



Decision to vary Everything
Everywhere's 1800 MHz spectrum
licences to allow use of LTE and
WiMax technologies

Decision

Publication date:

21 August 2012

Contents

| Section | | Page |
|--------------|--|-------------|
| 1 | Summary | 2 |
| 2 | Factual background and legal framework | 4 |
| 3 | Assessment of competition effects | 12 |
| 4 | Conclusion | 45 |
| Annex | | Page |
| 1 | Stakeholder responses to the March 2012 consultation | 46 |
| 2 | LTE deployments | 71 |
| 3 | iPhone exclusivity | 83 |
| 4 | Technical licence conditions | 94 |
| 5 | Varied licences | 97 |

Section 1

Summary

- 1.1 This document sets out our decision to vary Everything Everywhere's (EE) 1800 MHz Wireless Telegraphy Act 2006 licences to allow the use of LTE¹ and WiMAX² technologies.
- 1.2 On 23 November 2011 we received an application from EE for variation of its 1800 MHz licences to enable it to provide services using LTE technology in those frequencies. The application encompasses all frequencies currently licensed to EE in the 1800MHz band, i.e. the 2x15 MHz that it undertook to divest as a result of its merger in 2010 and the 2x45 MHz it will retain.
- 1.3 In light of this application, on 13 March 2012 we published a notice (the March 2012 consultation) setting out our intention, subject to consultation with any interested parties, to vary EE's licences as requested.
- 1.4 In the March 2012 consultation, we explained that: (i) in light of consumer demand for mobile data services, the availability of new high-speed mobile data services is likely to bring material benefits to consumers and citizens; (ii) if we were to vary EE's licences, EE would be likely to be the only entity capable of providing LTE/WiMAX services on a national basis for a period of time; (iii) we had therefore considered whether there was a risk of distortion to competition if we varied EE's licences; and (iv) our view, subject to consultation, was that no material risk to distortion of competition would arise as a result of such variation.
- 1.5 We received 16 responses to the March 2012 consultation, including a number of significant responses from other mobile operators. Having considered the responses to our consultation, we also sought certain further information from some stakeholders.
- 1.6 In light of the available evidence and in order to best meet our relevant regulatory objectives and statutory duties, we have considered the extent to which liberalising EE's 1800MHz licences now would:
 - be to the benefit of consumers because it would further their interests by, for example, encouraging innovation, investment, and the availability and use of high speed data transfer services throughout the UK; and improve choice, price, quality of service and value for money; and/or
 - give rise to a material risk of a distortion of competition to the detriment of consumers such that any benefits to consumers resulting from liberalisation of EE's 1800 MHz licences now would be outweighed by the detriment to consumers resulting from such a distortion of competition.

¹ LTE: Long Term Evolution, the next evolution of cellular mobile technologies, part of the family of standards developed by standardisation body 3GPP that includes 3G/UMTS/HSPA, designed to provide high speed data services. WiMAX: Worldwide Interoperability for Microwave Access, another wireless technology suitable for high speed data services, developed by standardisation body IEEE.

² WiMAX: Worldwide Interoperability for Microwave Access, another wireless technology suitable for high speed data services, developed by standardisation body IEEE.

- 1.7 Varying EE's licences would allow EE to provide better quality data services to consumers, for example with higher speeds and lower latency, than can be offered by operators using 3G technologies and existing spectrum holdings. Accordingly, we expect that consumers that choose to take EE's LTE service will derive benefits that they would not otherwise enjoy were we not to vary EE's licences now.
- 1.8 Although we consider it likely that EE will enjoy a competitive advantage during the period before other operators are able to launch their own LTE services, we consider on the evidence available that any such advantage is unlikely to result in an enduring advantage which distorts competition to the detriment of consumers. Our assessment takes account of the impending release of additional spectrum in the 800 MHz and 2.6 GHz bands which will enable other operators to launch competing LTE services during the course of 2013. We have also taken into account EE's obligation to divest itself of some its 1800 MHz spectrum.
- 1.9 In light of this assessment, and for the reasons explained in more detail in this decision, we consider that it is in the interests of consumers for us to vary EE's licences now, in accordance with EE's request. We have therefore today issued EE with varied 1800 MHz licences with the provisions authorising LTE and WiMAX coming into force on 11 September 2012.

Section 2

Factual background and legal framework

- 2.1 This section sets out the factual background relevant to EE's licence variation application and the applicable legal framework.
- 2.2 Section 3 assesses the likely impact on competition if we authorise the use of LTE and WiMAX technologies under EE's 1800 MHz licences.
- 2.3 Section 4 sets out our conclusions and decision.
- 2.4 This document should be read together with the annexes. This document, together with those annexes, as a whole comprises an impact assessment.

Factual background

Consumer demand for data services

- 2.5 There has been a huge increase in the use of mobile data services in the last couple of years, both through the take-up of dongles connecting PC/laptops to the internet and through the increasing use of data services on mobile handsets³. This rapid growth in data services is expected to continue for the foreseeable future.⁴
- 2.6 The Government has recognised the importance of data services, including mobile broadband and has set out an ambition to provide superfast broadband to at least 90 per cent of premises in the UK and to provide universal access to standard broadband with a speed of at least 2Mbps⁵.
- 2.7 LTE and WiMAX technologies are designed to provide high speed mobile data services. LTE technology specifically, has a number of advantages of over 3G/UMTS/HSPA technology because underlying differences in these technologies enable LTE to operate more efficiently with respect to the use of spectrum. Specific aspects of network performance where LTE delivers advantages over 3G/UMTS/HSPA, include greater cell spectral efficiency, improved latency, scope to prioritise traffic and the potential for higher peak data rates.

Current mobile spectrum holdings and technologies

- 2.8 There are over 80 million subscriptions to mobile services in the UK⁶. The voice and data services these consumers currently enjoy rely on the use of three frequency bands, namely 900 MHz, 1800 MHz and 2.1 GHz.
- 2.9 Table 1 details the mobile network operators' (MNOs) existing spectrum holdings.⁷

³In our Communications Market Report: UK of 4 August 2011, we estimate that data volume increased by a factor of 38 in the three years to the end of 2010.

⁴ For further discussion see: <http://stakeholders.ofcom.org.uk/market-data-research/other/technology-research/2011/4G-Capacity-Gains/>

⁵ See http://www.culture.gov.uk/what_we_do/telecommunications_and_online/7763.aspx

⁶ Ofcom's Communications Market Report

Table 1: MNOs' existing UK spectrum holdings

| Licensee | Amount of 900 MHz spectrum held (2x... MHz) | Amount of 1800 MHz spectrum held (2x... MHz) | Amount of 2.1 GHz paired spectrum held (2x... MHz) |
|------------------------------------|---|--|--|
| Telefónica | 17.4 | 5.8 | 10 |
| Vodafone | 17.4 | 5.8 | 15 |
| EE (current) | 0 | 60 | 20 |
| EE (post divestment ⁸) | 0 | 45 | 20 |
| H3G | 0 | 0 | 15 |

2.10 There are differences in both the technologies that are authorised for use in these bands, and in the equipment that is available on the market for use in these bands. These differences change over time as new technologies emerge and MNOs and consumers exercise choice in deciding what equipment and services to purchase. Table 2 provides an overview of the current situation. Current technologies are 2G/GSM, suitable for voice and low speed data services, and 3G/UMTS/HSPA⁹ suitable for voice and the higher speed data services currently available.

Table 2: Technologies authorised and available today in UK mobile bands

| | 900 MHz band | 1800 MHz band | 2.1 GHz band |
|---|------------------------|------------------------|--------------|
| Technologies authorised for use | 2G/GSM 3G/UMTS/HSPA | 2G/GSM 3G/UMTS/HSPA | 3G/UMTS/HSPA |
| Technologies for which equipment is currently available on the market | 2G/GSM 3G/UMTS/HSPA | 2G/GSM LTE | 3G/UMTS/HSPA |

2.11 Tables 1 and 2 show that each of EE, Telefónica, Vodafone and H3G holds 2.1 GHz spectrum that is suitable for the provision of higher speed data services using 3G/UMTS/HSPA. Three of these operators (EE, Telefónica and Vodafone) also hold spectrum at 900 MHz and 1800 MHz which is authorised for use of 3G/UMTS/HSPA technologies, but 3G/UMTS/HSPA equipment is only currently available to support such use in the 900 MHz band and not the 1800 MHz band, and there is no clear prospect of this changing in the near term. As such, only Telefónica and Vodafone hold spectrum (the 900 MHz spectrum) in addition to the 2.1GHz spectrum, that is suitable for providing 3G/UMTS/HSPA services now.

⁷ The MNOs' holdings also include further spectrum at 2.1 GHz, referred to as unpaired spectrum, to which they have been holding rights since 2000. However, this spectrum is not in use and we are not aware of any suitable equipment being commercially available.

⁸ EE's parent companies have given commitments to the European Commission to divest 2x15 MHz of EE's 1800 MHz spectrum. We explain and address this in more detail below in this section.

⁹3G is a family of mobile technologies that deliver voice and data services. UMTS is the original version of 3G. HSPA is its current, most advanced version. In this Notice, we use the term HSPA to refer to all versions of HSPA, including HSPA+ and DC-HSPA.

- 2.12 Telefónica has been using some of its 900 MHz spectrum to provide 3G services since early 2011¹⁰ and there have been reports that Vodafone plans to use some of its 900 MHz holdings to provide 3G services in future and has been preparing for this change.¹¹
- 2.13 LTE, the next generation of mobile technology following 3G/UMTS/HSPA, is not yet authorised for use in the UK in any of the spectrum bands set out in Table 1 and 2 above, although equipment to support LTE use is currently available in the 1800MHz band.¹²

A significant amount of additional mobile spectrum will be authorised for LTE use in 2013, with LTE equipment immediately available

- 2.14 There is a significant amount of additional spectrum suitable for the provision of mobile services, including using LTE technology, which will be authorised for LTE use in 2013, and for which LTE equipment is already available. There are two sources of this spectrum (i) spectrum to be divested by EE as part of its merger commitments made to the European Commission, and (ii) spectrum to be auctioned by Ofcom.

EE's Divestment spectrum

- 2.15 On 11 January 2010 France Télécom and Deutsche Telekom notified the establishment of a joint venture company (now EE) to the European Commission (the "Commission") under the EC Merger Regulation.¹³ This joint venture was established by France Télécom and Deutsche Telekom contributing their respective subsidiaries Orange UK and T-Mobile UK to EE.
- 2.16 Pursuant to this notification, the Commission considered whether the transaction would significantly impede effective competition in the common market or a substantial part of it. In doing so, the Commission assessed the incremental effect of the T-Mobile/Orange concentration on the assumption that the 1800 MHz spectrum would be authorised for LTE use in advance of the 800 MHz and 2.6 GHz spectrum becoming available for such use. In undertaking this assessment, the Commission identified a concern that the combined entity could be the only MNO with a clear path to full coverage maximum-speed LTE technology in the UK, as against the counterfactual that there would be two MNOs in that position, with 1800 MHz spectrum, in absence of the merger.¹⁴ The Commission felt that a merger without remedy could result in a bifurcation of the market "in the years to come", with the combined entity being the only MNO in the UK able to offer LTE technology at the best possible speeds with full coverage.
- 2.17 In its assessment, the Commission made the following assumptions about the availability of 800 MHz and 2.6 GHz spectrum: that the 800 MHz band would become available for use by the end of 2013 and that the 2.6 GHz band would be available for use immediately after the auction (which was expected at the time to take place in

¹⁰ <http://mediacentre.o2.co.uk/Press-Releases/O2-first-to-switch-on-new-superfast-3G-900MHz-network-2f8.aspx>.

¹¹ *Financial Times*, 2 May 2011

¹² We note that UK Broadband is authorised to use LTE and WiMAX technology in the 3.5 and 3.6 GHz bands in the UK.

Er03

¹³ Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (the EC Merger Regulation).

¹⁴ See paragraphs 122 and following of the European Commission's decision dated 1 March 2010.

2011) but would be subject to certain restrictions on its use in certain geographic areas until sometime in 2013 or 2014¹⁵. The Commission considered that it is possible to launch an LTE network by coupling sub 1 GHz spectrum and 2.6 GHz spectrum¹⁶ but noted that there were strong grounds to conclude that the merging parties could have a significant technological and marketing advantage over competitors in light of their ability to offer superior network quality in terms of maximum download speed, and potentially also in terms of consistency of provision of lower download speeds. The Commission also noted that the merging parties would have a significant time advantage due to the uncertain timing of the auction and the time needed to clear the 800 MHz spectrum¹⁷.

- 2.18 It was in light of these conclusions that the Commission considered that there were serious doubts as to the merger's compatibility with the common market in relation to the wholesale and retail telecommunications markets over the next few years as a result of the concentration of the 1800 MHz spectrum.¹⁸
- 2.19 As a result, France Télécom and Deutsche Telekom submitted various commitments to address the Commission's concerns. This included a commitment to divest 2x15 MHz of 1800 MHz spectrum on a specific timescale, specifically: 2x10 MHz of 1800 MHz spectrum¹⁹ is to be cleared and all related licences to be surrendered (where the spectrum has not been divested) to Ofcom by no later than 30 months after the 800 MHz and 2.6 GHz spectrum auction ends and no later than 30 September 2013; and a further 2x5 MHz of 1800 MHz spectrum²⁰ is to be cleared and all related licences to be surrendered (where the spectrum has not been divested) to Ofcom by no later than 30 September 2015 (the Divestment Spectrum). The overall effect of these commitments is to require that by 30 September 2013 at the latest 2x10 MHz of 1800 MHz spectrum is cleared and available for use by someone other than EE and that by 30 September 2015 a further 2x5 MHz of 1800 MHz spectrum is to be similarly cleared and made available to the same party.
- 2.20 The Commission considered these commitments were sufficient to address the competition concerns it had identified. As a result, it cleared the proposed transaction by declaring it compatible with the common market and with the functioning of the EEA agreement.
- 2.21 We set out in our March 2012 consultation our provisional view on the relevance to our assessment of the European Commission's merger decision. A number of respondents commented on this, arguing that we must make our own decision and that we had placed far too great a reliance on the merger decision.
- 2.22 We agree that we must take our own decision on liberalisation. Having considered the points made to us, we accept that we placed too great a reliance on the Commission merger decision in our March 2012 consultation. However, we remain of the view that the Commission's merger decision is a relevant factor in that it establishes as a matter of fact that 2x10 MHz of 1800 MHz spectrum is to be cleared and all related licences to be surrendered (where the spectrum has not been divested) to Ofcom by no later than 30 September 2013; and a further 2x5 MHz of 1800 MHz spectrum is to be cleared and all related licences to be surrendered

¹⁵ Paragraph 116 of the T-Mobile/Orange decision.

¹⁶ Paragraphs 128 and 135 of the T-Mobile/Orange decision.

¹⁷ The 800 MHz spectrum will not be available for use nationally until the process of digital television switchover has been completed.

¹⁸ Paragraph 138 of the T-Mobile/Orange decision.

¹⁹ At 1721.7 – 1731.7 MHz paired with 1816.7 – 1826.7MHz.

²⁰ At 1731.7 – 1736.7 MHz paired with 1826.7 – 1831.7MHz.

(where the spectrum has not been divested) to Ofcom by no later than 30 September 2015. We take this into account together with all other relevant facts and evidence in our competition assessment on which our decision is based.

Spectrum to be auctioned by Ofcom

- 2.23 On 24 July 2012 Ofcom published its “Assessment of future mobile competition and award of 800 MHz and 2.6 GHz” (the Award Statement) setting out its decisions relating to the award at auction of wireless telegraphy licences to authorise use of at least 2x90 MHz of paired spectrum suitable for mobile services at 800 MHz and 2.6 GHz band (the Combined Award).²¹ The Combined Award is scheduled to complete in early 2013. We anticipate that the 800 MHz band will be cleared, and hence available for use nationally, by the end of 2013. Similarly, we anticipate that the 2.6 GHz spectrum will be widely available for use by the end of 2013 and nationally by the end of Q1 2014²².
- 2.24 The main technology available for use in the 800 MHz and 2.6 GHz band is LTE. LTE user equipment, in particular dongles,²³ is available now, and we believe that a wide range of devices capable of using these bands, including smartphones, will be available across the EU from 2013.²⁴
- 2.25 The amount of spectrum becoming available at 800 MHz and 2.6 GHz is at least twice the amount that EE will hold at 1800 MHz following the divestment in 2013 and 2015. There are 2x30 MHz available at 800 MHz and at least 2x60 MHz available at 2.6 GHz.

Legal framework

- 2.26 The applicable legal framework derives from our duties under both European and domestic legislation, specifically from:
- 2.26.1 the Common Regulatory Framework²⁵ for electronic communications networks and services, in particular, the Framework Directive and the Authorisation Directive; and
- 2.26.2 the Communications Act 2003 (the “2003 Act”) and the Wireless Telegraphy Act 2006 (the “2006 Act”) which transpose the provisions of those directives into national law.

²¹ 800 MHz band: 791-821 MHz paired with 832-862 MHz; 2.6GHz band (paired spectrum): 2500-2570 MHz paired with 2620-2690 MHz.

²² The 2.6 GHz spectrum cannot be used on a widespread basis until aeronautical radars in the UK have been modified, as they are currently susceptible to interference as a result of transmissions in the 2.6 GHz spectrum band. A programme of work is currently under way to effect such modification.

²³ A dongle refers to a small piece of equipment that can plug into an electronic device, typically a computer, and enable that device to connect to a wireless network and get services such as internet access.

²⁴ See for example the GSA’s “LTE developments worldwide” slide 9 dated 20 January 2012, available at http://www.gsacom.com/gsm_3g/info_papers.php4 and press announcements regarding the launch of LTE smartphone, such as <http://www.telecoms.com/39611/first-european-lte-phone-coming-to-vodafone-germany/>.

²⁵ The Common Regulatory Framework comprises the Framework Directive (Directive 2002/21/EC), the Authorisation Directive (Directive 2002/20/EC), the Access Directive (Directive 2002/19/EC), the Universal Service Directive (Directive 2002/22/EC) and the Directive on privacy and electronic communications (Directive 2002/58/EC), as amended by the Better Regulation Directive (Directive 2009/140/EC).

Commission decisions

- 2.27 The European Commission's Radio Spectrum Committee ("RSC") Decision 2009/766/EC²⁶ (the "3G RSC Decision"), as amended by Decision 2011/251/EU²⁷ (the "LTE RSC Decision"), requires us to designate and make available the 900 MHz and 1800 MHz spectrum bands²⁸ for LTE and WiMAX by 31 December 2011.
- 2.28 Further, on 15 February 2012, the European Parliament and the Council adopted a Decision implementing the first Radio Spectrum Policy Programme²⁹ (the "RSPP Decision"). In particular, Article 6(2) provides:
- "In order to promote wider availability of wireless broadband services for the benefit of citizens and consumers in the Union, Member States shall make the bands covered by Decisions 2008/411/EC (3,4-3,8 GHz), 2008/477/EC (2,5- 2,69 GHz), and 2009/766/EC (900-1 800 MHz) available under terms and conditions described in those decisions. Subject to market demand, Member States shall carry out the authorisation process by 31 December 2012 without prejudice to the existing deployment of services, and under conditions that allow consumers easy access to wireless broadband services."³⁰*
- 2.29 The Competition Appeal Tribunal's judgment in *Telefónica O2 Limited v Office of Communications*³¹ finds that the obligation to "designate and make available" requires us to ensure that, by 31 December 2011, any legal impediment to the bands being authorised for use with LTE and WiMAX technology is removed. No such legal impediments exist in the UK, and so this requirement has been met.
- 2.30 The authorisation of particular undertakings to use the 900 MHz and 1800 MHz spectrum for LTE and WiMAX can only take place after implementation of the necessary authorisations and/or licence amendments in accordance with the applicable national legislation and the Authorisation Directive³². In light of EE's application, we consider in this document whether to authorise EE to use its 1800 MHz spectrum to deploy LTE and WiMAX technologies.

²⁶ Commission Decision 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.

²⁷ Commission Implementing Decision of 18 April 2011 amending Decision 2009/766/EC 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.

²⁸ 900 MHz band: 800-915 MHz paired with 925-960 MHz. 1800 MHz band: 1710-1785 MHz paired with 1805-1880 MHz.

²⁹ Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:081:0007:0017:EN:PDF>

³⁰ Telefónica and 3 read the March 2012 consultation as suggesting that our position was that the RSPP Decision imposed an obligation on Member States to authorise the use of the 1800 MHz band by 31 December 2012. We did not intend to give this impression and this is not our position. We agree that the RSPP Decision only requires that an authorisation process is followed, not that the outcome of the process is determined by that decision, and that any decision to authorise use is subject to the requirements of the CRF and, in particular, the Authorisation Directive.

³¹ [2010] CAT 25, Case Number: 1154/3/3/10.

³² We note here that it is open to other current licensees of 900 MHz and 1800 MHz spectrum similarly to request variations of those licences to allow LTE use. We will consider any such applications should we receive them, consistent with the matters set out in this document.

European Regulatory Framework

- 2.31 Article 14 of the Authorisation Directive requires that rights of use (in this case a wireless telegraphy licence) “*may only be amended in objectively justified cases and in a proportionate manner, taking into consideration, where appropriate, the specific conditions applicable to transferable rights of use for radio frequencies*”.
- 2.32 More generally, in carrying out our regulatory tasks, including considering the case for amending rights of use, we are required to take all reasonable measures which are aimed at achieving the objectives set out in Article 8 of the Framework Directive. Article 8 requires national regulatory authorities:
- to promote competition in the provision of *electronic communications* networks and services by, amongst other things by ensuring that there is no distortion or restriction of competition in the electronic communications sector and by encouraging efficient use and ensuring the effective management of radio frequencies; and
 - contribute to the development of the internal market by, amongst other things, removing obstacles to the provision of electronic communications networks and services at a European level and encouraging the interoperability of pan-European services.

The 2003 Act and the 2006 Act

- 2.33 The requirements of Article 8 of the Framework Directive are given effect to by our duties under the 2003 Act and the 2006 Act.
- 2.34 Our principal duty under the 2003 Act is to further the interests of citizens in communications matters, and the interests of consumers in relevant markets, where appropriate by promoting competition.
- 2.35 By virtue of our principal duty, we are required to secure (amongst other things) the optimal use for wireless telegraphy of the electro-magnetic spectrum, and the wide availability throughout the UK of a wide range of electronic communications services.
- 2.36 In performing those duties, we are also required to have regard to various matters where they appear to us to be relevant in the circumstances, including the desirability of promoting competition in relevant markets, the desirability of encouraging investment and innovation in relevant markets, and the desirability of encouraging the availability and use of high speed data transfer services throughout the UK.
- 2.37 In furthering the interests of consumers we must have regard in particular to the interests of those consumers in respect of choice, price, quality of service and value for money.
- 2.38 In performing our principal duty we must have regard in all cases to the principles under which regulatory activities must be transparent, proportionate, consistent and targeted only at cases in which action is needed.
- 2.39 The 2006 Act requires us, amongst other things, to have regard to the desirability of promoting the efficient management and use of the part of the electromagnetic spectrum available for wireless telegraphy.

Process for considering a licence variation request

- 2.40 In terms of process, Article 14 of the Authorisation Directive requires that Member States must ensure that, except where proposed amendments are minor and have been agreed with the licensee:
- notice of the proposed change is given in an appropriate manner; and
 - interested parties, including users and consumers, are allowed a sufficient period of time to express their views on the proposed amendments (such time to be no less than four weeks except in exceptional cases).
- 2.41 Section 7 of the 2003 Act provides that where we are proposing to do anything for the purposes of or in connection with the carrying out of our functions, and it appears to us that the proposal is important, then we are required to carry out and publish an assessment of the likely impact of implementing the proposal, or a statement setting out our reasons for thinking that it is unnecessary to carry out such an assessment. Where we publish such an assessment, stakeholders must have an opportunity to make representations to us about the proposal to which the assessment relates.
- 2.42 The 2006 Act sets out in Schedule 1 a process for the variation of wireless telegraphy licences. In the case where a variation is proposed by the licensee, we are under no obligation (under the 2006 Act) to consult on the proposal.
- 2.43 The variation of EE's 1800 MHz licence to allow LTE use of the relevant frequencies is not likely to be considered to be a minor variation by interested third parties. On that basis, notwithstanding that the variation is at the request of and therefore with the consent of the licensee, we published the March 2012 consultation to give interested third parties an opportunity to make representations on our proposal to vary the licences, and our assessment of the likely impact of doing so.

Section 3

Assessment of competition effects

Introduction

- 3.1 EE has requested us to vary its 1800 MHz licences to allow LTE use. We have considered that request in light of the relevant factual background set out in Section 2, the submissions and evidence provided to us, and our relevant regulatory objectives and statutory duties, including in particular our principal duty to further the interests of citizens and consumers.
- 3.2 In deciding whether to vary EE's licences as requested, we have considered the extent to which varying EE's 1800 MHz licences without delay would:
- be to the benefit of consumers because it would further their interests by, for example, encouraging innovation, investment, and the availability and use of high speed data transfer services throughout the UK; and result in better choice, price, quality of service and value for money; and/or
 - give rise to a material risk of a distortion of competition to the detriment of consumers such that any benefits to consumers resulting from liberalisation of EE's 1800 MHz licences without delay would be outweighed by the detriment to consumers resulting from such a distortion of competition.
- 3.3 The analysis that we have undertaken is forward looking and by its nature uncertain. For example, it is about technology which is not currently available in the UK, and consumers' preferences and behaviour in the future in relation to services provided using that technology are by definition unknown.
- 3.4 Accordingly, any decisions we make in this regard involve the application of regulatory judgement. In reaching our conclusions, we have had to balance the advantages and disadvantages of different options and likely effects, in light of the relevant factors and evidence, in order to reach an outcome that most appropriately meets our relevant regulatory objectives and statutory duties.
- 3.5 We have taken account of the responses to the March 2012 consultation and have obtained further information and undertaken further analysis in the light of those responses.
- 3.6 Our analysis below focuses on "national wholesalers", by which, for the purposes of this decision, we mean EE, Vodafone, Telefónica and H3G.³³ It thus excludes smaller mobile operators (with sub-national radio access networks ("RANs")) and MVNOs (mobile virtual network operators). While smaller operators and MVNOs do make a valuable contribution to the competitiveness of the mobile sector, we have focused on the national wholesalers since they are likely to be particularly important to competition. For example, they represent the four largest suppliers and each

³³ For further details see *Assessment of future mobile competition and award of 800 MHz and 2.6 GHz*, 24 July 2012 (the "Award Statement"), paragraphs 4.7-4.8. Note also that in the Award Statement, we recognised that the fourth national wholesaler could in principle be an entity other than H3G depending on the outcome of the auction. Award Statement available at:

<http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/statement.pdf>

operate at both the wholesale and retail level. This is consistent with our position in the Award Statement where we emphasised the importance of competition at the wholesale level.³⁴ Moreover, we did not receive any responses to the March 2012 consultation from mobile operators with sub-national RANs or from MVNOs. We discuss briefly in paragraphs 3.126 to 3.127 how the launch of LTE services by MVNOs using EE's LTE network might affect our analysis.

Non-confidential summary of this Section

- 3.7 The analysis set out in this Section relies on confidential material provided to us by mobile operators in their responses to the March 2012 consultation, in internal documents that were provided to us in response to information requests under our Wireless Telegraphy Act 2006 powers ("Internal Documents") and in subsequent letters, meetings or exchanges relating to these responses. We have redacted confidential material, analysis and forecasts from the published version of this Decision document to protect that confidentiality. In the interest of transparency, we set out here a non-confidential summary of our analysis.
- 3.8 Our analysis starts by establishing that liberalisation without delay will generate material consumer benefits, as consumers are able to purchase services that would otherwise be unavailable. We recognise the risk that, in principle, EE might be able to gain such a large advantage over its competitors that there would be a material distortion of competition and we go on to assess that risk. A material distortion of competition could potentially create a level of consumer detriment that would outweigh the more immediate consumer benefits. If that were the case, it would potentially be appropriate to delay liberalisation.
- 3.9 In order to balance the consumer benefits and detriments arising from liberalisation without delay, we have assessed the way in which the market is likely to develop against an alternative case in which liberalisation is delayed until the point at which other operators are able to launch their own LTE services. As explained in Section 2, we will award a considerable quantity of 800 MHz and 2.6 GHz spectrum through the Combined Award auction which we expect to conclude by March 2013. In addition, EE is required to divest (either through a private sale prior to the Combined Award auction, or through release in that auction) 2x15 MHz of 1800 MHz spectrum. We anticipate that spectrum released through the Combined Award and EE divestment will enable three other national wholesalers (i.e. those emerging from the Combined Award auction) to launch their own LTE services towards the end of 2013.
- 3.10 If we liberalise without delay, there will be an "Interim Period" in which EE attracts subscribers to its LTE service, some of whom will be won from other national wholesalers. Once other firms are also able to launch LTE services, there will be a "Secondary Period" during which EE retains an advantage as a result of liberalisation without delay. This Period will end when the other national wholesalers have substantially closed any gap between their own offerings and that of EE, where that gap arose as a result of liberalisation without delay.

³⁴ "In markets without competition at the wholesale level ... regulation has had to be used to mimic this competitive pressure (which can produce outcomes that are better than no regulation at all, but not necessarily as good as competition in terms of furthering consumers' interests). Accordingly, we believe that promoting competition at the national wholesale level is key to achieving our policy aim, as this should promote competition at the retail level without the need for regulated access". Award Statement, paragraphs 4.12-4.13.

- 3.11 In the Interim and Secondary Periods, consumers will benefit both because they can purchase services that would otherwise be unavailable, and because it is likely that the coverage of EE's LTE network (and possibly of other networks) will be more extensive than it would otherwise have been.
- 3.12 We have not sought to carry out a quantified welfare analysis of the consumer benefits that could arise from liberalisation without delay – there are significant challenges, for example, in assessing willingness to pay for a range of different customer segments for a product that has not yet been launched. However, we have considered both the number of consumers that are likely to purchase EE's LTE service during the Interim Period and the fact that many of these consumers are likely to spend in excess of £30 per month (based on 3G price points) as a result. These consumers will only make the choice to switch to EE's service if they believe they will be better off as a result. Although the total number of consumers that will subscribe to EE's service during the Interim Period may be modest relative to the overall size of the mobile sector, our assessment is that liberalisation without delay has the potential to generate material consumer benefits and that it would require a significant competitive distortion to overturn these benefits.
- 3.13 We have considered a range of ways in which competition could be distorted. The most serious is that a national wholesaler might suffer a substantial loss of scale and be reduced to a particularly low market share. If this occurred then future competition in the mobile sector might be reduced (at least until the national wholesaler recovered), to the detriment of consumers.
- 3.14 We have reviewed subscriber forecasts both from EE and from the internal impact analyses of other national wholesalers to assess whether such an outcome is likely. These forecasts suggest to us that the likely migration of subscribers to EE that would result from liberalisation without delay is modest when taken in the context of the mobile sector as a whole. The migration will be spread across several operators and appears highly unlikely to be of such a scale that it would prevent those operators from continuing to exert a competitive constraint on EE.
- 3.15 An alternative theory of consumer harm is that EE would benefit from an "unwarranted reputation effect" which would shield it from competitive pressure and enable it to charge higher prices and/or offer a lower quality of services as a result. Again, this would be to the detriment of consumers.
- 3.16 A number of respondents to the March 2012 consultation highlighted the potential relevance of the two year period in which Telefónica had an exclusive deal with Apple to sell the iPhone in the UK. We have considered these responses and have analysed the iPhone case, while recognising that there are a number of important differences between iPhone exclusivity and LTE1800 liberalisation such as the relative consumer preferences for handsets versus network characteristics. Although the data suggest that Telefónica benefited from exclusivity during the two year period, we find no evidence of a material unwarranted reputation effect thereafter that enabled Telefónica to win a disproportionate share of iPhone subscribers.
- 3.17 In considering reputation effects, we have also taken into account the duration of the Interim Period (around 15 months), the modest forecasts of likely LTE take-up relative to the overall size of the mobile sector and evidence on the importance to consumers of a reputation for operating a superior network. Taken together, the available evidence does not suggest to us that EE would be likely to benefit from any significant unwarranted reputation effect.

- 3.18 In addition, we have considered whether our assessment of the effects on competition and consumers would change materially as a result of any LTE access arrangement between EE and mobile virtual network operators (MVNOs). Our view is that such an arrangement – which would enable MVNOs to offer LTE services to their consumers – might modestly increase the number of consumers taking LTE services, but would not be sufficient to alter our conclusions.
- 3.19 Therefore, in light of our assessment, our overall conclusion is that liberalisation without delay will deliver significant benefits to consumers, and that there is no material risk that those benefits will be outweighed by an adverse impact on consumers resulting from a distortion of competition. Delaying liberalisation would therefore be to the detriment of consumers.
- 3.20 We recognise that liberalisation without delay is likely to have a negative financial impact on EE’s rivals and a positive impact for EE. It is generally good regulatory practice to avoid large, asymmetric profit shocks arising from regulatory decisions wherever possible, as they could be disruptive and contribute to perceptions of a less certain regulatory framework. This in turn could potentially weaken incentives to invest in the sector more generally³⁵ with negative consequences for consumers. However, we do not consider that liberalising EE’s 1800 MHz spectrum without delay would materially increase the perceived regulatory risk associated with investing in the UK mobile sector:
- Liberalisation would be in line with past regulatory practice and with clear statements. For example, the policy intention underlying both the RSC Decision (as amended by the LTE RSC Decision) and the RSPD Decision is that this spectrum should be liberalised at the earliest appropriate time.
 - Refusing to liberalise EE’s 1800 MHz spectrum early also carries risks in relation to the perceived regulatory attitude towards investment in the UK.
 - More generally, our focus on the effect on consumers best meets our statutory duties.

Structure of the remainder of this section

- 3.21 This section is structured as follows:
- First, we explain the different ways in which liberalisation may affect citizens and consumers, including identifying the benefits that may be likely to arise. This provides a framework for the subsequent analysis;
 - Second, we set out the different time periods that are relevant to the competition assessment;
 - Third, we assess whether there is a material risk that competition is distorted if we liberalise EE’s licences without delay; and
 - Fourth, we set out our principal conclusions.

³⁵ *Application of spectrum liberalisation and trading to the mobile sector – A further consultation*, Ofcom, 13 February 2009. Available at: <http://stakeholders.ofcom.org.uk/consultations/spectrumlib/>

Consumer benefits

Introduction to the impact on consumers

- 3.22 Our principal duty is to further the interests of citizens in relation to communications matters and consumers in relevant markets, where appropriate by promoting competition. Considering the impact on consumers is therefore of key importance to our assessment of the effects of liberalisation. We first provide an overview of the different ways in which liberalisation may benefit consumers.
- 3.23 As we set out in the March 2012 consultation, we consider that liberalising EE's spectrum without delay would result in immediate benefits to consumers, as they will have the option of buying new LTE services which would otherwise not be available.³⁶ As we explain later in this section, we anticipate that up to around [3<] consumers might subscribe to EE's LTE service by the end of 2013 in the event that we liberalise without delay.
- 3.24 Based on current 3G prices, we anticipate that most of these consumers will spend in excess of £30 per month³⁷ (and may also contribute to the costs of new devices) on enhanced mobile data services that are faster and more responsive than those currently available. For example, videos and other files will download more quickly and the experience of using the internet on a mobile device is likely to improve.
- 3.25 We have not sought to carry out a quantified welfare analysis of the scale of consumer benefit – to do so would require detailed assumptions about the willingness to pay of particular customer segments for a product that does not yet exist. However, on the assumption that consumers switch because they judge that they will be better off as a result, we consider that a decision which enables up to [3<] consumers access to such improved services is likely to generate material consumer benefits.
- 3.26 Provided that those benefits are not outweighed by other costs which are to the detriment of consumers, we consider that our statutory duties are best met by liberalising EE's 1800 MHz licences without delay. We therefore need to assess the nature of the benefits to consumers of liberalising without delay, the potential for consumer detriment, in particular resulting from any material risk of a distortion of competition, and the risk that the benefits to consumers would be outweighed by any such detriments.
- 3.27 In the March 2012 consultation we distinguished between a temporary distortion of competition and an enduring distortion of competition. For consumers to be worse off as a result of liberalisation without delay, we considered that any distortion to competition would have to: (i) endure beyond the point at which other operators launch LTE services; and (ii) lead to consumer detriment which would exceed any benefits consumers enjoy from liberalisation during the period when only EE offers LTE services.³⁸

³⁶ March 2012 consultation, paragraph 6.8.

³⁷ We anticipate that, at least initially, LTE services will be priced towards the upper end of current 2G/3G mobile prices. In Q1 2012, 30% of new post-pay mobile connections involved a monthly charge of £30 or more. The Communications Market 2012, Figure 5.75 on page 349.

³⁸ March 2012 consultation, paragraph 6.8.

The alternative to liberalisation without delay

- 3.28 To assess the impact of liberalising EE's 1800 MHz licences without delay, we need to compare the effect of immediate liberalisation against the most reasonable alternative course of action open to us.
- 3.29 We believe that the most appropriate alternative is one in which we delay liberalising EE's 1800 MHz licences until the point at which four national wholesalers are able to start offering LTE services using the spectrum allocated in the Combined Award (we refer to this as "delayed liberalisation"). This would mean that EE would not be able to start operating an LTE service using its 1800 MHz spectrum ahead of the LTE services that other operators are expected to launch using 800 MHz and 2.6 GHz spectrum. In practice we anticipate that this would involve liberalisation in Q4 2013 (see Annex 2).
- 3.30 This position is consistent with the one we took in the Award Statement. Our assumption there was that 1800 MHz spectrum would be available for use for LTE soon after the auction even if it has not happened before.³⁹ Hence we consider that comparing liberalisation without delay against liberalisation when other operators are able to launch LTE services is more appropriate than comparing against a case in which EE is *never* able to use its 1800 MHz spectrum for LTE services.
- 3.31 Moreover:
- The policy intention underlying both the RSC Decision (as amended by the LTE RSC Decision) and the RSPP Decision is that this spectrum should be liberalised at the earliest appropriate time; and
 - Vodafone and [X] advocated delaying liberalisation until the Combined Award spectrum can be used for LTE services, but did not advocate that liberalisation should be permanently prevented.⁴⁰
- 3.32 We have also considered whether it would be appropriate to compare liberalisation without delay against other liberalisation scenarios. For example, we could compare liberalisation without delay against a scenario in which liberalisation was delayed until the Divestment Spectrum becomes available i.e. 30 September 2013.⁴¹ In practice, liberalisation on this date would be very similar to liberalisation at the time at which all national wholesalers can launch LTE services⁴² so this alternative would not have a material impact on our analysis.

Economic framework for analysing the impact on consumers

- 3.33 We now set out the economic framework that we have used to analyse the impact on consumers and distinguish between the various time periods that are relevant to our analysis.

³⁹ Award Statement, paragraph A3.278.

⁴⁰ Vodafone confidential consultation response, page 2. [X] confidential consultation response, page

1.

⁴¹ [X].

⁴² This might imply that liberalisation is assumed to occur a slightly sooner than in our preferred definition of the alternative course of action. Adopting this alternative may thus imply that both the consumer benefits and the impact on competition are slightly smaller than under our preferred counterfactual.

- 3.34 In the March 2012 consultation we focused on the period in which EE could use the 1800 MHz band to provide LTE services but before the point at which EE's competitors would be able to launch LTE services using the 800 MHz and 2.6 GHz bands across a majority of the UK.⁴³ Vodafone criticised the March 2012 consultation for treating an operator's ability to offer a LTE service in a "binary" fashion. Vodafone argued that EE would enjoy a performance and coverage advantage over other operators, even after they launch their own LTE networks.⁴⁴
- 3.35 Vodafone's observation adds an additional dimension to our analysis of the impact of liberalisation on consumers. We show the various time periods in Figure 1. The Figure provides an illustration of the coverage of LTE networks over time if we liberalise without delay compared to the alternative in which liberalisation is delayed to the point at which four national wholesalers can launch LTE services:⁴⁵
- The purple curve (the highest curve) illustrates the coverage of EE's LTE network in the event that its 1800 MHz spectrum is liberalised without delay. The coverage of EE's LTE network gradually increases over time. The point at which EE launches LTE services is shown by the purple rectangle on this curve. This date is later than the date at which a small-scale launch would theoretically be possible, reflecting the need for operators to build a threshold level of network capability before they can provide an effective service to consumers.
 - The blue curve (the lowest curve) illustrates the coverage of EE's competitors' LTE networks. In this Figure, they are assumed to start deploying LTE networks after EE since they do not know what spectrum they will win in the Combined Award and do not have access to cleared spectrum suitable for LTE. The point at which they launch LTE services is shown by the blue rectangle on this curve (as in the case of EE, they are assumed to build a threshold level of network capability before they launch). However, at the point at which its competitors launch LTE services, EE's LTE network has greater coverage. The Figure shows other operators eventually catching up with EE's network coverage. For simplicity, in the Figure we assume that the rate at which EE's competitors increase their LTE coverage is not affected by the time at which EE's 1800 MHz spectrum is liberalised.⁴⁶
 - Finally, the green curve (the middle curve) illustrates EE's coverage if we were to delay liberalisation until the point at which four national wholesalers can launch LTE services. EE's LTE launch is shown by the green rectangle and occurs at the same time as the other operators' LTE launch (the blue rectangle). Crucially, the Figure shows that EE initially enjoys a greater level of coverage than its competitors, even if we do not liberalise its 1800 MHz spectrum now. EE has

⁴³ March 2012 consultation, paragraph 4.30.

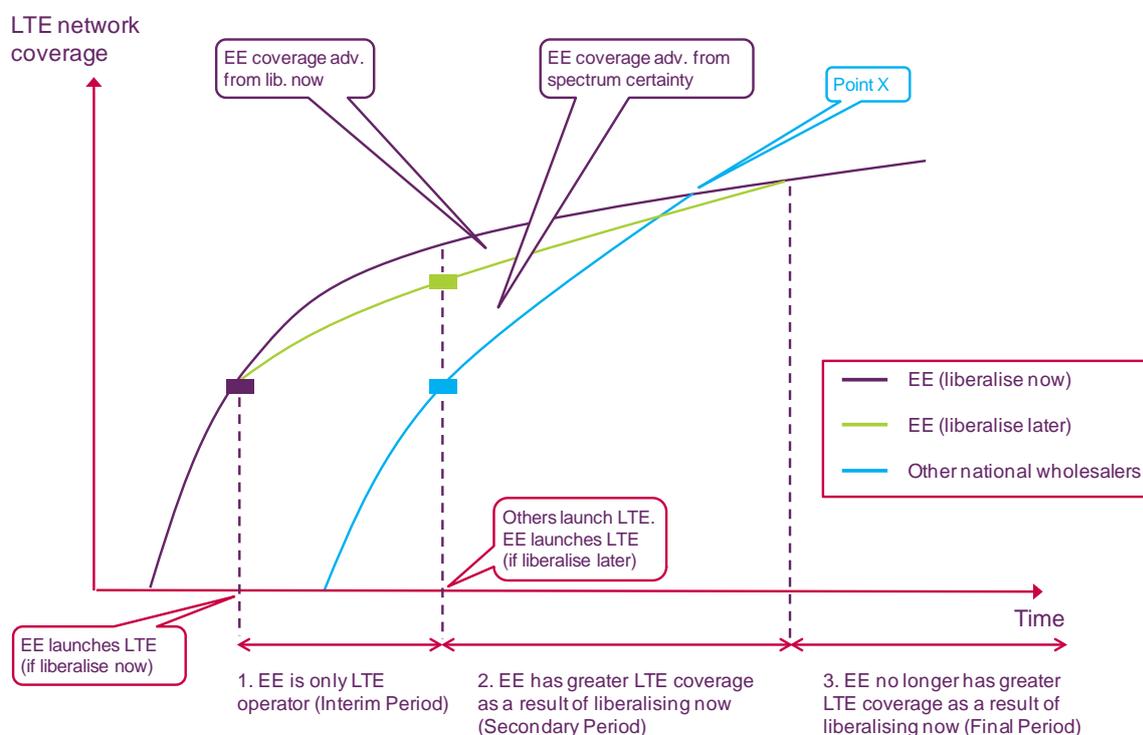
⁴⁴ For example, Vodafone confidential consultation response, page 15.

⁴⁵ We explain why we have used coverage as the most relevant measure of EE's potential advantage over its competitors in paragraph 3.38 below. We also provide further details of this analysis in Annex 2. We have not used a specific measure of coverage here (e.g. population coverage, indoor vs. outdoor) as our analysis rests on broad rather than exact comparability between the coverage of different operators. Vodafone used similar illustrative diagrams (depicting "Network sites" over time) in section 3 of its consultation response to help explain the impact of liberalisation at different points in time.

⁴⁶ In practice, it may be the case that liberalising EE's 1800 MHz spectrum without delay encourages the other national wholesalers to deploy their LTE networks at a faster rate, since they face greater pressure to catch-up with EE's network (compared to the situation where liberalisation is delayed). This would tend to reduce the time it would take them to catch up with EE and could increase consumer benefits.

already begun deploying LTE1800 equipment at its sites and can continue to do so in advance of the Combined Award. This reflects what Vodafone called “spectrum certainty”.⁴⁷

Figure 1: Illustrative depiction of LTE network deployment over time



3.36 The Figure shows the effect of liberalisation without delay on the relative coverage of each party’s network. Our analysis focuses on three different periods:

- An **Interim Period** (shown by time period 1), when EE is the only national wholesaler that can offer LTE services. It starts when EE is able to launch its LTE service. It ends when at least one other national wholesaler can launch a competing LTE service.
- A **Secondary Period** (shown by time period 2), which begins when at least one other national wholesaler can launch LTE services. The other national wholesalers also launch LTE services during the period. The key feature of the Secondary Period is that EE retains a coverage advantage over its competitors as a result of liberalisation without delay. The Secondary Period only ends when EE no longer has materially better LTE network coverage as a result of liberalisation without delay.⁴⁸
- A **Final Period** (shown by time period 3), when EE no longer has materially better LTE network coverage as a result of liberalisation without delay.

⁴⁷ Vodafone stated that “EE has benefited from spectrum certainty since its creation in 2010. It is not a case of “if” EE deploys LTE in the 1800 MHz band but only “when” ... In marked contrast to the position of all other operators, EE already has the spectrum certainty necessary to commit to the deployment of LTE hardware without the risk of stranding such LTE investment.” Vodafone confidential consultation response, page 16.

⁴⁸ Note that there could still be differences between national wholesalers’ LTE networks that stem from factors such as their particular spectrum holdings (as opposed to liberalisation without delay).

- 3.37 The Figure shows that there are two reasons why EE has greater coverage than other operators during the Secondary Period.
- EE enjoys spectrum certainty and has thus already begun preparing its LTE1800 network for LTE launch – for example by installing and testing equipment at its sites which can then be activated rapidly at the point of liberalisation. Even if liberalisation is delayed, we expect EE to continue preparing for LTE in this way (although possibly at a somewhat slower rate), and this advantage therefore exists regardless of whether or not we liberalise EE’s 1800 MHz spectrum without delay. This advantage for EE is shown by the difference between the green and the blue curves.
 - Liberalising EE’s 1800 MHz spectrum without delay accelerates the rate at which EE increases its LTE coverage. This advantage for EE is shown by the difference between the purple and the green curves.
- 3.38 The purest definition of the Secondary Period would be one in which the period only ends when any gap between the quality of EE’s network and those of its competitors is no longer materially greater than it would have been if liberalisation were delayed. This definition would imply that the coverage of EE’s competitors would be irrelevant to determining when the period ended (assuming that competitors’ roll-out plans are unaffected by the date of liberalisation).⁴⁹ The period would simply end at the date on which EE’s coverage as a result of liberalisation without delay was the same as its coverage would have been if liberalisation were delayed. On the diagram, this is shown as the point at which the green and purple lines intersect.
- 3.39 However, the relevance of the Secondary Period to our competition assessment is that it is a period in which EE continues to have an advantage over its rivals. If EE’s rivals have managed to extend their coverage to broadly similar levels (notwithstanding liberalisation without delay), then EE will no longer have any such advantage. This is shown by the point at which the blue and purple lines on the diagram intersect (point X). We therefore consider that the most practical definition of the end of the Secondary Period is that it is the earlier of:
- The date at which EE’s network deployment following liberalisation without delay is the same as it would have been had liberalisation been delayed; and
 - The date at which EE’s competitors achieve a broadly similar level of coverage to EE so that EE no longer has a material coverage advantage over those competitors.⁵⁰
- 3.40 This Figure also helps illustrate the impact of liberalisation on consumers over time, i.e. the differences between liberalisation without delay and delayed liberalisation.
- 3.41 On the one hand, it makes clear that liberalisation without delay has the potential to deliver material consumer benefits. This is for two reasons:

⁴⁹ Assume that EE’s coverage at time t as a result of liberalisation without delay is denoted by $E_{ND}(t)$ and its coverage if liberalisation is delayed is denoted by $E_D(t)$. EE’s competitors’ coverage is unchanged by the liberalisation decision and is denoted by $C(t)$. Under the pure definition of the Secondary Period, the Period ends at the time t^* at which $E_{ND}(t^*) - C(t^*) = E_D(t^*) - C(t^*)$, i.e. when $E_{ND}(t^*) = E_D(t^*)$.

⁵⁰ In this case, the Secondary Period ends at time t' when $E_{ND}(t') \approx C(t')$, since if $C(t) > E_{ND}(t)$, EE no longer enjoys any LTE advantage over its competitors.

- First, liberalisation without delay means that LTE services are available sooner. This will result in consumer benefits as during the Interim Period, consumers have the option of buying new LTE services that would not otherwise be available. As EE is the only LTE operator during the Interim Period it may be able to charge a higher price for LTE services (than it would be able to charge in the presence of LTE competitors).⁵¹ Although a higher price will reduce the net benefits that consumers gain from LTE services, consumers will still be better off relative to delayed liberalisation (when LTE services are not available at all in the Interim Period) – if consumers buy LTE services they presumably consider that service to be superior to the alternatives, notwithstanding the price.⁵²
 - Second, consumers also benefit to the extent that EE's network coverage is greater, compared to its coverage if liberalisation is delayed (i.e. the difference between the purple and green curves in Figure 1).⁵³
- 3.42 On the other hand, there is a risk that liberalisation without delay could weaken the competitive constraint that other operators exert on EE after the Interim Period. EE could gain a persistent reputation for being a relatively attractive network in terms of data services or EE's competitors could be significantly reduced in scale. If this were the case then EE might be able to charge higher prices and/or offer a lower quality of service to consumers in the Secondary Period and the Final Period, relative to the case where liberalisation is delayed.⁵⁴

Periods relevant to competition assessment

- 3.43 In the discussion above we distinguished between the Interim Period, the Secondary Period and the Final Period. We now summarise our views on the likely start and end of each of the three periods, based on information contained in the responses to the March 2012 consultation and in Internal Documents provided to us by the companies. Our detailed assessment is set out in Annex 2.
- 3.44 We treat the start of the Interim Period as September 2012 – i.e. the date at which EE's varied licence authorises the provision of LTE services, although we recognise that EE's actual launch could be later.
- 3.45 The Interim Period will end once at least one other national wholesaler can launch its own LTE services, and this will require a wholesaler to secure licences for 800 MHz, 1800 MHz or 2.6 GHz spectrum. We expect the Combined Award to be concluded and licences for 800 MHz and 2.6 GHz spectrum to be awarded in March 2013. The winner of EE's 2x15 MHz of 1800 MHz divestment spectrum will also be known by

⁵¹ One of the factors that affects the margin that EE is able to charge for LTE services is the extent of the constraint exerted by 3G services. For the avoidance of doubt, we have not defined relevant markets for the purposes of our competition assessment and do not consider that we need to do so. See Annex 1 for further details.

⁵² This of course assumes that consumers make well-informed decisions e.g. about the relative quality of 3G and LTE services. While it is possible that a few consumers will choose poorly (and so make themselves worse off), it is highly unlikely that a sufficiently large number of subscribers to EE's LTE service would choose so poorly as to generate a net consumer loss. Moreover poor consumer decisions may also arise regardless of whether or not we delay liberalising EE's 1800 MHz spectrum.

⁵³ It is also possible that other operators accelerate their LTE network deployment, if we liberalise without delay, although we do not rely on this potential benefit. For simplicity, the Figure does not show an effect on the rate at which EE's competitors deploy their LTE services as a result of liberalisation without delay.

⁵⁴ Another potential source of consumer detriment is a change in the perceived risk of investing in the UK. These potential detrimental effects are discussed further below.

that date (since the Divestment Spectrum must be sold privately prior to the auction or released for sale in the Combined Award auction).

3.46 However, national wholesalers will not be able to launch services using the released spectrum immediately:

- 800 MHz spectrum is not expected to be available on a nationwide basis until October 2013 and 2.6 GHz spectrum is not expected to be available on a nationwide basis until March 2014 (although the 2.6 GHz spectrum should be available throughout England and Central Scotland by the end of 2013). EE is only required to clear the first tranche (2x10 MHz) of the Divestment Spectrum in September 2013.
- There may also be a further delay before operators launch nationwide networks using this spectrum whilst they deploy and test network equipment.
- It may be possible for operators to launch a regional service earlier.

3.47 Hence, as set out in Annex 2, we consider that the Interim Period is likely to end in Q4 2013.

3.48 As explained in paragraphs 3.38 and 3.39, the duration of the Secondary Period depends on:

- how EE's network differs as a result of liberalisation without delay as compared with the case in which liberalisation is delayed; and
- the extent to which other operators have managed to catch up with EE's level of LTE coverage.

3.49 We do not have reliable information on the first of these two factors. However, in Annex 2 we explain that we expect other national wholesalers to be able to catch up with EE's level of coverage relatively quickly. We consider on that basis that the Secondary Period is likely to last no more than two quarters. However, we expect that the scale of any additional advantage to EE during the Secondary Period as a result of liberalisation without delay would be limited.

Assessment of material risk of distortion of competition

3.50 As we have explained above, liberalisation without delay is likely to generate consumer benefits both in the Interim Period (when consumers have access to services which would not otherwise be available) and in the Secondary Period, when EE's LTE deployment may be more extensive than it would be if liberalisation were delayed. The critical question we need to address, however, is whether there is a material risk of distortion of competition that would be to the detriment of consumers and which would outweigh the benefits. Our assessment is structured as follows:

- First, we consider the magnitude of the advantage that EE will enjoy over its competitors in the Interim Period and the Secondary Period as a result of liberalisation;
- Second, we discuss the impact of liberalisation on EE's competitors;
- Third, we discuss the impact of liberalisation on consumers.

Magnitude of the advantage enjoyed by EE

- 3.51 During the Interim and Secondary Periods, EE will enjoy a competitive advantage over other national wholesalers as a result of liberalisation without delay. In this subsection we consider the magnitude of this advantage. We do so for two reasons:
- First, the scale of benefits to consumers in the Interim Period and Secondary Period is likely to be correlated with the size of the advantage enjoyed by EE. Other things being equal, the more subscribers EE attracts to its LTE service as a result of this advantage, the greater will be the consumer benefits.
 - Second, the larger the advantage enjoyed by EE, the larger the potential for competition to be distorted in a way which results in consumer detriment in the Secondary Period and/or the Final Period.
- 3.52 The scale of these effects, the benefits to consumers and the potential for competition to be distorted, are likely to be correlated. However, the risks of a distortion of competition may, in principle, become more significant, relative to the scale of consumer benefit, if the magnitude of EE's advantage is particularly large. Specifically, if EE were to win a very large number of subscribers from its competitors, there is a risk that one of those competitors might be reduced to a scale at which it can no longer exert a material competitive constraint. Hence, although we might be confident that the benefits to consumers would outweigh any detriment from a distortion of competition if the take-up of EE's LTE service were modest, we might be less confident if take-up were very significant.
- 3.53 Our analysis is structured as follows:
- First, we summarise the position in the March 2012 consultation;
 - Second, we provide a high level overview of responses to the March 2012 consultation;
 - Third, we set out our conclusion on the magnitude of the advantage enjoyed by EE during the Interim Period; and
 - Fourth, we set out our conclusion on the magnitude of the advantage enjoyed by EE during the Secondary Period.

Ofcom's position in the March 2012 consultation

- 3.54 In the March 2012 consultation we referred to analysis from the 2012 Award Consultation.⁵⁵ We stated that, given the technical advantages of LTE, there are likely to be some competitor advantages associated with holding spectrum suitable for delivering LTE services ahead of competitors, although the extent of these advantages was unclear. Overall, we considered that it is possible that those operators with spectrum suitable for LTE may be at an advantage when competing for certain segments of services or customers.⁵⁶

⁵⁵ *Second consultation on assessment of future mobile competition and proposals for the award of 800 MHz and 2.6 GHz spectrum and related issues*, 12 January 2012 (the "2012 Award Consultation"). Available at: <http://stakeholders.ofcom.org.uk/consultations/award-800mhz-2.6ghz/>

⁵⁶ March 2012 consultation, paragraphs 5.11-5.12.

Consultation responses and developments since the March 2012 consultation

- 3.55 Respondents to the March 2012 consultation also made a number of submissions on the extent of the advantage that EE would enjoy over its competitors. Most importantly, we were provided with forecasts of the take-up of LTE services in 2012 and 2013. As explained below, we place particular weight on these forecasts.
- 3.56 A number of respondents criticised the inferences that we drew from the 2012 Award Consultation. For example, Telefónica argued that the performance differences between LTE and HSPA+ are magnified since EE's LTE1800 deployment will be into "empty spectrum" whereas 3G networks are "awash with traffic".⁵⁷ Telefónica arguments relate to the capacity that national wholesalers have to serve their customers and the consequential impact on the average data rates that consumers experience. We provide a fuller description of the responses to the March 2012 consultation in Annex 1.
- 3.57 We have now published the Award Statement. This included analysis on the role of capacity and average data rates. We set out four dimensions of quality of a mobile service to consumers and dimensions of capability to national wholesalers which are affected by spectrum holdings, that could be important to the credibility of a national wholesaler in the future:
- The capacity that the national wholesaler has to provide services, and the average data rates it can provide (whether delivered by UMTS or LTE);
 - The quality of coverage it can provide;
 - Whether it can provide the highest peak data rates (using large bandwidths of spectrum with LTE); and
 - Whether it can offer services based on LTE technology and so gain from other LTE advantages, such as better latency and the ability to better prioritise traffic.⁵⁸

Ofcom's response on the magnitude of the advantage enjoyed by EE during the Interim Period

- 3.58 We have been presented with a substantial body of evidence on the relative attractiveness of LTE services, and hence on the nature of the potential benefit to EE as a result of liberalisation without delay. As highlighted by consultation respondents, liberalisation without delay also increases the amount of spectrum that EE can use for mobile data services, which will tend to increase the average data rates that EE is able to offer. As a result of liberalisation, EE should be able to offer more attractive services to consumers.
- 3.59 We have considered this evidence carefully. Ultimately, the effect of liberalisation without delay will depend both on the technical benefits of LTE relative to alternatives (including issues such as handset availability), and on the attractiveness of those benefits to consumers. It is the combination and interaction of these factors that is of most significance.

⁵⁷ Telefónica confidential consultation response, paragraph 143. Similar points were made by Vodafone (for example, Vodafone confidential consultation response, pages 29-30 and 33-34) and [redacted].

⁵⁸ Award Statement, paragraph 4.39.

- 3.60 We also recognise that operators themselves will take into account both factors when developing their subscriber forecasts, and that subscriber forecasts therefore provide a strong indication of the way operators believe that the technical characteristics of LTE and consumer preferences for those characteristics interact. For this reason, we have focused our attention, and rely primarily, on operators' subscriber forecasts to inform our view on the magnitude of the advantage to EE that results from liberalisation without delay.
- 3.61 Below we discuss in turn the forecasts provided by EE and the analysis undertaken by Telefónica and Vodafone.

EE forecasts of LTE take-up

- 3.62 In its response to the March 2012 consultation, EE provided a forecast for the take-up of LTE smartphones in 2012 and 2013.⁵⁹ In a response to a statutory information request, EE subsequently provided an updated forecast for 2012 that reflected its latest views on the availability of LTE1800 devices.⁶⁰ In late July 2012, EE provided further data on anticipated quarterly growth in LTE smartphone subscribers and on LTE dongle and tablet subscribers in 2012 and 2013.⁶¹ These latest forecasts are set out in Figure 2 below. As discussed below, we have sought to compare the various forecasts provided by EE against internal EE documents prepared for business planning purposes.

Figure 2: EE forecasts of LTE take-up in 2012-2013

| | Total to end Q4 2012 | Total to end Q4 2013 |
|----------------------------------|----------------------|----------------------|
| EE LTE handset subscribers | [REDACTED] | [REDACTED] |
| EE LTE dongle/tablet subscribers | [REDACTED] | [REDACTED] |
| Total EE LTE subscribers | [REDACTED] | [REDACTED] |

- 3.63 EE also stated that:

- [REDACTED].⁶²
- [REDACTED].⁶³

- 3.64 We have compared the EE forecasts above with internal EE documents prepared for business planning purposes.

- The forecast of LTE handset take-up in EE's response to the March 2012 consultation matches the forecast contained in an internal EE document that we obtained using our statutory information gathering powers.⁶⁴

⁵⁹ [REDACTED]. EE confidential consultation response, page 20.

⁶⁰ EE response dated 9 July 2012 to statutory information request dated 26 June 2012, question 4(b).

⁶¹ [REDACTED]. Emails from EE dated 23 July 2012 and 27 July 2012.

⁶² Email from EE dated 27 July 2012.

⁶³ EE response dated 9 July 2012 to statutory information request dated 26 June 2012, questions 4(a) and 4(b).

⁶⁴ [REDACTED].

- This EE document also provides support for the 2013 forecast for dongle and tablet subscribers in Figure 2 above.⁶⁵
- As explained above, EE subsequently updated its forecast of LTE take-up. These updated forecasts (which are presented in Figure 2) are reflected in an internal EE email that was provided to us.⁶⁶

3.65 EE expected that around [X] of its LTE subscriptions would be upgrades by existing EE customers.⁶⁷ This implies that the remaining [X] of EE's LTE subscriptions are consumers acquired by EE from other mobile operators.⁶⁸ However, this latter % figure is not the right measure of the incremental impact on EE's competitors of its LTE service launch. This is because:

- The group of EE customers that upgrade to EE's LTE service (i.e. which represent [X] of the resulting LTE customer base) will include a proportion that would have left EE for one of its competitors in the course of normal churn, but which now decide to stay with EE to take the LTE service that EE's competitors cannot offer. In other words, EE's churn rate is reduced as a direct result of the launch of its LTE service; and
- The group of customers that join EE's LTE service from one of its competitors (i.e. which represent [X] of resulting LTE customer base) will include a proportion that would have joined EE anyway in the course of normal churn, but which now join EE as LTE customers rather than as 3G customers.

3.66 The relevant measure of the proportion of subscribers to EE's LTE service that have been diverted from other operators as a result of liberalisation without delay, needs to be derived from:

- the number of existing EE customers which upgrade to its LTE service when they would otherwise have left EE to join a competitor ("avoided losses"); and
- The number of customers that join EE from a competitor and who do so only because they want to take EE's LTE service. These customers would not have otherwise migrated to EE ("incremental gains")

3.67 Our analysis of EE's forecasts suggests that these two groups of subscribers together account for [X] of the total number of LTE subscribers that EE secures during the Interim Period.⁶⁹ We have multiplied this by the forecasts in Figure 2 in order to estimate the total number of subscribers that other operators might lose. As

⁶⁵ [X]

⁶⁶ [X].

⁶⁷ EE confidential consultation response, page 20.

⁶⁸ This assumption implies that EE's additional LTE subscriptions (apart from upgrades) are at the expense of its competitors, rather than from growth in the overall number of mobile users. It is reasonable to assume that almost all LTE handset users already have a mobile subscription. For example, in 2012 household take-up of mobile telephony was 94%. LTE handsets are also likely to be relatively costly which is likely to make them less appealing to those without a mobile phone. We recognise that some LTE dongle and tablet subscribers may represent additional growth given that take-up of these devices is much lower. For example, in 2012 mobile broadband penetration was 13% and in Q2 2011 tablet penetration was 11% (though not all of these tablets will have a mobile SIM card for mobile internet use). [X] Penetration figures taken from *The Communications Market 2012*, Figure 5.55 on page 333 and Figure 1.47 on page 62.

⁶⁹ We have derived this % number from information contained in EE Internal Documents. These give forecasts for the number of EE LTE subscribers, broken down between the following categories: [X]

a sensitivity, we have also calculated the impact if the losses to EE's competitors were greater. We illustrate this by showing a case in which 50% of EE's LTE subscribers are diverted from other operators as a result of liberalisation without delay.

Figure 3: Potential loss of subscribers by EE's competitors

| | Total to end Q4 2012 | Total to end Q4 2013 |
|--|----------------------|----------------------|
| Competitors' loss of subscribers (EE [X]) | [X] | [X] |
| Competitors' loss of subscribers (Ofcom 50%) | [X] | [X] |

Telefónica analysis of the effects of liberalisation

- 3.68 In its response to the March 2012 consultation, Telefónica calculated what it described as the "monopoly rents" flowing to EE as a result of liberalisation.⁷⁰ One step in Telefónica's calculation was to estimate the uplift in EE's net additions of post-pay subscribers as a result of liberalisation. Telefónica estimated that EE would attract an additional [X] post-pay subscribers per quarter once it was able to offer LTE handsets, dongles and tablets.⁷¹ Assuming that EE launches its LTE service in Q4 2012, Telefónica's assumptions imply that EE would have an extra [X] post-pay subscribers by the end of Q4 2013.⁷²
- 3.69 Telefónica's analysis focused on EE's net additions to post-pay subscribers. This is made up of three components: (i) the net number of post-pay subscriptions that EE wins from its competitors; (ii) the net number of EE pre-pay subscribers that upgrade to a post-pay subscription; and (iii) the number of 'new' post-pay subscribers (who do not currently have a mobile phone subscription) that EE wins. Some of the additional post-pay subscribers that EE acquires as a result of liberalisation without delay may fall within categories (ii) and (iii). Thus, while it seems reasonable to assume that a significant proportion of them are attracted to EE from other mobile operators (category (i)), a figure of [X] may overstate the number of subscribers that EE's competitors lose as a result of liberalisation without delay.
- 3.70 In response to a statutory information request, Telefónica provided an internal document that discussed the impact on Telefónica of liberalisation of EE's 1800 MHz spectrum. This stated that [X].⁷³ In Q1 2012, Telefónica accounted for around [X] of non-EE post-pay subscribers.⁷⁴ We have used this percentage to scale up Telefónica's forecast of its lost subscribers to give an overall figure for the impact on

⁷⁰ Telefónica confidential consultation response, paragraphs 160-166 and associated "CBA" spreadsheet.

⁷¹ Telefónica "CBA" spreadsheet, table 5.

⁷² [X].

⁷³ [X].

⁷⁴ This calculation is based on the post-pay subscriber base including MVNOs (Virgin Mobile and Tesco Mobile) and excluding EE. Including MVNOs is a more conservative approach as it has the effect of lowering the share for Telefónica, which increases the implied losses for the market overall when Telefónica's forecast losses are scaled upwards. Source: operator returns for Vodafone, Telefónica, H3G, Virgin Mobile and Tesco Mobile.

EE's competitors.⁷⁵ Our modification of Telefónica's forecast suggests that overall EE's competitors might lose around [redacted] subscribers. [redacted].

Vodafone analysis of the effects of liberalisation

- 3.71 In response to a statutory information request, Vodafone provided us with two Internal Documents that contained an estimate of the impact of liberalisation without delay on the lifetime value that Vodafone earns from its subscribers.⁷⁶
- 3.72 The first Vodafone document includes an estimate of the impact of the volume of handset and "mobile broadband" (i.e. dongle) connections. Vodafone estimated that it could lose [redacted] handset subscribers and [redacted] mobile broadband subscribers.⁷⁷ Adding up these figures gives an overall forecast of [redacted] connections lost by Vodafone.
- 3.73 In Q1 2012, Vodafone accounted for around [redacted] of non-EE post-pay subscribers.⁷⁸ Applying the same approach that we adopted for Telefónica's figures, we have used this percentage to scale up Vodafone's forecast of its lost connections to give an overall figure for the impact on EE's competitors. Our modification of Vodafone's forecast suggests that overall EE's competitors might lose [redacted] subscribers.⁷⁹
- 3.74 The second Vodafone document updates Vodafone's estimate of the impact of liberalisation on its lifetime value. [redacted].⁸⁰ This second document did not set out Vodafone's assumptions about the number of subscribers it would lose. However, in the first document the estimated lifetime value impact for Vodafone was around [redacted] in revenue terms.⁸¹ In the second document the lifetime value impact was [redacted] in revenue terms i.e. just under [redacted].⁸² This suggests that Vodafone's assumptions about subscriber loss are not significantly higher in this second document to those contained in the first.

Ofcom's position on the magnitude of the advantage enjoyed by EE during the Interim Period

- 3.75 EE's forecasts suggest that, if we were to liberalise its spectrum without delay, total LTE take-up could be in the region of [redacted] by the end of 2013. There are also a

⁷⁵ This implicitly assumes that Telefónica's loss of subscribers is representative of the impact on the subscribers as a whole. While this may not be the case in practice, we consider that our approach is reasonable for the purposes of scaling up Telefónica's forecast in order to cross-check EE's forecast.

⁷⁶ The lifetime value reflects the revenues that an operator earns from a customer over the entire period that the customer remains with that operator. This may consist of several contractual periods, since the operator may retain the customer even after their initial contract expires.

⁷⁷ [redacted]. Calculated by summing the figure for the change in "CBU" (customer business unit i.e. residential) and "EBU" (enterprise business unit i.e. commercial) connections. [redacted], Vodafone, 11 June 2012, slides 26 and 28. Provided in response to statutory information request dated 25 June 2012, question 1.

⁷⁸ Similar to the approach used for Telefónica, we have included MVNOs in the subscriber base. Source: operator returns for Vodafone, Telefónica, H3G, Virgin Mobile and Tesco Mobile.

⁷⁹ [redacted]. Note of meeting with Vodafone on 24th July 2012.

⁸⁰ [redacted], Vodafone, 2 July 2012, slide 3. This version is attached to an internal Vodafone email of 3 July 2012 (an almost identical version of these slides is also attached to an earlier internal Vodafone email of 2 July). Provided in response to statutory information request dated 25 June 2012, question 1.

⁸¹ [redacted], Vodafone, 11 June 2012, slide 28. Provided in response to statutory information request dated 25 June 2012, question 1.

⁸² [redacted], Vodafone, 2 July 2012, slide 18. This version is attached to an internal Vodafone email of 3 July 2012. Provided in response to statutory information request dated 25 June 2012, question 1.

number of different estimates of the impact of liberalisation without delay on EE's competitors:

- Our analysis of EE's forecast suggests that its competitors could lose [X] subscribers by the end of 2013. Our sensitivity on the EE forecast (in which we assumed that 50% of EE's LTE subscribers were diverted from other operators) changes this estimate to [X].
- Based on Telefónica's forecasts, EE's competitors could lose [X] subscribers by the end of 2013.
- Based on the first Vodafone document discussed above, EE's competitors could lose [X] subscribers. In the second Vodafone document the lifetime value impact was just under [X] than in the first.

3.76 Taking these various estimates in the round, suggests that EE's competitors, in aggregate, are likely to lose less than [X] subscribers during the Interim Period as a result of liberalisation without delay. We assume as a central estimate that EE's competitors would lose [X]. Even a high end estimate (based on the upper end of [X] is likely to be no more than [X].⁸³

3.77 In 2011, there were 82m mobile connections (including dongles) and 40m post-pay connections.⁸⁴ Placed in the context of the sector as a whole, the impact of liberalisation is thus modest. If EE is the only operator providing LTE services, by the end of 2013 LTE may account for up to [X] of post-pay subscriptions. The loss of subscribers suffered by EE's competitors in aggregate will be smaller still when expressed as a percentage of the overall number of connections – [X].

3.78 In conclusion, liberalisation without delay will allow EE to offer a more attractive service during the Interim Period, for example because it is able to use more spectrum for mobile data services. In the light of the new evidence we received in responses to the March 2012 consultation and in Internal Documents, we consider that while a material number of consumers are likely to find EE's LTE service attractive, when placed in the context of the mobile sector as a whole the impact is relatively modest during the Interim Period.

The magnitude of the advantage enjoyed by EE during the Secondary Period

3.79 In the Secondary Period, EE retains an advantage over its competitors. Those competitors launch LTE services within the period (and by definition at least one launches a service at the start of the period), but any quality gap between their offering and EE's offering is greater than it would have been if liberalisation had been delayed.

3.80 Forecasts of total LTE take-up are of limited value for assessing the magnitude of EE's advantage during the Secondary Period, since other operators will be able to compete with EE for LTE customers. Forecasts of the proportion of LTE customers

⁸³ As explained below, EE's competitors may also lose a small number of subscribers in the Secondary Period as a result of liberalisation without delay.

⁸⁴ In recent years there has been a trend of consumers substituting from pre-pay to post-pay subscriptions. As a result, the number of post-pay subscriptions has been growing. *The Communications Market 2012*, Ofcom, Figures 5.40 and 5.41 on page 319.

won by EE compared to other operators could provide direct evidence on the scale of advantage to EE in the Secondary Period, [§].⁸⁵

3.81 Nonetheless, we consider that EE's advantage is likely to be substantially smaller during the Secondary Period than during the Interim Period:

- During the Secondary Period EE will no longer be the only operator offering LTE services. Other operators will be able to supply LTE services using 800 MHz, divested 1800 MHz and 2.6 GHz spectrum.
- The main difference between EE's LTE network and that of other operators during the Secondary Period is likely to be greater coverage (rather than capacity, peak data rates or offering services based on LTE technology). Our analysis in Annex 2 suggests that that the coverage difference between EE and its competitors is likely to reduce rapidly.
- The duration of the Secondary Period is likely to be very considerably shorter than the duration of the Interim Period – we expect the Secondary Period to last one, or at most two quarters.

3.82 Since the duration of the Secondary Period is likely to be short, and EE's coverage advantage is likely to be modest during that period, we do not expect a further material increase in the number of subscribers lost by EE's competitors as a result of liberalisation without delay after the end of the Interim Period.⁸⁶ On the high end estimate of the number of subscribers that EE wins during the Interim Period, EE gains [§] from its competitors as a result of liberalisation without delay. We anticipate that it will win markedly fewer subscribers from its competitors in the Secondary Period and assume [§].

Impact of liberalisation on EE's competitors

3.83 Drawing on the analysis above of the likely magnitude of switching away from EE, we have assessed the impact of liberalisation on EE's competitors. This informs our subsequent analysis of the overall impact of liberalisation without delay on consumers. In particular, if a national wholesaler suffered a substantial loss of scale it might be considerably less able to exert a competitive constraint on EE (or other national wholesalers). In this case, competition (and therefore, ultimately consumers) might be harmed in the longer term. We have thus considered the take-up of EE's LTE service, the number of subscribers that might switch to EE from its competitors and how long it might take for EE's competitors to win them back.

Impact on competitors based on forecast take-up

3.84 In Figure 4 below we set out the impact of liberalisation without delay on EE's share of post-pay subscribers in the Interim Period and the Secondary Period, based on the forecasts discussed above.⁸⁷ By definition, the increase in EE's share of post-pay

⁸⁵ File note of conversation with EE on 23rd July 2012.

⁸⁶ During the Secondary Period, both EE and its competitors are likely to grow their base of LTE subscribers. However, the number of *additional* subscribers that EE attracts as a result of liberalisation without delay (compared to delayed liberalisation) is unlikely to be material.

⁸⁷ Note that the shares in this Figure relate to the retail post-pay subscribers of the four national wholesalers. If other operators, such as MVNOs, were included then the increase in EE's share would be slightly smaller.

subscribers is equal to the fall in the aggregate share of its competitors. This Figure sets out two different scenarios:

- A central estimate in which EE gains [X] post-pay subscribers from its competitors. [X]. We have placed less weight on our 50% sensitivity but have included the extra subscribers that EE is likely to divert from its competitors in the Secondary Period as a result of liberalisation without delay; and
- A high end estimate, in which EE gains [X] post-pay subscribers from its competitors. This includes [X] subscribers during the Interim Period and [X] in the Secondary Period.

Figure 4: Impact of different forecast scenarios on EE’s share of post-pay subscribers

| Scenario | Subscribers that switch to EE from its competitors (as a result of liberalisation without delay) | Percentage point increase in EE’s share of post-pay subscribers (current share 34.7%) |
|-------------------|--|---|
| Central estimate | X | X |
| High end estimate | X | X |

3.85 The Figure shows that the effect on EE’s share of post-pay subscribers would be a relatively modest increase of between [X] percentage points. Across all subscribers (post-pay and pre-pay) the percentage point increase would be even smaller. This increase is [X] to the increase in post pay subscribers that Telefónica generated over the two-year period that it had iPhone exclusivity.⁸⁸

3.86 The impact of liberalisation on Vodafone, Telefónica and H3G’s shares of supply depends on whether any of these national wholesalers are particularly likely to lose subscribers to EE. However, given the relatively modest increase in EE’s share of supply in 2013 shown in Figure 4, we not consider that we need to reach a definitive view. Rather, Figure 5 below shows the impact on each national wholesaler’s share of post-pay subscribers for the two scenarios above (the central case and the high end estimate), given an assumption about how many additional subscribers EE attracts from each of its competitors.⁸⁹

⁸⁸ Telefónica saw a [X] percentage point increase in its share of post-pay subscribers between Q4 2007 and Q3 2009. We recognise that there are differences between Telefónica’s iPhone exclusivity and 1800 MHz liberalisation. In particular, iPhone exclusivity was the result of commercial negotiations rather than a regulatory change. We discuss iPhone exclusivity in further detail in Annex 3.

⁸⁹ Shares calculated assuming that each national wholesaler loses subscribers to EE in proportion to its current share of post-pay subscribers (excluding EE).

Figure 5: Percentage point change in shares of supply (losses spread proportionally)

| Additional EE subscribers | Total subscribers | | | | Post-pay subscribers | | | |
|---------------------------|-------------------|----|----|-----|----------------------|----|----|-----|
| | VF | TF | EE | H3G | VF | TF | EE | H3G |
| [X] | X | X | X | X | X | X | X | X |
| [X] | X | X | X | X | X | X | X | X |

3.87 Although the above forecasts suggest relatively modest increases in the share of subscribers for EE, responses to the March 2012 consultation stated that many of these LTE subscribers are likely to be high-value customers.⁹⁰ Therefore, it is likely that EE's increase in its share in revenue terms would be higher than the values reported on a volume basis above.⁹¹ However, given the modest size of the percentage point changes in Figures 4 and 5 above, the increase EE's share of revenues is unlikely to be large.⁹²

3.88 We recognise that EE's competitors are likely to have their profits reduced if we liberalise without delay and that EE's profits are likely to increase, and that the sums of money involved are not small. [X].⁹³ However, our focus is on the impact of liberalisation without delay on consumers and our analysis of the impact on EE's competitors has been carried out in order to inform that consumer assessment.

Impact on competitors over the longer term

3.89 Even if EE does enjoy higher market share for a period, as the competitive advantage enjoyed by EE diminishes, its competitors will have the opportunity to win back the additional subscribers that EE gains (assuming EE does not enjoy an ongoing competitive advantage).

3.90 Nevertheless, it seems likely that it will take some time for the extra market share gained by EE to be eroded for two reasons.

3.91 First, switching mobile provider is not frictionless as consumers may face contractual and non-contractual costs in switching supplier.

⁹⁰ Telefónica confidential consultation response, paragraph 165. Vodafone confidential consultation response, page 48.

⁹¹ To calculate the changes in operators' shares of total revenue as a result of consumers switching to EE's LTE service it would be necessary to make assumptions about two factors. First, how much switching consumers currently pay for mobile services compared to an average consumer (this determines the fall in revenue for EE's competitors). Second, how much switching customers pay for LTE services compared to the amount that they currently pay (this determines the increase in EE's revenue).

⁹² The impact on the profitability of EE and the other national wholesalers will not be the same as the impact on their revenue. It depends on the incremental costs of serving those consumers that switch to EE's LTE service. This, in turn, depends on factors such as the cost to operators of handsets, the frequency with which consumers use different services (voice calls, text, data) and the incremental cost of those services to the operator.

⁹³ [X], Vodafone, 2 July 2012, slide 18. This version is attached to an internal Vodafone email of 3 July 2012. Provided in response to statutory information request dated 25 June 2012, question 1.

- Contract terms and length are likely to impede switching for some consumers, particularly if termination clauses are onerous. The general trend is that average mobile contract length has increased.⁹⁴ Reflecting the relatively high cost of LTE-enabled handsets, many of EE's new LTE subscribers are likely to be on two year contracts.⁹⁵
- Even after the contractual period has expired, consumers may exhibit a degree of inertia that limits how quickly they might be expected to churn to other operators. We have considered the scale of these other switching costs. In our 2009 Mobile Sector Assessment we concluded that effective competition is occurring within the mobile sector. We referred to shifts in retail and wholesale market shares and robust switching levels.⁹⁶ In the 2012 Award Consultation we pointed to survey evidence which suggests that although only a minority of consumers can be considered active in the market, it is not clear that consumers perceive there to be major barriers to switching. However, a large proportion of consumers do consider switching a 'hassle' and factors such as inertia or contractual conditions are cited as a barrier for at least some consumers.⁹⁷
- Reputational effects may be another non-contractual factor that may create a degree of inertia (discussed in paragraphs 3.114 to 3.122 below).

3.92 Second, it is consistent with the experience of Telefónica's two year exclusivity period for the iPhone (which we discuss in more detail in Annex 3). The experience of Telefónica's iPhone exclusivity suggests that liberalisation without delay is likely to allow EE to increase its market share and the erosion of this installed base may take some time. This may reflect switching costs as opposed to an enduring advantage from exclusivity.⁹⁸ In any event, the iPhone example does not suggest that, once EE's competitors launch LTE services, they will face undue difficulties in winning new LTE subscribers. Provided EE's competitors can offer LTE services during the period when the overall LTE segment is growing strongly they will have the opportunity to erode EE's overall share of the LTE segment relatively quickly.

Impact of liberalisation on consumers

3.93 In the light of the above discussion about the magnitude of the advantage enjoyed by EE and impact on EE's competitors, we now consider the impact of liberalisation without delay on consumers. Our analysis is structured as follows:

- First, we summarise the position in the March 2012 consultation;
- Second, we provide a high level overview of responses to the March 2012 consultation;

⁹⁴ The Communications Market 2012, page 347 and Figure 5.74 on page 348.

⁹⁵ LTE1800 versions of devices are likely to be more expensive than their 3G equivalents. [3<] response of 9 July 2012 to informal information request of 20 June 2012, question 5 –. EE is required to offer shorter 12 month contracts. However, many post-pay consumers choose contracts longer than 12 months in order to avoid more significant upfront payments for handsets or higher monthly payments. For example, 67% of new post-pay connections in Q1 2012 were for 24 months. The Communications Market 2012, Figure 5.74 on page 348.

⁹⁶ Mobile Evolution, Ofcom, 17 December 2009, paragraph 3.36. Available at:

http://www.ofcom.org.uk/consult/condocs/msa/statement/MSA_statement.pdf

⁹⁷ 2012 Award Consultation, Annex 6, paragraphs 5.91-5.96.

⁹⁸ Telefónica's share of post-pay subscribers peaked in [3<] and since then it has been gradually eroded. Assuming that the rate of erosion continues, Telefónica's post-pay share will return to its Q2 2007 (pre iPhone-exclusivity) levels [3<].

- Third, we set out the benefits for consumers of liberalisation;
- Fourth, we consider the potential for consumer detriment as a result of liberalisation; and
- Finally, we explain why our analysis is unchanged if EE grants MVNOs access to its LTE network.

3.94 We then draw this together from paragraph 33.114 to 3.122 onwards as part of our conclusion on whether any detrimental effects for consumers from liberalisation without delay are likely to outweigh the benefits.

Ofcom's position in the March 2012 consultation

3.95 In the March 2012 consultation we stated that delaying liberalisation would result in LTE services not being available until some time after the Combined Award. This would make at least some consumers worse off, relative to liberalising EE's 1800 MHz spectrum without delay, because they would have to wait longer to enjoy the benefits of LTE.⁹⁹

3.96 We considered that for delay to liberalisation of EE's 1800MHz licences to be appropriate and proportionate, any distortion to competition would at least have to endure beyond the Interim Period and the associated costs to consumers would have to exceed any benefits they enjoy from liberalisation during the Interim Period. Without any enduring costs, consumers will be better off with early liberalisation, since they have the option of buying new LTE services which would otherwise not be available.¹⁰⁰

3.97 We considered the possibility of a distortion to competition which endures beyond the Interim Period i.e. a scenario where EE is able to establish and maintain a first mover advantage which persisted even once other operators were able to deploy LTE. This could reduce competitive intensity and diminish the benefits to consumers over the longer term. Examples of an enduring first mover advantage were: (i) EE gains a reputation for offering high quality mobile data services; and/or (ii) EE is able to lock in customers and market share during the Interim Period. Overall, we considered that liberalisation of EE's 1800 MHz spectrum is unlikely to lead to an enduring competitor advantage even if it led to competitor advantage in the Interim Period.¹⁰¹

3.98 Moreover, even if there were some enduring competitor advantages as a result of liberalising EE's 1800 MHz spectrum for LTE as soon as possible, the costs associated with any distortion to competition would be unlikely to outweigh the benefits to consumers from having early access to new and improved mobile services – particularly given the correlation between any distortion of competition and the scale of consumer benefits in the Interim Period.¹⁰²

3.99 Finally we stated that delaying liberalisation may reduce the incentives on other competitors to respond to an early launch of LTE services in a way that is beneficial

⁹⁹ March 2012 consultation, paragraph 6.7.

¹⁰⁰ March 2012 consultation, paragraph 6.8.

¹⁰¹ March 2012 consultation, paragraphs 6.21-6.25.

¹⁰² March 2012 consultation, paragraphs 6.29.

for consumers (for example, by deploying the latest standard of HSPA more quickly than they would otherwise have done).¹⁰³

Consultation responses

3.100 We received a number of responses to the March 2012 consultation about the impact of liberalisation without delay on competition. EE was supportive of the March 2012 consultation and argued that any competitive advantage would not endure beyond the point at which other operators are able to launch LTE services on a regional basis.¹⁰⁴ Other respondents disagreed with the analysis in the March 2012 consultation. For example:

- Vodafone considered that there was a very significant risk to competition. It referred to EE establishing a reputation as the most attractive network for data services “for some period” and criticised our analysis of EE’s ability to “lock-in” consumers.¹⁰⁵
- Telefónica referred to EE being granted an LTE “monopoly” until other operators are able to launch LTE services and calculated what it characterised as the consumer detriment as a result of EE charging a high price for LTE services during that period.¹⁰⁶
- [S<] considered that there would be a distortion of competition in the Interim Period since EE would be able to charge a premium for its LTE services and develop a reputation for superior network quality.¹⁰⁷

3.101 A more detailed summary of responses is given in Annex 1.

3.102 Having considered and taken account of these responses, as well as the further information and further analysis we have carried out in the light of consultation responses, we have assessed in greater detail the impact of liberalisation on consumers.

Consumer benefits from liberalisation

3.103 Relative to the case where liberalisation is delayed, consumers will benefit during the Interim Period from the earlier availability of LTE services as well as an increase in the amount of spectrum that is available for mobile data services. As explained above, we consider that consumers will be better off during the Interim Period, relative to the case where liberalisation is delayed, even if EE is able to charge a relatively high price for LTE services. During the Secondary Period, consumers will also benefit (relative to the case where liberalisation is delayed) if the coverage of EE’s LTE network is greater than would otherwise have been the case at the same point in time.

3.104 We have not sought to quantify the consumer benefits that will arise from liberalisation without delay. However, the subscriber projections set out above,

¹⁰³ March 2012 consultation, paragraphs 6.30.

¹⁰⁴ EE confidential consultation response, page 3.

¹⁰⁵ Vodafone confidential consultation response, pages 25 and 49-51.

¹⁰⁶ Telefónica confidential consultation response, paragraphs 169-172.

¹⁰⁷ [S<] confidential consultation response, page 13. It also referred to a permanent distortion of competition if the Combined Award did not result in EE’s competitors acquiring sufficient suitable spectrum (see pages 15-17).

provide a broad indication of the scale of effect. In particular, it appears that up to around [redacted] consumers may subscribe to EE's LTE service during the Interim Period. All of these consumers will therefore benefit from a service that would otherwise have been unavailable. Many of these consumers are likely to pay monthly subscription charges in excess of £30 (based on current 3G price points) in addition to any costs of new devices. They will do so because they judge themselves to be better off as a result.

3.105 We expect the direct gains to consumers from subscribing to EE's LTE service as a result of liberalisation without delay to be the most significant form of consumer benefit. However, there may also be some additional sources of benefit.

3.106 First, liberalisation without delay may also prompt EE's competitors to respond in ways that benefit consumers, such as deploying more advanced HSPA technology. We have thus considered how other operators may respond to liberalisation, to help understand the extent to which consumers may benefit from those operator responses.¹⁰⁸ In carrying out that assessment we have focused on the internal documents provided to us following a statutory information request.¹⁰⁹ These potential responses are summarised further in Annex 1. In summary, we consider that [redacted]. However, there is some evidence that other operators will respond to the launch of an 1800 MHz LTE service from EE in ways that will provide benefits to those consumers that do not migrate to EE's LTE service:

- [redacted];¹¹⁰ and
- [redacted].¹¹¹

3.107 Second, it is possible that the earlier presence of EE's LTE service in the marketplace will encourage other network operators to roll out their own LTE networks faster than they would otherwise have done, advancing the point in time at which some consumers have a choice of LTE service.

Potential for consumer detriment as a result of liberalisation

3.108 In the light of responses to the March 2012 consultation we have considered whether competitive pressures on EE in the Secondary Period and the Final Period would be weakened as a result of liberalisation without delay. If so then consumers could suffer detriment as a result of higher prices and/or lower quality services.

3.109 Our assessment of the risks of consumer detriment is structured as follows:

- First, we discuss what inferences can be drawn from the experience of Telefónica's iPhone exclusivity deal;
- Second, we discuss the impact of switching costs (including minimum contractual periods);

¹⁰⁸ Such responses will mitigate the scale of the advantage that EE enjoys over its competitors. However, anticipated responses are likely to be reflected in operators' forecasts (which we discuss above).

¹⁰⁹ We asked operators to provide copies of internal documents discussing their commercial response to EE, in the event that it is authorised to deploy LTE services in 2012 using its 1800 MHz spectrum.

¹¹⁰ Presentation entitled "120712 Update with Guy #2 – Post Meeting Version.pptx"

¹¹¹ Presentation entitled "LTE ExCom Presentation", 23 April 2012

- Third, we discuss the risk that EE benefits from an ongoing reputation that weakens the competitive constraints upon it; and
- Fourth, we discuss other potential sources of consumer detriment.

Telefónica's iPhone exclusivity

3.110 During the Interim Period, EE enjoys *de facto* exclusivity over the supply of LTE services. Telefónica stated that its experience of iPhone exclusivity between 2007 and 2009 is “instructive”, but argued that the effects might need to be scaled up given that smartphone take-up has increased.¹¹² [§<]. See paragraph 3.70 above and particularly Footnote 74. Our analysis of this example is set out in detail in Annex 3. In summary:

- We consider that there are some differences between the iPhone exclusivity period and LTE1800 liberalisation. Nevertheless, the period of iPhone exclusivity provides an example where an operator had an advantage through exclusivity and where we can observe some of the possible impacts on the market after that period of exclusivity ended.
- Telefónica's share of total iPhone subscribers started from a very high level but has fallen gradually in the period since exclusivity ended. [§<].
- Our analysis does not suggest a persistent and significant reputation advantage for Telefónica arising from its iPhone exclusivity.

3.111 While the evidence from Telefónica's iPhone exclusivity is not conclusive evidence, it is at least suggestive that EE's LTE service will face significant competitive constraints once the Interim Period ends. This, in turn, suggests EE may be unable to charge higher prices and/or offer a worse quality of service in the Secondary Period and the Final Period on account of weakened competition.

Impact of switching costs

3.112 Other national wholesalers expressed concerns about EE's ability to sign up LTE customers for 24 month contracts.¹¹³ Such contracts mean that consumers face a cost if they switch to another operator. However, the existence of switching costs (including customer inertia) does not necessarily lead to consumer detriment, relative to the case where liberalisation is delayed. For example:

- Suppose (for the purposes of explanation) that switching costs are high. This might allow mobile operators to earn high margins since consumers are reluctant to switch supplier.
- Liberalisation without delay might result in EE having a sufficient advantage over its competitors to attract additional subscribers, notwithstanding the presence of switching costs. Once the Interim Period has ended and all operators can offer LTE service then switching costs may make it difficult for EE's competitors to win back their lost subscribers.

¹¹² Telefónica confidential consultation response, paragraph 168.

¹¹³ Vodafone confidential consultation response, page 49. [§<].

- Liberalisation without delay has thus resulted in EE attracting and retaining additional subscribers. It is also able to earn relatively high margins from those subscribers due to the existence of switching costs.
- However, crucially, switching costs also exist in the case that liberalisation is delayed. In other words, regardless of the timing of liberalisation, operators earn high margins as a result of the high switching costs. Liberalisation changes the identity of the operator that is able to earn high margins from a particular subscriber. There is thus an impact on the profits of EE's competitors (relative to the case where liberalisation is delayed) but there is no additional consumer detriment.¹¹⁴

3.113 For EE to be able to charge higher prices and/or offer worse a quality of service, relative to the case where liberalisation is delayed, impediments to switching away from EE would need to *increase* as a result of liberalisation without delay.¹¹⁵ In particular, respondents to the March 2012 consultation suggested that EE could enjoy an ongoing reputation advantage that means that consumers are less willing to switch away from it. We explore this theory of harm next.

Ongoing reputation effects

3.114 Consultation respondents argued that EE will gain a reputation advantage as a result of liberalisation. It is helpful to distinguish between two potential phases in any reputation advantage enjoyed by EE:

- During the Interim Period and, to a lesser extent, the Secondary Period consumers may perceive EE's network to be more attractive (relative to other operators) as a result of liberalisation without delay. If this perception is correct, liberalisation may thus result in a **warranted** reputation advantage for EE.
- During the Secondary Period the performance advantage (relative to other operators) that EE enjoys as a result of liberalisation narrows, before vanishing in the Final Period. However, EE's earlier reputation may persist if consumers fail to recognise that other networks can now offer a comparable service to EE. If the reputation advantage as a result of liberalisation persists in this way then EE may gain an **unwarranted** reputation advantage.

3.115 To help clarify the distinction between warranted and unwarranted reputation effects, Figure 6 shows an illustrative depiction of the difference in network performance between EE and one of its competitors.

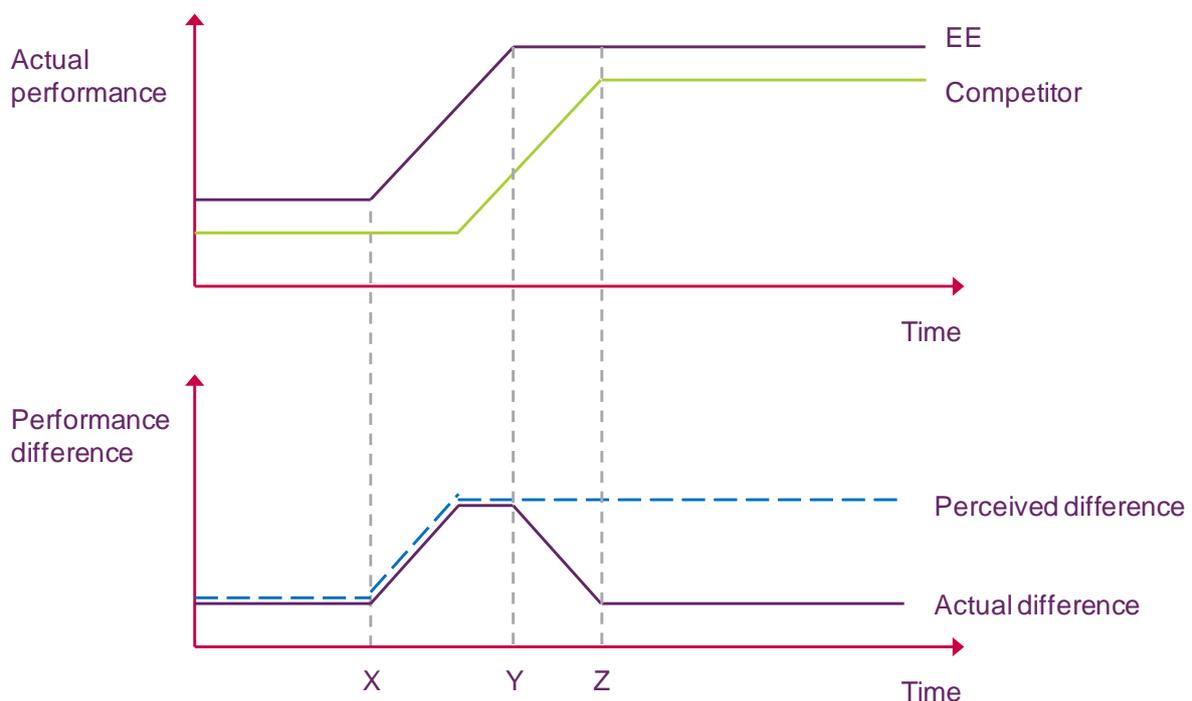
- The upper diagram depicts (in a stylised manner) the actual performance of EE's network over time. This is initially assumed to be constant. At time X, as a result of liberalisation, EE's network performance begins to improve. Performance is shown as rising gradually until it reaches a new plateau at time Y.

¹¹⁴ Consumer detriment is likely to exist in this example as a result of high switching costs. However, that detriment exists regardless of whether liberalisation occurs without delay.

¹¹⁵ We recognise that in practice consumers might not be fully informed about when EE's competitors will launch LTE services. As a result, consumers that would prefer to wait and purchase LTE services from other providers once they launch may instead make a decision they regret, namely signing up to a lengthy LTE contract with EE. While this may result in a degree of consumer detriment, it is not obvious that the level of detriment is material (particularly as EE's competitors have a strong incentive to inform consumers that they will be able to launch their own LTE services in 2013).

- The upper diagram also depicts the performance of a competitor's network over time. For the purposes of exposition (and clarity in the diagram), we have assumed that the other network consistently has lower performance than EE's network. The other network's performance is assumed to be constant until (at a point between time X and Y) it obtains additional spectrum in the Combined Award. At this point, its network performance gradually improves until it reaches a new plateau at time Z.
- The bottom diagram shows the difference in performance between EE and its competitor (i.e. the gap between the two curves in the upper diagram). As a result of liberalisation, the performance gap between the networks temporarily widens, before falling back to its original level as EE's competitor finishes upgrading. Between time X and time Z, EE enjoys an increase in performance advantage over its competitor as a result of liberalisation.
- The bottom diagram also shows what consumers perceive to be the difference between the two networks. For the purposes of explanation, this Figure assumes that consumers recognise that EE's network improves in performance relative to its competitor. EE thus enjoys a **warranted** reputation advantage between time X and time Y as a result of liberalisation. However, the Figure assumes that consumers fail to recognise that the other operator subsequently closes the performance gap. As a result, from period Y onwards EE enjoys an **unwarranted** reputation advantage – consumers overestimate how attractive EE's network is, relative to its competitor.

Figure 6: Illustrative depiction reputation effects



3.116 A reputation advantage potentially allows an operator to attract more customers and/or charge a higher (premium) price. Our particular concern is whether EE, as a result of liberalisation without delay, obtains an unwarranted reputation advantage. This could shield EE from competitive pressures to some extent and thus allow EE to charge higher prices and/or offer a lower quality of services. This is despite other

operators having closed the performance gap that previously existed as a result of liberalisation.

3.117 Respondents to the March 2012 consultation did not provide evidence that in our view reliably supports the proposition that a warranted reputation advantage would be unduly persistent, and therefore become an unwarranted reputation advantage.¹¹⁶

3.118 If an unwarranted reputation for operating a superior network arises as a result of liberalisation then it would be an ongoing advantage for EE. However, the scale of any consumer detriment depends on how important that reputation is, relative to other factors such as price. For example, if price is highly important to consumers then, even if EE enjoys an unwarranted reputation advantage, its resulting ability to raise prices is limited:

- [redacted].¹¹⁷
- Research conducted for Ofcom's UHF Strategy review asked mobile internet consumers about the importance of different service features. When asked what they thought would be the most important feature of mobile internet services over the next 10 years, respondents ranked "Good reception at home" (32%), "Monthly mobile bill" (21%) and "No download cap" (14%) as the most important. Other options included "Reliable service" in various places and "Good reception" in buildings other than at home. Conjoint analysis was used to assess the relative importance of these features and found that the monthly bill was by far the most important.¹¹⁸
- Research conducted for Ofcom's Mobile Call Termination market review asked consumers about their reasons for choosing their current network. The responses of this survey are also consistent with the view that consumers tend to rank cost/overall price of the service higher than other service features.¹¹⁹

3.119 This evidence does not by any means imply that quality is irrelevant – and we recognise that there may be some customer segments (e.g. business customers) that are more focused on quality than price – but it does suggest that for the most part, consumers regard price as somewhat more important than quality. If this is the case, it will reduce the negative effects of any unwarranted reputation advantage.

3.120 We have considered whether there are other examples that might provide evidence of reputational advantages. We discuss Telefónica's two-year exclusivity deal for the iPhone above and in Annex 3. This example does not suggest that once Telefónica's competitors launched rival iPhone offers it continued to enjoy a material advantage from the period of exclusivity.

3.121 In assessing reputation effects we also place significant weight on the fact that:

¹¹⁶ In addition to the material provided in response to the March 2012 consultation we also considered whether existing consumer surveys provided reliable evidence about this proposition. However, we decided not to attach weight to such evidence in our decision as it did not provide reliable evidence about the existence of an unwarranted reputation advantage.

¹¹⁷ [redacted].

¹¹⁸ *Ofcom UHF Strategy Research Summary Report*, February 2012, BDRC Continental for Ofcom, pages 23 and 25. Available at: http://stakeholders.ofcom.org.uk/binaries/research/spectrum-research/UHF-strategy-research/research_report.pdf

¹¹⁹ *Mobile Calling Patterns Research*, Jigsaw Research for Ofcom, May 2009, Figure 3. Available at: http://stakeholders.ofcom.org.uk/binaries/consultations/mobilecallterm/annexes/annex10_2.pdf

- The Interim Period is likely to last no more than 15 months; and
- Forecasts of likely LTE take-up suggest that the number of consumers actually subscribing to LTE on EE's network will be relatively modest relative to the overall size of the mobile sector.

3.122 In conclusion, the evidence that EE would enjoy an ongoing unwarranted reputation advantage that shields it from competition and allows it to charge higher prices and/or offer worse quality of services is weak. While we cannot rule out the possibility that some consumer detriment arises, there is a lack of evidence showing that consumers are likely to suffer substantial harm on this account.

Other potential sources of consumer detriment

3.123 For completeness, we briefly discuss other potential sources of consumer detriment.

3.124 Liberalisation without delay is likely to have a negative financial impact on EE's competitors and a positive impact on EE. We have previously recognised that it is generally good regulatory practice to avoid large, asymmetric profit shocks arising from regulatory decisions wherever possible, as they could be disruptive and contribute to perceptions of a less certain regulatory framework. This could potentially adversely affect incentives to invest in the sector more generally.¹²⁰ This, in turn, could lead to consumer detriment. However, we do not consider that liberalising EE's 1800 MHz spectrum without delay would materially increase the perceived regulatory risk associated with investing in the UK mobile sector:

- Liberalisation would be in line with past regulatory practice and with clear statements. For example, the policy intention underlying both the RSC Decision (as amended by the LTE RSC Decision) and the RSPD Decision is that this spectrum should be liberalised at the earliest appropriate time.
- Refusing to liberalise EE's 1800 MHz spectrum early also carries risks in relation to the perceived regulatory attitude towards investment in the UK.
- More generally, our focus on the effect on consumers best meets our statutory duties.

3.125 We have considered whether a national wholesaler might suffer a substantial loss of scale and be reduced to a particularly low market share.¹²¹ If this occurred then future competition in the mobile sector might be reduced (at least until the national wholesaler recovered), to the detriment of consumers.¹²² While EE's competitors are likely to lose subscribers we consider that they are unlikely to suffer a substantial loss of scale. As discussed above, the forecast number of subscribers that EE's competitors may lose during the Interim Period and the Secondary Period is small in the context of the mobile sector as a whole.

¹²⁰ *Application of spectrum liberalisation and trading to the mobile sector – A further consultation*, Ofcom, 13 February 2009. Available at: <http://stakeholders.ofcom.org.uk/consultations/spectrumlib/>

¹²¹ Similarly EE would gain scale, although it is unclear whether that extra size would materially reduce its average costs.

¹²² It is possible that a national wholesaler that lost large numbers of subscribers may experience diseconomies of scale that reduce its ability to advertise and operate at a national level. However, substantiating this risk is difficult since it would arise if the mobile sector was substantially more concentrated than it is today. Moreover it is also possible that a small national wholesaler could continue to offer attractive prices (although it may well incur losses while it attempts to rebuild its customer base).

MVNO access to EE's LTE network

3.126 We have considered whether our analysis of the impact of liberalisation on consumers would change if EE agrees to provide access to its LTE network to an MVNO. For the reasons set out below, we do not consider that our analysis would materially change.

3.127 [REDACTED].¹²³ [REDACTED].¹²⁴ [REDACTED]¹²⁵

3.128 If EE were to agree to provide an MVNO with access to its LTE service then our view of the likely impact is as follows:

- We would expect a somewhat larger number of consumers to purchase an LTE service underpinned by EE's wholesale offer (either from EE's retail business or an MVNO using EE's network). This could increase the number of subscribers lost by other national wholesalers.
- It is less clear whether or not an MVNO LTE access agreement would lead to a material increase in any constraints on EE's pricing of its LTE service. EE will have an incentive to set its wholesale price in such a way that minimises any cannibalisation effect on its own retail subscriber base.¹²⁶
- [REDACTED].¹²⁷
- However, wholesale access might also reduce the risk of EE gaining a unique reputation for offering high quality data services, since the MVNO would be able to offer a similar LTE service.¹²⁸

3.129 We do not consider that any of these impacts are likely to be sufficiently large to change our analysis of the impact of liberalising EE's 1800 MHz spectrum without delay. In addition, we cannot be sure that EE will agree to provide wholesale access to its LTE network to an MVNO. Our decision does not rely on such an agreement being concluded.

Conclusion on material risk of distortion of competition

3.130 We now set out our conclusions on whether there is a material risk of a distortion of competition if we amend EE's licences without delay to allow 1800 MHz spectrum to be used for LTE and WIMAX technologies. This takes into account responses to the March 2012 consultation, the further information that has been provided to us and the additional analysis that we have carried out in the light of those responses.

3.131 Liberalisation without delay will allow EE to offer a more attractive service during the Interim Period. Consumers will benefit during this Period from the earlier availability of LTE services as well as an increase in the amount of spectrum that is available for

¹²³ [REDACTED].

¹²⁴ [REDACTED] EE] response of 9 July 2012 to informal information request of 20 June 2012, questions 2(b) and 2(c)

¹²⁵ [REDACTED]

¹²⁶ We discussed this issue at Award Statement, paragraphs A3.88-A3.89.

¹²⁷ EE response of 9 July 2012 to informal information request of 20 June 2012, question 2(b)

¹²⁸ It is plausible that consumers would ascribe the performance advantage to the MVNO that retailed them an LTE service, rather than to EE (indeed many consumers may be unaware that EE is the company operating the underpinning LTE network).

mobile data services. As a result of liberalisation without delay, EE's LTE customers are likely to enjoy improved mobile data services, in terms of both speed and responsiveness. For example, videos and other files will download faster and the experience of using the internet on a mobile device is likely to improve. EE's forecasts suggest that total LTE take-up could be in the region of [X] by the end of 2013. During the Secondary Period, consumers may also benefit (relative to the case where liberalisation is delayed) since EE will have had more time to deploy its LTE network. Further, the potential reactions of EE's competitors (for example, [X]) may be a further source of consumer benefit.

- 3.132 We have considered whether these consumer benefits might be outweighed by detrimental effects for consumers that could result from an ongoing distortion of competition after the Interim Period ends.
- 3.133 EE is likely to enjoy an advantage over its competitors during the Interim Period. However, when placed in the context of the mobile sector as a whole the impact is relatively modest. EE's advantage as a result of liberalisation without delay is likely to be substantially smaller during the (brief) Secondary Period, which suggests that the impact on EE's competitors during this period is likely to be limited. EE's competitors are likely to lose some subscribers to EE as a result of liberalisation without delay. A central estimate (based on evidence drawn from Internal Documents provided by EE, Telefónica and Vodafone) is that EE's competitors could lose [X] subscribers in the Interim Period and the Secondary Period. We consider that [X] is likely to be a high end estimate for the number of subscribers that EE's competitors lose during these periods. We recognise that EE's competitors' profits are likely to be reduced as a result of liberalisation without delay, but this is a separate issue to the question of whether there is risk of a distortion of competition which could be to the detriment of consumers.
- 3.134 While the forecasts of LTE take-up provide clear evidence that consumers will benefit from liberalisation, the evidence of likely detrimental effects is far weaker. In particular, we have not found evidence that EE would enjoy any material ongoing unwarranted reputation advantage that would shield it from competition, thereby allowing it to charge higher prices and/or offer worse quality of services. Even if there were an unwarranted reputation advantage, it appears likely to be of limited magnitude. Furthermore, given the forecasts discussed above and the availability of a substantial amount of additional spectrum in 2013, the other national wholesalers are unlikely to suffer a substantial loss of scale that would weaken their ability to impose a competitive constraint. We thus consider that the benefits for consumers of liberalisation of EE's 1800 MHz spectrum without delay are likely to outweigh any detrimental impacts on consumers.
- 3.135 Therefore, taking account of the consultation responses and the further information provided and the additional analysis in the light of these consultation responses, we consider that our relevant regulatory objectives and statutory duties are best served by liberalising EE's 1800 MHz spectrum without delay.,

Impact of a material delay to the Combined Award

- 3.136 As we explain in Section 2 above, on 24 July 2012 we published the Award Statement in which we decided to award at auction wireless telegraphy licences to authorise use of at least 2x90 MHz of paired spectrum suitable for mobile services in the 800 MHz and 2.6 GHz bands. This auction is scheduled to complete in early 2013 and we anticipate that: the 800 MHz band will be cleared, and hence available

for use nationally, by the end of 2013; and the 2.6 GHz spectrum will be widely available for use by the end of 2013 and nationally by the end of Q1 2014.

- 3.137 Consultation responses raised the possibility that the Combined Award might be delayed and gave litigation of the Combined Award as the only example for such a delay occurring.¹²⁹ While this is possible, we have not taken account of any such delay from litigation of the Combined Award. We consider that taking the risk of a delay from litigation to the Combined Award into account would be likely to give rise to perverse incentives and would be inappropriate.
- 3.138 However, we note that the analysis set out in this Decision of the likely effects on competition of liberalising without delay depends on the 800 MHz and 2.6 GHz spectrum being available and allocated for use in 2013 or early 2014 at the latest. If for any reason that spectrum was not available and allocated for use within that timeframe, then we would need to revisit our analysis. This might include reconsidering whether or not it was appropriate to impose remedies if we considered that the effect of liberalising EE's 1800 MHz spectrum was distorting competition.

¹²⁹ Vodafone confidential consultation response, pages 14 and 29. Telefónica confidential consultation response, paragraphs 122-125. [redacted] confidential consultation response, pages 5 and 12-13.

Section 4

Conclusion

- 4.1 In light of the assessment set out above, we consider that liberalising EE's 1800 MHz licences now to allow the provision of services using LTE and WiMAX technologies is likely to bring material benefits to consumers and citizens. We have considered whether liberalising in this way is likely to result in a material risk of a distortion to competition to the detriment of consumers and have concluded that it is not likely to do so. In our view it is therefore likely to be in the interests of consumers and citizens for EE's licences to be liberalised as soon as possible.
- 4.2 Consequently, we have decided to vary EE's 1800 MHz licences to permit the deployment and use of LTE and WiMAX technology¹³⁰. We have accordingly today issued varied 1800 MHz licences to EE¹³¹ with the provisions authorising LTE and WiMAX coming into force on 11 September 2012. The form of variation is set out in Annex 5 below. The same form applies to both of EE's 1800 MHz licences.
- 4.3 As we are of the view that liberalisation of EE's 1800 MHz spectrum without delay is unlikely to result in a material risk of a distortion to competition to the detriment of consumers, we do not consider that it is necessary (or indeed objectively justified) to impose any conditions on that liberalisation. Therefore, we do not consider any further in this document the question of potential remedies.
- 4.4 As set out in section 2, we are required under the RSPP Decision, subject to market demand, to complete an authorisation process to liberalise the 900 MHz and 1800 MHz spectrum bands for LTE and WiMAX use by the end of this year. If we receive licence variation requests in respect of licences in those bands, demonstrating that there is market demand, we will consult on varying of those licences in accordance with the requirements of the relevant domestic legislation, and the Authorisation Directive.

¹³⁰ As part of our assessment, we have considered the impact that the use of LTE by Everything Everywhere in the 1800 MHz band would have on the operational performance of systems deployed by licensees in adjacent bands. We set out this analysis in Annex 4. Although we do not consider on the basis of this analysis that it is necessary at the current time to impose any technical licence conditions to address possible interference issues, there may be a need to take steps in the future to address a possible future interference issue on adjacent emergency services spectrum users. We provide further details in Annex 4.

¹³¹ We received no comments on the proposed wording of the variations to EE's licences and so we have adopted the wording on which we consulted in the varied licences that we have issued to EE.

Annex 1

Stakeholder responses to the March 2012 consultation

- A1.1 This Annex summarises the main points raised in responses to the March 2012 consultation where these are not covered in the main document or in Annex 2 (on LTE Deployment), Annex 3 (iPhone exclusivity) and Annex 4 (Technical conditions). It also includes our responses to points made by stakeholders in their replies to our requests for information and in subsequent meetings.
- A1.2 We received comments on the March 2012 consultation from 16 respondents, the non-confidential versions of which we published on our website¹³². After the closure of the consultation period, we requested further information from five stakeholders, including Internal Documents circulated, copied or sent to senior management on specific topics. Stakeholders asserted confidentiality over the material provided in response to these requests.
- A1.3 We respond to the detailed points made by stakeholders below, but in summary:
- Vodafone, Telefónica, [redacted] and one private individual all opposed the early liberalisation of EE's 1800 MHz licences arguing, broadly, that this would bestow an unfair competitive advantage on EE and distort competition. They argued that liberalisation should be delayed until cleared auction spectrum is available to enable EE's competitors to launch LTE based services;
 - EE, the Global Mobile Suppliers Association, Net-Tek Ltd, [redacted] and 5 private individuals all supported the proposal arguing, broadly, that the initiative would be good for consumers, would encourage investment and benefit UK business and the economy; and
 - two respondents did not comment on the merits of the proposed liberalisation and restricted their comments to a concern that the possible risk of interference to adjacent services should be fully taken into account.
- A1.4 We have grouped specific points raised into the following sections:
- Potential attraction of services that EE could offer on account of its LTE service launch;
 - Potential responses of other operators to EE's launch of LTE services;
 - Impact of liberalisation on competition;
 - Remedies to address competition concerns; and

¹³² <http://stakeholders.ofcom.org.uk/consultations/variation-1800mhz-lte-wimax/?showResponses=true>

- Issues concerning process and approach.

Potential attraction of services that EE could offer on account of early liberalisation

A1.5 We have grouped the points on the potential attractiveness of the services that EE could offer on account of early liberalisation as follows:

- Scale of EE's performance advantage; and
- LTE1800 device availability.

Scale of performance advantage

Stakeholders' comments

A1.6 A number of respondents sought to emphasise the extent to which an LTE network might outperform existing 3G networks. Particular emphasis was given to increased download speeds and reduced latency. One respondent noted that Verizon's LTE customers received download speeds in excess of 11Mbps, compared to between 2 and 3Mbps on the HSPA+ networks of AT&T and T-Mobile.¹³³ [redacted] cited download speeds for LTE from its sister network in [redacted], with peak rates of [redacted] and average rates of [redacted].¹³⁴ Telefónica observed that average data rates on Verizon's and AT&T's 2x10 MHz LTE networks typically ranged from 15 – 20Mbps.¹³⁵ In comparison, Telefónica also provided some data from performance tests undertaken on the UK's HSPA+ networks, which showed that download data rates are typically [redacted].¹³⁶ Vodafone provided some figures from Telstra's LTE deployment in Australia which suggested a similar performance difference.¹³⁷ Vodafone also provided a graph which showed the mid-cell download rates of HSPA+ and 2x10 MHz LTE as [redacted].¹³⁸

A1.7 In their response to the March 2012 consultation, Vodafone provided a graph that illustrated the difference in peak download rates (both theoretical and practical) between 2x10 MHz LTE and DC-HSPA+.¹³⁹ Practical download rates for LTE and DC-HSPA+ are shown to be 50Mbps and 30Mbps respectively, i.e. download rates for LTE are approximately 1.7 times those of DC-HSPA+. Vodafone provided some additional documentation, which summarised measurements undertaken in their trial network¹⁴⁰. They showed approximate download speeds for DC-HSPA+ of [redacted]. It should be noted that these measurements were obtained on a test network and the measured download speeds will be higher than likely to be achieved in real conditions on a live network. However, in terms of relative performance, the measurements suggest that the download speed of 2x10 MHz LTE is approximately [redacted] than DC-HSPA+. Vodafone provided another graph which

¹³³ [redacted] response to the March 2012 consultation, p13.

¹³⁴ Presentation from [redacted] entitled [redacted] (2j.pptx), slide 17

¹³⁵ Telefónica's response to the March 2012 consultation, p35.

¹³⁶ Telefónica's confidential response to the March 2012 consultation, Figure 1, p34.

¹³⁷ Vodafone's response to the March 2012 consultation, figure 7, p33.

¹³⁸ Presentation from Vodafone entitled [redacted], slide 4.

¹³⁹ Vodafone's response to the March 2012 consultation, figure 5, p 25.

¹⁴⁰ Presentation from Vodafone entitled [redacted], slide 5.

showed the mid-cell download rates of DC-HSPA+ and 2x10 MHz LTE as [redacted] respectively¹⁴¹.

- A1.8 EE estimated that customers could expect an average download speed of between [redacted] LTE network, compared to between [redacted] on a 3G network (up to approximately [redacted]). Information in internal EE documents also referred to experience of other operators that have deployed LTE networks obtaining practical speeds of [redacted] as against practical speeds of [redacted]¹⁴².
- A1.9 In its response to the March 2012 consultation¹⁴³, Telefónica provided some evidence on achievable performance for a 2x20 MHz LTE network, based on measurements taken from its trial network in London operating at 2.6 GHz. They showed that peak download and upload rates were around [redacted] respectively, with typical download rates in the middle or edge of the cell between [redacted]. Telefónica also argued that a 2x20 MHz LTE would offer twice the average download rates as those of a 2x10 MHz LTE network, or approximately 30 - 40Mbps. EE provided some information that suggested that a typical download data rate for a 2x20 MHz LTE network is [redacted].¹⁴⁴
- A1.10 One respondent provided some data on the latency of LTE networks compared to 3G. It cited results from TeliaSonera's network in Finland, which measured latency on LTE at 23ms, compared to 117ms for 3G.¹⁴⁵ Information provided by EE compared latency for LTE networks (approximately [redacted]) with HSPA+ networks (between [redacted]).¹⁴⁶ Documents provided by Vodafone in response to an Information Request indicate a view that [redacted.] The document notes that the level of latency in [redacted].¹⁴⁷
- A1.11 Telefónica, Vodafone and [redacted] emphasised that EE's LTE network will be lightly loaded upon launch and that we should take this into account when making performance comparisons with other operators' more loaded 3G networks. Furthermore, they argued that should EE migrate users to its LTE network then its 3G network will become less loaded and, therefore, better able to support higher data rates.
- A1.12 Vodafone also emphasised that EE can also enhance its 3G network through the deployment of DC-HSPA+ as, in addition to EE's holdings at 1800 MHz, they also have a significant holding at 2.1 GHz.¹⁴⁸ This, and a more general point made by [redacted], highlights a view that liberalising EE's holding at 1800 MHz would give the company a greater total holding of spectrum suitable for mobile broadband deployment, compared with the other operators.
- A1.13 EE, for its part, argued that it has less spectrum suitable for UMTS/HSPA on a hertz per customer basis compared to Vodafone or H3G [redacted]. It presented a table showing the ratio created by dividing each operator's holdings of spectrum available for UMTS by their total customer numbers (including MVNOs). It noted that the ratio of Hz / customer was 0.66 for EE as compared with 2.42 for H3G, 1.03 for

¹⁴¹ Presentation from Vodafone entitled [redacted], slide 4

¹⁴² [redacted] internal EE document provided to Ofcom, p7.

¹⁴³ Telefónica's response to the March 2012 consultation, p34

¹⁴⁴ Presentation from EE entitled [redacted], slide [redacted].

¹⁴⁵ [redacted] confidential response to our March 2012 consultation, p14.

¹⁴⁶ [redacted] internal EE document provided to Ofcom, p7.

¹⁴⁷ Internal email from Vodafone, subject line [redacted], dated 11 June 2012

¹⁴⁸ Vodafone's response to the March 2012 consultation, p2 and p32

Vodafone and 0.60 for Telefónica, with the inference being that it was more spectrum constrained than Vodafone or H3G on this measure¹⁴⁹.

- A1.14 [redacted]¹⁵⁰ There is currently no support for voice calls on LTE, necessitating handover to a 2G or 3G network in order to make or receive a call. It therefore takes longer for an LTE device to set up a call, compared to a 2G or 3G device¹⁵¹. [redacted].

Ofcom's response

- A1.15 We agree that LTE is likely to support higher performance mobile data services as reflected in faster speeds and lower latency than are achievable with 3G technologies. This is likely to be a source of consumer benefit as well as a source of competitive advantage over operators that do not have LTE capability.
- A1.16 Making a direct and meaningful comparison between EE's LTE network and its competitors' 3G networks is not straightforward, however; there are a number of 3G variants with different levels of performance and enhancements to 3G technologies are still being made. It also depends on the capacity that an operator has to serve its customers (i.e. network loading). Furthermore, we need to be careful in comparing the performance of different networks to allow for differences in the way measurements are made. Subject to these caveats, our own review of performance for existing LTE networks yielded broadly similar conclusions to those implied by respondents as summarised above. In particular, a detailed study¹⁵² of live 3G and LTE networks in a number of cities in the US indicated that a 2x10 MHz LTE network will offer download speeds approximately 5 – 7 times faster than HSPA+ and approximately 1 – 2 times faster than DC-HSPA+ networks.
- A1.17 We recognise that the speed advantage of EE's initial LTE service over existing 3G services will be increased because EE's LTE network will be lightly loaded at the outset whereas existing 3G networks are, in some cases, heavily loaded. We also recognise that EE will be able to deploy DC-HSPA+ to increase the speed of its 3G service. The same points apply to other operators of course: the speed that consumers will experience when other operators are able to launch their own LTE services will, for a period following launch, also be increased on account of light loading; and other operators can, and are, deploying DC-HSPA+ on their 3G networks.
- A1.18 We recognise that the migration of EE customers from its 3G network to its LTE network will reduce the loading on its 3G network (although the forecast numbers indicate that the impact of this effect is likely to be modest during the Interim Period). But, by the same token, if EE acquires customers from its competitors (which is the main subject of their concern), then the loading on their 3G networks will also reduce accordingly. We also note EE's observation on the ratio of spectrum availability per customer and observe that, if the ratio for EE is adjusted to take account of EE deploying a 10MHz LTE carrier in its 1800 MHz spectrum holding during the Interim Period, then its ratio increases from 0.66 Hz / customer to 0.99

¹⁴⁹ EE's response to the March 2012 consultation, table 3, p18.

¹⁵⁰ Presentation from Vodafone entitled [redacted], slide 6

¹⁵¹ [redacted]

¹⁵² <http://www.pcmag.com/Fastest-Mobile-Networks>

Hz / customer; this moves it close to the overall average across the four wholesale operators on this measure.¹⁵³

- A1.19 Whilst the above observations provide context for our competition assessment, we do not need to form a view on the magnitude of the network performance advantage. This is because the size of performance advantage is relevant to the question of competitive distortion only in so far as it impacts on the size of the commercial advantage that EE enjoys as a result of liberalisation without delay. But this is captured implicitly in the forecasts of the number of customers that switch to EE's LTE service on which our competition assessment is based.

Device Availability

Stakeholders' comments

- A1.20 A number of respondents commented on the prospective availability of LTE devices at 1800 MHz, noting that this is an important factor in the ability of EE to gain competitive advantage through the launch of an LTE service. They noted that the 1800 MHz device ecosystem has developed rapidly over recent years.
- A1.21 EE told us in its response to the March 2012 consultation that it planned to launch with [X] devices. These include [X]. [X]¹⁵⁴ [X]¹⁵⁵. EE has also told us that it no longer expects to have an [X] available at launch¹⁵⁶.
- A1.22 We believe that all devices that have LTE capability will also support 3G and that there will also be 3G versions of all LTE devices (i.e. consumers will not need to take a service from EE if they wish to use a particular device, although they will be able to obtain an LTE service on the handset only from EE for so long as EE is the only operator providing the relevant LTE service). EE indicated¹⁵⁷ that the cost of the LTE enabled devices would be [X].
- A1.23 [X]¹⁵⁸ and [X]¹⁵⁹ informed us that they expect the iPhone 5 to be launched in 2012 and to be available to all operators, including EE. [X] and [X] placed significant emphasis on this development, telling us that they expected the iPhone 5 to have an [X]. Vodafone and Telefónica explained that these were internal working assumptions and we do not therefore take them as being definitive. They argued that this was significant for a number of reasons: [X]. Vodafone told us that [X].
- A1.24 [X.] EE has informed us¹⁶⁰ that this device will be [X].

Ofcom response

- A1.25 We agree that handset availability will be an important factor in the take-up of LTE. In this respect there are a number of leading smartphones such as the iPhone and Samsung Galaxy SIII that would have the potential to support the relative

¹⁵³ The numbers for total paired spectrum increase to 30MHz paired for EE and 79.7MHz paired for the Total, as compared with total customer numbers of 30.4m and 80.6m respectively.

¹⁵⁴ For the reasons set out in our response to this point below, we do not consider that we need definitive information on this point from EE for the purposes of our competition assessment.

¹⁵⁵ Emails from EE to Ofcom on 23 and 27 July 2012

¹⁵⁶ Note of conference call 17 July 2012 between Ofcom and EE.

¹⁵⁷ EE response of 9 July 2012 to our non-statutory information request of 20 June 2012, question 5.

¹⁵⁸ Meeting between Ofcom and [X].

¹⁵⁹ Meeting between Ofcom and [X].

¹⁶⁰ Conference call 17 July 2012 Ofcom/EE.

attractiveness of LTE (provided they were LTE enabled). Our own assessment on handset availability, undertaken as part of the Combined Award, noted the increase in LTE1800 devices, along with a general increase in device support for LTE at 800 MHz and 2.6 GHz.¹⁶¹

- A1.26 The next generation iPhone (iPhone 5) is expected to launch in 2012 and we note the suggestion of some stakeholders that the iPhone 5 will launch with [redacted]. We understand the arguments put forward by [redacted] and [redacted] about the significance of an iPhone 5 being launched with [redacted]. We note that if the iPhone 5 is released in 2012 with [redacted].
- A1.27 Whilst the information provided to us by the respondent operators provides a good picture of expected device availability, we do not have definitive information on which future handsets will support LTE. However, we do not consider that we need definitive information on this matter for the purposes of our assessment. This is because we expect that the operators' awareness of the expected availability of 1800 LTE devices will be reflected in their forecast numbers which we take directly into account in our competition assessment. We note that EE will clearly know which devices it plans to launch with and that its internal forecasts of LTE take-up will reflect this knowledge. Moreover, Vodafone's internal analysis of the number of customers it might lose to EE's LTE service includes a "worst case scenario" in which it assumes that the [redacted].¹⁶²

Potential responses of other operators to EE's launch of LTE services

Stakeholders' comments

- A1.28 The March 2012 consultation commented that liberalisation of EE's 1800 MHz spectrum could result in competitive responses from other operators, noting the form that some of these responses could take. Stakeholders made a number of comments on the feasibility of these responses; in particular, Vodafone responded in some detail.
- A1.29 In light of the responses to our March 2012 consultation we exercised our information gathering powers under the section 32A of the Wireless Telegraphy Act 2006 to request relevant internal documents from certain companies including each of Vodafone, Telefónica and H3G on how they might respond to the launch of an 1800 MHz LTE service by EE.
- A1.30 EE argued that other operators could launch limited LTE services during 2013 using their existing spectrum holdings.¹⁶³ In contrast, other operators argued that this would not be practical. Vodafone saw limited prospect of competitors deploying LTE at 900MHz, as manufacturers of devices and equipment focus on spectrum bands offering the widest addressable market. Vodafone noted that spectrum in the 900 MHz band is currently in use and would have to be cleared before it could be used for LTE, even if equipment were available. Vodafone noted that it is unlikely that the 900 MHz band will be used for LTE until after the 800MHz and 2.6GHz bands become available for use and 2.1GHz will continue to be used for 3G services for some time and is unlikely to become available for LTE for at least a few years.

¹⁶¹ <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/RW-lte.pdf>

¹⁶² Presentation from Vodafone entitled [redacted]

¹⁶³ EE's response to the March 2012 consultation, p17.

- A1.31 Vodafone has explored the possibility of [redacted]. Vodafone also cited the limited performance benefit of [redacted].¹⁶⁴
- A1.32 Vodafone agreed that, technically, it might be possible for Telefónica and Vodafone to offer a more competitive LTE service by sharing their respective holdings of 2x5.8 MHz at 1800 MHz. [redacted].^{165 166}
- A1.33 Respondents provided Internal Documents which contained information on the options for using their existing 3G networks to respond to EE's launch of LTE services. Telefónica concluded that [redacted].¹⁶⁷ Vodafone [redacted].¹⁶⁸
- A1.34 In general, national wholesalers argue that they will be at a significant competitive disadvantage against EE's LTE service irrespective of enhancements that can be made to their own 3G services.¹⁶⁹

Ofcom's response

- A1.35 Our conclusion from the review of the responses to the March 2012 consultation and Internal Documents, supplemented in some cases by additional explanation from the respondent companies, is that it is unlikely that other operators could (or that it would make sense for them to) use their existing spectrum holdings to launch a meaningful LTE900 or LTE1800 service of their own ahead of launching LTE services using spectrum from the Combined Award. In particular:
- the 900 MHz band does not provide a realistic option for deploying LTE services in this timeframe ;¹⁷⁰ and
 - the use of Telefónica's and Vodafone's existing 2x5.8MHz holdings in the 1800 MHz band to deploy LTE services is also unlikely ahead of a launch of LTE services using spectrum from the Combined Award. In the case of Telefónica [redacted].¹⁷¹ Vodafone would also need to [redacted]. Its internal documents indicate that it has [redacted].¹⁷²;
- A1.36 We note that both Telefónica and Vodafone have considered whether the [redacted] ^{173 174}
- A1.37 There is, however, evidence of operators looking at other ways that they could respond to an EE LTE launch (ahead of access to the auctioned 800 MHz, 2.6 GHz and divested 1800 MHz spectrum) through enhancements to their 3G services or through other commercial responses. In particular:
- [redacted].¹⁷⁵

¹⁶⁴ Presentation from Vodafone entitled [redacted] slides 3, 13 and 14.

¹⁶⁵ Vodafone's response to the March 2012 consultation, p28.

¹⁶⁶ Letter from Telefónica in response to an Information Request, 9 July 2012

¹⁶⁷ Presentation from Telefónica entitled [redacted], 23 April 2012

¹⁶⁸ Presentation from Vodafone entitled [redacted]

¹⁶⁹ Letter to Ofcom from [redacted]

¹⁷⁰ This is consistent with our position in the Award Statement, where we stated (at paragraph A2.67) that the use of 900 MHz spectrum for LTE is likely to be somewhat later than 800 MHz, 1800 MHz and 2.6 GHz.

¹⁷¹ Presentation entitled [redacted], June 2012

¹⁷² Presentation from Vodafone entitled [redacted]

¹⁷³ Slide entitled [redacted], 23 April 2012

¹⁷⁴ Presentation from Vodafone entitled [redacted]

- [redacted].^{176 177}

A1.38 Enhancements made to 3G services will clearly reduce the gap in quality of service that can be offered against LTE (where a customer is in LTE coverage). But they are also relevant from a comparative quality of service perspective in that an LTE customer will need to fallback onto a 3G service whenever it is out of range of LTE coverage. In this context, we note that, aside from the ability to enhance their 3G networks Telefónica and Vodafone will also continue to enjoy an advantage over EE in respect of their ability to deploy HSPA and HSPA + services in 900 MHz spectrum. These points notwithstanding, we agree that the launch of EE's LTE service will put other wholesale operators at a competitive disadvantage against EE until such time as they are able to launch their own LTE services.

A1.39 Our conclusion is that is unlikely to be feasible for other operators to provide a credible LTE based response to EE ahead of doing so with the 800 MHz, 2.6 GHz or divested 1800 MHz spectrum. However, we consider it likely that some, if not all, other operators will respond to the launch of an 1800 MHz LTE service from EE in a way that will provide benefits to those consumers that do not migrate to EE's LTE service (as judged against the counterfactual) by some combination of enhancing their 3G services and / or by deploying a range of commercial responses.

A1.40 For the purposes of the competition assessment presented in Section 3, we assume that these operator responses will be reflected implicitly in the customer acquisition forecasts on which we have based that assessment.

Impact of liberalisation on competition

A1.41 We have grouped the responses on the impact of liberalisation on competition as follows:

- Marketing advantages for EE;
- Reputation effects;
- Consumer 'lock-in';
- Higher prices during the Interim Period;
- First mover disadvantages;
- The legitimacy of EE gaining a competitive advantage as a result of a regulatory decision; and
- Our decision to liberalise 900 MHz spectrum.

Marketing advantages for EE

Stakeholders' comments

A1.42 Respondents noted the technical advantages of early liberalisation would allow EE to launch an aggressive marketing campaign to win customers.

¹⁷⁵ Presentation from Telefónica entitled [redacted], 23 April 2012

¹⁷⁶ Presentation from Vodafone entitled [redacted]

¹⁷⁷ Presentation from Vodafone entitled [redacted]

- A1.43 [redacted] referred to the ability of EE to mirror the marketing campaigns used in the launch of LTE services by Telstra (in Australia) and Verizon (in the US) that highlighted speed advantages and improved user experiences. It considered that these advantages will allow EE to attract many new customers from rivals and increase its market share during the Interim Period.¹⁷⁸
- A1.44 Vodafone noted that, while actual data rates experienced by consumers are likely to be more important, peak data rates can still be a significant marketing focus. Vodafone therefore saw peak data rates as important to competition. Vodafone noted for example that Telstra's marketing referred to 'smart versus dumb' networks¹⁷⁹ and [redacted]¹⁸⁰ (these issues are discussed separately below). Vodafone also referred to AT&T in the US presenting LTE as an unmatched step-change in performance.¹⁸¹

Ofcom's response

- A1.45 We agree that EE is likely to launch its LTE service with a major marketing campaign. However, the impact of any marketing campaign by EE highlighting the advantages of LTE in the Interim Period will be reflected implicitly in the forecasts which inform our competition assessment in Section 3. There is a separate question as to whether such marketing would ultimately result in EE gaining an unwarranted reputation advantage over a longer period. We consider those effects separately in Section 3 and below.

Reputation effects

Stakeholders' comments

- A1.46 Vodafone argued that the performance improvements associated with early liberalisation mean that EE could establish a reputation as the best network for data for some period.¹⁸² This could result in EE seeking [redacted].¹⁸³
- A1.47 Vodafone noted evidence from Japan that it claimed demonstrates how enduring LTE first mover advantage is likely to be. It presented forecasts based on data from Wireless Intelligence for the incumbent operator (NTT DOCOMO) relative to its competitors.¹⁸⁴ DOCOMO was the first operator to launch LTE services in Japan in December 2010 and its competitors launched in early 2012 onwards.¹⁸⁵ According to this forecast, DOCOMO is expected to retain significant market share by Q4 2016 (50% of the LTE segment in Japan) some 4½ years after competitors had launched LTE services. Vodafone noted that this forecast predicted DOCOMO retaining a high share of subscribers in the LTE segment despite it having only a small head start before the second competitor entered with a rival LTE service in early 2012.

¹⁷⁸ [redacted].

¹⁷⁹ Vodafone non-confidential response, page 38.

¹⁸⁰ Vodafone confidential response, page 40.

¹⁸¹ Vodafone non-confidential response, page 39.

¹⁸² Vodafone non-confidential response, page 25.

¹⁸³ Vodafone confidential response, page 25.

¹⁸⁴ Vodafone non confidential response, pages 44-45.

¹⁸⁵ EMOBILE (eAccess) launched LTE data services in March 2012: http://www.eaccess.net/cgi-bin/e_press.cgi?id=822

- A1.48 Vodafone also stated that [redacted].¹⁸⁶
- A1.49 Telefónica highlighted its experience with the iPhone exclusivity between late 2007 to late 2009 as “instructive” when trying to estimate the impact of exclusivity.¹⁸⁷
- A1.50 [redacted] noted that the technical benefits of liberalisation will allow EE to develop a reputation for superior network quality. [redacted] quoted a summary of a US research firm’s (ARCchart) report on the average data rates offered by Verizon following the launch of LTE on its network.¹⁸⁸ [redacted] noted that, according to this report, LTE deployment ahead of AT&T and other rivals allowed Verizon to “eviscerate the competition with lightning broadband speeds” in the US.¹⁸⁹
- A1.51 EE submitted that any reputational advantages will not persist beyond the Interim Period. EE referred to H3G being the first operator to launch 3G services in the UK in March 2003, whereas other operators launched their 3G services 12-24 months later.¹⁹⁰ EE referred to the 2012 Award Consultation in which we stated that the available evidence does not suggest that H3G’s earlier launch allowed it to benefit from a persistent first mover advantage.¹⁹¹

Ofcom’s response

- A1.52 As explained in Section 3, it is important to distinguish between warranted and unwarranted reputation advantages. If a firm can attract more subscribers to its network because it genuinely offers a more attractive service, then it benefits from a warranted reputation effect, but this does not lead to consumer detriment. This applies whether or not the warranted reputation effect derives from being the first mover. On the other hand, an unwarranted reputation advantage as a result of liberalisation without delay may result in consumer detriment. As explained below, we do not consider that the material provided to us relating to overseas markets provides strong evidence that liberalisation without delay is likely to result in an unwarranted reputation advantage.
- A1.53 We have considered evidence from iPhone exclusivity in Annex 3. Below we make some general points on the use of international evidence. We then comment on Vodafone’s evidence in relation to Japan and Australia. We then comment on the research cited by [redacted]. Finally, we comment on EE’s argument in relation to H3G’s early launch of 3G services.
- A1.54 In considering possible examples of the impact of the liberalisation without delay we have considered whether we could usefully draw any inferences from international experiences. There are clearly challenges with international evidence as there may be a number of market specific factors that make direct read across to the UK difficult. For example, there may be differences in the degree of competition, including any incumbency advantages that might exist; the availability of spectrum; rivals’ roll-out plans for competing LTE services etc.¹⁹²

¹⁸⁶ Vodafone confidential response, pages 39-41.

¹⁸⁷ Telefónica non-confidential response, paragraph 168, page 40.

¹⁸⁸ [redacted].

¹⁸⁹ <http://www.rethink-wireless.com/2011/09/12/verizon-eviscerates-competition-lightening-lte-speeds.htm>

¹⁹⁰ EE confidential consultation response, pages 36-37.

¹⁹¹ EE confidential consultation response, footnote 194 on page 52.

¹⁹² Moreover, international evidence may be less useful in terms of assessing other factors such as likely take-up due to country specific factors. For example, the earlier launch of LTE services in other

- A1.55 Nevertheless, we have considered further the international experiences presented to us. In particular, we asked national regulatory authorities in Japan, Sweden and Australia for their views on whether operators with a head-start in the launch of LTE services appear to have any competitive advantage). We were not made aware of specific emerging evidence on reputation or competition effects.
- A1.56 Turning to the evidence presented by stakeholders, Vodafone provided us with forecasts to 2016 of LTE subscribers in the Japanese market. We observe first that forecasts of what might happen in 4 years time are likely to be of more limited value than evidence that demonstrates actual reputation impacts. In any case, we consider that data relating to the Japanese LTE mobile market are likely to be of limited use to us when assessing whether to liberalise of EE's licence in the UK. This is for several reasons:
- the forecasts are from a single source and extend four years into the future. In the context of the rapidly changing mobile sector, assessing precise outcomes over a period of four years is subject to considerable uncertainty. The forecasts therefore provide only one potential representation of the market and we have no basis upon which to be sure that it is a correct representation.
 - even if these forecasts embodied some view of a first mover advantage, we would want to understand the underlying rationale for long-term reputation effects and consumer detriments and see supporting evidence. It is not sufficient to simply *assume* that there is some kind of reputation effect as a means for generating a forecast, rather than providing *evidence* that such an effect actually exists.
 - as with many international comparisons, it is not clear to us that there is a reliable means to adjust for the particular differences between the circumstances of the UK and Japan. Given the shortcomings of relying on forecast evidence and availability of alternative, more direct evidence, we have not sought to carry out such an adjustment.
- A1.57 Vodafone also referred to the impact of Telstra's launch of its LTE service on its brand perception. However, it is not possible from this survey evidence to determine accurately the role that the launch of LTE services has had on changing consumer perceptions of each network. For example, prior to the launch of LTE, Telstra, as the incumbent mobile operator, may already have had certain advantages. The Australian regulatory authority told us that Telstra had far greater geographic coverage relative to the new entrants and that coverage was a very important network performance metric to consumers.
- A1.58 [X].
- A1.59 The ARCchart report cited by [X] simply relates to average data rates offered by US operators. It does not discuss how those data rates have affected those operators' reputations. We separately discuss the impact of liberalisation without delay on EE's network performance above.
- A1.60 EE referred to H3G's early launch of 3G services. As explained in the 2012 Award Consultation, H3G did not appear to benefit from a persistent first mover

countries was against the background of fewer handsets and some operators only launched initially with mobile broadband (i.e. dongles and datacards).

advantage.¹⁹³ Having considered these findings, we have decided to place little weight on the experience of H3G's early launch of 3G services for the purposes assessing the impact of liberalisation without delay.¹⁹⁴

Consumer 'lock-in'

Stakeholders' comments

- A1.61 EE stated that any competitive advantage will not endure beyond the Interim Period. It considered that customers that purchase EE's LTE service will not be locked-in beyond the normal contractual period. In support, EE stated that Ofcom had previously found that consumers generally find the switching process fairly easy.¹⁹⁵ EE also stated that the pool of LTE customers will gradually expand over time. Following the Interim Period, these customers will have a choice of LTE operators.¹⁹⁶
- A1.62 Vodafone considered that first movers will typically seek to lock customers into contract terms of 24 months.¹⁹⁷ Vodafone noted that Ofcom dismissed this concern in the March 2012 consultation on the basis that switching costs may protect EE's competitors, as fewer customers would be out of contract and eligible to upgrade to EE's LTE services in the Interim Period. Vodafone argued against this view, however, as it considered:
- EE would be better placed to pre-market to likely LTE adopters before its actual launch of services because it has more spectrum certainty. This would allow customers to allow such contracts to lapse in the Interim Period.
 - It would also be possible for EE to 'buy out' customers from their existing contracts by offering a discounted introductory period. It considered that while competitors could respond with their own discounts, they will lack the advantage of LTE services.
- A1.63 Vodafone also referred to our argument in the March 2012 consultation that even if some customers were locked-in during the Interim Period, there will still be a large pool of potential LTE customers when other operators enter the market. Vodafone acknowledged that if the volume of interest in LTE were very low during the Interim Period and customers were tied into long contracts that lasted considerably longer than duration of the first mover advantage, then the degree of lock-in might be slight and easily overcome by later entrants. However, Vodafone did not consider that these conditions hold. Instead it submitted that:

¹⁹³ 2012 Award Consultation, Annex 6, paragraph 3.214 and paragraphs 5.97-5.100. We made similar observations in the Award Statement, paragraphs 4.174-4.176.

¹⁹⁴ The other factors identified in the 2012 Award Consultation suggest that H3G may have been affected by factors that are not relevant to EE's position, particularly H3G's lack of a 2G subscriber base. Moreover the mobile market has changed substantially since 2003, when mobile data services were in their infancy.

¹⁹⁵ EE also stated that the customers it attracts during the Interim Period are likely to be relatively active (i.e. less prone to inertia). 2012 Award Consultation, Annex 6, paragraphs 5.91-5.96. Cited at EE consultation response, pages 51-52.

¹⁹⁶ EE consultation response, page 52.

¹⁹⁷ For Vodafone's comments on consumer lock-in, see Vodafone non-confidential response, pages 46-48.

- The UK market did not support long contract lengths and the pool of potential churners to an LTE first mover during the Interim Period was potentially quite large.¹⁹⁸
- As growth in the market for mobile broadband consumers has been slowing, the pool of data only customers available to competitors when they launch rival LTE services will be limited.¹⁹⁹

A1.64 Vodafone considered that for existing mobile broadband customers the promise of LTE to increase their effective data speed must be attractive, and that new mobile broadband customers may be attracted by LTE speeds. If only EE is in a position to offer such services, a very considerable proportion of mobile broadband customers may switch to LTE, and new mobile customers may arrive when EE is the sole LTE operator. This may well lead to market dominance in mobile broadband and an effective 'lock-in' of such customers by EE.

Ofcom's response

A1.65 Vodafone submitted that during the Interim Period there is a significant pool of customers who are likely to be out of contract and that these could potentially be interested in taking-up LTE services. We discuss operator forecasts (which we would expect to take these issues into account) and our views on likely take-up in Section 3.

A1.66 We also set out our views on contractual and non-contractual switching costs in Section 3. Importantly, even if a number of consumers sign up with EE in the Interim Period on two year contracts (so as to benefit from LTE services) this does not necessarily lead to consumer detriment (see paragraph 3.91).

A1.67 In addition, Vodafone also made a number of observations on the number of potential LTE subscribers that operators would be able to compete for after the Interim Period ends. In response, our view is that:

- When placed in the context of the mobile sector as a whole, the forecasts of LTE take-up in 2012 and 2013 are relatively modest. This implies that in 2014 and beyond there are likely to be significant numbers of potential LTE customers that mobile operators can compete for.
- While Vodafone particularly focused on mobile broadband subscribers, these only make up a relatively small proportion of the base of consumers with devices capable of accessing data services. For example, in 2011 there were 5.1m

¹⁹⁸ In relation to the first of its points, Vodafone noted that the maximum contract length in the UK market is 24 months. Vodafone further noted evidence that in a 15 month period (the minimum Interim Period, in its view), approximately 50% of all customers can potentially churn. Vodafone noted that with a longer Interim Period (which it saw as likely) the potential pool of churning customers rises towards the totality of the UK mobile market. Regarding the number of the potential pool that might actually become LTE customers, Vodafone pointed to evidence from a survey for EE that suggested that 43% of respondents wanted faster mobile internet connections. Vodafone also referred to increasing take-up of smartphones and "data hungry" applications which it considered would be better served using LTE than by using 3G technology.

¹⁹⁹ Vodafone noted evidence from The Communications Market 2011 that growth in the mobile broadband segment had slowed to 2% in 2010. Vodafone further noted that the introduction of LTE might change the relative performance of mobile broadband relative to fixed broadband, potentially resulting in growth in the overall number of mobile broadband subscriptions. However, Vodafone argued that these additional subscribers would only be attracted to an operator with LTE.

mobile broadband subscribers compared to 32.6m smartphone data users and 1.2m users with 3G-enabled tablets. Mobile broadband subscriptions grew by 4.9% in 2011. Tablet and smartphone take-up are both growing sharply.²⁰⁰

- As set out in Section 3, EE forecasts that it would attract [redacted] dongle and tablet subscribers by Q4 2013. Since there were 5.1m mobile broadband subscribers in 2011, we do not agree with Vodafone's claim that early liberalisation could lead to "market dominance" of mobile broadband by EE.
- Moreover, recent survey evidence suggests that at least 42% of mobile broadband subscribers in 2012 were on pre-pay contracts.²⁰¹ Assuming that the mix of pre-pay and post-pay subscribers is similar in the case of LTE mobile broadband, a significant proportion of EE's LTE mobile broadband subscribers would not face a contractual barrier to switching to another mobile operator once the Interim Period ends.

Higher prices during the Interim Period

Stakeholders' comments

A1.68 Vodafone referred to operators adopting different pricing strategies worldwide. Vodafone noted examples where some operators have chosen to price LTE services at a premium or according to the speeds offered:

- in Germany, T-Mobile has priced its LTE services at a premium rate (€50 compared with €10, €15 and €25 packages); and
- Telia in Sweden is offering high end (10-80 Mbit/s) services for a higher price than its 5-10Mbit/s and 10-20Mbit/s services.

A1.69 Vodafone also noted that other operators (Verizon, NT&T and DOCOMO) had priced LTE similar to existing 3G services, with differentiation based on monthly allowances of inclusive minutes within the tariff package. Nevertheless, it considered that operators that have launched LTE services have seen extra value, even if the ways in which operators have extracted this extra value has differed between markets.²⁰²

A1.70 [redacted]²⁰³ and Telefónica submitted that early liberalisation of EE's licence would raise concerns of a temporary distortion of competition as EE would be able to price LTE services at a premium.

A1.71 In particular, Telefónica submitted its own illustrative quantification of the negative impact on consumers caused by the monopoly rents²⁰⁴ that could be charged by a single national wholesaler of 4G in the Interim Period.²⁰⁵ On the basis of an

²⁰⁰ The Communications Market 2012, Figure 5.7 on page 288. Also page 287.

²⁰¹ 51% of survey respondents said that their mobile broadband service was post-pay, 42% said that it was pre-pay and the remainder responded "don't know". The Communications Market 2012, page 289.

²⁰² Vodafone non-confidential response, pages 39 and 41-42.

²⁰³ [redacted].

²⁰⁴ Telefónica argued that in any cost benefit analysis Ofcom must assume that a monopoly provider of 4G will charge monopoly rents. In relation to this point, see paragraphs A1.107 to A1.111 on the definition of relevant markets. We have set out our views on the appropriate framework for our competition assessment in Section 3.

²⁰⁵ Telefónica non-confidential response page 39.

illustrative assumption about pricing this analysis suggested that consumers would be overcharged by [§<]. Each quarter's delay to the Combined Award would equate to a further [§<] additional detriment to consumers. A delay of one year in 4G launch would cost consumers between [§<] in monopoly rents.²⁰⁶

Ofcom's response

- A1.72 Vodafone referred to operators extracting "extra value" from LTE services. As explained in Section 3, we consider the key question is whether or not consumers are better off, rather than the impact on EE's profits.
- A1.73 In Section 3 we identify that a key benefit of liberalisation without delay would be the availability of LTE sooner (relative to the alternative of delayed availability of LTE services). As discussed in Section 3, we consider that consumers will be better off in the Interim Period from the availability of LTE without delay even if these services are charged at a premium to 3G services. This is because consumers will only switch to EE's LTE service if they believe they will be better off as a result and the alternative is a situation where no LTE services are available to consumers until late 2013.
- A1.74 In addition, we note that higher prices may also reflect higher costs associated with providing LTE services. For example, the cost of LTE handsets could be higher than non-LTE enabled versions of the same handset model.²⁰⁷ Hence, higher prices may (at least in part) reflect higher costs of provision.
- A1.75 Telefónica's response included an attempt to provide an illustrative quantification of the costs of liberalisation of EE's licence without delay. Telefónica assumed in its analysis that EE would earn monopoly rents during the Interim Period. In light of the discussion in the paragraphs above and Section 3, we do not consider that the cost estimates generated by Telefónica's illustrative quantification are particularly informative in light of the framework used for our competition assessment²⁰⁸ Telefónica's analysis fails to take into account the benefits to consumers of LTE services being available sooner.

First mover disadvantages

Stakeholders' comments

- A1.76 Vodafone noted that we argued in the March 2012 consultation that as well as first mover advantages, there could be disadvantages to a player entering the market first.²⁰⁹

²⁰⁶ Telefónica estimated that the NPV of a monopoly provide charging an additional 5-10% over a 24 month period equates to an additional £38-76 per annum per customer (averaged across EE's net additions). Telefónica noted that this was a conservative estimate as it reflects the average value of EE's customer base, not the high value customers that it would seek to attract and lock-in.

²⁰⁷ [§<].

²⁰⁸ Telefónica's analysis appears to compare EE setting a 'monopoly price' (5 to 10% higher) against an alternative scenario where EE's prices for LTE are based on the average rate seen for all contract customers (presumably as some proxy for a 'competitive price'). However, as discussed in Section 3, the comparison we have made in our competition assessment is between liberalisation of EE's licence without delay or a delay until late 2013, not against the hypothetical scenario in which LTE services are offered competitively. Therefore, we consider Telefónica's approach cannot be a correct basis for analysis.

²⁰⁹ Vodafone non-confidential response, pages 45-46.

A1.77 Vodafone accepted that, in the abstract, it is plausible for the first mover into a market to be at a disadvantage. For example if that product launch is problematic then this could lead to a long term loss of reputation or an advantage for later entrants that can ‘learn lessons’ from the first mover’s experience. Vodafone argued however that LTE is not new globally and LTE is not an untested technology for which demand is unknown. The overall types of services offered using LTE are unlikely to be fundamentally new, it is merely that LTE will offer a superior experience in a market for which demand is both well established and rising. Given the wide availability of LTE1800 handsets and LTE RAN equipment, EE will benefit from the experiences of true ‘first movers’ globally.

Ofcom’s response

A1.78 While we cannot entirely rule out UK specific risks to a first-mover, we have not attached weight to this in our competition assessment. We consider that Vodafone’s argument that EE will be able to ‘learn lessons’ from deployments in other markets has some validity. Furthermore, we consider that the benefits to EE from liberalisation without delay will outweigh any first mover disadvantages.²¹⁰

The legitimacy of EE gaining a competitive advantage as a result of a regulatory decision

Stakeholders’ comments

A1.79 Telefónica stated that “gifting” a “statutory monopoly” to EE (which for historic reasons has a large 1800 MHz holding) is not a legitimate basis for EE to secure exclusivity in the supply of LTE services.²¹¹

Ofcom’s response

A1.80 It is inevitable that, for a range of reasons, there will at different times be differences in the competitive position of different operators including on account of the difference in their spectrum holdings. This has always been the case and it is likely to remain so. A regulatory decision to liberalise spectrum is one which removes a barrier preventing the licensee from deploying new types of technology in the interests of consumers. However, a regulatory decision to liberalise spectrum holdings will inevitably alter the competitive position between operators to the extent that operators have different holdings of the spectrum concerned. For example, Telefónica and Vodafone have some competitive advantages as a result the decision to liberalise the 900 MHz and 1800 MHz bands to allow 3G (UMTS) use at a time when equipment exists to exploit 900 UMTS but not to exploit 1800UMTS (and taking account of the better propagation characteristics of UMTS900 over UMTS2100). However, in our advice to Government, we considered that there was a limited risk of a material distortion to competition arising from a decision to liberalise Telefónica’s and Vodafone’s licences for the use of the 900 MHz band to deliver 3G services.²¹² It is for this reason (i.e. that a competitive advantage could

²¹⁰ In any case, in the event that such disadvantages did arise then any impact of liberalisation without delay will be smaller than set out in Section 3. Our overall conclusion (namely that immediate liberalisation is appropriate) would be unaffected.

²¹¹ Telefónica contrasted this with the advantage that it gained from its iPhone exclusivity deal, which resulted from commercial negotiation rather than a regulatory decision. Telefónica non-confidential consultation response, paragraph 167.

²¹² Advice to Government, October 2010

<http://stakeholders.ofcom.org.uk/binaries/consultations/spectrumlib/annexes/government-advice.pdf>

arise from liberalisation that gives rise to a material risk of a competitive distortion) that Ofcom has to consider the likely effects of liberalisation, in light of its duties and the specific facts of each case.

Decision to liberalise 900 MHz spectrum

Stakeholders' comments

- A1.81 Respondents commented on whether or not Ofcom's decision in 2011 to liberalise the 900 MHz licences of Vodafone and Telefónica for the use of 3G services provided a relevant analogy for the current question of whether to liberalise EE's 1800 MHz licences for the use of LTE services.
- A1.82 EE argued that Ofcom's previous decision to vary the 900 MHz licences allowed Vodafone and Telefónica to gain a comparative advantage over other operators in the provision of 3G services. It maintained that this was due to the better propagation characteristics of 900 MHz spectrum as compared to 2100 MHz, and because liberalisation of the 900 MHz licences had enabled Vodafone and Telefónica to increase the capacity of their 3G networks, while EE had no such opportunities.²¹³
- A1.83 Vodafone also observed that Ofcom had conducted a far more detailed review of possible competition effects of 900 MHz liberalisation, compared to the March 2012 consultation.²¹⁴

Ofcom's response

- A1.84 We are here considering whether to liberalise EE's 1800 MHz licences without delay in light of the potential effects on consumers and competition. In doing so, we have taken into account the facts that are relevant to this assessment. Our assessment of the likely effects of liberalising now is set out in Section 3. We note Vodafone's comment that our competition assessment is different in form to the competition assessment that we carried out when considering the variation of the 900 and 1800 MHz licences to permit 3G services. However, we are satisfied that the assessment we have undertaken in this case is appropriate in the circumstances.

Remedies to address competition concerns

Stakeholders' comments

- A1.82 Notwithstanding our provisional view that liberalisation without delay would not give rise to a material risk of any distortion to competition, we nevertheless explored, in the March 2012 consultation whether, if a different conclusion were reached, there might be remedies to address the risk of temporary or enduring distortion of competition. Three broad options were explored; delay to liberalisation, regulated wholesale access and a distribution of spectrum rights of use. For the reasons set out in the March 2012 consultation, we provisionally concluded that the most appropriate and proportionate action would be for us to liberalise EE's 1800 MHz licence without delay.

²¹³ EE non-confidential response, pages 16-18.

²¹⁴ Vodafone non-confidential response, pages 14-15.

- A1.83 As summarised above, Vodafone, Telefónica and [redacted] all considered that liberalisation would give rise to an enduring distortion of competition. These operators all proposed that liberalisation should be delayed until all four operators have access to sufficient (cleared) spectrum to enable deployment of credible national networks. EE, in contrast, argued that delay would be inappropriate and would not serve the interests of consumers and UK business.
- A1.84 Few comments were made about the hypothetical option to redistribute rights of use, although Vodafone agreed that the option was unattractive and EE noted that this option would require clearance of spectrum and, therefore, could be disruptive to existing services and take some considerable time to implement.
- A1.85 Telefónica and Vodafone argued that Ofcom's analysis of the possible benefits of wholesale access to EE's LTE network had not been adequately explored. In particular, both companies argued that Ofcom should have taken into account the existence of the wholesale access agreement between EE and H3G and Virgin Mobile which, it was proposed, could be used as a template for a regulated wholesale access agreement. EE argued that there are considerable technical challenges associated with wholesale access, which would necessarily delay implementation.

Ofcom's response

- A1.86 For the reasons set out in this decision, we remain of the view that liberalisation of EE's 1800 MHz spectrum without delay would not lead to a material distortion of competition to the detriment of consumers. As such, we do not consider that it is necessary (or indeed objectively justified) to impose any conditions on that liberalisation or that we need to address further the question of potential remedies.
- A1.87 Nevertheless, there are two points on which we respond for the record. We understand that the wholesale access agreement between EE and H3G [redacted].²¹⁵ EE told us [redacted] ²¹⁶. [redacted].
- A1.88 We also note that there is a very material difference between an MVNO LTE access agreement and a wholesale LTE access agreement. In the first case, the MVNO uses the host network operator to provide all network-related services experienced by its customers; for example, if a customer moved out of LTE coverage it would fall back onto the 3G or 2G network of the host network operator. The implementation of an MVNO arrangement by the host network operator is concerned primarily with back-office operations (eg. authentication and billing functionality). In contrast, under a wholesale LTE access agreement the customer would need to fall back onto the 3G or 2G network of the client operator when it moved out of range of the LTE coverage of the host network operator. This type of access arrangement would be significantly more complicated to implement as it would require the appropriate technology for handing-over to a competitor's network to be ordered, installed and tested at each LTE site [redacted] ²¹⁷. Accordingly, even if EE were to extend its MVNO access agreement with Virgin Mobile to cover LTE services (as well as 3G and 2G services), this would not provide the basis for a regulated wholesale LTE access agreement.

²¹⁵ File note of conversation with EE on 8th August.

²¹⁶ Attachment to EE letter dated 9th July sent in response to Ofcom request for information.

²¹⁷ *ibid*

Issues concerning process and approach

Failure to consult properly

Stakeholders' comments

A1.89 In its response to the March 2012 consultation and in subsequent correspondence, Telefónica set out its view that Ofcom had failed to consult properly for the purposes of Article 14 of the Authorisation Directive²¹⁸. Telefónica considered that a number of factors needed to be addressed in a further consultation, including:

- various factors relating to the European Commission's merger decision;
- details of a wholesale access agreement between EE and H3G;
- a proper assessment of the relevant market into which LTE1800 services would be launched; and
- a quantified cost-benefit analysis²¹⁹.

A1.90 Vodafone also made similar submissions, arguing that Ofcom needs to reconsult on any revised competition assessment that it undertakes, as not to do so would constitute a procedural irregularity that would vitiate any decision to vary EE's licences.²²⁰

Ofcom's response

A1.91 We do not agree with Telefónica and Vodafone that we have not consulted properly in the March 2012 consultation and that a further consultation is therefore required for the purposes of the Authorisation Directive:

- in light of consultation responses, we have set out our position on the European Commission's merger decision in Section 2 of this decision;
- we do not consider that the existing agreement between EE and H3G over wholesale access is of particular relevance to our assessment of whether we should vary EE's 1800 MHz licences now to permit LTE use. We note that (a) as explained at paragraph A1.87 above, we understand that [X] and (b) we do not rely on the existence of the agreement to justify our decision to vary EE's licence now;
- in light of consultation responses we have conducted further assessment of the likely effect on competition of varying EE's licences to authorise LTE use, and have reached the same conclusion as that set out in the March 2012 consultation, namely that it would be in consumers' interests for us to vary EE's licences without delay;
- we address below Telefónica's response regarding a cost-benefit analysis.

A1.92 We do not therefore consider that we are required to reconsult further on this matter.

²¹⁸ Telefónica letter to Ofcom of 9 July 2012.

²¹⁹ Telefónica non-confidential response paragraphs 20 to 31.

²²⁰ Vodafone letter to Ofcom of 9 July 2012.

Failure to conduct quantified cost-benefit analysis

Stakeholders' comments

A1.93 In its response to the March 2012 consultation, Telefónica set out its view that Ofcom had made a procedural error by not conducting a quantified cost-benefit analysis, notwithstanding that in Telefónica's view such a quantified cost-benefit analysis is required in order to reach a decision that is sufficiently robust to withstand profound and rigorous scrutiny.²²¹

Ofcom's response

A1.94 As set out in Section 2 of this decision, section 7 of the 2003 Act provides that where we are proposing to do anything for the purposes of or in connection with the carrying out of our functions, and it appears to us that the proposal is important, then we are required to carry out and publish an assessment of the likely impact of implementing the proposal, or a statement setting out our reasons for thinking that it is unnecessary to carry out such an assessment. Where we publish such an assessment, stakeholders must have an opportunity to make representations to us about the proposal to which the assessment relates. Section 7(5) provides that any such assessment may take such form and relate to such matters that Ofcom considers appropriate.

A1.95 In considering how best to meet its duties, including the duty under section 7 of the 2003 Act as set out above, Ofcom must take account of the specific facts and circumstances of each case, and decide how best to act in their light. In some cases, Ofcom may decide that it is appropriate, in considering the likely impact of its proposals, to seek to quantify their likely effect; however, we do not consider that it will always be appropriate or necessary to do so.

A1.96 In the March 2012 consultation, we set out at paragraph 2.3 that that document, together with its annexes, as a whole comprised an impact assessment. Throughout the document, where appropriate, we set out what we considered would be the likely effect of our proposals.

A1.97 We do not consider that it was necessary for us to seek to quantify the likely effects of our proposals in this case, nor have we sought to quantify the likely effects in this decision. There are significant challenges to carrying out a quantified welfare assessment, for example in assessing willingness to pay for a range of different customer segments for a product that has not yet been launched. Hence any such quantification would itself be subject to considerable uncertainty, and therefore of limited merit. We have however set out our qualitative assessment of the likely impact of our decision in Section 3 where we assess the likely effect on competition of liberalisation without delay. We have also considered projections of the likely number of subscribers in order that we can understand the likely scale of effects.

A1.98 Telefónica provided what it described as a "preliminary CBA".²²² This analysis did not quantify the benefits of liberalisation although it did estimate what Telefónica characterised as "monopoly rents" associated with early liberalisation. Telefónica did not attempt to quantify the impact on competition after the Interim Period ended. We have considered Telefónica's analysis in paragraphs A1.75 above.

²²¹ Telefónica non-confidential response paragraph 24, and paragraphs 109-114.

²²² Telefónica non-confidential response paragraph 159.

Interaction with the Combined Award

Stakeholders' comments

A1.99 Vodafone expressed concern that the Combined Award would be delayed, which would delay the release of LTE-suitable spectrum to EE's competitors.²²³ Telefónica expressed similar concerns and considered that the March 2012 consultation failed to assess the possibility that liberalisation without delay increases the risk that the Combined Award is delayed.²²⁴ Similarly [X] stated that liberalisation without delay means that EE has a clear incentive to seek to delay the Combined Award (e.g. through litigation). This respondent considered that EE would be better placed to withstand delays to the Combined Award as a result of liberalisation.²²⁵

A1.100 Vodafone and Telefónica also expressed concerns about the consistency of our reasoning in the March 2012 consultation and in the 2012 Award Consultation.

- Vodafone stated that liberalising EE's 1800 MHz spectrum without delay is hard to reconcile with our position in the 2012 Award Consultation. In that document we stated that we would be concerned if the Combined Award resulted in fewer than four credible national wholesalers. Vodafone suggested that similar reasoning about the importance of credible competitors applies in the provision of LTE services. In Vodafone's view, this logic implies that we should design a liberalisation regime that provides for at least four national operators to be able to launch LTE services at roughly the same time, rather than an "EE monopoly".²²⁶
- Telefónica stated that the 2012 Award Consultation highlighted the risk of "market bifurcation" i.e. the risk that a separate relevant market develops for some mobile services or customers (e.g. LTE services). Telefónica stressed the importance of Ofcom acting consistently and criticised the March 2012 consultation for failing to consider whether "EE's monopoly on LTE" will be insufficiently constrained by other mobile services.²²⁷ Telefónica further argued that if the price of LTE services were constrained by the price of 3G services then there is no case for reserving spectrum in the Combined Award since H3G could remain competitive even if it did not acquire additional spectrum.²²⁸

A1.101 Finally, [X] noted that there was a likelihood of distortion beyond the Interim Period. [X] stated that the analysis in the 2012 Award Consultation implies that liberalising EE's 1800 MHz spectrum for LTE would result in EE being the only credible national wholesaler in the short and longer term, even if EE won no additional spectrum in the auction.²²⁹ [X] thus submitted that Ofcom's own analysis showed liberalising EE's 1800 MHz spectrum would create an operator facing few competitive constraints unless rivals can acquire suitable spectrum in the Combined Award to be "credible". However, this respondent also submitted that the auction design for the Combined Award does not ensure that EE's competitors will acquire suitable spectrum. [X] highlighted various potential outcomes of the sale of divestment spectrum and the Combined Award that, in its view, would [X].

²²³ For example, Vodafone confidential consultation response, pages 14, 28, 29 and 53.

²²⁴ Telefónica non-confidential consultation response, paragraphs 119-131.

²²⁵ [X] confidential consultation response, pages 12-13.

²²⁶ Vodafone confidential consultation response, pages 53-53.

²²⁷ Telefónica non-confidential consultation response, paragraphs 138-140.

²²⁸ Telefónica non-confidential consultation response, paragraphs 160 and 163.

²²⁹ [X] confidential consultation response, page 15.

A1.102 [S] argued that Ofcom should recognise the “unintended consequences” of liberalising EE’s 1800 MHz spectrum in circumstances where competitors may fail to acquire enough spectrum to compete effectively with EE. It considered that without effective safeguards in the Combined Award, liberalisation could seriously prejudice Ofcom’s objective of ensuring that there are four credible national wholesalers following the auction.²³⁰

Ofcom’s response

A1.103 We consider the possibility of delay to the Combined Award in paragraphs 3.136 to 3.138.

A1.104 Vodafone and Telefónica expressed concerns about consistency with the Combined Award. We consider that there is no inconsistency. In particular, the frame of reference for our analysis in this decision is different.

- Vodafone and Telefónica both referred to an EE “monopoly” in LTE services during the Interim Period. However if we delay liberalisation then no LTE services are available during that period. In other words, when comparing liberalisation without delay against delayed liberalisation we are comparing a situation where one national wholesaler can supply LTE services with a situation where no-one can supply LTE services. As explained in Section 3, liberalisation without delay means that consumers will be better off during the Interim Period.
- In contrast, in the Award Statement we considered the impact if there were fewer than four credible national wholesalers after the Combined Award compared to the case where there are at least four credible national wholesalers.²³¹ For the reasons set out in Section 3, we do not consider that liberalisation without delay is likely to materially weaken EE’s competitors in large part because the scale of switching to EE as a result of liberalisation without delay appears modest in the context of the mobile sector as a whole. An important reason for this conclusion is that the duration of the Interim and Secondary Periods is relatively short, particularly when compared to the longer term timeframes that we were considering in the Award Statement.

A1.105 We turn now to Telefónica’s argument that if the price of LTE services were constrained by the price of 3G services then there is no case for reserving spectrum in the Combined Award since H3G could remain competitive even if it did not acquire additional spectrum. Telefónica’s claim does not accurately reflect the position in the Award Statement. In that statement we identified four dimensions that could be important to the credibility of a national wholesaler in the future.²³² In particular, we considered that it was necessary to have enough capacity to deliver a competitive average data rate.²³³ H3G’s low share of spectrum creates a material risk that it would not be credible without additional spectrum from the Combined Award.²³⁴ Put simply, without additional spectrum H3G is likely to be able to offer only a relatively low average data rate. This would make its 3G service less attractive compared to the average data rates that other national wholesalers could offer on both their LTE and 3G services.

²³⁰ For example, [S] confidential consultation response, pages 2, 6, 10-11 and 16-18.

²³¹ Award Statement, paragraph 4.20.

²³² Award Statement, paragraph 4.39.

²³³ We stated that the importance of offering services based on LTE technology was unclear although it was more likely to be necessary to credibility in the longer term. Award Statement, Figure 4.2.

²³⁴ Combined Award Statement, paragraphs 4.135-4.137.

A1.106 [X] was concerned that liberalisation risks undermining the objectives of the Combined Award. In the Award Statement we assumed that 1800 MHz spectrum would be available for use for LTE soon after the auction even if it were not available earlier.²³⁵ In any event, [X] arguments rest upon its premise that the Combined Award may result in a national wholesaler failing to acquire sufficient spectrum to be credible. We do not accept this premise for the reasons set out in the Award Statement.

Definition of relevant markets

Stakeholders' comments

A1.107 Telefónica submitted that Ofcom failed properly to assess the relevant markets into which LTE1800 services will be launched. Telefónica considered that the superior performance of LTE (on an empty network) relative to HSPA + (on a loaded 3G network) increased the bifurcation risk (i.e. that LTE1800 services would not be constrained by alternative data services such as HSPA+). Telefónica submitted that if a bifurcated market arose (i.e. for high speed services) then liberalisation to permit LTE1800 would create a “monopoly provider” with significant market power, which would be unlawful for Ofcom to do.²³⁶

A1.108 EE stated that defining the relevant market(s) is standard practice when assessing whether there is a risk of a distortion or restriction of competition. It considered that our conclusions would be the same under any reasonable alternative frame of reference, so we could leave open the precise market definition. EE considered that precedent supports the use of a single market for mobile communications services that is not sub-divided by technology, network type, customer or service.²³⁷ EE stated that there is no reliable evidence that the market will bifurcate, for example into a separate market associated with higher data speeds and superior latency, as a result of liberalising EE's 1800 MHz spectrum.²³⁸

Ofcom's response

A1.109 Market definition can be a useful tool for assessing the competitive constraints on a particular product. However it is a means to an end rather than an end in itself, and before embarking on a market definition exercise it is important to consider whether it would inform our overall analysis.

A1.110 We do not consider that market definition is necessary for the purposes of the analysis in this decision. Telefónica and EE's responses relate to whether we should assess the market in which LTE services lie. This would shed light on the extent to which the price of LTE services is constrained by 2G/3G mobile services and whether EE would be able to charge a high price for its LTE services during the Interim Period. However, as explained in Section 3, consumers will be better off during the Interim Period, relative to the case where liberalisation is delayed, even if EE is able to charge a relatively high price for LTE services. See also our assessment in paragraphs A1.72 to A1.75 of the consultation responses relating to high prices during the Interim Period. As to Telefónica's argument that liberalisation to permit LTE1800 would create a “monopoly provider”, as we indicate in section 3,

²³⁵ Award Statement, paragraph A3.278.

²³⁶ Telefónica non-confidential consultation response, paragraphs 22-23, 154, 167.

²³⁷ In support EE cited a number of cases, including the T-Mobile/Orange merger decision. EE consultation response, pages 41-42.

²³⁸ EE consultation response, pages 41-45.

we consider that our relevant regulatory objectives and statutory duties are best served by liberalising EE's 1800 MHz spectrum without delay.

A1.111 The analysis in Section 3 also assesses whether any national wholesaler might suffer a reduction in scale such that it could no longer compete effectively. That analysis is carried out in the context of the sector as a whole and would not change if there were, or were not, a narrow market for LTE services.

Unlawful discrimination and State aid

Stakeholders' comments

A1.112 [X] maintained that our proposal to liberalise EE's licences would involve (a) unlawful discrimination and a lack of an open spectrum allocations process²³⁹, and (b) the grant of unlawful State aid²⁴⁰.

A1.113 [X] argued that liberalising EE's licences without appropriate measures to address the distortion of competition which would result would be in breach of Ofcom's duty to allocate spectrum according to objective, transparent and non-discriminatory criteria and following a procedure that is open, transparent and non-discriminatory as required, amongst other things, by Article 5(2) of the Authorisation Directive.

A1.114 [X] considered that liberalising EE's licences for 4G use would provide technical benefits to EE over and above those provided by UMTS (3G) technology, and as such EE would derive significant first mover advantages which all operators must be given the opportunity to benefit from. [X] set out its view that liberalisation effectively amounts to the granting of new rights, and that the fairest option would be to re-allocate the liberalised spectrum. It noted that the design of the auction of the 800MHz and the 2.6GHz spectrum could take into account and balance the advantages that EE would gain from liberalisation of its licences, but considered that the auction design that Ofcom had at that time proposed did not achieve this.

A1.115 [X] further argued that Article 107(c) TFEU prohibits aid granted by a Member State or through state resources which distorts or threatens to distort competition by favouring certain undertakings insofar as it affects trade between Member States. It noted that EU case law has established that spectrum is a valuable state resource, the grant of what can amount to an unlawful aid unless the anti-competitive advantage is cured by particular measures or broader regulatory controls. [X] considered that if Ofcom were to vary EE's licence this would provide a material benefit to EE, and a disadvantage to other mobile operators. As a result, it considered that the proposed grant of rights would distort competition in the market for electronic communications services.

Ofcom's response

A1.116 We do not agree that varying EE's existing rights to use certain frequencies in the 1800 MHz band effectively amounts to a new grant of rights to use those frequencies which must be allocated in a manner open to all in accordance with, amongst other things, Article 5(2) of the Authorisation Directive.

²³⁹ [X] confidential response, section 2.2.

²⁴⁰ [X] confidential response, section 2.3.

- A1.117 Radio frequencies are a scarce and finite resource. As a result, Article 5(1) of the Authorisation Directive provides that where possible, use of radio frequencies should not be made subject to individual rights of use.
- A1.118 Article 5(2) applies to instances where it is necessary to grant individual rights of use of radio frequencies. It sets out the minimum requirements which Member States must meet in such circumstances. We consider that it is clear from both the text and intention of Article 5(2), when read in the context of the European Communications Directives as a whole, that it is intended to relate to instances in which Member States grant individual rights of use over radio frequencies to entities that did not previously hold rights to use those frequencies. The minimum requirements set out in Article 5(2) are intended to ensure that all potential users of radio frequencies have an opportunity to gain access to use them, and that Member States should not grant individual authorisations without affording all interested parties that opportunity.
- A1.119 In light of the above, we do not consider that Article 5(2) applies in every situation in which a Member State varies an existing licence (in other words, where a right to use the frequencies in question has previously already been granted).
- A1.120 In this case, EE already holds rights to use the frequencies in question, and we are considering an amendment to those rights. Article 14 of the Authorisation Directive applies to the amendment of existing rights of use of radio frequencies. For the reasons set out in this decision, we consider that we have met the requirements of Article 14 in considering EE's licence variation request.
- A1.121 We do not consider that it is discriminatory for different operators to have different rights to use spectrum, as is currently the case. We also note that we are not under a duty to equalise the amount and nature of the spectrum which different stakeholders have licences to use in the UK. We therefore disagree that liberalising EE's licences is in itself inherently discriminatory. As set out in Section 3 above, we have considered the likely effects of liberalising now on both consumers and competition, and for the reasons set out in that section, we are satisfied that our statutory duties are best met by liberalising EE's 1800 MHz licences without delay.
- A1.122 Finally on this point, we do not agree that varying EE's licences would involve the grant of State aid. We do not consider that varying the rights of use that EE already holds to use the frequencies in question involves the grant of any aid through state resources for the purposes of Article 107 TFEU. In any event, we note that
- as required by the Government Direction to us of 20 December 2010 we will revise the annual licence fee for the use of EE's licences following the auction of the 800 MHz and 2.6 GHz spectrum, to reflect full market value. That value will clearly have to take account of the fact that the licences permit the deployment of 4G technology;
 - we have considered the likely effect on competition of liberalising EE's licences, and for the reasons set out above in Section 4 of this decision, we do not consider that liberalising now would be likely to distort competition; and
 - we consider that our decision to liberalise is consistent with our duties pursuant to the regulatory scheme set out in both the European Common Regulatory Framework and the relevant domestic legislation which implements that framework.

Annex 2

LTE deployments

Introduction

A2.1 This annex considers the deployment of LTE networks and services by different operators. It summarises the observations and arguments from responses to the March 2012 consultation and draws on information and comments from the Internal Documents received from each national wholesaler and subsequent meetings and email exchanges with them. In the case of Everything Everywhere (EE), the focus is on the deployment of LTE in the 1800 MHz band (LTE1800). For the other national wholesalers²⁴¹, the focus is on LTE deployment in spectrum obtained via the Combined Award or via private sale of divested 1800MHz spectrum.

A2.2 This annex is set out in the following order:

- terminology used to define relevant time periods;
- basis for comparing network deployments;
- EE's deployment of LTE at 1800MHz;
- deployment of LTE by EE's competitors; and
- Implications of the above for interim and secondary periods.

Definition of relevant time periods

A2.3 In assessing the impact on consumers of liberalisation we have identified the following three time periods:

- An **Interim Period**, when EE is the only national wholesaler that can offer LTE services. It starts when EE is able to launch its LTE service. It ends when at least one other national wholesaler can launch a competing LTE service.
- A **Secondary Period**, which begins when at least one other national wholesaler can launch LTE services. The other national wholesalers also launch LTE services during the period. The key feature of the secondary period is that EE retains a coverage advantage over its competitors as a result of liberalisation without delay. The Secondary Period only ends when EE no longer has materially better LTE network coverage as a result of liberalisation without delay.²⁴²
- A **Final Period**, when EE no longer has materially better LTE network coverage as a result of liberalisation without delay.

²⁴¹ It is possible that [X]. We discuss the potential implications of such a development in Section 3.

²⁴² Note that there could still be differences between national wholesalers' LTE networks that stem from factors such as their particular spectrum holdings (as opposed to early liberalisation). Strictly, the Secondary Period ends when any gap between the quality of EE's network and those of its competitors is no longer materially greater than it would have been in the case where liberalisation is delayed.

A2.4 Later in this annex we go on to describe these periods and the factors that affect their start point, end point and duration in more detail.

Basis for comparing network deployments

A2.5 In our Combined Award Statement²⁴³, we identified four dimensions that could be important to the credibility of a national wholesaler in the future. These were: (i) the capacity that the national wholesaler has to provide services, and the average data rates it can provide; (ii) the quality of coverage it can provide; (iii) whether it can provide the highest peak data rates; and (iv) whether it can offer services based on LTE technology and so gain from other LTE advantages (such as reduced latency and the ability to better prioritise traffic).

A2.6 An important consideration for our assessment of competition for this Decision relates to the comparison of mobile service quality in the Secondary Period when other operators have launched their own LTE service, but have not yet “caught up” with EE’s LTE service. In this context, we use the level of population covered by the LTE network as the essential differentiator in the quality of mobile service that can be provided by EE as against the quality of mobile service that can be provided its competitors. This is because:

- Coverage is the fundamental distinguishing characteristic at any given location (i.e. “is a consumer able to obtain an LTE service in that location or not?”);
- The main relevance of network capacity in any location is that it impacts on the average speeds that consumers in that location will experience. However, the average speed will also depend on the number of active LTE users in the cell which, in turn, will be related to the number of customers that have signed up to operator’s LTE service. Although we would expect other national wholesalers to have a lower density of LTE sites than EE in the immediate period following the launch of their competing LTE services, they will also have a lower density of customers than EE at this time (they will start with no customers at all, of course, whereas EE will have built up an LTE customer base during the interim period). There is no reason to believe that any resulting difference in average data speeds experienced on account of these opposing factors will represent a significant discriminator between the competing LTE services. Furthermore, over the near term timescale that we are considering for this Decision, capacity is unlikely to be a significant constraint on any national wholesaler after the auction (given the amount of spectrum allocated through the Combined Award); and
- Those aspects of quality which are a function of LTE technology (the impact of technology on average and peak speeds and on latency etc.) will clearly be a common factor.

A2.7 Where relevant, we also comment on the LTE channel bandwidth (e.g. 10 MHz vs. 20 MHz channels) since bandwidth will impact on capacity (although, as noted above, we consider that capacity is unlikely to be a significant constraint on any national wholesaler after the auction).

²⁴³ Paragraph 4.39, “Assessment of future mobile competition and award of 800 MHz and 2.6 GHz”, <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/statement.pdf>

EE's deployment of LTE at 1800 MHz

- A2.8 This section summarises EE's LTE1800 deployment plans on the basis of information in EE's response to the March 2012 consultation and information obtained subsequently from Internal Documents and supplementary explanations. These plans are clearly predicated on their 1800 MHz licences being varied in time to enable a launch in 2012. Internal Documents provided by EE and dated June 2012 indicate a planned LTE launch date in [redacted]²⁴⁴, we treat the start of the interim period as being September 2012 (i.e. i.e. the date at which EE's varied licence authorises the provision of LTE services).
- A2.9 Vodafone cited the relative ease of EE's transition to LTE at 1800 MHz as they already have 2G equipment operating in this frequency band. In comparison, competitors would likely be deploying LTE into entirely new frequency bands, which would be more time-consuming and complex.²⁴⁵
- A2.10 EE commented that its launch of LTE services is dependent on its [redacted].²⁴⁶
- A2.11 Whilst we acknowledge a number of these points, the relevant information for the purposes of our competition assessment comes from what EE has told us of its actual deployment plans and from corresponding information in Internal Documents and related exchanges. This information is summarised in the following paragraphs.
- A2.12 EE plans to launch LTE1800 services in [redacted]. By the end of 2012, coverage will have increased to cover around [redacted] of the population²⁴⁷. Thereafter, the level of population coverage will continue to increase. In its response to the March 2012 consultation, EE said that its LTE coverage would increase to [redacted] by the end of 2013²⁴⁸. Subsequent information from EE indicates that it might achieve a higher coverage level of [redacted] by the end of 2013 and that this higher coverage level is consistent with its updated, high scenario forecast of LTE smartphone uptake for end of 2013²⁴⁹. However, EE has explained that these higher numbers are internal working assumptions, [redacted].²⁵⁰ For the purposes of our analysis we have regard to both the [redacted] figures for the level of coverage at the end of 2013. All of these percentage figures for EE's LTE service relate to outdoor population coverage.
- A2.13 We asked EE for details of its deployment plans beyond 2013. EE explained that it had not carried out any internal forecasts for 2014 or beyond²⁵¹.
- A2.14 At launch, EE plans to deploy an LTE network based on a [redacted] carrier.²⁵² EE plans to [redacted] EE has indicated that [redacted]

Deployment of LTE networks by EE's competitors

- A2.15 For the reasons explained in Annex 1 we consider that EE's competitors at the national wholesaler level (Vodafone, Telefónica and H3G) will focus on the

²⁴⁴ Email from EE to Ofcom of 7 August 2012.

²⁴⁵ Vodafone's response to the March 2012 consultation, p19.

²⁴⁶ EE's confidential response to the March 2012 consultation, section 3.2.4.

²⁴⁷ Presentation entitled "LTE coverage", July 2012, slide 3.

²⁴⁸ EE's confidential response to the March 2012 consultation, section 3.2.1.

²⁴⁹ File note of conversation between EE and Ofcom on 23 July 2012. Attachment to internal EE email of 10 July 2012.

²⁵⁰ Email from EE to Ofcom on 7 August 2012.

²⁵¹ File note of conversation on 23 July.

²⁵² EE's confidential response to the March 2012 consultation, sections 3.2.1, 3.2.4 and 3.4.

auctioned 800 MHz and 2.6 GHz bands and/or on the divested 1800 MHz spectrum to deploy LTE networks. The focus of this section is therefore on the deployment of LTE networks and services in these bands. We do not consider that Vodafone and Telefónica could sensibly deploy LTE services using either their 900 MHz holdings or their existing 1800 MHz holdings during the interim period.

A2.16 This section considers:

- The auction timetable;
- The timeline for spectrum clearance in the 800 MHz and 2.6 GHz bands;
- The potential for deployment of LTE networks in the 800 MHz and 2.6 GHz bands; and
- The potential for deployment of LTE networks in the divested 1800 MHz spectrum.

Auction timetable

A2.17 In the Combined Award statement we set out our intention to hold the auction for the 800 MHz and 2.6 GHz bands as soon as possible. We expect the following high-level timetable:

- 11 September 2012: Consultation closes on the draft statutory instrument which implements the auction rules;
- Before the end of December 2012: Invite applications to bid in the auction;
- Early 2013: Auction commences; and
- March 2013: Auction concludes and licences awarded.

Timeline for spectrum clearance in the 800 MHz and 2.6 GHz bands

A2.18 The availability of spectrum at 800 MHz and 2.6 GHz for LTE services is separate from the auction conclusion and depends on the timetable for clearance of existing services from these bands. The clearance timetable was published as part of the Combined Award statement and is summarised below.

Clearance of the 800 MHz band

A2.19 In our statement of June 2009 on clearing the 800 MHz band we set out our decision to allow use of the whole band for mobile services by clearing channels 61 and 62 (790 to 806 MHz) of Digital Terrestrial Television (DTT).²⁵³ Until the DTT users of these channels have been relocated to alternative spectrum the 800 MHz band will not be fully available for use by mobile services.

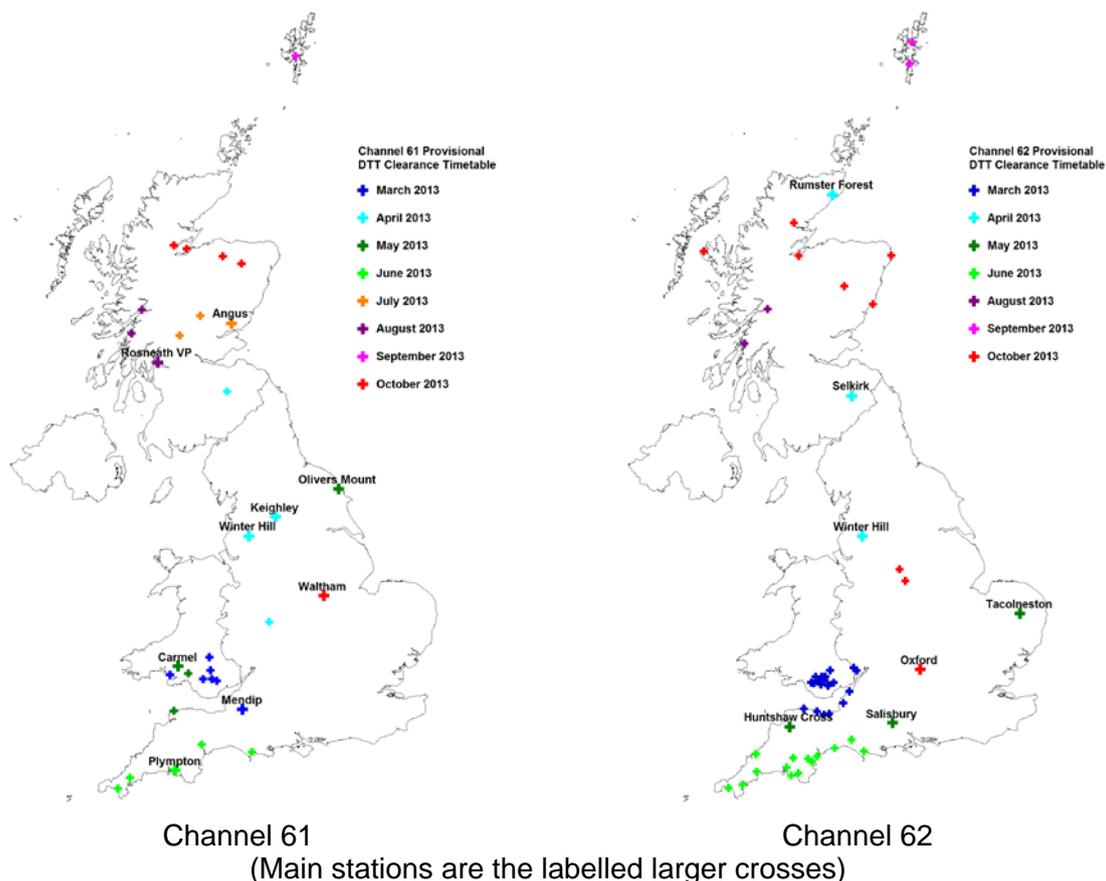
²⁵³ Digital Dividend: Clearing the 800 MHz band, 30 June 2009, <http://stakeholders.ofcom.org.uk/binaries/consultations/800mhz/statement/clearing.pdf>

A2.20 As set out in the Information Memorandum in relation to the award of 800 MHz and 2.6 GHz spectrum²⁵⁴ (“the IM”), DTT clearance will progress geographically, so that some parts of the UK will become available for new 800 MHz services earlier than others. Our expectation is that Northern Ireland will be cleared by the end of calendar year 2012, Wales by the end of May 2013, and that England and Scotland will be fully cleared by the end of October 2013. There may be a possibility of some deployment of 800 MHz services ahead of full clearance, but this will be subject to the restrictions imposed on the 800 MHz licensees by notices in the form set out at Annexes 5 and 6 to the IM.

A2.21 DTT clearance will take place on a transmitter by transmitter basis. The DTT licensees have informed Ofcom that they have instructed their supplier, Arqiva, to plan network changes according to the timetable provided in Annex 6 of the IM.

A2.22 Figure 7 illustrates where and when DTT stations will clear channels 61 and 62 respectively during 2013 up until the end of October 2013 when clearance is complete, according to the timetable.

Figure 7: DTT channel 61 and 62 clearance in 2013



A2.23 In addition, national wholesalers wishing to deploy services in the 800 MHz band will be required to mitigate interference to DTT viewers. The details of the proposed arrangements for DTT coexistence – including the establishment by licensees of an

²⁵⁴ “The award of 800 MHz and 2.6 GHz spectrum: Information Memorandum” and annexes, <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/IM.pdf>, <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/IM2.pdf>

organisation to carry out mitigation – are also set out in the IM. We do not expect that the DTT coexistence arrangements will delay roll-out beyond the dates listed above, except possibly for deployment in the period most immediately following the auction.

Availability of the 2.6 GHz band

- A2.24 Aeronautical radionavigation and radiolocation services operate in the S-Band, adjacent to the 2.6 GHz band. Frequency allocations in the lower part of this band are jointly managed by the Civil Aviation Authority (CAA) and the Ministry of Defence (MOD). The lower part of this band, 2700 to 2900 MHz, is mainly used for primary surveillance radar, used for civil and military air traffic control (ATC), as well as some other military and civil radars.
- A2.25 Radars are designed to detect very low power signals in their own frequency bands, and receivers can be filtered to ensure that transmissions from adjacent frequency bands are not also detected. However, where filtering is insufficient, higher power transmissions from adjacent bands, even those which are well separated in frequency terms, can still be detected by radars and their performance can be degraded as a result.
- A2.26 We published an Information Update on the coexistence of S-band radar systems and adjacent future services on 11 December 2009²⁵⁵, which set out the potential scope of the issue and the work we were undertaking. Since then we have commissioned further work to design and develop prototype modifications which would make radar equipment more resilient to interference with minimal impact on radar performance. We signed off the first prototype modification in June 2012 and we expect the last prototype modification to be delivered by the end of September 2012.
- A2.27 A cross-government programme is in place to co-ordinate the roll-out plans for modifications to civil and military radars. A grant scheme is in place for operators of civil radars and the co-ordinated roll-out plan is intended to ensure that civil radars in most of the UK are modified by the end of 2013, thereby allowing widespread deployment of mobile services in the 2.6 GHz band. The MOD has a coordinated programme in place to implement modifications, where they are needed, to MOD radars, on a timetable aligned with the civil programme.
- A2.28 A detailed regional timetable for modifications to civil and military radars was set out in the Information Memorandum for the Combined Award published on 24 July 2012.²⁵⁶ Radar modifications will take place on a regional basis, with London and the South East of England, the Midlands, the North West of England and Yorkshire complete by the end of September 2013; central Scotland and Tyneside complete by the end of December 2013; and the South West of England, Wales, Northern Ireland and the Scottish Highlands complete by the end of March 2014.
- A2.29 However, earlier deployment and commissioning of equipment at 2.6 GHz may be possible, providing licence conditions are met, as exemplified by the fact that Telefónica has been able to trial LTE at 2.6 GHz in London.

²⁵⁵ Coexistence of S Band radar systems and adjacent future services, 11 December 2009, <http://stakeholders.ofcom.org.uk/binaries/spectrum/spectrum-awards/awards-in-preparation/infoupdate.pdf>

²⁵⁶ The Award of 800 MHz and 2.6 GHz spectrum: Information Memorandum, 24 July 2012, <http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/IM.pdf>

Deployment of LTE networks using spectrum at 800 MHz and 2.6 GHz

A2.30 This section covers the information provided by operators which relates to their ability to deploy LTE networks and launch LTE services using spectrum they may win as part of the Combined Award. We begin by summarising the points made by Vodafone in its response to the March 2012 consultation (as Vodafone made some substantive points in this regard). We then consider the evidence from Internal Documents and follow-up meetings, notably those relating to the Beacon proposal for network sharing between Vodafone and Telefónica. We then consider the implications for LTE network deployment and LTE service launch.

Response to March 2012 consultation

A2.31 Vodafone described the steps an operator will take in deploying an LTE network²⁵⁷, stating that many of these steps require knowledge of the deployment frequency band. These steps include:

- Coverage planning and identification of sites for installation or upgrade;
- Designing and dimensioning base station solutions based on anticipated traffic, including antenna design and deployment of other frequency-specific radio equipment; and
- Arranging access to sites for deployment of new equipment, potentially involving planning permission or agreement with landlords.

A2.32 Given these dependencies, Vodafone emphasised the importance of spectrum certainty²⁵⁸, i.e. the knowledge of the exact bands into which a network will be deployed. Vodafone asserted that the longer the period of spectrum certainty, the longer the period an operator has to plan its network deployment and, therefore, the more prepared the operator will be. Vodafone identified the completion of the auction as the point at which operators would have this spectrum certainty in respect of 800 MHz and 2.6 GHz spectrum.

A2.33 Vodafone claimed that until spectrum certainty is achieved, operators will be unable to commit the significant resources required to deploy key network equipment. In particular, operators will wait for spectrum certainty before deploying [§<]²⁵⁹. The risk of deploying [§<] ahead of spectrum certainty could be mitigated by using [§<]. However, Vodafone stated that this complicates design and increases costs.²⁶⁰

A2.34 Once all equipment is installed, the operator will commence testing and optimisation. Vodafone suggested that between 3 – 6 months is a reasonable period to undertake this work, after which services can be launched.²⁶¹

A2.35 Vodafone suggested that EE's competitors would need to perform more extensive optimisation in order to match EE's network performance as EE will benefit from

²⁵⁷ Vodafone's response to the March 2012 consultation, pp53-54

²⁵⁸ Vodafone's response to the March 2012 Consultation, section 3

²⁵⁹ Pages 3-4, Supplementary Vodafone submission arising from Vodafone-Ofcom meeting of 24 July 2012

²⁶⁰ Vodafone's response to the March 2012 Consultation, p54

²⁶¹ Vodafone's response to the March 2012 Consultation, pp54-55

operational experience during the Interim Period.²⁶² It also commented that EE's competitors would likely be deploying LTE into entirely new frequency bands, which would extend the time taken to reach a similar level of coverage to EE's network (in contrast to the relative ease of EE's transition to LTE at 1800 MHz as EE already has 2G equipment operating in this frequency band).

Beacon proposal

- A2.36 In response to our request for information on LTE deployment, Telefónica and Vodafone referred us to their submission on their planned extension to network sharing arrangements, called Beacon. This included information on their plans for [REDACTED]. [REDACTED] The evidence provided in the Beacon submission is of direct relevance to the question of when Telefónica and Vodafone can deploy and launch LTE services.
- A2.37 [REDACTED]^{263 264}
- A2.38 A summary of the Beacon equipment roll-out plan²⁶⁵ is shown in 3, alongside the alternative case of individual network coverage targets for Vodafone and Telefónica should the Beacon proposal not go ahead. The figures in the table are summarised from three charts and reflect interpretation of graphical data. The dates and the coverage figures for Vodafone and Telefónica are, therefore, approximate and are provided to illustrate broad levels of population coverage over time. The figures represent the level of indoor population coverage and we would therefore expect the corresponding level of outdoor population coverage to be significantly higher.

Table 3: Level of population coverage under Beacon proposal

[REDACTED]²⁶⁶

Implications for provision of LTE service in auctioned spectrum

- A2.39 When considering the relevance of the above [REDACTED] coverage numbers it is important to note that our competition assessment is concerned with the speed at which EE's competitors could rollout their own LTE networks if they were concerned to do so as quickly as possible. If an operator chooses to deploy its LTE networks at a slower rate, for financial or commercial reasons, for example, then that choice is not relevant to our competition assessment (i.e. a decision by one of EE's competitors to deploy its own LTE network at a slower rate than it could do should not form the basis for a regulatory decision that delays the opportunity for EE to deploy its LTE services). In this context, we consider that there is no essential difference in the regulatory position of Vodafone and Telefónica as regards their prospective ability to deploy LTE networks in the 800 MHz and 2.6 GHz bands.
- A2.40 In this context the relevant definition of the Secondary Period in our competition assessment is the time that competing LTE services are able broadly to match the coverage of EE's LTE service. If an operator elects to progress relatively slowly that does not necessarily imply that it could not have deployed its network more quickly. We regard [REDACTED] (higher) projection (in the without-Beacon case) as indicative of

²⁶² Vodafone's response to the March 2012 Consultation, p55

²⁶³ Beacon submission, [REDACTED]

²⁶⁴ Supplementary Vodafone submission arising from Vodafone-Ofcom meeting of 24 July 2012, pp3-

4

²⁶⁵ Beacon submission, Annex 1[REDACTED]

²⁶⁶ [REDACTED]

what either Telefónica or Vodafone could achieve, and therefore take [REDACTED] coverage as being the relevant determinant of the Secondary Period should Beacon not proceed. Accordingly, when referring to the without-Beacon case below, we refer only to the percentage coverage numbers from [REDACTED].

A2.41 The parties to the Beacon proposal, Vodafone and Telefónica, have indicated a strong commitment to the proposal.^{267 268} However, there is still uncertainty over whether the proposal will go ahead – for example, some aspects are under consideration by the Office of Fair Trading (OFT). For the purposes of our competition assessment of the EE 1800 MHz licence variation request, we consider the implications of both possible outcomes – i.e. first, that Beacon proceeds, in which case we focus on the percentage coverage numbers in the Beacon column of the above table (the “with-Beacon” case); and second that Beacon does not proceed, in which case we focus on the percentage coverage numbers in the relevant without-Beacon column of the above table.

A2.42 [REDACTED]²⁶⁹

A2.43 In the following paragraphs we consider in turn:

A2.44 [REDACTED] The Beacon submission²⁷⁰ describes a [REDACTED] timeframe for upgrading an existing site. [REDACTED].

A2.45 [REDACTED]

A2.46 [REDACTED].

A2.47 [REDACTED]

A2.48 [REDACTED]

A2.49 [REDACTED]^{271 272}

A2.50 [REDACTED]

A2.51 [REDACTED]

A2.52 [REDACTED]^{273 274}

A2.53 Although these profiles of coverage expansion are based directly on the confidential information provided to us in the context of the Beacon proposal, we have had to make assumptions in order to translate this information into an estimate of potential LTE service coverage. There is inevitably a broad range of potential outcomes.

²⁶⁷ Vodafone press release,

<http://www.vodafone.co.uk/cs/groups/public/documents/webcontent/vftst162773.pdf>

²⁶⁸ Telefónica press release, <http://news.o2.co.uk/Press-Releases/Telef%C3%B3nica-UK-and-Vodafone-UK-to-strengthen-their-network-collaboration-385.aspx>

²⁶⁹ [REDACTED]

²⁷⁰ [REDACTED]

²⁷¹ Telefónica comments that under the Beacon proposal it will be able to [REDACTED] (“Attachment 7 [REDACTED]”). In a clarification of this comment, Telefónica explained that this was a working assumption subject to refinement.

²⁷² We understand that it is now possible to adjust site equipment remotely which – when combined with more sophisticated network diagnostic tools – may accelerate the network optimisation process.

²⁷³ [REDACTED]

²⁷⁴ [REDACTED]

However, given the framework for our competition assessment, we have been focused on the outcomes that would have the potential to raise the most significant competition concerns. We consider that by using relatively pessimistic assumptions to derive the coverage forecasts, we have been appropriately cautious.

- A2.54 On the basis of the above, we consider that it is likely that acquirers of 800 MHz and 2.6 GHz spectrum will be in a position to launch LTE services in Q4 2013. We note that this timing is broadly consistent with the position set out in Vodafone's response to the March 2012 consultation that an LTE service could be launched nine months after gaining spectrum certainty²⁷⁵ (nine months from a March 2013 auction completion date gives a launch date of December 2013). It is also consistent with a Telefónica Internal Document which includes a timeline showing [redacted]²⁷⁶
- A2.55 The discussion above is based on the Beacon documents which concern Vodafone and Telefónica. We would expect H3G to have similar opportunities to deploy at 2.6 GHz to Vodafone and Telefónica, should it acquire the spectrum at auction. It may face a somewhat different position in terms of deploying at 800 MHz in that Vodafone and Telefónica would be able to exploit their existing 900 MHz sites, whereas H3G might look to exploit the existing MBNL 2100 MHz sites as well new sites.

Deployment using divested 1800 MHz spectrum

- A2.56 One operator will also have the opportunity to launch LTE1800 services, using spectrum divested by EE. In total, 2x15 MHz of spectrum will be divested, with an initial 2x10 MHz made available by September 2013 and the remainder by September 2015. The spectrum will either be divested through private sale or, if such a commercial agreement cannot be completed in time, via the Combined Award auction at the beginning of 2013. This would give the new owner of the spectrum at least 6 months, and up to 12 months (if a private sale were concluded quickly) to deploy and test network equipment, with the potential to launch LTE services between September and December 2013.

- A2.57 [redacted].^{277 278}

Implications for interim and secondary period

- A2.58 We now bring together the above evidence and analysis to consider the implications of the above for the interim and secondary periods.
- A2.59 For the purposes of our competition assessment in section 3 we assume that:
- the Interim Period is assumed to begin in September 2012 (the date at which EE's varied licence authorises the provision of LTE services);
 - the Interim Period is most likely to end (and the Secondary Period begin) at the end of 2013.

²⁷⁵ Vodafone's response to the March 2012 Consultation, table 1, p21. Note that Vodafone uses an illustrative auction completion date of June 2013 in its example.

²⁷⁶ Presentation from Telefónica entitled [redacted]

²⁷⁷ Beacon submission, [redacted]

²⁷⁸ [redacted]

A2.60 The likely duration of the secondary period is less clear for the reasons set out below.

A2.61 Figure brings together the evidence available to us on the predicted levels of population coverage for EE's LTE network at 1800 MHz (including both the lower and higher coverage levels for end of 2013 as discussed above) and on the [X] coverage for an Award spectrum operator (including both the Beacon case and without-Beacon case)²⁷⁹. The dotted lines illustrate the effects of network deployment ahead of launch, solid lines indicate the situation following launch. The launch date is indicated by a rectangle.

Figure 8: Depiction of LTE network deployment over time

[X]

A2.62 It is important to note that the lines in Figure are not directly comparable for a number of reasons:

- EE's data represents its expected level of outdoor population coverage, while the Beacon and without-Beacon cases represent indoor population coverage. Since outdoor coverage of a network will exceed its indoor coverage, this will tend to overstate the position of EE's coverage relative to the Award spectrum operator coverage²⁸⁰. This suggests that we should adjust EE's coverage figures downwards by around [X] for the purposes of comparisons;
- The lines representing the coverage for an Award spectrum operator relate to [X] coverage, rather than [X] coverage. This will overstate the potential LTE service coverage at the outset. [X]
- The information on coverage levels for EE [X].

A2.63 We also consider that, for the purpose of determining the end of the Secondary Period, we should pay more attention to the higher coverage numbers for EE because we are concerned with how quickly EE could deploy if it chose to (in the same way that we have focused on the higher of the Vodafone and Telefónica coverage numbers in the without-Beacon case). Indeed, one could consider the lower EE deployment rate as providing an illustration of what EE might do in the event that it was not permitted to launch its LTE service until Q4 2013 [X]. If so, then a decision to liberalise without delay would result in a coverage level that was [X] higher in Q4 2013 than it would have been at this time if EE was prevented from launching its LTE service until Q4 2013. As noted in section 3, a more extensive LTE coverage of this nature would be an incremental benefit to consumers deriving from the decision to liberalise without delay.

A2.64 The coverage levels for EE in the above figure relate to EE's 1800 MHz network. EE itself could acquire 800 MHz spectrum in the auction. If so, and if it used this spectrum to deploy LTE in areas not already covered by its LTE1800 service, then this would help it expand the coverage of its LTE service above the levels represented in Figure 8 from Q4 2013 onwards. However, as this would mean deploying LTE800 in areas of lower population density (than its then existing

²⁷⁹ The figure does not include the potential expansion of coverage using divested 1800 MHz spectrum as we have no specific information on this from stakeholder responses.

²⁸⁰ The comparison between the between outdoor and indoor coverage for its LTE network at the end of 2012 for EE is shown as [X]

LTE1800 network), the impact on the overall rate of LTE service expansion will be more modest.

- A2.65 Whilst acknowledging the above qualifications, we consider it likely, on the basis of the evidence we have, that the Secondary Period will last at most two quarters. In particular, it appears that any coverage advantage EE would have over its rivals by the end of Q2 2014 would be less – potentially considerably less – than 10 percentage points, and declining. The test we have used to define the end of the Secondary Period is that EE should not have materially better LTE coverage than its competitors as a result of liberalisation without delay. Although there is no exact threshold that we can use to apply this test, we consider that 10 percentage points is a reasonable figure below which a temporary coverage advantage would not translate into a significant competitive advantage.
- A2.66 We consider that an important factor in the ability of competing operators to close the coverage gap on EE's 1800 MHz LTE network relates to the better propagation characteristics of 800 MHz spectrum, as against 1800 MHz spectrum. This means that a similar level of coverage is achieved with fewer sites at 800 MHz than at 1800 MHz (this factor is not reflected in Vodafone's illustrative diagrams on page 22 and 27 of its response to the March 2012 Consultation).
- A2.67 We make a final comment on the channel width of the LTE services. [3<] Networks deployed in 800MHz and 2.6GHz are likely to use a mix of 10MHz carriers (at 800MHz) and 20MHz carriers (at 2.6GHz) from the outset.

Annex 3

iPhone exclusivity

Introduction

A3.1 In this Annex, we consider the implications of Telefónica's two-year exclusivity period for the Apple iPhone between 2007 and 2009. Telefónica highlighted its experience with the iPhone as "instructive" when trying to estimate the impact of exclusivity.²⁸¹ We consider two key questions:

- What does the available evidence suggest about Telefónica's advantages during the period of iPhone exclusivity and did it continue to enjoy advantages over its competitors beyond the exclusivity period?
- How relevant is the iPhone exclusivity example to our decision on liberalisation without delay?

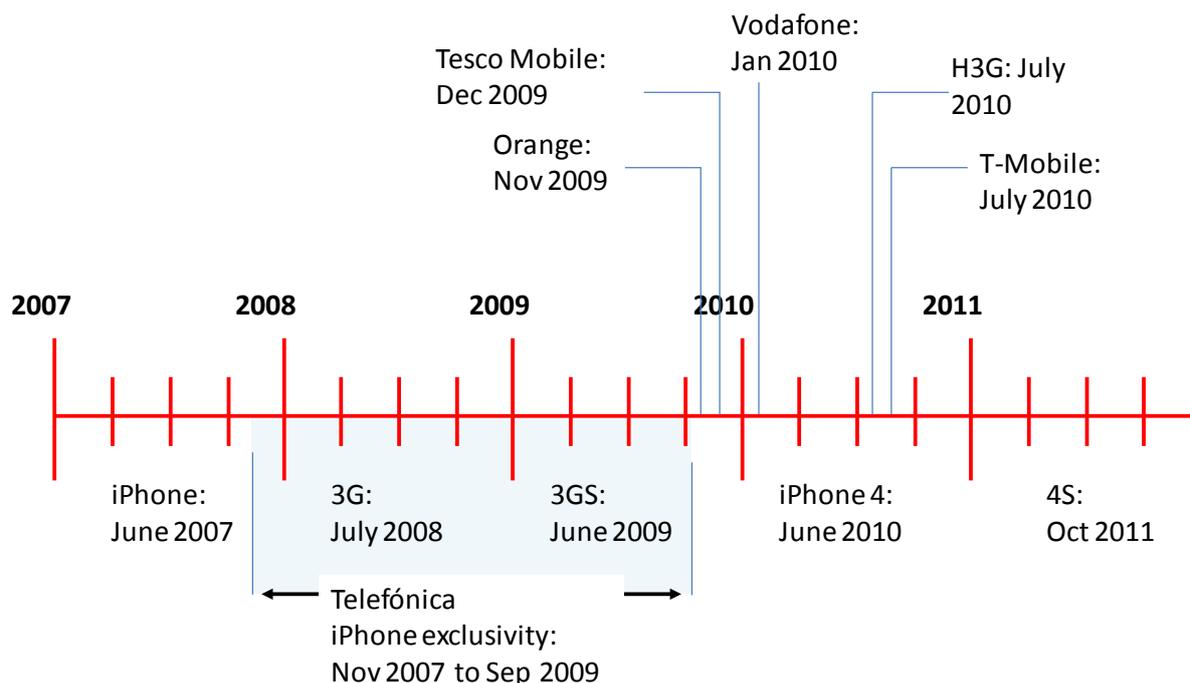
A3.2 The Annex is split into four parts. First, we provide some background on the timeline associated with the iPhone, Telefónica's exclusivity period and the subsequent launches by its competitors. Second, we consider stakeholders' views on possible competitor advantages and their comments on the relevance of iPhone exclusivity to liberalisation of EE's 1800 MHz licence. We then set out our view on the relevance of iPhone exclusivity to the current case. Finally, we present our analysis of the available data on Telefónica's market position relative to EE, H3G and Vodafone. We examine Telefónica's advantage during the iPhone exclusivity period and what happened once that period ended.

Background

A3.3 Telefónica's exclusivity for the iPhone lasted just under two years, from November 2007 until September 2009. In Figure 9 below we set out the key dates associated with the launch of iPhone services on different networks and the availability of different iPhone models.

²⁸¹ Telefónica confidential consultation response, paragraph 168.

Figure 9: Timeline associated with iPhone launches in the UK²⁸²



A3.4 Orange was the first competitor to launch after Telefónica’s exclusivity period ended in November 2009. Tesco Mobile (an MVNO that uses Telefónica’s network) and Vodafone launched in December 2009 and January 2010 respectively. T-Mobile and H3G’s launches were a little later in July and August 2010 respectively, following the launch of the iPhone 4.

Further information requests and questions to stakeholders

A3.5 In light of Telefónica’s view that the “*experience of iPhone exclusivity between 2007 and 2009 is instructive when trying to estimate the impact of exclusivity*”, we asked follow-up questions to the four national wholesalers, including:

- a statutory request for data on active iPhone subscribers for each operator; and
- a request for views on the impact of iPhone exclusivity after Telefónica’s period of iPhone exclusivity had ended and the relevance of this example to the case in which EE enjoys a period in which it is the only operator providing LTE services.

Comments on operator advantages associated with iPhone exclusivity

A3.6 We set out below the comments made in response to our information requests on operator advantages associated with iPhone exclusivity. Respondents asserted confidentiality over their comments.

A3.7 EE considered that [redacted].²⁸³

A3.8 Vodafone noted that [redacted].²⁸⁴

²⁸² Launch dates source: Pure Pricing (for plans excl. Tesco Mobile); Wikipedia (for models).

²⁸³ EE response of 9 July 2012 to non-statutory information request of 20 June 2012, question 3(a).

A3.9 Telefónica identified [redacted]:²⁸⁵

A3.10 [redacted]:²⁸⁶

Relevance of iPhone exclusivity to 1800 MHz liberalisation

A3.11 We also received comments in response to our information requests on the relevance of iPhone exclusivity to 1800 MHz liberalisation. Again respondents asserted confidentiality over their comments.

A3.12 EE considered that [redacted].²⁸⁷

A3.13 Vodafone considered that [redacted].²⁸⁸

A3.14 Both Telefónica and [redacted] noted that [redacted].²⁸⁹

A3.15 [redacted] also noted [redacted].²⁹⁰

A3.16 Telefónica submitted that [redacted].²⁹¹ Also, as discussed in paragraph 3.110, in internal documents Telefónica [redacted].

Ofcom's view on the relevance of iPhone exclusivity to 1800 MHz liberalisation

A3.17 As set out above, [redacted]. We agree that iPhone exclusivity may help inform our assessment of the likely effects of liberalisation without delay. Specifically, it could potentially help inform:

- the magnitude of the advantage an operator might enjoy during the exclusivity period; and
- the impact on the market following the end of the exclusivity period.

A3.18 Given the availability of other, more direct evidence of the magnitude of the likely effect of LTE exclusivity, we do not place weight on the magnitude of the effect of iPhone exclusivity as an indicator of the likely take-up of LTE services. For the magnitude of advantages, we have relied instead on operators' own forecasts of expected LTE take-up. This evidence is set out in Section 3.

A3.19 We have fewer direct measures of the likely impacts on the market after the Interim Period, and in this context, we have therefore placed somewhat more weight on the iPhone evidence. Therefore, in the remainder of this Annex we focus upon evidence of an impact on the market in the period after exclusivity ended. In particular, we

²⁸⁴ Vodafone response of 9 July 2012 to non-statutory information request of 20 June 2012, question 1(a).

²⁸⁵ [redacted]. Telefónica response of 9 July to non-statutory information request of 20 June 2012, question 1(a). Email from Telefónica dated 20 July 2012.

²⁸⁶ H3G response of 9 July 2012 to non-statutory information request of 20 June 2012, question 2(a).

²⁸⁷ EE response of 9 July 2012 to non-statutory information request of 20 June 2012, question 3(b).

²⁸⁸ Vodafone response of 9 July 2012 to non-statutory information request of 20 June 2012, question 1(b).

²⁸⁹ Telefónica response of 9 July to non-statutory information request of 20 June 2012, question 1(b). H3G response of 9 July 2012 to non-statutory information request of 20 June 2012, question 2(b).

²⁹⁰ [redacted] response of 9 July 2012 to non-statutory information request of 20 June 2012, question 2(b).

²⁹¹ Telefónica response of 9 July to non-statutory information request of 20 June 2012, question 1(b).

consider whether there is evidence of an unwarranted²⁹² reputation advantage from iPhone exclusivity that continued to persist beyond the exclusivity period.

- A3.20 We recognise that there are differences between the two cases. In particular, the iPhone example relates to the attractiveness of one handset relative to other handsets, which may not be a good proxy for the attractiveness of EE's LTE network relative to other operators' 3G networks or LTE networks (once launched). As explained above, [3<]. Furthermore, iPhone exclusivity lasted for 2 years. This is likely to be longer than the duration of the Interim Period.²⁹³
- A3.21 We also recognise that there are inherent and potentially substantial difficulties in splitting out those effects that are caused by iPhone exclusivity from other effects, such as competitor responses, the importance of rival handsets etc. Any conclusions that we can draw from the iPhone evidence need to be interpreted with caution.

Ofcom's analysis of the effects of iPhone exclusivity

- A3.22 In the following section, we consider the available evidence on Telefónica's market performance. We have presented our analysis based initially on post-pay subscribers and based on the retail position of the four existing national wholesalers (i.e. excluding MVNOs). We then analyse Telefónica's position based on data on iPhone subscribers by operator in the period after iPhone exclusivity ended.²⁹⁴
- A3.23 We have focussed initially on post-pay subscribers (rather than iPhone subscribers) because the data we have on post-pay subscribers is available over a longer timeframe. In particular, these data allow us to compare Telefónica's performance against its competitors in the period of exclusivity relative to its performance in the periods before and after exclusivity.
- A3.24 We have also focused initially on post-pay subscriber numbers (rather than both post-pay and pre-pay subscriber volumes) as the majority of iPhone subscribers tend to be on post-pay contract plans. Moreover, pre-paid plans were not initially available on the Telefónica network for iPhone contracts.²⁹⁵ If anything the inclusion

²⁹² In Section 3, we distinguish between warranted and unwarranted reputation advantages in considering potential consumer detriments. We note there that an unwarranted reputation advantage (where consumer's perceptions of an operator's network performance differ from the actual performance) could shield an operator from competitive pressures to some extent and thus allow it to charge higher prices and/or offer lower quality of services. In the case of the iPhone, in theory, an unwarranted reputation advantage could arise if (due to exclusivity over the iPhone for nearly two years) consumers continued to strongly associate the iPhone with the Telefónica brand even after the end of the exclusivity. For example, post-exclusivity, this unwarranted reputation effect could result in a significant proportion of consumers believing that Telefónica is the only network on which the iPhone was available (even though it is available on all networks on broadly equivalent terms).

²⁹³ [3<] also referred to the Secondary Period. However as explained in paragraph 3.81 we consider that EE's advantage is likely to be substantially smaller during the Secondary Period than during the Interim Period.

²⁹⁴ We have not presented pricing evidence in this annex. In response to our non-statutory questions on iPhone exclusivity, no stakeholder suggested that Telefónica had charged a premium for iPhone contracts relative to its competitors. Nevertheless, we checked some of the headline iPhone contract prices across operators in the period after exclusivity ended. Such comparisons of retail packages across operators are potentially problematic (due to differences in characteristics of tariff packages such as inclusive data and minutes). However, our analysis of headline values did not suggest that Telefónica has charged a premium for iPhone customers relative to its competitors.

²⁹⁵ Telefónica began offering pre-pay plans for the iPhone 3G on 16 September 2008.

<http://www.telecompaper.com/news/o2-uk-to-launch-prepaid-iphone-3g-on-16-september>

of pre-pay customers in our analysis would reduce any apparent advantage Telefónica enjoyed in terms of the share of total subscribers it was able to attract because few iPhone subscribers are on pre-pay contracts.

- A3.25 We exclude MVNOs due to data consistency issues through time, but in any case we do consider that the inclusion of MVNOs would alter our conclusions.²⁹⁶

Subscribers and service share data

- A3.26 In Figure 10, we compare the relative growth in Telefónica's base of post-pay subscribers with combined growth in the base for the other three national wholesalers (i.e. EE, H3G and Vodafone). For comparison purposes all values are indexed to Q1 2006 (=100).

Figure 10: Post-pay subscribers (indexed to Q1 2006 = 100) [X]

Source: Ofcom August 2012, based on operator returns (excluding MVNOs)

- A3.27 Figure 10 shows that prior to Telefónica's iPhone exclusivity period, Telefónica's average rate of growth in its post-pay subscribers base [X] the average growth in post-pay subscribers for the other three operators. During the iPhone exclusivity period, there was a clear increase in Telefónica's growth of pre-pay subscribers. Telefónica's post-pay subscriber base grew by nearly [X], which was [X] the growth rate seen for the other national wholesalers. After the period of exclusivity, Telefónica's growth was [X]. As a result, over the period 2006-2012 as a whole, Telefónica grew on average at a percentage rate [X] that observed for the rest of the industry.
- A3.28 These trends are reflected in Telefónica's share of post-pay subscribers as shown in Figure 11 below.

Figure 11: National wholesalers' share of post-pay subscribers [X]

Source: Ofcom August 2012, based on operator returns (excluding MVNOs)

- A3.29 At the beginning of the exclusivity period, Telefónica had a share of post-pay subscribers of just over [X]. Over the period of iPhone exclusivity, Telefónica increased its share of post-pay subscribers by [X] percentage points. Telefónica's share peaked at [X] in [X] before gradually falling back to [X] by the start of 2012 [X].
- A3.30 In summary, the data suggest Telefónica's base of post-pay subscribers grew faster than its competitors during the exclusivity period resulting in a gain in its share of the post-pay segment. Telefónica [X] resulting in Telefónica's share of post-pay subscribers [X].

iPhone subscriber volumes and shares

- A3.31 In considering Telefónica's market performance in the paragraphs above, we relied on post-pay subscriber numbers. It is possible however that other factors (such as

²⁹⁶ Although, our focus in this document has been on national wholesalers any reputation advantage for these operators is likely originate at the retail level. In this context, we consider it unlikely that any reputation advantage that a national wholesaler derives from its retail arm would transfer across to an MVNO (with an access agreement with that national wholesaler).

changes to post-pay tariffs, marketing strategies etc) rather than increases in iPhone sales could have contributed to the gain in market share experienced by Telefónica.²⁹⁷ We therefore formally requested data from the national wholesalers on iPhone subscriber numbers in order to:

- assess whether changes in Telefónica's share of post-pay subscribers were related to iPhone subscribers; and
- examine how Telefónica's market position with respect to iPhone subscribers evolved after iPhone exclusivity ended.

A3.32 In relation to the first bullet, we have compared Telefónica's growth in its post-pay base to the growth in iPhone subscribers. [§].

A3.33 We have also considered the data on iPhone subscribers for the period following the end of iPhone exclusivity in Q4 2009.

- First, we consider how Telefónica and other national wholesalers' shares of iPhone subscribers have changed since the end of 2009.
- Second, we compare Telefónica's changes in iPhone subscriber numbers relative to its competitors.
- Third, we compare Telefónica's iPhone sales to those of its competitors.

Shares of total iPhone subscribers

A3.34 National wholesalers' shares of total iPhone subscribers are shown in Figure 12 below.

Figure 12: National wholesaler's share of total iPhone subscribers [§]

Source: Ofcom analysis, based on data submitted by national wholesalers under Section 32A information request²⁹⁸.

A3.35 Figure 12 shows that Telefónica's share of total iPhone subscribers started from a very high level but has fallen gradually in the period since exclusivity ended. [§].

A3.36 This result is consistent with the market gradually returning to close to its pre-exclusivity state after a period in which Telefónica had some advantages due to iPhone exclusivity. As we discuss in Section 3, it takes time for operators to see rapid increases (or decreases) in their market shares as mobile consumers, in general, are likely to exhibit a degree of stickiness in terms of their switching behaviour that results in inertia in the market. This general degree of consumer stickiness across the market is also likely to be applicable to iPhone subscribers. For example, many iPhone customers were on 18 or 24 months deals and the non-contractual issues we refer to in Section 3 that generate customer inertia are also likely to apply to this segment. Reflecting this general inertia, we would expect that

²⁹⁷ An analysis based on post-pay only is nevertheless useful as it provides a consistent set of data for post-pay subscribers over a long timeframe. In particular, it allows us to compare Telefónica's performance relative to its competitors before, during and after the iPhone exclusivity period.

²⁹⁸ Data requested on 26 June 2012 under statutory powers.

any initial gains in market share resulting from Telefónica's acquisition of iPhone subscribers would take some time to unwind.²⁹⁹

Gains in iPhone subscribers after exclusivity had ended

A3.37 Figure 12 does not, however, shed light on whether Telefónica benefited from a reputation advantage (either warranted or unwarranted) after exclusivity finished. We have therefore looked more directly at Telefónica's success (or otherwise) in winning iPhone subscribers in the non-exclusive period relative to its rivals. In carrying out this analysis, we have considered both net additions and gross iPhone additions.

- *Gross iPhone Additions*: show the new iPhone subscribers that an operator attracts from one period to the next. Those subscribers may previously have subscribed to the iPhone with competitors, or be entirely new iPhone subscribers.
- *Net iPhone Additions*: show the change in subscriber numbers from one period to the next. An operator's net iPhone additions are equal its new iPhone subscribers (gross additions) less the iPhone subscribers that it loses.

A3.38 In Figure 13 below we show our estimates of each operator's share of net iPhone additions (i.e. total new iPhone subscribers) based on data we requested from national wholesalers. We have calculated these shares based on the changes in each operator's active base of iPhone subscribers by quarter.³⁰⁰ Therefore, the figure shows which national wholesaler saw the largest net gains in subscribers in each quarter since exclusivity ended.

Figure 13: Estimated shares of iPhone net additions

Source: Ofcom analysis, based on data submitted by national wholesalers under Section 32A information request³⁰¹

A3.39 The data in Figure 13 suggest that following the end of iPhone exclusivity other operators were

A3.40 Net additions on their own, however, may not be the most appropriate indicator of Telefónica's position relative to its competitors. At the immediate end of the exclusivity period, Telefónica was unable to win iPhone subscribers from its competitors, but the other operators were able to win subscribers from Telefónica. It is therefore possible that Telefónica was losing a large number of its iPhone subscribers to its rivals but winning an even greater number of new iPhone subscribers.

A3.41 We have therefore adjusted our estimates of net additions to generate estimates of gross additions.³⁰² We have based this adjustment by assuming that iPhone

²⁹⁹ [redacted].

³⁰⁰ These data are based on the change in the number of active iPhone subscribers reported for each operator per quarter so any changes in the subscriber base will reflect additional customers gained net of any losses due to customer churn.

³⁰¹ Data requested on 26 June 2012 under statutory powers.

³⁰² In Figure 11, we presented data on operator's share of net gains. We calculated these shares of net gains based on changes in operators' iPhone subscriber base between quarters. For example, if Telefónica had 100 subscribers in Q1 2010 and this rose to 110 subscribers in Q2 2010 then this would imply a net addition of ten iPhone subscribers. To estimate gross additions, we need to account for churn to Telefónica's base of iPhone subscribers in each quarter. So if five subscribers also

subscribers were on 18 month contracts and that 5% of out-of-contract iPhone subscribers would switch in each quarter.³⁰³ The results are shown in Figure 14. We emphasise that the 5% assumption is a cautious assumption that is likely to represent an upper limit on Telefónica's performance. It appears high relative to industry norms and relative to the loyalty expressed by iPhone subscribers (see for example footnote referred to earlier in this paragraph).

Figure 14: Estimated shares of iPhone gross additions [X]

Source: Ofcom analysis, based on data submitted by national wholesalers under Section 32A information request³⁰⁴

- A3.42 The data in Figure 14 suggest that Telefónica's performance was [X], other operators were [X]. Relative to its share of post-pay subscribers prior to iPhone exclusivity ([X]), Telefónica performed [X].
- A3.43 Clearly, there are a number of reasons driving each operator's performance. But the adjusted data does not suggest a persistent and significant reputation advantage arising from exclusivity for Telefónica.

iPhone sales

- A3.44 In response to our non-statutory questions to national wholesalers about the period of iPhone exclusivity, some respondents referred to sales data as providing evidence of a reputation advantage to Telefónica. In particular, [X] referred to Telefónica's share of iPhone sales based on GfK Panelmarket data presented in Figure 15 below. According to GfK, the information covers the majority of sales in market and we consider that the dataset is sufficiently representative for the period after June 2010.³⁰⁵ Prior to June 2010, GfK was obliged to rely on extrapolations [X].

churned from Telefónica between Q1 and Q2 2010 then this would imply a gross addition of 15 subscribers.

³⁰³ Operators' 2012 interim financial statements suggested monthly average churn rates of between 1.0 and 1.2% (see footnotes 274 and 275 below). We have made a simplifying assumption that in a particular quarter 5% of eligible iPhone subscribers would switch. This is likely to overstate the actual churn rate, and therefore overstate any advantage that Telefónica would have had as a result of exclusivity. We have applied this churn rate by assuming that a subscriber that signed up to an iPhone contract in Q4 2009 would be eligible to churn in Q3 2011 (or any period thereafter). Thus if 100 consumers signed-up to an 18-month contract in Q4 2009, 5% in this case of those would churn in Q3 2011 (which would equate to five iPhone subscribers). In Q4 2011, we assume that the number of customers eligible to churn would again reflect Telefónica's base 18 months prior to this period (i.e. its subscriber base in Q1 2010) less those that we have already counted as churning (i.e. the five subscribers that already switched in Q4 2009). We have also made a corresponding adjustment for the churn of other operators on the assumption that towards the end of the period some of their iPhone base would begin to be 'out of contract' and eligible to switch. We note that given the launch dates of various operators (and assuming subscribers are eligible to switch after 18 months) then only Orange and Vodafone's iPhone subscribers would be eligible to switch towards the end of the period i.e. in mid-2011 onwards. As H3G and T-Mobile launched services from mid-2010 onwards, we assume that none of their iPhone subscribers would be out of contract in the post-iPhone exclusivity period we have considered (i.e. until Q1 2012).

³⁰⁴ Data requested on 26 June 2012 under statutory powers.

³⁰⁵ These data are based on point of sales information collected from major retailers and operators. The main sales data not covered relate to operators selling to business consumers.

Figure 15: GfK monthly iPhone sales data for each operator [X]

- A3.45 Referring to the GfK data, [X] noted that [X]. On this measure, [X].
- A3.46 At face value, these data could provide evidence that Telefónica enjoyed a reputation advantage associated with iPhone exclusivity, which contrasts with the evidence on subscriber additions above. However, as with the subscriber additions data, we believe a number of adjustments are needed before we can make any inferences about reputation effects.
- A3.47 In particular, there are certain differences in the GfK sales data (shown in Figure 15) and the net additions data (shown in Figures 13 and 14) that we need to take into account:
- For GfK sales, the data relate to point of sales data for new iPhone contracts. They include consumers that churn and upgrade to a new iPhone, although they exclude consumers that retain their existing iPhone and churn between operators (for example to a SIM-only/ PAYG tariff). Therefore, these new sales data will less affected by churn than the net additions data.
 - More importantly, the GfK data will also include consumers that upgrade their iPhone to a newer model without changing network. This will particularly affect Telefónica which, relative to the other operators, has a larger existing base of iPhone subscribers that on average are more likely to have an older iPhone model.
- A3.48 As mentioned above, and as suggested by [X], one interpretation of the GfK sales data is that Telefónica performed strongly compared to other operators and relative to its overall share of sales for all post-pay customers. However, reflecting the nature of the GfK's sales data (i.e. it includes consumers upgrading iPhone that stay on the same network), it does not distinguish between:
- Telefónica enjoying an ongoing reputation advantage when competing for subscribers that acquire an iPhone for the first time; and
 - Telefónica encouraging its existing subscriber base to upgrade to a new iPhone model (or even doing so without encouragement).
- A3.49 General consumer inertia means that when considering upgrading their phones, many consumers may remain on the same network.³⁰⁶ In Section 3, we distinguish between this general inertia and additional consumer stickiness attributable to reputation effects arising from exclusivity. As discussed in Section 3, general inertia in the market is not a factor that would lead liberalisation without delay to create additional consumer detriment.
- A3.50 For there to be a significant reputation effect, there would need to be a material difference in Telefónica's performance which is not explained by upgrades. For illustrative purposes, we have considered the effect of alternative assumptions of the proportion of Telefónica's recorded iPhone sales that are upgrades.³⁰⁷ For

³⁰⁶ Indeed, in its response to our non-statutory question [X] submitted that: [X].

³⁰⁷ This calculation is based on annual sales data submitted by H3G for each of the calendar years 2010 and 2011 and 2012 (to May) (the last data point).

example, if 30% of Telefónica's new iPhone sales were upgrades then its Telefónica's average share of new sales [redacted].³⁰⁸

- A3.51 Our conclusion is that the GfK iPhone sales data does not point to a material ongoing reputation advantage after the end of Telefónica's iPhone exclusivity, although we cannot entirely rule out the possibility of a limited reputation advantage.

Other stakeholder comments

- A3.52 Operators made other comments relevant to our assessment in response to our information requests. Again, respondents asserted confidentiality over their these comments.
- A3.53 [redacted].³⁰⁹ We consider that this is consistent with our analysis above, which showed that Telefónica acquired additional subscribers during the period of iPhone exclusivity, but does not shed light on whether Telefónica enjoyed an enduring benefit after exclusivity ended.
- A3.54 [redacted].³¹⁰ [redacted].³¹¹ [redacted].³¹²
- A3.55 [redacted]. We consider, however, that it is difficult to conclude from this evidence that the period of iPhone exclusivity resulted in a persistent advantage for Telefónica.
- A3.56 A limitation of the evidence referred to on churn rates is that it applies to all contract subscribers (rather than considering churn rates of iPhone customers compared to the wider market). In this respect, it is difficult to infer too much from these data when other factors are likely to be influencing retention rates for all contract customers. Indeed, the Wireless Intelligence report refers to steps taken by Telefónica to improve customer retention and wider market factors such as the general trend towards greater smartphone penetration as contributing to lower churn.
- A3.57 In any case, the evidence [redacted] referred to does not suggest material differences in levels of churn for Telefónica relative to either Vodafone or EE in 2010. The evidence [redacted] referred to on customer churn also saw both Vodafone and EE reducing customer churn following the end of the exclusivity period. Indeed, more recent data for EE shows that across its retail brands it was successful in reducing post-pay customer churn to 1.1% in Q2 2011, which has largely been sustained in its most recent results (1.2% in Q2 2012).³¹³ These values are not materially different to the most recent contract customer churn results for Telefónica (1.0% in Q2 2012).³¹⁴ More importantly, our analysis of the iPhone specific data discussed above does not provide strong evidence that Telefónica had a significant reputation advantage.

³⁰⁸ We recognise that the GfK retail sales data for other operators may also include some existing customers upgrading their iPhone but remaining on the same network. However, given Telefónica's competitors launched the iPhone later, we would expect that impact of any adjustment to sales data for upgrades to be smaller than that for Telefónica.

³⁰⁹ Telefónica response of 9 July to non-statutory information request of 20 June 2012, question 1(a).

³¹⁰ [redacted].

³¹¹ <http://www.wirelessintelligence.com/analysis/2011/04/o2-records-lowest-churn-rates-in-uk/>

³¹² [redacted].

³¹³ <http://everythingeverywhere.com/2012/07/25/everything-everywhere-interim-results-for-6-months-ended-30-june-2012/>

³¹⁴ See page 51: http://www.telefonica.com/en/shareholders_investors/pdf/rdos12t2-eng.pdf

A3.58 [redacted].³¹⁵ We agree that the extra subscribers Telefónica attracted as a result of iPhone exclusivity are likely to be relatively high value. However, as shown in Figures 10 and 11 above, the extra revenues did not appear to translate into an ongoing advantage in winning, for example, post-pay subscribers once exclusivity ended.³¹⁶

Conclusions on reputation

A3.59 The evidence from Telefónica's iPhone exclusivity requires careful interpretation but does not point towards a significant enduring reputation effect. Overall the evidence shows that Telefónica managed to sustain a greater share of iPhone subscribers even after its period of exclusivity finished. However, in a market with customer inertia, this is not surprising. It takes time for subscribers to switch away and it is easier for an operator with an existing customer relationship to upgrade a customer to a new device than it is for a competitor to persuade the customer to switch. Neither of these factors, however, point to an enduring, unwarranted reputation effect.

A3.60 In order to find evidence of an enduring, unwarranted reputation effect, we would need to see that Telefónica had been disproportionately successful in winning new iPhone subscribers to its network despite the fact that all four national wholesalers (and some MVNOs) were offering the same handsets. Our analysis of both iPhone sales data and changes in subscriber numbers does not appear to provide such evidence – or at the very least, does not point to any significant effect.

³¹⁵ Telefónica response of 9 July to non-statutory information request of 20 June 2012, question 1(a). H3G response of 9 July 2012 to non-statutory information request of 20 June 2012, question 2(a)].

³¹⁶ In any case, there is a question over [redacted] observations of the benefit of high value consumers in terms of providing funds to help gain market share in future. For this to translate into a plausible theory of harm would seem to rely on other national wholesalers facing cash constraints in funding future profitable commercial behaviour such as increasing their market share (or it relies on operators engaging in unprofitable behaviour).

Annex 4

Technical licence conditions

- A4.1 In the March 2012 consultation we set out our assessment of the impact that the use of LTE within the spectrum licensed to Everything Everywhere at 1800 MHz would have on adjacent users. We noted that the CEPT has conducted two studies on coexistence between LTE and WiMAX systems in the 1800 MHz band and users of adjacent spectrum. We proposed – and in the absence of any comments from users in those bands, now conclude – that, in the light of the findings of these studies, it is not necessary to impose any additional technical licence conditions on Everything Everywhere in order to address coexistence with those adjacent users considered by the CEPT.
- A4.2 The British Entertainment Radio Group (BEIRG), a trade body representing users of radio spectrum in the Programme Making and Special Events (PMSE) sector, expressed concern that the use of LTE in the 1800 MHz band could result in harmful interference to PMSE users in the adjacent 1785-1800 MHz band. BEIRG noted that it is important that the deployment of LTE in the 1800 MHz band does not render the 1785-1800 MHz band unusable for the PMSE community.
- A4.3 We consider the impact the liberalisation of Everything Everywhere's licence will have on the PMSE community below.

Users in the 1785-1805 MHz band

- A4.4 The CEPT reports did not specifically consider the impact that the use of LTE in the 1800 MHz band would have upon the following adjacent users as these are in most cases specific to the UK:
- Users of the 1785-1805 MHz band in Northern Ireland;
 - PMSE users in the 1785-1800 MHz band on the UK mainland; or
 - Emergency services systems operating in the 1790-1798 MHz band on the UK mainland.
- A4.5 We have therefore conducted our own high level analysis in relation to coexistence between LTE services in Everything Everywhere's spectrum holdings in the 1800 MHz band and the users listed above.
- A4.6 This analysis focuses principally on the impact of Out of Band (OOB) emissions from LTE mobile stations only. This is because, as set out in the March 2012 consultation, the requirements for OOB emissions from LTE base stations are identical to, or more restrictive than, those for already permitted UMTS base stations. Therefore the licence variation considered in this decision is not expected to alter the regulatory position in relation to permitted OOB emissions from base stations.
- A4.7 Our analysis draws upon a combination of: technical information provided to us by the adjacent licensees in question; existing studies undertaken by Ofcom; and measurements we have taken of OOB emissions from LTE mobile stations which

operate in the 1800 MHz band.³¹⁷ We note that due to equipment available to us, we have only been able to undertake a limited number of measurements of OOB emissions from LTE equipment which operates in the 1800 MHz band. It is therefore difficult to make inferences as to what the typical profile of OOB emissions from LTE mobile stations operating in this band will be in the future when networks are deployed in the UK. Moreover, we only have limited information about the precise technical specification of adjacent users' equipment. This being the case, the analysis we have conducted is necessarily high level.

Users of the 1785-1805 MHz band in Northern Ireland

A4.8 As indicated above, the 1785-1805 MHz band in Northern Ireland is licensed to Personal Broadband UK Limited (PBUK). Based on the analysis we have undertaken, we do not believe that the liberalisation decision dealt with in this decision will cause harmful interference to PBUK's use of the 1785-1805 MHz band in Northern Ireland. Consequently we do not consider it necessary to impose any additional technical licence conditions on Everything Everywhere's 1800 MHz licences in order to manage interactions with PBUK.

PMSE

A4.9 As noted above, PMSE has access to the 1785-1800 MHz band in the mainland UK. As part of our work on the award of 800 MHz and 2.6 GHz spectrum we undertook a study on the potential for LTE interference to wireless audio.³¹⁸ That study focussed specifically on the wireless audio in the 863 to 865 MHz band. However, it is reasonable to assume that the impact of LTE signals adjacent to PMSE in the 800 MHz band will be similar to the impact between LTE in Everything Everywhere's spectrum and PMSE equipment used in the 1785-1800 MHz band. We have therefore read across the results from the previous study taking into account the larger frequency separation between the two bands in this case (a minimum of 3.3MHz).

A4.10 The study cited above suggests that it is possible in certain circumstances that the operational range of PMSE systems may be reduced as a result of the deployment of LTE equipment at the top edge of the 1800 MHz band licensed to Everything Everywhere (and when the PMSE equipment is operating in the lower part of its 1785 – 1800 MHz range)³¹⁹. These specific circumstances are likely to occur infrequently and we do not expect that any reduction in range that did occur would make the PMSE service unusable. In addition, based on our additional study of a live LTE network³²⁰, we would generally expect the impact of LTE to be considerably lower than the worst case scenarios examined in the wireless audio testing report. Whilst we note that this analysis is based on a slightly uncertain read across from other bands, we nevertheless conclude that any increased risk of interference to PMSE users is likely to be relatively minor.

³¹⁷ See <http://stakeholders.ofcom.org.uk/binaries/consultations/variation-900-1800mhz-lte-wimax/summary/condoc.pdf>

³¹⁸ http://stakeholders.ofcom.org.uk/binaries/consultations/tlc/annexes/Wireless_Audio_Testing.pdf

³¹⁹ That study suggested that for an LTE device within 5m of the wireless audio microphone receiver, the wireless audio system would still operate satisfactorily up to a distance of 63m in a typical indoor environment.

³²⁰ LTE User Equipment Coexistence with 862 - 870MHz" published at:

<http://stakeholders.ofcom.org.uk/binaries/consultations/award-800mhz/statement/lte-coexistence.pdf>

- A4.11 Moreover, we believe that, should they deem it necessary, PMSE users would be able to mitigate this risk to some extent by restricting the use of LTE mobile stations in the immediate vicinity of their receiver equipment.
- A4.12 Taking the above points into account, we conclude that it would not be necessary or proportionate to impose additional technical licence conditions on Everything Everywhere in order to manage coexistence with adjacent PMSE users.
- A4.13 We also note that, Everything Everywhere has indicated to us that it will not deploy its initial LTE uplink at top edge of its licensed band³²¹. For so long as this remains the case, we would expect there to be a negligible impact on the operational range of PMSE equipment, even with no mitigation actions.

Emergency services systems operating in the 1790-1798 MHz band

- A4.14 As indicated above, the 1790-1798 MHz band is used for emergency services systems. Based on information provided to us by the emergency services we have conducted some high level, theoretical analysis of the likelihood of an increase in harmful interference as a result of permitting the use of LTE within Everything Everywhere's band.
- A4.15 Everything Everywhere has indicated that it will not deploy its initial LTE uplink adjacent to the upper edge of its licensed band. On this basis, our analysis indicates that the emergency services systems will not experience any increase in the risk of harmful interference as a result of permitting the use of LTE services by Everything Everywhere in its 1800 MHz band.
- A4.16 Given the high level, theoretical nature of our assessments and the limitations on the information available at this time, we have not been able to undertake a detailed assessment of how the emergency services would be affected in practice if Everything Everywhere were to use spectrum at the very top of its uplink band for LTE. Therefore if Everything Everywhere were to extend its LTE uplink to the upper edge of the licensed band, we would expect it to work with the emergency services – facilitated by Ofcom if necessary – in order to develop a better understanding of what impact, if any, this would have on adjacent emergency services systems.
- A4.17 In the eventuality that this work yielded evidence that LTE uplink deployments at the upper end of the band did have an adverse impact on adjacent emergency services systems we would, in the first instance, expect Everything Everywhere and the emergency services to reach an agreement on coordination or mitigation actions. Should the parties not reach an agreement as to how best to manage any risks highlighted, we might need to consider notifying an appropriate coordination procedure, as provided for in EE's licence.

³²¹ By this (and all subsequent) references to "the top edge of the licensed band", we mean the top edge of the LTE uplink channel being higher than [\geq] MHz.

Annex 5

Varied licences

A5.1 Published separately