer benefits will be enhanced by allowing more suppliers of services that are most in demand.
- 3.13 However, each liberalisation proposal will be considered on its merits. Ofcom recognises that there may be some limited circumstances in which liberalisation might lead to a distortion of competition. Ofcom will consider such matters before making or agreeing to licence variations. There may be cases in which a variation of licence terms that enables a change from one service or application to another could have an adverse effect on competition and consumer welfare.

However, it is anticipated that these are likely to be the exception. Annex 2 includes further analysis on the issue of competition.

- 3.14 One respondent sought clarification why competition would be taken into account ex-ante for liberalisation when Ofcom had decided not to do so in connection with trading. The reason is that the two cases raise different concerns in relation to competition.
- 3.15 In the case of trading, existing licence rights to transmit on a particular frequency range are transferred from one party to another. No change to licence terms, including to those on permitted use, is authorised. Any competition concern will most often derive not from the transfer itself but from licensees' future behaviour subsequent to the transfer. General competition law is designed to deal with such eventualities. As explained in the Statement on ensuring effective competition following the introduction of spectrum trading, available electronically at [Ofcom Website | Statement](#), Ofcom has concluded that it would not be proportionate in the circumstances to have an ex-ante competition check for trading.
- 3.16 In the case of liberalisation, Ofcom will be required to make decisions on the removal or reduction of restrictions on the use of spectrum. These decisions may be made in relation to the variation of individual licences or classes of licence. In making these decisions, Ofcom is required to take all relevant considerations into account in the light of its statutory duties. As explained in the consultation document on spectrum liberalisation, there may be circumstances in which effects on competition are a relevant consideration in such decisions.

Spectrum quality and interference

- 3.17 Several respondents expressed concern about the risk of an increase in harmful interference and commented that Ofcom should continue to play an active role in guarding against interference through investigation and enforcement.
- 3.18 There was particular concern that spectrum quality should be clearly and robustly defined in order to ensure confidence. Views differed between whether spectrum quality should be based on existing spectrum quality or the levels assumed by Ofcom for planning purposes in making assignments.
- 3.19 A number of responses stressed the importance of having clear and robust definitions of spectrum quality to support trading and to give certainty about levels of interference following a change of use. The consultation document proposed using existing Technical Frequency Assignment Criteria (TFAC) as a basis for spectrum quality benchmarks (SQBs). These criteria define how Ofcom plans assignments and in effect determine the unwanted signals that might be expected to spill over into neighbouring assignments. The consultation document emphasised that actual levels of interference might, for a variety of reasons, differ from the theoretical predictions and that, where rights under a wireless telegraphy licence change hands through trading, it would be for the purchaser to exercise due diligence to ensure that actual spectrum quality is adequate for its intended purpose.

- 3.20 Some respondents considered the TFAC to be insufficiently transparent or robust. Others, however, agreed with Ofcom's proposed approach. They considered this to be workable, that the TFAC are sufficiently clear to allow users to assess whether a given licence variation is likely to be acceptable and that, as the TFAC are already in use, they have been proven to be effective in terms of maintaining spectrum quality to the intended standard.
- 3.21 Ofcom agrees that it is essential to have effective safeguards against excessive interference. We have concluded for reasons set out below that this can be achieved through existing TFAC and coordination procedures with the SQB embedded in them and will use these as a key criterion when deciding whether or not to allow a requested licence variation and in investigating interference complaints. Full technical details will be published with the liberalisation guidance.
- 3.22 Emission levels in neighbouring assignments may, despite Ofcom's best efforts, differ from those predicted resulting in higher than expected interference following a licence variation. If that happens, we will respond expeditiously in accordance with our published performance targets of 24 hours for safety-of-life services and 5 working days for businesses.
- 3.23 Ofcom will provide technical advice and assistance in case problems are experienced by users or potential users in applying or interpreting TFAC. As suggested by some respondents, we will establish a front-line contact for each licence class to provide assistance and publish contact details on Ofcom's website.

How should spectrum quality be defined?

- 3.24 There was a difference between respondents on whether SQBs should be based on assignment planning criteria or on actual levels of unwanted emissions experienced in neighbouring assignments. Ofcom agrees with those respondents that consider that it would be excessively restrictive to base SQBs on actual levels. For example, before variation, a band may be underutilised because the existing service was unsuccessful commercially. If the new use is more popular, use of the band will grow and neighbouring assignments may notice an increase in unwanted emissions. Ofcom believes it is reasonable in these circumstances to apply a benchmark based on the spectrum quality implicit in the planning assumptions for the band. In other words, the spectrum quality benchmark that Ofcom considers to be relevant for the purposes of its liberalisation policy is the TFAC used in Ofcom's assignment and enforcement functions.
- 3.25 Ofcom considers that the TFAC strike a fair and reasonable balance between different spectrum users in accordance with Ofcom's spectrum duties.
- 3.26 Some responses made detailed technical suggestions about how spectrum quality should be redefined or expressed concern that Ofcom might redefine TFAC in a way that adversely impacts on existing licensees. As mentioned above, several respondents saw advantage in our proposal to retain existing TFAC for phase 1 of liberalisation and we do not intend to change them at this stage. However, we anticipate that BR TFAC will be enhanced for phase 2 later in 2005 and may be more radically altered in the context of the SFR. We will consult before making material changes to TFAC, whether in phase 1 or subsequently.

- 3.27 Some responses referred to the possible introduction of ultra-wideband (UWB) and cognitive radio and the implications for future liberalisation. Ofcom agrees that these new technologies are relevant. They are being considered further in the context of the SFR and a separate consultation on UWB, which was published on 13 January 2005 and is available electronically at [Ofcom Website | Ultra Wideband](#).

Predictability and certainty

- 3.28 Several responses stressed the need for certainty about spectrum quality in order to maintain confidence and promote investment. In particular, incumbents seek certainty that their spectrum quality will not be degraded as a result of a change of use in a neighbouring assignment. New entrants also have an interest in certainty that their spectrum rights will not be varied further as a result of complaints of interference from other licensees.
- 3.29 Ofcom understands the importance of predictability and certainty. However, as discussed in paragraphs 4.14 to 4.20 of the consultation document, it is not possible, for technical and also for legal reasons, to eliminate uncertainty entirely. For example, the level of unwanted emissions in a neighbouring assignment may differ from theoretical predictions; and the effects of unwanted emissions will depend on the quality of the victim installation. The total noise floor may rise as a result of factors outside Ofcom's control, such as electro-magnetic emissions from non-radio sources (eg microwave ovens or computers) or unauthorised transmissions.
- 3.30 The effect on spectrum quality of a proposed change to licence terms is a relevant consideration and will be a key criterion but cannot be the only factor to be taken into account. This is because Ofcom must consider other relevant factors, such as the particular effect of its duties as set out in the Communications Act 2003, international obligations, including EU directives, directions from the Secretary of State and general legal principles. For a fuller discussion of these matters, see paragraphs 3.20 to 3.27 of the consultation document.
- 3.31 Spectrum quality issues arise irrespective of liberalisation policies and have not in the past prevented substantial investment in new networks and services. However, we appreciate that the introduction of liberalisation raises the profile of this issue. We will do what we can to enhance predictability by publishing guidance on the application of liberalisation policies and general information on the types of applications that Ofcom has granted and the extent to which it has been necessary to intervene following complaints of interference.

Initial consideration of applications for variations

- 3.32 As a general rule, Ofcom will seek to uphold SQBs and will refuse applications that would have the predicted effect of reducing spectrum quality in neighbouring assignments below the SQB. We cannot give a guarantee that we would never allow any variation that had this effect. However, we would do so only after consultation with affected users and careful consideration of relevant factors in accordance with Ofcom's duties, as well as of the legitimate expectations of the parties.

- 3.33 Nor can we guarantee that we will invariably grant a request for a variation that meets the SQB criterion. There may be other considerations, including public policy or competition reasons, that lead Ofcom to refuse the application although we consider that such cases are in general likely to be infrequent and transitional in nature.

After variations have been granted

- 3.34 If Ofcom allows a variation and neighbouring assignments subsequently complain of interference, Ofcom will investigate whether the licensee against whom the complaint is made is complying with the terms and conditions of the licence. We may also compare the complainant's spectrum quality against the SQB and take into account any agreement that may exist between the parties. The action, if any, that Ofcom takes will depend on the circumstances and could include requiring the licensee responsible for the unwanted emissions to take remedial action.
- 3.35 It is therefore important that applicants for licence variations carry out their own due diligence into the effects on neighbouring assignments instead of relying solely on Ofcom's predictions that spectrum quality in neighbouring assignments will be above the SQB. Liberalisation involves empowering spectrum users to take more decisions on how spectrum is used but, with this added freedom, comes greater responsibility.
- 3.36 Although we cannot guarantee spectrum quality, we believe that the processes and safeguards we are putting in place provide an appropriate and reasonable balance between flexibility and certainty and between new entrants and incumbents.

Who will be responsible for technical evaluation of proposed variations?

- 3.37 Several respondents asked about responsibility for providing the technical information needed to assess the impact of proposed licence variations on the spectrum quality of neighbouring assignments and were concerned about the burden this might impose, especially if Ofcom was to require technical information to be provided by an 'accredited person'.
- 3.38 Ofcom wants the liberalisation process to be as straightforward and light-touch as possible, consistent with the need to mitigate the risk of interference. In phase 1, Ofcom will usually assess the impact of proposed variations on spectrum quality using our own modelling and assignment tools. To do this we will require a certain amount of technical information from applicants but this will be no more than is necessary. Where a change is particularly novel (for example changes not listed in Annex 1), we may require a greater amount of information, which might include technical studies on the interference impact of the proposed change. In such a case, we will inform you of the information we require as soon as possible.
- 3.39 Applicants may also choose to carry out their own technical checks to verify that the spectrum they intend to use is of sufficient quality for their proposed service and also to satisfy themselves that their proposal will not reduce neighbouring assignments' spectrum quality below the SQB but Ofcom will not require them to do so.

- 3.40 Ofcom will take account of the spectrum quality of third parties without any need for them to submit technical data, although they will be welcome to make representations if they so wish.

Publication of information

- 3.41 Responses confirm the importance attached to transparency and predictability, Ofcom is publishing, and will keep up to date, a range of information to assist current and potential spectrum users. This will include comprehensive liberalisation guidance, including on categories of applications likely to be accepted, TFAC and coordination procedures, international constraints and FAQs. Information about changes in licence class will be reflected in the Wireless Telegraphy Register provided that they are to data provided by the register. The Register is available through the Spectrum Licensing Portal at [Ofcom Website | Spectrum Licensing Portal](#).
- 3.42 However, as emphasised in the consultation and elsewhere in this Statement, the use of TFAC or SQBs should not be construed as limiting Ofcom's discretion to decide whether or not to vary a particular licence or to act on a particular complaint of interference.

Consulting third parties

- 3.43 There was a divergence of view in the responses about the extent to which Ofcom should consult third parties about whether or not to grant applications for licence variations. Some considered that there should be comprehensive consultation about proposed licence variations as Ofcom could not be certain that particular licensees would not be affected. Others felt that this would make the process too cumbersome and could breach commercial confidentiality; and that Ofcom should not adopt a precautionary approach to consultation. One respondent cited obligations under European law.
- 3.44 Ofcom is mindful of the importance of transparency and consultation and understands concern about possible increases in interference. On the other hand, it does not wish to make the liberalisation process excessively cumbersome. Many licence variations may be expected to relate to minor changes to technical configuration, such as the addition of new base stations to existing networks that are unlikely to cause interference. Consultation with third parties on each individual variation in such cases would serve little useful spectrum management purpose and provide little benefit to industry and consumers. Indeed, it would be likely to hold back network deployment to the detriment of operators and their subscribers.
- 3.45 Ofcom has carefully considered the views expressed and concluded that it can strike a reasonable balance to consult as outlined below.
- *Licence variations listed in the exhibits in Annex 1.* As discussed at paragraph 5.16 of the consultation document, Ofcom does not wish to divert resource from, and delay the introduction of, MASTS and so proposed that the programme of liberalisation measures should be progressed through licence variation in phase 1, as opposed to generic variation of all licences in these classes, as an interim measure until MASTS is operational. For those categories of variation, Ofcom has already consulted on the changes proposed and so further individual notification is in general neither appropriate nor proportionate. The

consultation document and this statement effectively give notice that Ofcom expects to allow such variations.

- *Licence variations not listed in Annex 1.* Ofcom will consider how to meet its obligations under article 14 of the Authorisation Directive on a case-by-case basis and whether consultation is necessary taking account of its statutory duties and the avoidance of unnecessary uncertainty and delay. The potential for an increase in unwanted emissions will be a particularly relevant factor.
- Policy on consultation will not affect operation of procedures for site clearance or coordination with users in the UK or other countries where required.

3.46 This will become less of an issue as licences become more generically flexible and users gain greater freedom to change use without requiring Ofcom to change their licence terms. However, irrespective of whether or not Ofcom has consulted about a particular change, we will investigate and take appropriate enforcement action if a complaint of interference is received.

Key performance indicators for dealing with variation applications

3.47 Several responses pointed to the importance of establishing key performance indicators (KPIs) for Ofcom's consideration of requests for licence variations. There was concern that applications might take too long to determine and that this would inhibit innovation. Ofcom agrees that it is important that applications should be dealt with expeditiously, subject to ensuring proper consideration, for example if there are complex interference or coordination issues or a need for international coordination, and that it is desirable to establish and publish KPIs.

3.48 Section 1E of the Wireless Telegraphy Act 1949 specifies the procedure and timescale where Ofcom proposes to vary or revoke a licence, although this does not apply where the variation is at the request of the licensee. However the period of a month allowed for Ofcom to give notice of its intention and receive representations seems a reasonable starting point.

3.49 For types of licence variations identified in the exhibits in Annex 1, Ofcom intends to apply the same performance targets as that currently used for licence application. Detailed of these can be found at [Ofcom Website | Annual Report 2003 - 04 in PDF](#). If the request is deemed to require coordination with third parties or more detailed examination is required, Ofcom will advise the applicant of this and the likely timescale for dealing with the application.

3.50 Requests for complex or novel variations outside those specified in Annex 1 may require detailed technical analysis, consultation with third parties, and international coordination. We will endeavour to process these as quickly as reasonably possible and will in any case within a month of receipt of the application inform the applicant of our plan and projected timescale for progressing the application.

Receiver quality

- 3.51 Respondents generally agreed that Ofcom should not seek to regulate receiver quality but it was suggested that Ofcom should publicise the importance of receiver standards to quality of service. Ofcom agrees that this could be helpful and will consider how best to do this, for example in the liberalisation guidance and information sheets on interference.

Next steps

- 3.52 Ofcom is publishing detailed guidance on liberalisation in parallel with this Statement at http://www.ofcom.org.uk/licensing_numbering/radiocomms/trading/libguide/?a=87101.
The new policies will be introduced on publication of this Statement, from which date Ofcom will consider applications for change of use or configuration. We expect to consult during 2005 on the further liberalisation in the BR sector to be introduced later in the year.
- 3.53 More fundamental proposals for technology-neutral, flexible licences have been proposed in the SFR and will be taken forward in that context. Proposals to extend liberalisation beyond phases 1 and 2 of this Statement to spectrum used for certain mobile services and FWA bands will be considered in the light of responses to the SFR:IP.

Summary

- 3.54 This section has summarised the responses and Ofcom's conclusions on some key aspects, including the RIA, competition, spectrum quality and consultation with third parties. The following section contains a more detailed summary of issues raised on each question with Ofcom's response.

Section 4

Summary of responses

Issues raised	Ofcom's response
<p>Question 1: What are your views on Ofcom's general approach to introducing greater flexibility and, in particular, on the timing and phasing?</p>	
<p><i>Almost all respondents broadly support Ofcom's proposals for a rolling programme of liberalisation, initially through individual licence variation and, in time, through generic licence change.</i></p>	
<p>Ofcom's steady and pragmatic approach is supported as it will allow experience to be gained before extending liberalisation. The phased approach with ex-ante clearance by Ofcom should ensure that liberalisation does not harm spectrum use.</p>	<p>In view of the positive response, Ofcom intends to proceed as proposed. We will take account of experience of initial phases before extending liberalisation.</p>
<p>The need for caution is understood but there should be rapid progress to further reform.</p>	<p>Ofcom is committed to progressive liberalisation as described in this Statement.</p>
<p>In particular, liberalisation of broadcast bands requires further study.</p>	<p>Ofcom recognises the particular complications in the case of broadcasting arising from public service obligations and linkage with digital switchover.</p>
<p>Ofcom's approach is cautious and opportunities are likely to be correspondingly limited. There should be an aggressive timetable for other bands, including TV broadcast and 11 GHz.</p>	<p>We remain committed to rolling out liberalisation as quickly as possible but consider that the phased approach is preferable for reasons given by other respondents. Previous sections of this Statement outline Ofcom's plans for further stages of liberalisation, which are further discussed in the SFR and SFR:IP.</p>
<p>Ofcom is pursuing an aggressive and demanding agenda. It would be better to delay liberalisation until MASTS is operational to allow a move to generically flexible licences in BR.</p>	<p>Ofcom has planned the timetable to be realistic and achievable. The phasing synchronises liberalisation with the MASTS project.</p>
<p>Inadequate analysis of policy issues and of costs and benefits of liberalisation. Given the uncertainties, liberalisation should not be the default position.</p>	<p>Ofcom considers that it has taken due account of relevant policy considerations and has adequately addressed the costs and benefits. See previous section and Annex 2 for full response.</p>
<p>Concern about resources needed to assess individual requests for variations.</p>	<p>Ofcom expects to have sufficient resources in place to deal with applications in the first phase of liberalisation. Beyond that, the move to more generically flexible licences should reduce the number of individual requests.</p> <p>Ofcom will undertake the assessment itself although it may request supporting information from the applicant, especially where the variation falls outside an existing licence class.</p> <p>Ofcom will take account of the spectrum</p>

Issues raised	Ofcom's response
	quality of third parties without any need for them to submit technical data, although they will be welcome to make representations if they so wish.
Care should be taken to avoid introducing distortions in the market through excessively rapid change. There should be a level playing field as regards restrictions and obligations placed on incumbents and new entrants.	Ofcom has a duty to have regard to the desirability of promoting competition where appropriate and believes that incumbents cannot in general expect to be protected from competition. However, Ofcom acknowledges there may be a need in some cases to curtail or defer liberalisation in order to achieve an orderly transition and a level playing field.
Not obvious why public policy considerations should be transitional.	Public policy considerations that relate to the change from 'command & control' to market forces are, by definition, transitional and hence temporary. In any case, public policy considerations will be taken into account for as long as necessary.
Spectral efficiency should not be equated with the number of services and users in a band.	Ofcom agrees that it is necessary to take account of factors such as the economic and other benefits derived from spectrum as well as of how intensively it is used.
Greater certainty is needed as to the extent of changes that Ofcom will allow.	The move to more generically flexible licences will provide greater <i>a priori</i> certainty. Meanwhile, Ofcom will provide assistance through guidance notes and helpdesks.
Generic licence variation should not be introduced until Ofcom can demonstrate it will not increase interference. Further analysis and study is required before this second phase.	Ofcom will be carrying out further studies and will consult before moving to generically flexible licences.
Important that Ofcom is willing to consider proposals that run ahead of the examples shown in the timetable. Evaluation of such proposals should be fair, equitable and transparent.	Ofcom confirms its commitment to consider and evaluate any applications for change of use that are submitted although it may take longer to do so than for the cases listed in Annex 1.
Ofcom should work closely with the European Commission to bring about a more flexible regime that secures the benefits of harmonisation while allowing other applications and technologies to be deployed. Ofcom should not allow change of use that conflicts with international obligations.	Ofcom is taking a leading role in discussions within the EU and CEPT on making harmonisation more flexible and dynamic while retaining the advantages. As stated in the consultation document and elsewhere in this Statement, Ofcom will, in implementing liberalisation, comply with all applicable international obligations.
Given the lack of certainty as to what constitutes a '3G service', Ofcom's proposals on 3G are neither proportionate nor non-discriminatory.	Short and medium term issues about future use of spectrum for 3G services, including a possible definition, are discussed in the SFR:IP. Staggering consultations helps prevent consultative overload while enabling

Issues raised	Ofcom's response
The Implementation Plan 'roadmap' should have been published with the consultation on liberalisation.	issues to be considered together.
The timetable towards liberalisation needs to be outlined by Ofcom.	This Statement clearly sets out the timetable.
More specific indications of post-2005 developments should be provided, including the implications of UWB and cognitive radio.	The SFR takes this further. There will also be a further consultation specifically on UWB.
Ofcom should continue to play an active role in guarding against interference.	Ofcom agrees. This Statement reaffirms our commitment to continue to be vigilant in investigating and resolving interference.
<p>Essential that Ofcom takes appropriate account of incumbents' quality of service and does not agree to variations that would reduce this without their consent.</p> <p>The proposer of a new technology should have to demonstrate that it will not cause harmful interference. On the other hand, it was also said that this would be too onerous or even impossible.</p>	<p>Ofcom agrees, with the proviso that the relevant benchmark is spectrum quality based on existing assignment criteria and that it is not necessary to obtain incumbents' consent.</p> <p>For the reasons given in the consultation and this Statement, Ofcom considers that it is appropriate and reasonable to assess applications against the benchmark implicit in existing assignment criteria. Licence conditions will continue to require licensees not to cause harmful interference.</p>
Would welcome more specific information on policies for licence duration and geographical rights.	Ofcom's policy on licence duration has been articulated in its statement on spectrum trading. Geographical rights are already specified in licences but will be made more explicit where this will be useful.
Ofcom should take special account of the needs of essential and safety-of-life services, including in certain PMR bands at airports.	Ofcom will act to ensure that essential and safety-of-life services have spectrum of a quality needed for operational purposes. There will be an ongoing dialogue with such users. PMR bands are not included in the first phase of liberalisation but Ofcom has noted the point.
Parties to existing contracts should not be able to trigger termination through trading or change of use.	Ofcom does not agree that such arrangements should form part of its assessment of requests for variations. These are commercial matters for the parties to resolve.
How does the move to more flexible licences fit with the proposed consolidation of the wireless telegraphy legislation? Are definitions of "undue" and "harmful" interference consistent?	The proposed consolidation measure, which is the responsibility of the DTI, makes no substantive change to the law on licensing or to the definitions of "undue" or "harmful" interference.

Issues raised	Ofcom's response
<p>Question 2: (a) What are your views on Ofcom's proposals to base initial spectrum emission rights and quality benchmarks on existing licence conditions and assignment criteria ?</p> <p>(b) Is there an alternative approach you would suggest and why?</p> <p><i>The great majority of respondents supports Ofcom's proposals and agrees that this is a pragmatic and acceptable starting point. However, many ask about the process for assessing applications for licence variations and the basis for the technical criteria.</i></p>	
<p>Not clear that existing licence conditions are sufficient to define the spectrum quality benchmarks (SQBs) and emission rights where a new service with potentially uncertain effects is introduced.</p>	<p>Ofcom considers (and many respondents agree) that the proposals are workable and that the TFAC provide applicants and others with sufficient technical information, certainly for phase 1. As discussed in relation to question 4, they are tried and tested.</p> <p>Where necessary, they have been clarified in preparation for liberalisation and will be published with guidance to liberalisation to ensure transparency.</p> <p>Innovative technology outside an existing licence class will be carefully considered as part of the variation process.</p>
<p>Various comments and suggestions were made on the technical description of emission rights and spectrum quality.</p>	<p>No changes are currently envisaged to TFAC in phase 1 of liberalisation. There will be further consultation before TFAC are changed for later phases. See preceding section.</p>
<p>Valuable to allow users to negotiate adjustments to licences but final recourse to Ofcom is essential.</p>	<p>Ofcom will determine applications for licence variations needed to give effect to agreements between users on spectrum quality. However, it is not generally Ofcom's role to arbitrate between users on the terms of, or on disputes arising from, such agreements.</p>
<p>As experience is gained of SQBs, introduction of new processes should be developed by Ofcom working with a range of stakeholders. Emission rights should be based on boundary power levels and spectrum masks. Other respondents expressed reservations about these concepts.</p>	<p>Boundary limits and spectrum masks could be an option for later phases of liberalisation. There would be consultation with stakeholders before such changes were introduced. The SFR discusses this issue in more detail.</p>
<p>Spectrum rights should not be defined solely on the basis of modelling. Measurements should also be used. SQBs should also take account of known equipment characteristics and in-building performance for mobile networks.</p> <p>Would welcome clarity on how emission rights and SQBs might change in future.</p>	<p>Ofcom will continue to use modelling to predict the effect of proposed variations but will intervene if unwanted emissions are found to be excessive.</p> <p>We will work with stakeholders to improve definitions of spectrum quality in the follow-up to the SFR.</p>
<p>Liberalisation should not degrade actual spectrum quality any longer than minimum</p>	<p>Ofcom will continue to act to investigate and resolve complaints of interference on the</p>

Issues raised	Ofcom's response
before Ofcom acts.	same timescales as at present.
SQBs should be set by reference to current interference levels. Further work is necessary to establish existing licensees' current spectrum quality. 3G presents specific issues.	Ofcom understands the need for users to have confidence in the quality of spectrum. However, as discussed in the preceding section, we agree with those respondents who consider that this would be too restrictive. Ofcom agrees that 3G raises special issues. These are discussed in the SFR:IP.
Guidelines on interference and TFAC will not be binding on Ofcom. This will lead to uncertainty. Ofcom should clarify how it intends to implement clear spectrum property rights.	See preceding section. Ofcom has to consider individual applications for licence variations on their merits. We will not change assignment criteria or SQBs without full consultation with affected users.
Ofcom may design TFAC in a way that exposes licensees to harmful interference. Harmful interference is comparatively rare and may be too lax a criterion. Lower levels of interference may be appropriate benchmarks. Particular concern was expressed about broadcast reception. The definitions of "harmful" and "undue" interference should be consistent.	The SQBs are based on existing assignment criteria, not harmful interference as defined in the legislation. "Harmful" and "undue" interference are defined by section 183 of the Communications Act 2003. No change is planned to the definitions.
There should be flexibility for radical changes of use. Some respondents considered that it should be possible to change use of fixed service spectrum to provide mobile services while others disputed that or considered that such a change would require further study and consultation. Some disagreed, arguing that FWA band should not be liberalised to allow mobile use until cellular spectrum is also liberalised.	Ofcom agrees in principle that there should be as much flexibility as possible. Radical changes of use beyond those listed in Annex 1 will be welcome and are positively encouraged but may take longer to assess. Possible future use of FWA bands for mobile services is discussed in the SFR:IP.
Ofcom should require no more than the minimum necessary information from applicants to make its decision. There should be no requirement for information to be provided by an accredited person. It is not clear who will pay for assessing applications.	Ofcom wishes to make the process as straightforward as possible and will require no more than the minimum information it needs. There is no intention to require applicants to use accredited persons to submit applications. However, applicants may wish to carry out their own due diligence.
Spectrum allocations should continue to be subject to European and ITU harmonisation. Ofcom should work with Europe on harmonised emission masks and guidelines and to harmonise technical regulatory and licensing conditions.	Harmonisation is potentially beneficial but needs to be more dynamic, flexible and technology-neutral. Ofcom is working in the ITU and Europe to achieve this. Technical regulatory and licensing conditions need to be tailored to national circumstances and, in Ofcom's view, are already sufficiently harmonised by the new European framework.

Issues raised	Ofcom's response
<p>Support for the principle of not regulating receiver quality but Ofcom should warn the public about poor design.</p> <p>A flexible approach to receivers should be adopted that takes account of the R&TTE Directive and techniques in other countries.</p>	<p>Ofcom will consider how best to draw attention to issues of receiver standards where appropriate, for example in the liberalisation guidance and information sheets on interference.</p>
<p>Does Ofcom envisage extending MASTS to sectors other than Business Radio? It may not be suitable for others such as broadcasting.</p>	<p>Ofcom will continue to use the assignment tool that is most suitable for each licence sector.</p>

Question 3: Would you find it useful for Ofcom to publish monitoring data and what format and content would you find most useful?

With one exception, all respondents agreed it would be useful to publish monitoring data.

<p>Format should be sufficient to allow entrepreneurs to evaluate change of use possibilities.</p> <p>Specific suggestions included:</p> <ul style="list-style-type: none"> • background noise levels would be useful with daily and seasonal variations; • channel utilisation; • electronic format, possibly password-protected for registered users, searchable by frequency, time and signal strength; • it would be undesirable to disclose data on emergency services frequencies. 	<p>Ofcom is considering making monitoring reports available on the Ofcom website in html or pdf formats and will take the suggestions made in the consultation into account in doing so. It should be noted that interpretation of the data is the responsibility of the user, who should take technical advice from a suitably qualified person.</p>
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Question 4: (a) What are your views on Ofcom's specific proposals for liberalisation in the licence classes discussed in this document (PAMR, national paging, data networks, common base stations, PBR, FWA, point-to-point fixed links, scanning telemetry)?

(b) Do you agree that these proposals are unlikely to be problematic from a spectrum management perspective? Do you see any other reasons why Ofcom should not proceed with these proposals?

Most respondents agree that Ofcom's proposals are sensible and appropriate, although some consider they should be taken further in the near future.

<p>Use of TFAC is fair and should ensure liberalisation does not create additional risk of interference.</p> <p>TFAC contain sufficient detailed information to undertake interference analysis. Proposed SQBs should be sufficient for initial phase of liberalisation.</p>	<p>Ofcom agrees.</p>
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Issues raised	Ofcom's response
Timing should be shifted to 2005-06 to allow Ofcom more time to prepare.	Implementation has been phased to allow adequate preparation, including introduction of new BR assignment tool.
On-site services should be included in liberalisation.	Ofcom is considering how best to liberalise on-site services. Exemption may prove possible in some bands.
<u>Business Radio</u>	
<p>Support proposed rationalisation and removal of public/private distinction.</p> <p>Overlay licences should be actively considered.</p> <p>BR should be allowed in other bands. Ex-PAMR spectrum should be auctioned in 2005.</p>	<p>Ofcom intends to proceed with rationalisation and elimination of private/public distinction in phase 2 when new BR assignment tool is operational.</p> <p>Overlay licences are under consideration. There would be consultation before they are introduced.</p> <p>Ofcom's plans for releasing ex-PAMR spectrum to market are discussed in the SFR:IP.</p>
Competition in one class may be reduced if competition is increased in another.	Liberalisation, by reducing or removing barriers to entry caused by allocation policy, is inherently pro-competitive. See preceding section and Annex 2 for further detail.
<p>Important to maintain Radio Investigation Service (RIS).</p> <p>Better definition required of spectrum quality.</p>	<p>Ofcom intends to maintain a radio investigation service.</p> <p>TFAC and SQB definitions will be reviewed before phase 2 liberalisation.</p>
<u>FWA</u>	
General welcome for proposals. A number of respondents made specific comments about future use of the FWA bands. Some urged there should be no change to restrictions to fixed services. Others argued that FWA should be liberalised to allow mobile services.	The SFR:IP discusses possible further liberalisation of FWA.
The proposed technical criteria are insufficiently robust or clear.	Existing criteria and coordination arrangements appear to be working satisfactorily and Ofcom sees no immediate need to change them in phase 1.
It is important to coordinate with fixed satellite services in the 3.6 GHz band.	Ofcom understands the concern. This issue is discussed in the SFR:IP.

Issues raised	Ofcom's response
<u>Fixed Links</u>	
<p>Ofcom's FiLSM tool should be made available online so users can make their own optimisations. This will allow a reduction in central control but Ofcom should be prepared to arbitrate.</p> <p>The present system is too conservative but progress might be slowed by the need for international agreement.</p> <p>Another respondent suggested that present TFAC should be retained and that Ofcom should revoke licences where links are unused for more than one renewal period but it was also suggested that link length policy should be relaxed and availabilities higher than 99.99% provided.</p>	<p>Ofcom is considering making FiLSM available online. Ofcom is willing to consider variations beyond those in Annex 1 and will consider more radical changes for generic flexibility as part of the reforms discussed in the SFR.</p>
<u>Scanning telemetry</u>	
<p>General agreement with proposals. Respondents stressed the critical nature of many scanning telemetry services.</p>	
<u>National paging and data</u>	
<p>One respondent commented on the opportunities for change of use in these bands.</p>	<p>Ofcom's proposals provide for phased liberalisation that will allow considerable flexibility.</p>
<p>Question 5: (a) What are your views on the proposals for dealing with requests for licence variations and for dealing with interference?</p> <p>(b) Do you consider that they are reasonable, proportionate and will be effective in preventing harmful interference?</p> <p><i>Almost all respondents support the proposals although there were several comments on various aspects and a difference of view on the extent to which Ofcom should consult.</i></p>	
<p>There should be key performance indicators for processing applications for variations so this is not unduly protracted.</p> <p>Others suggested longer should be allowed for consultation and representations: 3 months was proposed.</p> <p>One respondent suggested that Ofcom should consult after a variation had been allowed to see if any deterioration in spectrum quality had been noticed.</p> <p>It was also suggested that approval should initially be conditional for a period of 12 months.</p>	<p>Ofcom agrees that it will be desirable to publish KPIs as stated in the previous section.</p> <p>Making agreement subject to post-variation consultation or conditional would make the process slower and more cumbersome and increase uncertainty.</p> <p>Ofcom considers that this would be disproportionate given our commitment to investigate interference if it arises and to intervene if necessary.</p> <p>Paragraphs 3.47 to 3.50 set out the key performance indicators we intend to apply in dealing with requests for licence variations.</p>

Issues raised	Ofcom's response
<p>The liberalisation process should be transparent and open and allow for consultation with potentially affected third parties. There was a difference of view between those who thought that consultation should be limited and those who thought it should be broadly based on the precautionary principle as it could be difficult for Ofcom to identify third parties who had an interest. There was also concern that consultation might compromise commercial confidentiality.</p> <p>One respondent suggested a system of pre-registration of interest in particular bands.</p> <p>Others suggested that Ofcom should set out principles for deciding whom to consult.</p>	<p>Ofcom does not wish to slow liberalisation by disproportionately extensive consultation. On the other hand, we are mindful of the advantages and need for transparency. The preceding section explains how Ofcom intends to balance these considerations.</p> <p>A system of pre-registration does not seem necessary as Ofcom does not intend to consult as a matter of routine.</p> <p>Some details of variations will appear on the WT Register after they are made. Ofcom will consider commercial or security sensitivities on a case by case basis.</p>
<p>Ofcom should provide identified contact points to assist spectrum users and potential users.</p>	<p>We agree this would be useful and will provide contact points. Details are being published in the liberalisation guidance.</p>
<p>Ofcom should publish its decisions on liberalisation and give reasons.</p>	<p>Details of licence variations will appear in the Wireless Telegraphy Register. Ofcom will give reasons for its decisions to applicants and those affected. General trends that emerge that would be helpful to applicants will be incorporated in the liberalisation guidance, which will be updated from time to time.</p>
<p>Third parties should be compensated for reductions in spectrum quality below the SQB caused by a licence variation.</p>	<p>Our proposals envisage that applicants might enter into commercial agreements with affected third parties if their spectrum quality would be adversely affected. These commercial arrangements could involve compensatory payments between the parties.</p>
<p>There should be a cut-off beyond which third parties should not be able to object to a variation.</p>	<p>Ofcom understands the need for certainty but has to balance the interests of those affected, bearing in mind that a variation may give rise to interference some time after the variation. As discussed in the preceding section, if Ofcom subsequently receives a complaint of interference at any time, Ofcom will investigate and may, depending on circumstances require the licensee originating the interference to take remedial measures.</p>
<p>Ofcom should continue to deal with interference with a clear process of escalation, especially where interference appears to be systemic. The onus for avoiding increased interference should lie with the applicant.</p>	<p>As stated in the preceding section, Ofcom will maintain its interference investigation and enforcement role with a view to upholding SQBs. It has to be borne in mind that interference may result from shortcomings in the complainant's installation.</p>

Issues raised	Ofcom's response
Account should be taken of social as well as commercial considerations. Investment in systems should be a factor.	Ofcom's legal duties encompass the promotion of both economic and other benefits.
Competition considerations should be taken into account in considering licence variations.	As explained in the preceding section, competition considerations will be taken into account.

Question 6: Do you agree that, in the case of segmentation, the parties themselves should be responsible for resolving interference issues between them (ie that do not affect third parties)?

The majority of respondents agree with the proposal.

The parties should be able to refer the issue to Ofcom or an independent adjudicator if agreement cannot be reached.	Commercial negotiations on how to partition an assignment will generally be a matter for the parties concerned.
The process should be transparent to third parties.	Creation of new licences will appear on the WT Register.
How will Ofcom assess and monitor interference in such cases?	If a complaint of interference is received, Ofcom will act to enforce licence conditions and to ensure third parties' spectrum quality is not unduly affected.
Ofcom should expand the Spectrum Register to include information about applications for change of use, approval of privately agreed changes to interference standards, segmentation of assignments and interference disputes. The information should include: name of applicant, frequency range, current and any proposed change of use or other conditions, any interference studies undertaken in assessing an application and approval form Ofcom for any agreed modification to interference or QoS levels.	Ofcom has consulted extensively on the information to be made available in the WT Register. No extension is currently planned although we will keep the contents under review.

Annex 1

Liberalisation in 2005

- A1.1 There will be two mechanisms for liberalisation. The first is *individual licence variation*. A licensee wishing to change use, technology or technical parameters outside the terms of the current licence will have to seek a variation from Ofcom. Licence variation may be a precursor to a transfer of rights by trading or could be requested by an incumbent wishing to retain the licence but with different terms and conditions. Ofcom is publishing guidance on technical aspects and the procedure for handling requests for variations.
- A1.2 The second is *generic licence change* to make licences intrinsically more flexible through removal of certain restrictions on technology and application. This embeds liberalisation in the licence itself and allows users to change use or technology without *ex-ante* clearance by Ofcom.
- A1.3 Individual licence variation enables Ofcom to maintain tighter control over potential interference but offers licensees less certainty about what will be permitted. It is also more burdensome administratively. Generic licence change offers greater certainty and is less burdensome as there is no need for prior application to Ofcom. However, it carries a greater risk of interference. Defining emission rights that are technology and usage neutral but provide sufficient safeguards against interference is complex and challenging.
- A1.4 Ofcom's liberalisation programme for 2005 focuses on making significant and early progress focusing in three key licence sectors: Business Radio (BR), Fixed Wireless Access (FWA) and Fixed Links (FL). Liberalisation principles will apply also to requests outside these categories although these may take longer to process. Initially, liberalisation will be by individual licence variation but Ofcom plans to move to a more generic licensing approach in Business Radio when its new assignment tool is available, which is expected to be later in 2005.
- A1.5 Ofcom will take a number of considerations into account in assessing requests for licence variations. These include international obligations, its statutory duties, any directions issued by the Secretary of State and general legal principles such as the duty to act reasonably and rationally, taking account of legitimate expectations.
- A1.6 Ofcom will also consider whether there are wider policy objectives that justify delaying or restricting the introduction of liberalisation in some areas. Such cases are likely to be exceptional and temporary in nature to facilitate an orderly transition from 'command & control' to more liberal policies. For example, the SFR:IP considers the removal of restrictions from licences that prevent the use of spectrum not presently used for mobile services for 3G services and suggests that a suitable transitional period might last to 2007.
- A1.7 Some types of change of geographical and frequency boundaries between neighbouring assignments do not involve significant risk of

interference and will be allowed through spectrum trading as *partial transfers*. This will be a more streamlined process than licence variation but will involve a transfer of rights by the transferee to another party. Following a separate consultation, Ofcom has made regulations permitting partial transfers in certain frequency bands and licence classes, available electronically at http://www.ofcom.org.uk/consult/condocs/spt_wtr/statement/stwtr.pdf.

Planned roll-out of liberalisation

- A1.8 The first phase of liberalisation in 2005 applies across a range of core licence classes. Exhibits 1 and 2 summarise Ofcom's plans by licence class and service. Applications for licence variation to allow change of use beyond those listed in this Annex will be welcomed and are positively encouraged although these may require more extensive analysis and consideration.

Exhibit 1: spectrum liberalisation plans for 2005 by licence class and service

<i>Licence sector</i>	<i>Licence Class</i>	<i>Changes to be permitted: licensee, frequency, coverage, illustrative technology and use</i>
Business radio <i>previously known as Public Mobile Operator (PMO)</i>	Analogue PAMR	<p>Phase 1 - early 2005</p> <ul style="list-style-type: none"> • Liberalised technology through new single Interface Requirement • Change of licence class and type of use within and between PMO and PBR sectors by licence variation (see exhibit 2) <p>Phase 2 – late 2005</p> <ul style="list-style-type: none"> • Licence classes and licences simplified to offer greater flexibility on use • Geographical partitioning and more flexible frequency partitioning
	Digital PAMR	<p>Later 2005</p> <ul style="list-style-type: none"> • Completion of realignment exercise with MoD will enable introduction of trading and liberalisation
	National Paging	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • Liberalised technology through new single Interface Requirement • Change of licence class and type of use within and between PMO and PBR sectors by licence variation (see exhibit 2) <p>Phase 2 – late 2005</p> <ul style="list-style-type: none"> • Licence classes and licences simplified to offer greater flexibility on use • Geographical partitioning and more flexible frequency partitioning
	<p><i>420-450 MHz band excluded from proposals because of sharing requirements</i></p> <p><i>The ERMES paging bands (169 MHz paired with 870 MHz) excluded as all licences have been returned to Ofcom. Use of band currently under review within Europe.</i></p>	

<i>Licence sector</i>	<i>Licence Class</i>	<i>Changes to be permitted: licensee, frequency, coverage, illustrative technology and use</i>
	Data Networks (174-208 MHz)	Phase 1 – early 2005
	<i>420-450 MHz band excluded because of sharing requirements</i>	<ul style="list-style-type: none"> • Liberalised technology through new single Interface requirement • Change of licence class and type of use within sector by licence variation (see exhibit 2)
	<i>866-868 MHz band excluded pending consultation on deregulation</i>	Phase 2 – late 2005
	<i>Transfer of rights only for single narrowband licence for asset-tracking at 133 and 146 kHz.</i>	<ul style="list-style-type: none"> • Licence classes and licences simplified to offer greater flexibility on use • Geographical partitioning and more flexible frequency partitioning
	Common Base Stations	Phase 1 – early 2005
	<i>420-450 MHz band excluded from proposals because of sharing requirements</i>	<ul style="list-style-type: none"> • Liberalised technology through new single Interface Requirement • Removal of minimum subscriber requirement
		Phase 2 – late 2005
		<ul style="list-style-type: none"> • Licence classes and licences simplified to offer greater flexibility on use • Geographical partitioning and more flexible frequency partitioning
Business radio previously known as Private Business Radio (PBR)	National & Regional Private Business Radio	Phase 1 – early 2005
	<i>420-450 MHz band excluded from proposals because of sharing requirements</i>	<ul style="list-style-type: none"> • Liberalised technology through new single Interface Requirement • Change of licence class and type of use within and between PMO and PBR sectors by licence variation (see exhibit 2)
	<i>Licences in this class held by the emergency services will not be subject to trading before 2006</i>	Phase 2 – late 2005
	Wide-area PBR	<ul style="list-style-type: none"> • Licence classes and licences simplified to offer greater flexibility on use • Geographical partitioning and more flexible frequency partitioning
	On-Site PBR	Phase 2 – late 2005
		<ul style="list-style-type: none"> • Liberalised technology through new single Interface Requirement • Licence classes and licences more usage-neutral

<i>Licence sector</i>	<i>Licence Class</i>	<i>Changes to be permitted: licensee, frequency, coverage, illustrative technology and use</i>
Fixed Wireless Access	3.4 GHz	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • Liberalised technology for fixed use • Flexible frequency and geographical partitioning through partial transfer • <i>Further liberalisation discussed in SFR:IP</i>
<i>See SFR:IP for discussion of future use of other FWA bands at 10 and 40 GHz</i>	3.6 GHz	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • Liberalised technology for fixed use • Flexible frequency and geographical partitioning through licence variation • <i>Further liberalisation discussed in SFR:IP</i>
	28 GHz	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • Liberalised technology for fixed use • Flexible frequency and geographical partitioning by partial transfer
	Fixed links	Scanning Telemetry
	Point-to-point fixed links	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • Change of bandwidth (resulting from use of different modulation type and/or data rate) by licence variation • Technical changes by licence variation • Change of antenna by licence variation <p>Phase 2 – late 2005</p> <ul style="list-style-type: none"> • Examine on-line application for change of licence characteristic
	32 GHz	<p>Phase 1 – early 2005</p> <ul style="list-style-type: none"> • One-third of 32 GHz band currently used for point-to-point fixed links will be liberalised to the same extent as other terrestrial fixed link spectrum <p>2005 and beyond</p> <ul style="list-style-type: none"> • Two-thirds of 32 GHz band is currently vacant • <i>Future use under consideration – see SFR:IP</i>

Exhibit 2: phase 1 Business Radio liberalisation

<i>Channel spacing</i>	<i>Current licence class</i>	<i>Illustrative licence change – more straightforward examples</i>
12.5 kHz	Analogue PAMR	Change to: <ul style="list-style-type: none"> • Public mobile data or • National and regional PBR or • National paging
	Public mobile data	Change to: <ul style="list-style-type: none"> • National and regional PBR or • National paging or • Analogue PAMR
	National & Regional PBR	Change to: <ul style="list-style-type: none"> • Public mobile data or • National paging or • Analogue PAMR
25 kHz	National paging	Change to <ul style="list-style-type: none"> • Public mobile data or • National and regional PBR or • Analogue PAMR

Note 1 The new BR flexibilities will be enabled by introducing a single *Interface Requirement* for a wide range of licences in the public mobile and private business sector. This will contain technology-neutral emission limits for services that operate in 12.5 kHz and 25 kHz channels.

Note 2 *Frequency segmentation* of current 25 kHz channels into 12.5 kHz within existing rasters will be allowed by partial transfer. Ofcom is currently exploring whether greater degrees of partition could be supported (eg 6.25 kHz) and hopes to introduce such facilities progressively over the next few years.

Annex 2

Regulatory Impact Assessment (RIA)

- A2.1 Annex 4 of the September consultation document presented a regulatory impact assessment (RIA) for the introduction of spectrum liberalisation, comprising a risk assessment and an evaluation of the net benefits.
- A2.2 A few responses raised substantive issues concerning the risk assessment and the evaluation of net benefits. These are discussed below.

Approach to cost and benefit measurement

- A2.3 One respondent to the consultation disputed the way changes in welfare were measured. Specifically, they questioned whether it was appropriate to base assessments of welfare on the value of the spectrum to users. Ofcom accepts that the change in welfare is strictly speaking the sum of the changes in producer and consumer benefits and that the change in producer benefits should include both service providers and equipment manufacturers. However, Ofcom believes that, it is appropriate to use the change in value to the spectrum user as a proxy for the change in welfare.
- A2.4 Presented below is Ofcom's justification of why it believes that its approach to welfare measurement is appropriate in the case of a change of use of spectrum resulting from spectrum liberalisation.
- A2.5 Ofcom expects that liberalisation will generally be welfare-enhancing. Liberalisation encourages efficient allocation of spectrum between different uses and is inherently pro-competitive as it lowers barriers to market entry. Additionally, liberalisation will facilitate innovation by removing restrictions which prevent users from responding quickly to market and technological developments. By facilitating the more rapid offering of new services this boost to innovation would be expected to broaden consumer choice, promote competition and hence increase overall welfare. Whilst there will be both winners and losers, the overall effect of liberalisation will generally be to increase welfare to the benefit of both producers and consumers.
- A2.6 Removing or reducing restrictions on spectrum use allows spectrum to migrate to more valuable applications. Rational producers can be expected to take advantage of that opportunity. So the economic value to producers of the spectrum in the new use can be expected to be higher than in the old. In other words the additional economic value from the new use will be greater than the reduction, if any, in economic value of the original application.
- A2.7 Factors which influence economic value are the level of output, the price and the costs of production. The incentive properties of liberalisation (in combination with trading and AIP) indicate that the new use would be expected to represent a more efficient and/or innovative use of spectrum. For example, liberalisation may allow a producer to liberalise a proportion of its spectrum, whilst still maintaining pre-existing output levels. This would lead to consumers being unambiguously better off, as they benefit from the increased output of the new liberalised spectrum without losing any of the benefits from the output of the old.

- A2.8 Alternatively, liberalisation may result in an operator reducing output in one market whilst increasing output in another. For example, as highlighted in the responses, liberalisation may be used to transfer output from more competitive (lower profitability) to less competitive (higher profitability) markets. This would generally be where the increase in the economic value of the output in the new use (market A) is larger than the decrease in economic value of the old (market B). If the economic value is larger this generally indicates that the total surplus to be shared between consumers and producers is also larger.
- A2.9 In market A, where there is now a larger total surplus to share and where the level of competition has increased, it would be generally the case that some of these benefits are passed onto consumers, or at least, that consumers are not made any worse off. For example, the increase in economic value to producers may be partly due to a reduction in the costs of production, as users migrate from less to more cost-efficient applications and technologies. It would be expected that some of these increased producer benefits would be passed on to consumers through lower prices.
- A2.10 Additionally, over time we would expect any reduction in output in market B to be mitigated by other producers entering the original market (if they perceive there are benefits from doing so) and lowering prices and or raising output to the advantage of consumers. Whilst spectrum is not a limitless resource and there are limits on the extent to which one frequency can be substituted for another, the incentives to use spectrum efficiently provided by liberalisation (in conjunction with trading and AIP) can be expected to limit the cases in which producers would not be able to obtain spectrum to move into a market if there are significant benefits to be gained from doing so.
- A2.11 Therefore, a change of use which leads to an increase in producer benefits would also be generally expected to make consumers better off.
- A2.12 There is a small number of situations in which market failures could result in a mis-match between private producer and consumer benefits or between private and wider social benefits, for example in the presence of important externalities or where the service provided has at least some of the characteristics of a public good. Ofcom considers these cases to be unlikely to occur often, and there are often alternative policy instruments which can be used to correct such market failures.
- A2.13 Some respondents also raised the issue of the measurement of the impact of liberalisation on the producer surplus of equipment manufacturers as well as service providers. If producer gains for service providers are due to a reduction in the cost of the equipment they use (ie a reduction in the price at which manufacturers are selling their equipment), then some of the increase in service provider or consumer benefits may be at the expense of a reduction in equipment manufacturer benefits. However, to assess the impact on total welfare any reduction in the benefits of equipment manufacturers would need to be considered against the increases in the benefits of other producers and consumers (as in competitive markets at least some of the producer benefits would be expected to be passed onto consumers).
- A2.14 To the extent that the additional producer benefits of the service providers are solely due to a reduction in the price at which manufacturers are selling their equipment, the reduction in the benefits of manufacturers can be considered as a direct transfer of benefits between different producers with consumers being

unaffected. However, in competitive markets it would be expected that the service providers would pass at least some of these benefits onto consumers through a reduction in prices. Further to this, Ofcom expects that liberalisation will generally result in additional benefits to consumers due to, for example, increased innovation and consumer choice. In this case the reduction in the manufacturer benefits will be more than offset by the increase in the benefits of other producers and consumers. Therefore, Ofcom does not consider the lack of explicit measurement of the benefits of equipment manufacturers to invalidate its approach to welfare measurement.

A2.15 A further issue which respondents raised in relation to the impact of liberalisation on equipment manufacturers relates to the issues of standardisation and harmonisation, and their impact on the economies of scale achieved by equipment manufacturers. These issues are discussed in detail below. However, in summary, Ofcom does not expect that liberalisation will have a detrimental impact on the economies of scale achieved by equipment manufacturers.

Costs of liberalisation

A2.16 Other respondents raised concerns with regards to the reliance on the results of the study by Analysys, DotEcon and Hogan & Hartson for the European Commission into the introduction of spectrum trading. In particular, respondents felt that this study did not fully capture the costs of interference. Additionally, respondents suggested that Ofcom should undertake further analysis of its own into the costs, benefit and risks of the introduction of liberalisation, including analysis of changes to specific spectrum bands and licence classes.

A2.17 The possible costs of interference due to liberalisation are uncertain and it is not possible to provide a definitive estimate of their magnitude. For example, it is not possible to predict *a priori* the nature of all change of use requests that will be made or the interference that these may give rise to. However, there are several factors that Ofcom considers will mitigate the risk and possible cost of interference.

- If interference arises, Ofcom will investigate and take appropriate action.
- In the first phase of liberalisation, Ofcom's prior approval will be required for change of use beyond existing licence conditions and Ofcom will compare interference against spectrum quality benchmarks.
- Technology-neutral emission rights will not be introduced until additional experience is gained and assignment tools and criteria have been updated.

A2.18 Ofcom considers that these factors will limit the impact of possible interference both in terms of magnitude and duration. Given the magnitude of the expected benefits of liberalisation, Ofcom does not consider it likely that the costs of liberalisation have been under-estimated to such an extent that they will outweigh the benefits.

Benefits of harmonisation

- A2.19 Some respondents raised concerns that the RIA does not take sufficient account of the consumer benefits of harmonisation, such as the positive network externalities arising from interoperability, economies of scale and competition in the terminal market.
- A2.20 Harmonisation may be imposed on a mandatory basis by regulation or arise as a result of market forces on a voluntary basis and may be international or national. As stated in the consultation document, Ofcom will not liberalise where this would be contrary to UK obligations under European law or international agreements.
- A2.21 Research into the costs and benefits of both harmonisation (ie agreement on the spectrum in which it is best to develop a new technology) and standardisation (ie agreement on a set of common technological standards to be used) has shown that mandatory harmonisation can have both positive and negative effects on competition, innovation, quality and costs. Whether the net effect of mandatory harmonisation is beneficial or not will depend on the economic and technical characteristics of the product or service.
- A2.22 Particular benefits of harmonisation thought by respondents to be at risk from liberalisation include:
- loss of economies of scale, interoperability and competition in the terminal market; and
 - development of “wasteful” competition between different standards.

As discussed in following paragraphs, Ofcom believes that the risk of these potential losses is mitigated by a number of factors.

Economies of scale, interoperability, competition in terminal market

- A2.23 Liberalisation does not preclude standardisation or harmonisation. Either may be market-driven. It is possible that lack of regulatory compulsion may have an indirect impact if industry is unable to co-ordinate its use of spectrum in the highest value uses. However, Ofcom considers this to be unlikely to occur often. Where harmonisation is perceived to be beneficial, there are reasons to expect that market-driven harmonisation will occur without the need for regulatory intervention. These reasons are discussed further below.
- A2.24 If market-driven harmonisation does not occur despite the existence of net benefits, harmonisation can be achieved by regulatory intervention nationally or through the CEPT or EU. Therefore, if harmonisation is considered beneficial in a specific case, there can be *de facto* or *de jure* harmonisation, even under a general policy of liberalisation.
- A2.25 Presented below are Ofcom’s reasons for expecting that industry-driven co-operation on standardisation and harmonisation will take place where there are net benefits and for believing that any indirect impact of liberalisation on beneficial standardisation and harmonisation will be limited.

- Compliance with industry-driven standards is prevalent in other industries without regulatory compulsion. Manufacturers commonly recognise the benefits of inter-operability and respond by publishing or making available their specifications to others and allowing third party manufacture under licence. Therefore, even in a liberalised market, positive network externalities due to interoperability would still be expected to be achieved.
- In addition to the evidence of markets achieving interoperability without regulatory intervention, economic theory indicates that the presence of network externalities is not sufficient to generate a lack of interoperability. The greater the importance of the network externality the greater the incentive for compatibility between products. This is because firms can benefit from producing goods which are compatible. In other words firms are able to internalise the positive network externality which exists between different consumers. This suggests that, where interoperability is socially welfare enhancing, firms will generally provide compatible products.
- Harmonisation can be self-reinforcing. The more users who make harmonised use of spectrum, the higher the value of the spectrum to each user.
- Industry drive for standards indicates an understanding of the benefits which can sometimes be gained from voluntary harmonisation and standardisation. If these benefits are lost due to a failure to co-operate, this recognition would be expected to lead to market solutions to facilitate harmonised use of spectrum in highest value uses.
- Technical developments are diminishing the need for harmonisation in order to generate economies of scale, interoperability and competition in the terminal market.

Competition between standards

A2.26 Liberalisation could result in additional competition between standards, which some respondents characterised as wasteful. Ofcom does not agree with that generalisation. Competition between standards has both costs and benefits that need to be considered together to assess the overall effect. Standards competition is not uncommon. Although it will impose costs and risks on manufacturers, it can also help to ensure that the highest-value standard (or standards) is ultimately adopted. This is because competition is more likely to allow new ideas and disruptive technologies to be trialled, which risk-averse regulators may be reluctant to sanction.

Consideration of additional policy options

A2.27 One respondent characterised the RIA as considering only two options: maintaining current restrictions (ie not allowing liberalisation) and moving more quickly to the second stage of liberalisation (ie removing usage restrictions from licences to make them more flexible and allow change of use without the need for prior approval). This respondent suggested that the RIA should also consider the option of allowing liberalisation but with closer scrutiny to take account of issues such as the benefits of harmonisation, consumer issues and competition in the terminal market.

A2.28 When assessing specific proposals for liberalisation, Ofcom will take into account, amongst other things, its statutory duties which include consideration of economic and other benefits and the efficient management and use of spectrum. Therefore, Ofcom does not consider the option presented by the respondent to be significantly distinct from the proposals considered in the RIA.

Impact of liberalisation on competition, innovation and investment

A2.29 Some respondents suggested that the RIA did not fully consider the possibility of liberalisation distorting existing competition. Respondents raised the issue of the impact of the liberalisation of 2G spectrum on the structure of competition.

A2.30 Ofcom expects liberalisation to be pro-competitive. Since liberalisation may be used to transfer output from more competitive (lower profitability) to less competitive (higher profitability) markets, this is likely to increase overall competition. However, Ofcom recognises that there may be some limited circumstances in which liberalisation might lead to a distortion of competition. Ofcom will consider such matters before making or agreeing to licence variations. The competition impact of the liberalisation of 2G spectrum is considered in the SFR:IP and is not considered further here.

A2.31 One respondent indicated that the RIA did not take account of the effect of liberalisation on investment and innovation incentives on existing market participants.

A2.32 Ofcom considers that liberalisation will have a positive net impact upon investment and innovation incentives. Liberalisation will facilitate the allocation of spectrum to its highest value uses and therefore will create incentives to invest and innovate for both new entrants and existing market participants. If liberalisation allows a new (higher value) service to be offered to the detriment of an old (lower value) service, the level of innovation and investment created by the higher value service can be expected to outweigh the lost innovation and investment from the lower value service.

Public policy implications of liberalisation

A2.33 Other issues were raised in relation to the public policy implications of the proposed liberalisation.

- It was pointed out that, although public policy issues (such as broadband provision) could still be realised in a trading environment, if spectrum is bought (from public funds) on the open market for a chosen application this would be more expensive, as the spectrum costs would be those of the higher value application.
- One respondent raised a concern that economic principles and drive for de-regulation can have a serious impact on users who require an element of institutional safeguarding.

A2.34 Ofcom believes that liberalisation does not prevent the use of spectrum to achieve public policy aims nor institutional safeguards for particular uses. These factors can be addressed in considering decisions on specific liberalisation proposals. Liberalisation, in combination with trading, will facilitate

an assessment of the true economic costs and benefits of such spectrum usage.

- A2.35 One respondent suggested that there could be issues of “equity” not taken into account by the market where an application is of greater financial value to the provider but benefits fewer people than an alternative use of the spectrum. Circumstances can arise in which the market will tend to underprovide particular services. Public goods are the usual example. This market failure is normally corrected by government provision of the relevant good. This provision involves payment by government for the required inputs to production, including spectrum in the case of a radio application. In addition, Ofcom has a duty to consider both economic and other benefits in carrying out its spectrum functions and will have regard to both in implementing liberalisation.

Impact on the introduction of new services

- A2.36 One respondent indicated that, whilst the RIA suggests that liberalisation will make it easier to introduce a completely new service, the existing spectrum management approach also allows new services to be introduced. This respondent suggested that Ofcom needs to establish the specific benefits of liberalisation in greater detail.
- A2.37 Ofcom agrees that it is possible to introduce new services under the existing spectrum management approach. However, this process tends to be slower and to involve significant uncertainties for new operators. Moreover, Ofcom has less complete and current information than market participants about the commercial value of different uses of spectrum. Ofcom considers that liberalisation will promote a more efficient utilisation of a scarce economic resource (spectrum) than the existing system since it will remove barriers to entry that reserve particular frequency bands for specific applications. Existing users will therefore face the opportunity cost of their use of spectrum (as they will now face a wider choice as to how they use it). This will facilitate and promote migration to higher value uses, whether combined with change of ownership through trading or not.

Magnitude of the net benefits of liberalisation

- A2.38 One respondent pointed out that more recent figures for Australian trading show 3.6% of spectrum licences changing hands 2003/4 (source: ACA) rather than 8%. This respondent also suggested that trading of apparatus licences is running at 2-3%, and is likely to be more in line with the rate of change of use because of the reduced ‘portability’.
- A2.39 In the RIA for the November 2003 consultation document, the net benefit calculation considered trading volumes ranging from 4% to 16% with a base case assumption of 8%. The volume of trades impacts on both the costs and the benefits of trading (and liberalisation). Although a reduction in the volume of trades would impact on the magnitude of the net benefit, it would not reverse the conclusion that there are positive net benefits from the introduction of trading and liberalisation. The RIA to the November 2003 consultation document showed that if the volume of trades fell from 8% to 4% the net benefits would fall from £228m to £112m (assuming both liberalisation and trading are allowed).

- A2.40 The same respondent suggested that it is likely that annual benefits will decrease over the years, as the initial readjustment is made.
- A2.41 Ofcom does not consider it likely that annual benefits will decrease over time. Continued technological developments will drive benefits from both trading and liberalisation. Therefore, the annual benefits would only be expected to decrease over time if the pace of technological development was to slow significantly. Ofcom does not consider there to be reasons to expect such a slow-down in the pace of technological development. The available evidence suggests the contrary.
- A2.42 One respondent questioned the source of the value of a PAMR licence of £9450 presented in the RIA to the November 2003 consultation. This respondent also indicated that the spectrum pricing study completed by Indepen, Aegis and Warwick Business School gives a marginal value of £1.27m for a national 1MHz channel compared to £1.24m for PMR. The respondent suggested that, in this case, liberalisation could result in a net cost, rather than benefit, even before consumer surplus is included.
- A2.43 To promote consistency in the spectrum values used in the assessment of the indicative net benefits of trading and liberalisation the values of spectrum presented in the RIA to the November 2003 consultation were based, wherever possible, on the analysis completed by NERA and Smith Systems in 1996 and 1998¹. The £9,450 value of a PAMR licence is the mid point between the maximum and minimum values per 2x12.5KHz channel, as reported in the 1998 NERA and Smith System analysis. Ofcom does not consider it to be reasonable to expect that liberalisation will result in change of use from high to low value spectrum uses. In general, we would expect that applications for change of use would seek to move from markets with lower returns to markets with higher returns. However, it is reasonable to expect that the returns from different spectrum uses will change over time. Therefore, that a high-value use in one period may become a low-value use at a later point in time.
- A2.44 The analysis presented in the RIA presents an indicative assessment of the net benefits of trading and liberalisation based on a consistent set of spectrum values assessed at a particular point in time. It is not possible to forecast the pattern of future change of use requests. These will depend on the relative spectrum values at the point in time at which the change of use is requested, as assessed by the market participants. The fact that the specific pattern of change of use or values of alternative uses may be different from those used in the RIA does not invalidate the general conclusion that rational users will generally migrate to higher value applications and that liberalisation can be expected to be beneficial overall.
- A2.45 One respondent noted that one of the estimates quoted in relation to the benefits in the RIA is a 1995 estimate of the benefits from the early introduction of new mobile services of over £2 billion a year. This respondent pointed out that, were liberalisation to be poorly managed with mobile services suffering increased interference, then the supply of mobile services might be harmed. In such a case, the figure of £2 billion a year would be reflective of a cost, not a benefit, of liberalisation.

¹ Study into the Use of Spectrum Pricing (1996), Review and Update of the Spectrum Pricing Models (1998).

A2.46 Ofcom is taking a cautious approach to liberalisation that includes safeguards that Ofcom, and many respondents, believe will effectively mitigate the risk of interference. Ofcom is aware of the risk identified and is taking measures to manage it. In any case, the cost of interference would reach that level only if interference were so bad that the spectrum used by mobile network operators became completely unusable. Given the safeguards Ofcom is introducing, the scenario envisaged by the respondent is not considered realistic. In the unlikely event that such large-scale harmful interference were to arise, Ofcom would take appropriate action.

Annex 3

List of respondents to the consultation

BAA plc
Broadband Access Strategies LLP
BT plc
Channel Four Television
Civil Aviation Authority (CAA)
Communications Management Association (CMA)
COLT Telecommunications
David Hall Systems Ltd
Emap Performance Ltd
Henry O'Tani
Hutchison 3G UK Limited
IEE
Intel Corporation (UK) Ltd
Intellect UK
Intelsat LLC, Panamsat
Joint Radio Company Ltd (JRC)
MLL Telecom Limited
Motorola Ltd
Nokia UK Ltd
NTL Broadcast
O2 (UK) Limited
On Site Communications Association (OSCA)
Orange
Police IT Organisation (PITO)
SMG plc
Spectrum Trading Associates
TAUWI
THUS plc
T-Mobile (UK) Limited
Transfinite Systems Ltd
Vodafone Limited
WiMAX Forum
Wireless Messaging Association (WMA)

Two respondents asked not to be identified.

Annex 4

Glossary

2G

Second generation of mobile telephony systems using digital encoding. GSM (Global System for Mobile Communications) is the 2G technology used in Europe.

3G

Third generation of mobile systems. Provides higher-speed data transmissions to support multimedia applications such as broadcast-quality video.

Allocation

a) The process of identifying specific frequency ranges for specific applications; or b) a frequency band entered in a table of frequency allocations, for use by a particular category of services.

Antenna

A passive device designed to radiate and receive electromagnetic energy.

Apparatus

Any equipment 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.

Authorisation Directive

Directive 2000/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services

AVL

Automatic Vehicle Location: integration of wireless and communications and location tracking devices into automobiles to allow fleet tracking, remote diagnostics, roadside assistance, etc.

Band

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

Band III

Former TV broadcast band between 174 and 208 MHz, now used mainly for mobile communications.

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.

Bluetooth

Wireless standard for short-range radio communications between a variety of devices such as PCs, headsets, printers, mobile phones and PDAs.

CEPT

Conference of European Postal and Telecommunications administrations, comprising over 40 European administrations.

Common Base Stations

- a) A single channel base station for PBR shared by users (also known as a community repeater); or
- b) 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.

Coordination Agreements

Arrangements between the UK and neighbouring countries designed to avoid harmful interference between users in different countries. Also, arrangements within the UK to limit

interference between domestic spectrum users.

Data Networks

A network established and operated for the specific purpose of providing data transmission services for the public.

eirp

Equivalent Isotropically Radiated Power. The product of power supplied to an antenna and the antenna gain in a given direction relative to an isotropic antenna, ie one that radiates equally in all directions.

EMC

Electro-Magnetic Compatibility: the ability of equipment or systems to be used within designated environments without causing or receiving electromagnetic interference.

Emissions

Electromagnetic energy propagated from a source, which may occur anywhere in the spectrum.

ERP

Effective Radiated Power.

ETSI

European Telecommunications Standards Institute.

Ex-ante

Before an event, eg a trade, takes place.

Ex-post

After an event.

Field Monitoring

Monitoring spectrum use in real-world situations.

FiLSM

Ofcom's Fixed Links Spectrum Management assignment system

Fixed Links

Communications links between fixed points. Such links may be unidirectional or bidirectional, and may be point-to-point or point-to-multipoint.

Framework Directive

Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory

framework for electronic communications networks and services

Frequency Boundaries

The extremities of the radio frequency range of an assignment, specified either in terms of a central frequency with channel width, or a frequency range.

Frequency Re-use

Re-using the same frequencies at different spatial locations, in such a manner that they do not cause undue interference.

FWA

Fixed Wireless Access: radio link to the home or the office from a cell site or base station, replacing the traditional local loop.

GHz

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

GSM

Global System for Mobile communications. The international operating standard for the second generation of digital cellular mobile communications.

Guard band

Frequency range between assignments to protect users on either side from out-of-band interference.

Harmonisation

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

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.

Land Mobile

A mobile service between base stations and land mobile stations, or between land mobile stations.

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 PBR. Volume classes refer to those licence classes for which there are significant numbers of licensees, for example on site PBR with 26,000 licensees and on-board maritime with 64,500.

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 2005.

Mesh radio

Broadband Fixed Wireless Access architecture that avoids the limitations of point-to-multi-point systems.

MMDS

Multi-channel Multipoint Distribution Services: means of distributing television signals, through microwave from a single transmission point to multiple receiving points, often used as an alternative to cable-based television.

Ofcom

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

Overlay licences

Licences that are encumbered by 'sitting tenants' with defined rights for both the newly licensed users and incumbents. The overlay licensee can negotiate with incumbents to gain exclusive access to the band.

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.

PFD

Power Flux Density. A measure of the intensity of a radio signal at a specific location.

PMR

Private Mobile Radio (PMR), see PBR.

Point-to-multipoint

Fixed link having at one end a multi-directional antenna for communication with multiple users over an area.

Propagation

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

PSD

Power Spectral Density. A measure of the intensity of a radio signal, averaged over a specified frequency range.

RA

The Radiocommunications Agency: an executive agency of the Department of Trade and Industry responsible for the management of most non-military spectrum in the UK and for representing the UK internationally. RA ceased to exist when its functions transferred to Ofcom on 29 December 2003.

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.

Refarming

Migration from an outgoing to an incoming service on a particular range of spectrum.

Remote meter reading

The reading of meters from a distance using radio.

Roll-out requirements

Specific requirements relating to build or operation of radio networks.

Safety of life services

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

Scanning Telemetry

Typically used by water, electricity and gas companies for remote measurement and control functions.

Site Clearance

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

SMO

Spectrum Management Organisation: an organisation that undertakes the administrative and technical management of part of the radio spectrum, usually limited to the identification of suitable assignments, record keeping, calculation of interference risks and distribution of licences.

Software Defined Radio

Technology to allow more efficient use of spectrum. The radio is programmed to select vacant spectrum on which to transmit or reduce power to prevent interference. Also known as cognitive radio.

SFR

Ofcom's Spectrum Framework Review, published 23 November 2004, that sets out Ofcom's vision for spectrum management.

SFR:IP

The Spectrum Framework Review: Implementation Plan that sets out Ofcom's plans for releasing spectrum in 2005-08 and extending liberalisation and trading to mobile services.

Spectrum mask

The spectrum space within which a device transmits.

Spectrum

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

SQB

Spectrum Quality Benchmark – used to define the standard of spectrum quality that licensees can expect to experience. Based on TFAC.

Telemetry

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

TFAC

Technical Frequency Assignment
Criteria used by Ofcom in planning
and granting assignments.

Trading Regulations

Regulations made under section 168
of the Communications Act to
introduce and regulate spectrum
trading.

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.

UMTS

Universal Mobile Telecommunications
System – a 3G standard.

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 radiocommunications service used
for navigation or safety, or that
degrades, obstructs or repeatedly
interrupts broadcasting or other
radiocommunications.

UWB

Ultra Wide Band. A technology that
spreads a low-power signal thinly over
a wide range of frequencies.

VHF

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

Wireless LAN

Wireless Local Area Network.

WT Acts

Wireless Telegraphy Acts 1949, 1967
and 1998 as amended by the
Communications Act. They regulate
use of UK radio spectrum.

WT Act licences

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