EXPLANATORY MEMORANDUM TO

THE WIRELESS TELEGRAPHY ACT 2006 (DIRECTIONS TO OFCOM) ORDER 2010

2010 No. [DRAFT]

1. This explanatory memorandum has been prepared by the Department for Business, Innovation and Skills and is laid before Parliament by Command of Her Majesty.

This memorandum contains information for the Joint Committee on Statutory Instruments.

2. Purpose of the instrument

2.1 To direct the Office of Communications (OFCOM) to carry out a package of spectrum management measures that will support the deployment of next generation mobile broadband services, as outlined in the Digital Britain Report (Cm 7650). The measures will also enable the UK to meet its obligations to implement Directive 2009/114/EC[1] and Commission Decision 2009/766/EC [2] on the liberalisation of frequencies in the 900MHz and 1800MHz bands to allow them to be used for different mobile telephony technologies.

3. Matters of special interest to the Joint Committee on Statutory Instruments

3.1 There are no matters of special interest to the JCSI.

4. Legislative Context

4.1 The instrument is being made under section 5 of the Wireless Telegraphy Act 2006. This is the first time that this power has been used.

4.2 The instrument additionally implements Directive 2009/114/EC and the Commission Decision which extend the technologies that can be used with certain radio spectrum frequencies. The Decision will allow the deployment of improved mobile broadband services across Europe. The direction to OFCOM will require it to take a variety of actions in respect of existing spectrum holdings, competition

[1] Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community (Text with EEA relevance) OJ L 274, 20.10.2009, p. 25.

[2] Commission Decision 2009/766/EC of 16 October 2009 on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community (notified under document C(2009) 7801) (Text with EEA relevance) OJ L 274, 20.10.2009, p. 32.

and supporting the availability of higher speed mobile broadband services across the UK.

4.3 A Transposition Note has been prepared for this instrument and is attached to this memorandum.

5. Territorial Extent and Application

5.1 This instrument applies to all of the United Kingdom.

6. European Convention on Human Rights

The Minister for Digital Media has made the following statement regarding Human Rights:

In my view the provisions of the Wireless Telegraphy Act 2006 (Direction to OFCOM) Order 2010 are compatible with the Convention rights.

7. Policy background

7.1 In January 2009, the Government published its interim Digital Britain report setting out a series of actions designed to ensure the UK maximised the opportunities for all in the digital age.

7.2 Part of that report dealt with radio spectrum and the creation of a wireless spectrum modernisation programme. In that report, the Government identified a complex set of challenges that were hindering the release and use of additional spectrum that could support the deployment of next generation broadband services. Subsequently the Government announced the appointment of an Independent Spectrum Broker to examine whether a solution could be found to overcome the challenges.

7.3 The Independent Spectrum Broker's report was published on 12th May 2009[3] and the Government's response to it was published in the Digital Britain report in June 2009. In that report, the Government indicated that it was minded to accept the proposals set out by the Independent Spectrum Broker, subject to further work to be progressed by the Independent Spectrum Broker.

[3] Report from the Independent Spectrum Broker : findings and policy proposals

7.4 This additional work was designed to address a number of issues, the most significant being those around making 900 MHz and 1800 MHz spectrum available for both GSM and UMTS systems to implement Directive 2009/114/EC and the Decision.. .This phase of work involved extensive engagement with a range of stakeholders. BIS published the Independent Spectrum Broker's final report of September 2009 in its Consultation on a Direction to Ofcom to Implement the Wireless Radio Spectrum Modernisation Programme (referred to in paragraph 7.5).

7.5 In the Digital Britain report, the Government noted that there was an option to direct OFCOM to implement any decision to take forward the proposals. In the light of the Independent Spectrum Broker's final report, the Government decided that the proposals represented a basis for further action and that it would seek to do this through a direction to OFCOM. In doing so, the Government was obliged to consult on the direction it proposed to give to OFCOM. The consultation document was published on the 16th October 2009, with a closing date for responses of 8th January 2010.

8. Consultation outcome

8.1 The consultation document was sent to a range of organisations, including OFCOM, telecommunications companies, representative organisations for businesses and consumers, equipment manufacturers and infrastructure operators. The Department received 35 responses. Although the majority of respondents broadly welcomed the overall objectives of the spectrum modernisation programme, given the complex nature of the issues and the differing positions of many of the interested stakeholders, there was a significant divergence of views around a number of the proposals. A small number of respondents believed that a direction would be inappropriate at this time.

8.2 The consultation document, the responses and a summary of the responses are available on the Department's website at: www.berr.gov.uk/consultations/closedwithresponse.

9. Guidance

9.1 The direction sets out actions for OFCOM. It does not require direct action by any other organisation. OFCOM have been consulted on the direction and no further guidance is planned.

10. Impact

10.1 The impact of the instrument on business, charities or voluntary bodies is limited. Only those businesses providing mobile telecommunication networks or services, or who may wish to do so in the future, are directly impacted by this instrument.

10.2 The impact on the public sector is also limited. A number of departments have an interest in the use of spectrum and have been kept informed of these plans.

10.3 An Impact Assessment is attached to this memorandum.

11. Regulating small business

11. 1 The legislation does not apply to small business.

12. Monitoring & review

12.1 Success will be determined by the release of spectrum into the UK market suitable for the deployment of high speed mobile broadband services and the availability of those services to consumers and business. OFCOM regularly publish reports on the state of the UK communications market and will therefore monitor developments.

13. Contact

Mark Swarbrick at the Department of Business, Innovation and Skills (Tel: 0207 215 2900: mark.swarbrick@bis.gsi.gov.uk) can answer any queries regarding the instrument.

Summary: Intervention & Options

Department /Agency:	Title:	
Department for Business, Innovation and Skills (BIS)	**Impact Assessment for a direction to Ofcom to implement the Wireless Radio Spectrum Modernisation Programme**	
Stage: Final	**Version:** Final	**Date:** 5 March 2010

Related Publications: Digital Britain Final Report (June 2009); Independent Spectrum Broker's Final Report (September 2009); Consultation on a Direction to Ofcom to implement the Wireless Spectrum Modernisation Programme

Available to view or download at:

http://www.bis.gov.uk/ofcom-wireless-modernisation-programme

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What is the problem under consideration? Why is government intervention necessary?

The Digital Britain Final Report set out the UK Government's objectives on wireless infrastructure to facilitate a rapid transition to next generation high speed mobile broadband and progress towards universal coverage in 3G and next generation mobile services. Key to delivering these objectives is enabling the efficient use of spectrum which has been hampered by disagreements over the the future use of 2G spectrum, known as 2G refarming, stemming from a lack of consensus amongst industry operators. Ongoing delays may slow progress towards these objectives and may serve to weaken competition in the mobile sector. Therefore, government intervention is required to resolve quickly these co-ordination problems to ensure the release, re-allocation and liberalisation of certain bands of radio spectrum so as to ensure the efficient use of spectrum, which would contribute to improvements in infrastructure, competition and coverage that would deliver the Government's objectives.

What are the policy objectives and the intended effects?

The UK Government will direct Ofcom to implement a package of proposals presented by the Independent Spectrum Broker in his final report to Government in September 2009. The overall aim of these proposals is to achieve the release, liberalisation and wider spread of spectrum in a number of bands, including sub-1GHz spectrum.

By implementing this solution, the UK Government hopes to overcome the impasse which is preventing progress towards the objectives set out in the Digital Britain Final Report with respect to the wireless infrastructure.

What policy options have been considered? Please justify any preferred option.

The following options are being considered by Government

Option 1: Do nothing - Ofcom left to address the issues through the normal regulatory process

Option 2: Implement the Independent Spectrum Broker's proposed solution

Following the consultation (which lasted between October 2009 and February 2010, the Government has decided to direct Ofcom to implement the Independent Broker's proposed solution, with a number of amendments resulting from the consultation.

When will the policy be reviewed to establish the actual costs and benefits and the achievement of the desired effects?

A post implementation review will be carried out within three to five years to assess the implementation of the Programme.

Ministerial Sign-off For final proposal/implementation stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister:

Stephen Timms

.....Date: 8 March 2010

Summary: Analysis & Evidence

Policy Option:	Description: **To implement the Independent Spectrum Broker's proposed solution**

COSTS

ANNUAL COSTS

One-off (Transition) **Yrs**

£ Not Quantified

Average Annual Cost (excluding one-off)

£Not Quantified

Description and scale of **key monetised costs** by 'main affected groups'

Potential benefits of competition being avoided due to liberalising 900 MHz spectrum in the hands of the incumbents as opposed to subjecting it to an auction. This has been addressed through other elements of the package such as the use of short-term spectrum caps. It is not possible to assign an indicative estimate.

Total Cost (PV) £ Not Quantified

Other **key non-monetised costs** by 'main affected groups' Some operators may incur costs arising from additional retail service and wholesale access obligations. These have not been quantified. Payments associated with the purchase of newly released or awarded spectrum represent transfers.

BENEFITS

ANNUAL BENEFITS

One-off **Yrs**

£ Not Quantified

Average Annual Benefit (excluding one-off)

£Not Quantified

Description and scale of **key monetised benefits** by 'main affected groups'

The additional benefits are likely to stem from the liberalisation of the 800 MHz occurring sooner under the implementation of the ISB proposals and from any additional benefits from the combined auction. In addition, there will also be potential benefits from avoiding delays and the costs of the release of 1 block of 900 MHz spectrum.

Total Benefit (PV) £ Not Quantified

Other **key non-monetised benefits** by 'main affected groups' Benefits stemming from rapid transition to next generation mobile and mobile broadband, progress towards universal coverage in 3G and next generation mobile and continuing strong competition in the mobile sector

Key Assumptions/Sensitivities/Risks BIS used Ofcom modelling where appropriate to make a qualitative assessment of whether the costs and benefits associated with the ISB's proposed solution could be relatively higher or lower. This is due to the complex nature of modelling spectrum and limited resources available. The limitations of this approach are set out in the evidence base.

Price Base Year	Time Period Years	**Net Benefit Range** (NPV) **£ N/A**	**NET BENEFIT** (NPV Best estimate) **£ N/A**

What is the geographic coverage of the policy/option?			UK	
On what date will the policy be implemented?			2010	
Which organisation(s) will enforce the policy?			Ofcom	
What is the total annual cost of enforcement for these organisations?			N/K	
Does enforcement comply with Hampton principles?			Yes	
Will implementation go beyond minimum EU requirements?			No	
What is the value of the proposed offsetting measure per year?			N/A	
What is the value of changes in greenhouse gas emissions?			N/K	
Will the proposal have a significant impact on competition?			Yes	
Annual cost (£-£) per organisation (excluding one-off)	Micro	Small	Medium	Large
Are any of these organisations exempt?	No	No	N/A	N/A

Impact on Admin Burdens Baseline (2005 Prices) (Increase - Decrease)

Increase	£ N/A	Decrease	£ N/A	**Net**	**£** N/A

Key: **Annual costs and benefits: Constant Prices** **(Net) Present Value**

Background

The Digital Britain Final Report set out the UK Government's objectives with respect to wireless infrastructure. These were:

- A rapid transition to next generation high-speed mobile broadband
- Progress towards universal coverage in 3G and Next Generation Mobile
- Maintaining a highly competitive mobile market

Key to achieving these goals is the re-allocation and liberalisation of radio spectrum currently used to deliver second generation and third generation mobile services (900, 1800 and 2100MHz) and the release of new spectrum from the digital dividend (800MHz) and the so-called third generation extension band (2600MHz).

Mobile network operators (MNOs) ideally need a mixture of low and high spectrum frequencies in order to deliver next generation mobile (NGM) services. Lower frequencies such as 800 and 900MHz are good for achieving wide coverage, requiring fewer base stations to cover a particular area and delivering in-building penetration while higher frequencies such as 2100 and 2600MHz are good for providing capacity for large numbers of end-users in dense (urban) environments.

The Interim Report identified a number of obstacles hampering the release of spectrum suitable for next generation mobile broadband services. These included the differing circumstances and conflicting incentives of the existing mobile network operators as well as continuing legal and regulatory uncertainties around the use of spectrum.

In response to those delays, the UK Government announced in the Interim Report that as part of a proposed Wireless Radio Spectrum Modernisation Programme[4], it would be seeking a solution either through a voluntary industry consensus or an imposed Government solution and appointed an Independent Spectrum Broker (ISB) to assist in this process. The ISB initial set of proposals were published on 13 May 2009. Following further rounds of discussion with the mobile network operators and other interested parties, the ISB presented a revised package of proposals in his final report to Government in September 2009.

The Government consulted on these proposals in October 2009 and now proposes to implement the ISB package, with some amendments in response to the consultation and taking account of the recent announcement on the joint venture between Orange and T-Mobile (as discussed in the Competition Assessment on Page 13), through a Direction to Ofcom.

Rationale for government intervention

[4] The Wireless Radio Spectrum Modernisation Programme which was announced in the Interim Report comprises five elements: establishing whether there could be a voluntary spectrum trading solution between the existing mobile network operators to allow the seamless liberalisation of use of the existing 2G radio spectrum; making more spectrum available through the release of the 2600MHz spectrum and the Digital Dividend 800MHz spectrum; greater investment certainty; allowing more network sharing and seeking a significant contribution to the proposed broadband universal service commitment. Fuller details of the Programme can be found on page 29 of the Digital Britain Interim Report at http://www.culture.gov.uk/images/publications/digitalbritain-finalreport-jun09.pdf

Ofcom have consulted twice on an appropriate method to rebalance holdings of one particular frequency – 900MHz – but the co-ordination problems arising from disagreements on the costs and time required to achieve any re-farming among operators have delayed progress. This in turn has had a knock on effect in delaying the release of 2.6 GHz spectrum. Government intervention is considered necessary to find a broader solution to overcome these disagreements over costs and time to enable the release and efficient use of radio spectrum to help the UK Government to deliver the objectives set out in the Digital Britain Final Report with respect to wireless infrastructure.

Intervention would help to achieve these objectives by enabling Government to make progress on the public policy priorities which it has identified in the Final Report. These are:

Infrastructure

The increased availability of sub-1GHz spectrum should enable network operators, new or existing, to roll out new infrastructure or make improvements to the existing network which will support high quality, fast and reliable next generation mobile and mobile broadband and the new innovative services which they could offer.

Competition

Access to suitable radio spectrum constitutes a significant barrier to entry and expansion in the mobile sector. Increased availability of sub-1 GHz should serve to increase competition by enabling new operators to enter the sector resulting in the emergence of a larger number of alternative competing next generation mobile and mobile broadband networks. Competition for radio spectrum may also lead to this valuable resource being allocated and used more efficiently than before. This could lead to significant benefits for consumers in the form of lower prices and greater consumer choice both in terms of the number of operators available and the range of new and innovative services on offer.

Universality

The increased availability of spectrum will also help make progress toward universal coverage in 3G and next generation mobile including mobile broadband by enabling network operators to extend and improve existing rural coverage and provide better indoor coverage in both rural and urban areas[5].

Options

Option 1: No direct Government Intervention: Ofcom left to address issues through the normal regulatory process

[5] The Government will apply coverage conditions on the licences for 800MHz spectrum where this can be consistent with achieving the largest spread of services in the UK.

Under this option, no action would be taken by Government through a Direction to Ofcom to provide a wider distribution of suitable radio spectrum across mobile operators.

The 900MHz spectrum band would still be liberalised under the revised EU GSM Directive to allow 3G mobile services to be deployed in that band. The 1800MHz band would also be liberalised to allow 3G mobile services in accordance with the draft Radio Spectrum Committee decision.

Ofcom would have to decide how best to implement the above EC legislation. Given the large number of issues which Ofcom would need to consider, and the widely differing views of various stakeholders, this would likely entail further consultation and could result in further delay. Ofcom would also have to make decisions regarding:

1) The award of the 2.6 GHz spectrum
2) The award of the 800 MHz spectrum
3) Whether to impose access and/or coverage obligations
4) What rules (including possible spectrum caps) would go into any auction they design.

Option 2: Adopt ISB's revised package of proposals

The ISB's revised package of proposals outlined in the final report and presented to Government in September 2009 are highly technical in nature. In summary these include:

- Liberalisation of 900MHz, 1800MHz to allow UMTS services, and other services that can coexist with GSM and UMTS, to be used in these spectrum bands. 2.1GHz spectrum will also be liberalised
- Spectrum licences in these bands to be indefinite in order to create greater investment certainty for operators
- Spectrum licences in these bands to be made tradable so that those who can make best use of the spectrum are able to acquire it
- Revised annual licence fees that reflect in future the full market value of these radio spectrum bands in order to encourage its more efficient use

- Wider spread of spectrum held by existing or new operators in these bands through the short-term use of spectrum caps and the relinquishment of excess spectrum for auction in order to encourage competition between operators
- Extension of 3G and mobile broadband coverage with a view to achieving near universal coverage by placing particular coverage and access conditions on operators
- Alignment of up-coming auctions – namely the combined auction of the 2.6GHz and 800MHz spectrum bands – to provide operators greater certainty in building spectrum portfolios necessary to provide next generation mobile (NGM) services

Cost - Benefit Analysis of Options

Methodology

Modelling the economic value achievable from the release and liberalisation of different bands of spectrum is a highly technical and resource intensive exercise. The models developed by Ofcom to inform their policy proposals analyse a number of different possible scenarios and are underpinned by a number of wide-ranging economic and technological assumptions including the amount of spectrum released, the number of potential competitors, the demand for communication and media services and the timing of spectrum release.

Due to the complex nature of modelling spectrum release and limited resources available, it has not been possible for BIS to quantify precisely the potential economic value associated with the ISB proposed solution.

Cost benefit analysis of the options is based on comparing the ISB's package of measures against a counterfactual based on what were Ofcom's preferred policy options prior to the start of the Digital Britain process, as published in previous consultation documents[6]. We have used the results of Ofcom modelling, which was developed for the purpose of informing their policy proposals, where appropriate, to make a qualitative assessment of whether the costs and benefits associated with the ISB's proposed solution could be relatively higher or lower. The costs and benefits associated with the release and liberalisation of the relevant bands of spectrum – 900 MHz, 1800 MHz, 2100 MHz – have been assessed individually. For completeness, we have also considered the costs and benefits associated with the combined auction of 800 MHz and 2600 MHz. Therefore, this approach is an imperfect assessment and as such the estimates of costs and benefits outlined in this Impact Assessment are intended solely for illustrative purposes. A brief note of the key assumptions underpinning Ofcom modelling (particularly the 900 MHz frequency is included in Annex 2).

However, the disadvantage of considering these proposals on an individual basis is that it does not provide a true assessment of the expected economic value of the ISB's package of measures as a whole, as this is not possible. It is clear that the implementation of the ISB's package will lead to a more equitable allocation of spectrum and enable its efficient use thus facilitating faster and more extensive roll-out of next generation mobile and mobile broadband networks.

[6] The weblinks to the reports are attached here: http://www.ofcom.org.uk/consult/condocs/800mhz/, http://www.ofcom.org.uk/consult/condocs/spectrumlib/ http://www.ofcom.org.uk/consult/condocs/2ghzrules/statementim/statement/statement.pdf It should be noted that the circumstances have changed materially since these documents were published. It should not therefore be assumed that the preferred options set out therein would be the options that Ofcom would pursue if the Government did not intervene . Moreover, Ofcom's proposals for the 2.6GHz level of spectrum have been withdrawn in light of the publication of the Digital Britain Report

Cost - Benefit Analysis for 900 MHz

The ISB's package included a proposal to liberalise this spectrum in the hands of existing holders, making it tradable and the licenses indefinite, subject to wholesale access conditions and revised annual licence fees to reflect the full economic value of this spectrum.

In February 2009, the Ofcom analysis resulted in a preferred option to release 1 block of spectrum (2 x 2.5 MHz of spectrum for each of Vodafone and O2) against the counterfactual of liberalising the spectrum in the hands of the incumbents[7]. Therefore, the Ofcom counterfactual is the same as the ISB proposal for 900 MHz and the additional costs and benefits of the Ofcom preferred option serve as a reasonably good proxy (by reversing the additional costs and benefits of the Ofcom preferred option to derive the impact of the ISB proposal) for the additional benefits and costs of the ISB proposal for liberalising 900 MHz in the hands of the incumbents respectively.

However, it is important to note that the Ofcom analysis was based on a five player market and the recent approval by the European Commission of the merger between Orange and T-Mobile discussed in the Competition Assessment has now led to a now four player market. This means that the estimates cited in this section need to be handled with care, as they can now only offer a very rough guide to the magnitude of impacts (tens or hundreds of millions of pounds) and rather than an approximate indication.

In contrast to liberalisation in the hands of incumbents, the release of 1 block could impose costs of up to £90m in total, calculated on a present value basis over 20 years using the 3.5 per cent social discount rate (Table 1 overleaf)[8].

According to the ISB proposals, O2 and Vodafone would remain the license holders in this spectrum and consumers would be unlikely to receive the benefit of increased competition, although it is possible that consumers could benefit from any enhancement of their 3G networks. These two players hold the only available spectrum at the present time below 1 GHz (900MHz) which has cost efficiencies compared to other frequencies above 1GHz. Under the Ofcom proposals to ensure that 1 block of 900 MHz spectrum is released, it is assumed that this may lead to the number of players who can fully compete in the provision of high quality mobile broadband services would increase from 2 to 4[9]. Any potential for any such competition benefits – were they to arise – may not be available with the ISB proposal to liberalise 900 MHz spectrum in the hands of the incumbents.

Furthermore, under the ISB proposals any bid by Vodafone and O2 for spectrum at 800 MHz that is successful will require the holder to relinquish into the auction an amount of 900 MHz spectrum equivalent to the amount of spectrum that is acquired in order to offset any adverse competitive effects thus ensuring that the sub-1 GHz spectrum does not become overly concentrated.

It may also be possible to argue that under the ISB proposal competition would be constrained further through the creation of barriers to entry, if other bidders were to bid strategically to deny access to their competitors. If that occurs, operators without access to spectrum below 1 GHz could face higher costs and could find it more difficult – if not impossible – to roll out NGM services. However, the use of short-term spectrum caps will address this issue.

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[7] http://www.ofcom.org.uk/consult/condocs/spectrumlib/

[8] Page 84 of "Application of spectrum liberalisation and trading to the mobile sector – A further consultation" published by Ofcom on 13 February 2009.

[9] However, this assumption in Ofcom analysis was later challenged by operators in the response to the Ofcom consultation.

Table 1, below, summarises the main costs and benefits of the impact of the direction on the 900 MHz spectrum – liberalisation in the hands of incumbents – which are additional to the counterfactual, which was Ofcom's preferred policy option[10].

Table 1: Additional costs and benefits of liberalisation of 900 MHz in the hands of incumbents (the ISB recommendation)[11]

Benefits of the ISB proposal on 900 MHz against the Ofcom Proposal	Costs of the ISB proposal on 900 MHz against the Ofcom Proposal
Avoids delays as a result of legal challenges to Ofcom proposals (Reduced welfare of £45m as a result of 3 months' delay).	Any possible loss of potential for increased consumer welfare associated with liberalising the 900 MHz spectrum in the hands of the incumbents, arising from the possible likelihood of an absence of increased competition[12].
Avoids costs of release of 1 block of 900 MHz spectrum of up to £90m[13].	

Source: BIS interpretation of Ofcom analysis published in February 2009 http://www.ofcom.org.uk/consult/condocs/spectrumlib/

Cost - Benefit analysis of 1800 MHz spectrum

The ISB's package included a proposal to liberalise this spectrum in the hands of existing holders, making it tradable and the licenses indefinite and revised annual licence fees to reflect the full economic value of this spectrum.

As with the 900 MHz spectrum, Ofcom considered policy options involving release of spectrum or regulated access to spectrum against the counterfactual of liberalising the spectrum in the hands of the incumbents. However, Ofcom concluded that the best option was liberalisation of the 1800 MHz spectrum in the hands of incumbents so the implementation of the ISB proposal would have no additional impact against the counterfactual of the Ofcom proposal.

However, this assessment does not take account of the European Commission's approval of the merger of the UK operations of Orange and T-Mobile, which was partly due to the two parties' offer to divest 15MHz of spectrum, as discussed in the Competition Assessment on Page 13.

Cost - Benefit analysis of 2100 MHz spectrum

Prior to the merger between T-Mobile and Orange had been approved by the European Commission this spectrum had been evenly distributed amongst 5 players and there is no European requirement to liberalise this spectrum. Ofcom was minded to liberalise and make tradable the 2.1 GHz licenses. The Independent Spectrum Broker recommended licenses at 2.1 GHz be made indefinite, liberalised and tradable and be subject to annual license

[10] These estimates are based on a five player market and not a four player market, which is the outcome of the recently approved merger of T-Mobile and Orange.
[11] The costs and benefits are based on a period of 20 years and the 3.5% social discount rate has been used.
[12] According to one scenario of three scenarios modeled by Ofcom, a change in competition from 2 to 4 players leads to indicative estimates of benefits of £375m to £875m over 20 years (Page 60 of "Application of spectrum liberalisation and trading to the mobile sector – A further consultation" published by Ofcom on 13 February 2009. The assumptions underpinning this estimate have been challenged by operators (as some operators believed that the benefits were overestimated and others that the benefits were underestimated). However, it is important to note that these benefits do not occur with the other two scenarios.
[13] There may also be avoided costs to operators of clearing spectrum (clearing 1 block could lead to £2m – £20m network costs of disruption), which may only be in the worst case scenario, as stated by Ofcom in "Application of spectrum liberalisation and trading to the mobile sector – A further consultation" published by Ofcom on 13 February 2009.

fees. However, Ofcom in its 2009 consultation document stated that it was not making any proposals regarding the term of the licenses. Therefore, if we use Ofcom's policy proposals as the counterfactual, there may be some additional impact – although it is not possible to be certain – from the implementation of the ISB proposals with regards to the 2100 MHz spectrum. For example, if the licenses were made indefinite there may be a positive impact on license holders' incentives to invest.

Cost - Benefit analysis of 800 MHz and 2.6 GHz spectrum

By 2009 Ofcom had launched separate consultations on auctioning 800 MHz and 2.6 GHz bands of spectrum[14]. Since the consultation, Ofcom's proposals for 2.6GHz have been withdrawn in light of the publication of the Digital Britain Report[15]. Ofcom made a statement in July 2009 to confirm their proposals to clear channels 61 to 69 of 800MHz based on the responses they received to the consultation they did in February 2009. The Independent Spectrum Broker recommended that instead of two separate auctions taking place for these bands of spectrum a Combined Auction of the 800MHz and 2.6GHz spectrum should take place, as a Combined Auction will make appropriate decision making easier for those companies wishing to acquire spectrum in bands and at levels that would support the roll out of new services. The Government anticipates the auction occurring 9 to 12 months after the making of the Direction:

- The Government will support Ofcom in taking all practical measures to expedite the clearance of the 800MHz band, in particular the clearance of channels 61, 62 and 69.
- The Government will apply coverage conditions on the licences for 800MHz spectrum where this can be consistent with achieving the largest spread of services in the UK.
- There will be time limited spectrum caps on spectrum holdings below 1GHz and in total.
- The TDD portion of the 2.6GHz spectrum will be auctioned separately[16].

The 800 MHz spectrum

The initial proposals from Ofcom for clearing all of the 800 MHz, published in a consultation document in February 2009, recommended a preferred option, which was confirmed in a statement from Ofcom in July 2009, based on clearing channels 61, 62 and 69 and including the spectrum in the cleared award against a counterfactual of liberalising 800 MHz band without clearing these three channels[17]. Ofcom have as yet made no external proposals because of the Digital Britain process taking place. The preferred option at that time is used here as an illustration of what Ofcom could do if the Government were not to implement the ISB's proposals for 800 MHz and 2.6 GHz. Ofcom suggested that the costs of clearing these channels would range from £90m to £203m and the total benefits of liberalising all of 800MHZ could range from £4.2 billion to £7.6 billion (Table 2, below).

[14] http://www.ofcom.org.uk/consult/condocs/800mhz/statement/clearing.pdf
http://www.ofcom.org.uk/consult/condocs/2ghzrules/statementim/statement/statement.pdf
[15] http://www.ofcom.org.uk/radiocomms/spectrumawards/awardspending/award_2010/Update26GHz230609.pdf
[16] Please refer to the Independent Spectrum Broker's initial report for a definition of FDD and TDD spectrum and the differences between them.
[17] http://www.ofcom.org.uk/consult/condocs/800mhz/statement/

Table 2: Total benefits of liberalising all of 800MHz[18]

	Scenario 1[19]	Scenario 2[20]	Scenario 3[21]
Option D: Clear channels 61, 62 & 69			
Economic value of DTT	2,000	2,000	3,100
Economic value of Mobile Broadband	4,400	4,400	1,300
Economic value of MMS	0	1,400	0
Less costs of clearing channels 61, 62 & 69	-90	-203	-203
Total economic value	**6,300**	**7,600**	**4,200**

Source: Ofcom, Digital Dividend: Clearing the 800MHz Band, Consultation, 2009. http://www.ofcom.org.uk/consult/condocs/800mhz/800mhz.pdf

The additional benefits from the Government's proposals to hold a Combined Auction, over and above the benefits from Ofcom's proposals, have not been quantified here. However, we would expect them to be positive, especially if the liberalisation of the 800MHz band occurred sooner under the Government's proposals and from any additional benefits from the combined auction.

The 2.6 GHz spectrum

As stated previously, Ofcom have withdrawn their previous proposals for the 2.6GHz spectrum and currently do not have an external proposal for this level of spectrum. One of the main reasons for withdrawing the proposals was the publication of the Digital Britain Report, setting out the Government's intention the adopt the ISB's proposals. The counterfactual for 2.6GHz is therefore that the government does nothing and Ofcom develop a proposal for 2.6GHz.

It is therefore anticipated that there will be increased benefits from competition and innovation from the ISB's proposals, over the counterfactual, because they will take effect sooner, and the benefits will be received for longer. Ofcom's previous analysis for their withdrawn proposal had suggested that the benefits of auctioning 2.6GHz spectrum would be in the order of hundreds of millions of pounds.

Summary Table of Qualitative Impacts of the ISB's package

The table below summarises the different impacts of the ISB packages as a whole against the current status quo – in the absence of Government intervention through a Direction to Ofcom and before Ofcom addresses these issues through the normal regulatory process - in qualitative terms.

Benefits	Costs
If fewer masts are needed by operators to deliver next generation mobile services and mobile broadband, cost savings could arise because at low frequencies, mobile services can be relayed over much larger areas at lower cost as fewer masts are needed. There may also be a positive environmental impact in that the detrimental effect that masts may have on the landscape is reduced.	Under this option some operators acquiring newly released or newly awarded spectrum would also be required to make payments either to the Exchequer, the relinquishing operator or in some cases both (which would also represent a benefit for the tax payer and hence would be a transfer).

[18] Ofcom, Digital Dividend: Clearing the 800MHz Band, Consultation, 2009. http://www.ofcom.org.uk/consult/condocs/800mhz/800mhz.pdf

[19] **Scenario 1: Strong demand for mobile communication**: strong consumer demand for mobile communications and weak demand for other services

[20] **Scenario 2: Strong demand for all services**: strong demand for the spectrum for all mobile communications, DTT and MMS.

[21] **Scenario 3: Strong demand for DTT**: strong demand for DTT and relatively weak demand for mobile communications and MMS. (This scenario was used to stress-test the analysis and was not considered especially likely.)

The release and liberalisation of these particular frequencies will enable the delivery of next generation mobile and mobile broadband networks that will provide capacity, speed and reliability of services to consumers.
It will also help to extend the coverage of next generation mobile and mobile broadband into rural areas and inside buildings
Greater social inclusion of people and communities in more remote regions

Improved quality and delivery of public services (e.g. education and health care services), particularly in more rural areas
Further productivity gains arising from the increased take-up and use of next generation mobile and mobile broadband
Increased consumer choice in terms of the number of alternative network operators available and range of services on offer.

Competition assessment

Any assessment of competition in the mobile sub-sector will be influenced significantly by the merger of the UK operations of the third and fourth MNOs of T-Mobile and Orange, which was cleared by the European Commission on 1 March 2010 on the basis of the following commitments by both parties on the following issues:

- 3UK (the fifth MNO) had a radio access network sharing agreement with T-Mobile, which would have been put at risk by the initial terms of the merger thus potentially threatening its viability on the market because the radio access network is a key infrastructure element of a mobile network. Therefore, the parties concluded a revised agreement with 3UK, the effect of which is to preserve the competitive pressures that 3UK brings as well potentially avoiding situation where the number of players being reduced was to 3 from 5 rather than to 4 from 5.
- As the combined amount of spectrum being held at 1800 MHz by the two parties would be larger than that of their competitors, the parties offered to relinquish 15 MHz of spectrum. There are likely to pro-competitive benefits as it would allow other competitors to roll out services more easily, but the magnitude of benefits would vary depending on which player(s) acquired the spectrum.

Prior to the merger being agreed, there were five main national mobile companies or so-called mobile network operators (MNOs). These are Vodafone, Orange, O2, T-Mobile and Hutchinson 3G (H3G). Four of the five MNOs networks – Vodafone, Orange, O2 and T-Mobile are able to provide both 2G and 3G mobile telephony services[22]. The fifth MNO, H3G, is a pure

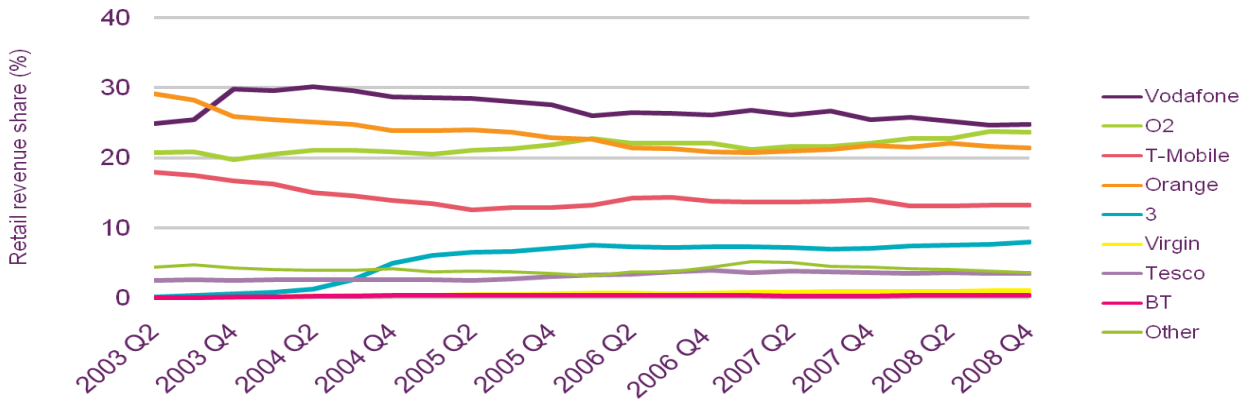
[22] 3G represents the next generation of mobile phone technologies and services. It offers greater capability in terms of data transmission and new services such as video clips, photo-messaging, e-mail, games, MP3 player, interactive and information services.

3G network, but in areas in the UK not covered by its own 3G network, 3 has a national roaming agreement with Orange to use its 2G network.

Then, there are a number of secondary players known as Mobile Virtual Network Operators (MVNOs). These companies do not have their own spectrum allocation or wireless network and provide their mobile telephony services by agreeing wholesale deals with the MNOs which enable them to use their spectrum and network. According to Ofcom[23], there are approximately 25 MVNOs of which Virgin, Tesco Mobile and BT are the largest. Virgin operates through T-Mobile, Tesco Mobile through O2 and BT through Vodafone.

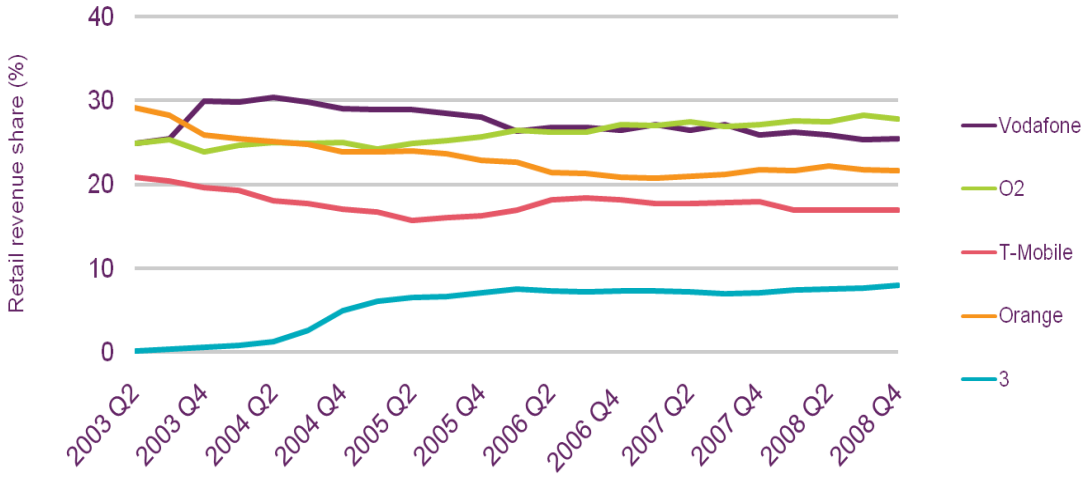
The sub-sector is competitive relative to other countries and the level of competition has increased since H3G entered the sector in 2003. The market shares of the top four MNOs have varied significantly in recent years at both the wholesale and retail level (see Figure 1 and 2 below).

Figure 1: Estimated retail revenue share (%)



Source: Ofcom (2009)

Figure 2: Estimated wholesale revenue share (%)

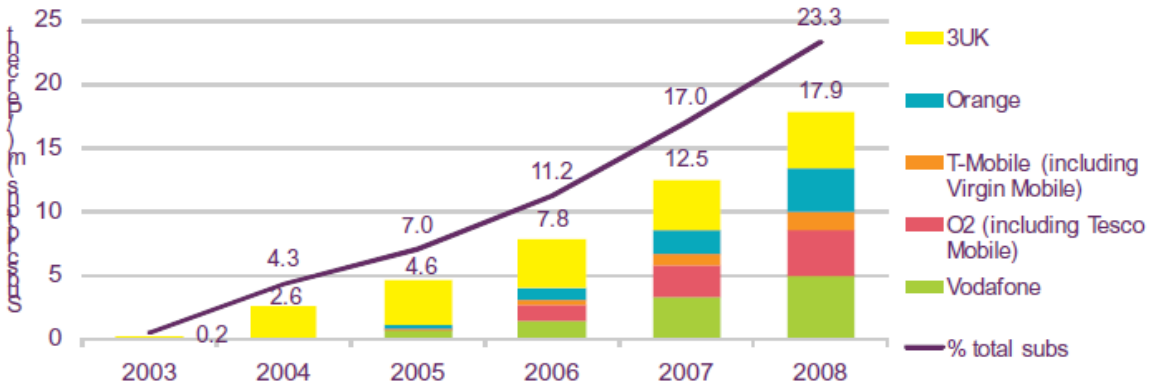


[23] Ofcom (2009) *Mostly mobile: Ofcom's mobile sector assessment.* Second consultation, page 32 http://www.ofcom.org.uk/consult/condocs/msa/msa.pdf

Source: Ofcom (2009)

Figure 3 below shows that Vodafone, 3UK, O2 and Orange appear to have similar market shares in terms of the number of 3G subscriptions.

Figure 3: 3G mobile subscriptions, by network operator[24]



Source: Ofcom / operators / Informa
Note: 3G connections defined as connections sold with 3G-capable handsets

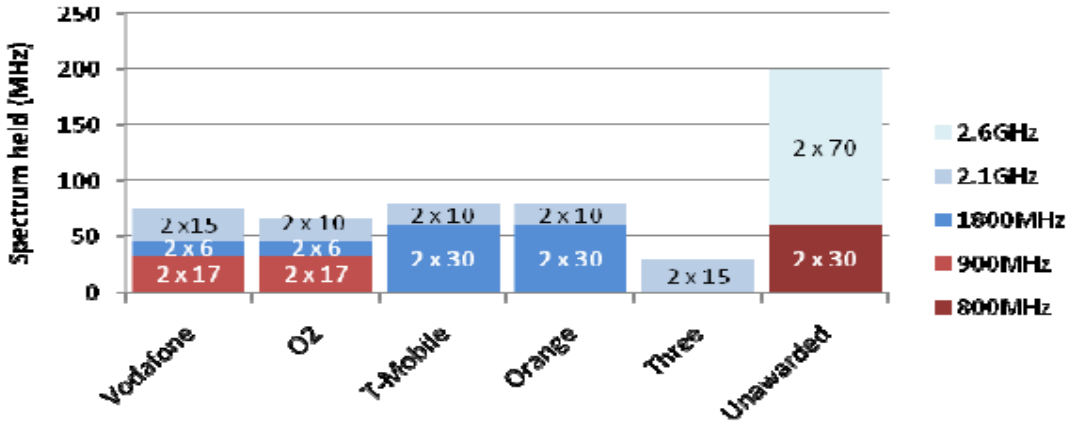
Figure 4 overleaf shows that holdings of 900, 1800 and 2100MHz varies significantly across the five mobile operators – Vodafone, O2, T-Mobile, Orange and Hutchinson 3G (H3G):

- 900MHz is entirely held by Vodafone and O2
- 1800MHz is mostly held by T-Mobile and Orange with Vodafone and O2 sharing the remainder
- 2.1GHz is relatively evenly divided across the four main MNOs and Hutchinson 3G (H3G) which does not have any holdings of 900 or 1800MHz.

Figure 4: Distribution of paired spectrum across the five main MNOs[25]

[24] Figure reproduced from Ofcom Communications Market Report 2009 at http://www.ofcom.org.uk/research/cm/cmr09/cmr09.pdf

[25] Figure 4 reproduced from Independent Spectrum Broker's Interim Report to Government, May 2009 at http://www.culture.gov.uk/images/publications/ISB_final_report.pdf In Figure 4 above, the block of 2.6GHz spectrum relates only to FDD spectrum and excludes TDD spectrum. Please refer to the Independent Spectrum Broker's initial report for a definition of FDD and TDD spectrum and the differences between them.



Source: Independent Spectrum Broker's initial report, May 2009

There is evidence to suggest that the current allocation of spectrum provides Vodafone and O2 with a cost advantage over the other operators. This is because spectrum at different frequencies has different properties. In particular, spectrum below 1GHz is particularly valuable because lower frequencies enable mobile phone signals to cover longer distances and penetrate buildings more effectively than higher frequencies.

Taken as a whole, the ISB's proposed solution should have a pro-competitive effect. Access to suitable radio spectrum constitutes a significant barrier to entry and expansion in the mobile sector. Increasing the availability of sub 1GHz spectrum should enable incumbent operators to extend their existing networks into new areas. It may also lead to the emergence of a larger number of alternative competing next generation mobile services and mobile broadband networks if it also encourages the entry of other potential network operators.

However, it is possible to consider the potential for adverse competitive impacts for individual elements of the ISB package, for example, the liberalisation of the 900 MHz spectrum in hands of the two incumbents as discussed in the cost-benefit analysis.

In its latest mobile sector assessment Ofcom notes the healthy level of competition and investment which already exists in this sector and believes that it can best promote investment in the sector by continuing to promote competition[26].

Other specific impact tests

Other environment/ rural proofing

It is possible that there proposals may have a positive impact on the environment. If more operators are able to acquire and use lower frequencies to deliver next generation mobile

[26] Ofcom Mobile Sector Assessment, Mobile Evolution, December 2009.

services and mobile broadband, fewer masts may be needed reducing the detrimental effect masts may have on the aesthetic value of the landscape.

Race, disability and gender equality

After an initial screening it has been deemed that no significant impact is anticipated on the statutory impact tests for race, disability and gender equality.

Other tests

Other specific impact tests have been considered including the Small Firms Impact Test, Legal Aid, Sustainable Development and Carbon Assessment. Again, after initial screening, it has been deemed that no significant impact is anticipated.

Post Implementation Review

A post implementation review will be carried out within three to five years of the Direction to Ofcom being laid. This will – in part through the use of Ofcom surveys and reports which monitor the mobile subsector – assess the implementation of the Independent Spectrum Broker's package of policies - whether suitable spectrum holdings and early deployment of networks had been achieved - and the avoidance of unintended consequences.

Specific Impact Tests: Checklist

Use the table below to demonstrate how broadly you have considered the potential impacts of your policy options.

Ensure that the results of any tests that impact on the cost-benefit analysis are contained within the main evidence base; other results may be annexed.

Type of testing undertaken	***Results in Evidence Base?***	***Results annexed?***
Competition Assessment	Yes	No
Small Firms Impact Test	No	No
Legal Aid	No	No
Sustainable Development	No	No
Carbon Assessment	No	No
Other Environment	Yes	No
Health Impact Assessment	No	No
Race Equality	Yes	No
Disability Equality	Yes	No
Gender Equality	Yes	No
Human Rights	No	No
Rural Proofing	Yes	No

Annex 1

Radio spectrum management in the UK

Ofcom aims to manage radio spectrum in a way which maximises the economic and social value which can be generated from it. It seeks to achieve this using a market-based approach in which Ofcom aims to[27]:

- Promote the efficient use of the radio spectrum by allowing spectrum to be transferred to, and used by the user who values it most highly
- Promote competition by increasing the availability of spectrum for use in the most valuable service
- Facilitate economically valuable innovation as new users enter the market to offer new services

To deliver these objectives, Ofcom has implemented the following policies:

- Spectrum trading – allowing spectrum to be transferred from one operator to another
- Spectrum liberalisation – relaxing restriction on the technologies which may be used in particular spectrum bands and the types of services which may be offered
- Spectrum pricing – updating the annual fees for spectrum so that they may also accurately reflect the value to operators of using it
- Prompt release – enabling unused spectrum to be released into the market as quickly as possible allowing maximum flexibility as to its subsequent use.

[27] Ofcom (2005) *Spectrum Framework Review: Implementation Plan*.

Annex 2

Ofcom's 900 MHz Model

Assumptions:

1. 2 years to clear 1 block of 900 MHz spectrum (from 2009 up to mid to late 2011).
2. Material gap of 2-4 years from benefits being received by consumers.
3. Baseline demand period: 2008-2027
4. Number of players: up to 5.
5. Different sizes of impact considered in terms of proportion of mobile service revenues: High (15%), Base (25%), and Low (35%).
6. Spectrum release date: 2011 (BIS says 2013 at the latest and the 2011-13 period is for clearing and making use of 900 MHz spectrum)
7. Quantification based on 3.5% Green Book rate and over a 20 year period.
8. 900 MHz will be available over the 2011 to 2015 period. 800 MHz spectrum will be ready to be used between late 2012 and end 2013. 800 MHz services will be available over the 2014-15 period.
BIS consultation document states that the first third of 800 MHz spectrum will be available by 1 January 2013.
9. 3 significance scenarios:
High: high demand/high quality
Medium high demand/low quality
Low low demand/low quality
10. Release of 1 block means going from 2 players to 4 players.
11. 3 approaches to dealing with traffic displaced as a result of partial clearance and release of spectrum in 900 MHz
    - SFH upgrades + UMTS 2100 widening
    - SFH upgrades + GSM cell splitting
    - GSM upgrades + cell splitting

The Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2010

Transposition Notes

(i) Directive 2009/114/EC of the European Parliament and of the Council of 16 September 2009 amending Council Directive 87/372/EEC on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community **(ii) Commission Decision 2009/766/EC of 16 October 2009 on the harmonisation of the 900 MHz and 1800 MHz frequency bands for terrestrial systems capable of providing pan-European electronic communications services in the Community**
The purpose of Directive 2009/114/EC ("the Directive") is to allow new digital technologies to be deployed in the 900 MHz band in coexistence with GSM systems. Therefore, the exclusive reservation of the 900 MHz band for GSM systems needs to be removed. Article 1(1) of the Directive requires Member States to make the 900 MHz band available for both GMS and UMTS systems, as well as for other systems capable of providing electronic communications services that can coexist with GSM systems in accordance with technical implementing measures adopted pursuant to Commission Decision 2009/766/EC ("the Decision"). The Decision requires the implementation of technical measures to allow the coexistence of GSM systems with other terrestrial systems capable of providing electronic communications services in the 900 and 1800 MHz bands. Article 3 and the Annex to the Decision provide that UMTS systems that comply with UMTS Standards as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11, are terrestrial systems capable of providing electronic communications services that can coexist with GSM systems in the 900 MHz band. Under the Annex, UMTS systems must, in the absence of bilateral or multilateral agreements between neighbouring network operators (that may have less stringent technical parameters if agreed between those operators), be subject to conditions requiring carrier separation of 5 MHz or more between two neighbouring UMTS networks and carrier separation of 2.8 MHz or more between a neighbouring UMTS network and a GSM network. Article 1(2) of the Directive requires that when making the 900 MHz band available for UMTS systems, Member States must examine whether the existing assignment of the 900 MHz band is likely to distort competition in the mobile markets concerned and, where justified and proportionate, address distortions. Article 4 of the Decision requires the 1800 MHz band to be designated and made available for GSM systems and for UMTS systems in accordance with the Annex (as above). The Office of Telecommunications (OFCOM) is responsible for the management of the radio spectrum in the United Kingdom. Their powers and duties for the management of radio spectrum are set out in the Communications Act 2003 and the Wireless Telegraphy Act 2006 ("the Act"). Under section 5 of the Act, the Secretary of State can give general or specific directions to OFCOM about the carrying out by them of their radio spectrum functions. Directions are made by order and no order can be made unless a draft of the order has been laid before Parliament and approved by a resolution of each House. The Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2010 will give directions to OFCOM that will achieve the United Kingdom's compliance with the Directive and the Decision. At present, the wireless telegraphy licences granted by OFCOM to use the 900 MHz band and the 1800 MHz band allow for the bands to be used for GMS systems. The directions will require OFCOM to vary the relevant licences to allow for use of those bands for both UMTS and GMS systems and to ensure that network operators comply with the technical parameters in the Decision. This table has been prepared by the Department for Business, Innovation and Skills.
DIRECTIVE 2009/114/EC

Article(s) of the Directive	Detail	Implementation (references are to the provisions of the Order)
1(1)	Requires Member States to make the 900 MHz band available for both GSM and UMTS systems, as well as for other terrestrial systems capable of providing electronic communications services that can coexist with GSM systems in accordance with "the Decision".	Article 4(2)(a) requires OFCOM to vary licences covering the 900 MHz band to allow use of that band for both GSM and UMTS systems. On other terrestrial systems that can coexist with GSM systems in accordance with the Decision, see the table for the Decision (below).
1(2)	Requires Member States, when implementing the Directive, to examine whether the existing assignment of the 900 MHz band to the competing mobile operators in their territory is likely to distort competition in the mobile markets concerned and, where justified and proportionate, to address such distortions in accordance with article 14 of Directive 2002/20/EC ("the Authorisation Directive").	This Order directs OFCOM to take a range of measures aimed at ensuring the release of additional electromagnetic spectrum for use by providers of next generation wireless mobile broadband, the early deployment of next generation wireless mobile broadband and the broad coverage of next generation wireless mobile broadband services. In authorising current licensees to use the 900 MHz for both GMS and UMTS systems, likely market distortions are addressed in the context of the full range of measures in the Directions.
2	Definitions of "GMS system" and "UMTS system"	These definitions are reflected in article 3 (Interpretation)

DECISION 626/2008/EC

Article of the Decision	Detail	Implementation (references are to the provisions of the Order)
1	Sets out the aim of the Decision.	No implementation required.
2	Sets out the definitions used in the Decision	These definitions are reflected in article 3 (Interpretation)
3	Provides that the terrestrial systems capable of providing electronic communications services that can coexist with GSM systems in the 900 MHz band within the meaning in article 1(1) of the Directive are those listed in the Annex i.e. UMTS systems complying with UMTS Standards as published by ETSI, in particular EN 301 908-1, EN 301 908-2, EN 301 908-3 and EN 301 908-11.	The definition of UMTS systems in article 3 (Interpretation) restricts those systems that the 900 MHz band licences must be varied to accommodate to those in the Annex to the Decision.
3	The systems shall be subject to the conditions and implementation deadlines laid down in the Annex. Under the Annex, UMTS systems must, in the absence of bilateral or multilateral agreements between neighbouring network operators (that may have less stringent technical parameters if agreed between those operators), be subject to conditions requiring carrier separation of	Article 18(2) requires OFCOM to impose the necessary technical requirements when it liberalises the 900 MHz band spectrum for both GSM and UMTS systems.

	5 MHz or more between two neighbouring UMTS networks and carrier separation of 2.8 MHz or more between a neighbouring UMTS network and a GSM network.	
4	The 1800 MHz band shall be designated and made available for GSM systems and for GSM and UMTS systems.	Article 18(1) requires OFCOM to designate the 900 MHz and 1800 MHz bands for both GSM and UMTS systems.
5	Member States may designate and make available the 900 MHz band and the 1800 MHz band for other terrestrial systems not listed in the Annex where certain conditions are met.	No implementation required.
6	Member States shall keep the use of the 900 MHz band and the 1800 MHz band under review to ensure the efficient use thereof and in particular report to the Commission any need for a revision of the Annex.	No implementation required.