



Statement on the Requests for Variation of 900 MHz, 1800 MHz and 2100 MHz Mobile Licences

Statement

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Section 1

Summary

- 1.1 This Statement sets out our decisions in respect of variations to the 900 MHz, 1800 MHz and 2100 MHz licences proposed in our Consultation published on 1 February 2013.
- 1.2 For the reasons set out in this Statement, we have decided to proceed with the variations that permit the use of 4G technology in each of the 900 MHz, 1800 MHz and 2100 MHz licences and to increase the maximum permitted power in the 900MHz licences by 3dB. At the same time we will update a number of terms and conditions in these licences in order to align them more closely with the equivalent terms and conditions in the recently awarded 800MHz and 2.6GHz licences.
- 1.3 This decision delivers a long standing objective to liberalise all mobile licences so as to remove the regulatory barriers to deployment of the latest available mobile technology. Even though operators may not seek to deploy 4G services in the newly liberalised bands in the immediate future, the interests of consumers will be served by the fact that these bands have been liberalised now, ahead of a market led transition to their use for 4G technology in future. As a result, operators can plan and implement a transition to 4G technology in these bands without having to engage in a further regulatory process.

Section 2

Introduction and Legal Framework

- 2.1 On 1 February 2013 we published a Consultation on variation of the licence conditions in the 900MHz, 1800MHz and 2100MHz licences¹. This followed requests by Vodafone and Hutchison 3G to remove the regulatory constraint on the use of LTE (4G) technology in their 900/1800/2100 MHz spectrum licences, and by Vodafone and Telefónica for a 3dB increase in power for UMTS (3G) technology in the 900 MHz band.
- 2.2 The consultation document set out the factual background to these requests, the legal framework under which we have considered these requests and the framework we use to consider these licence variation requests relating to the impact on competition and the impact on spectrum management. The legal framework is restated below.
- 2.3 As regards the impact on competition, we considered the extent to which varying the licences 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 mobile 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 varying those licences without delay would be outweighed by the detriment to consumers resulting from such a distortion of competition.
- 2.4 In the context of spectrum management, Ofcom's general policy is to set technical restrictions that are the minimum necessary to provide adequate protection against harmful interference. This is because optimal use of the radio spectrum is more likely to be secured if users decide, rather than Ofcom dictates, the way in which technology is used or a service is provided in a particular frequency band. Imposing the minimum necessary constraints will increase users' flexibility and freedom to respond to changing conditions and to make best use of the valuable spectrum resource. Following on from this, we considered in each case whether varying the relevant licences would be consistent with the minimum necessary to provide adequate protection against harmful interference.
- 2.5 We received 13 responses to the consultation, two of which were submitted in confidence. The non-confidential responses are published on Ofcom's website².
- 2.6 Sections 3 – 5 consider the responses to our proposals and set out our decisions, in respect of:
- The liberalisation all mobile licences in the 900 MHz, 1800 MHz and 2100 MHz bands to permit the deployment of LTE and WiMAX (4G) services, where such licenses have not already been liberalised (Section 3);

¹ [Variation of 900 MHz, 1800 MHz and 2100 MHz Mobile Licences](#)

² [Variation of Mobile Licences, Responses](#)

- An increase in the maximum permitted base station transmit power in the 900 MHz frequency band for UMTS (3G) and 4G technology (Section 4): and
- Amendment of the format and administrative terms of the 900 MHz, 1800 MHz and 2100 MHz licences (Section 5 and Annex 1).

Legal Framework

2.7 The applicable legal framework derives from our duties under both European and domestic legislation, specifically from:

- the Common Regulatory Framework for electronic communications networks and services, in particular, the Framework Directive and the Authorisation Directive together with a number of Decisions that apply to these specific spectrum bands; and
- 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.

European Law

2.8 There are a number of European Directives and Decisions that relate specifically to these frequency bands³.

2.9 Council Directive 87/372/EEC⁴, (the “GSM Directive”) reserved the frequency bands 880-915 MHz and 925-960 MHz for the introduction of public pan-European cellular communications using GSM (2G) technology. This was amended by Directive 2009/114/EC⁵ to include GSM (2G), UMTS (3G) “as well as for other terrestrial systems capable of providing electronic communications services that can coexist with GSM systems.”

2.10 The European Commission’s Radio Spectrum Committee (“RSC”) Decision 2009/766/EC⁶ the “3G RSC Decision”), as amended by Decision 2011/251/EU⁷ (the “LTE RSC Decision”), requires us to designate and make available the 900 MHz and 1800 MHz spectrum bands⁸ for LTE and WiMAX by 31 December 2011.

³The 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)].

⁴Council Directive 87/372/EEC of 25 June 1987 on the frequency bands to be reserved for the coordinated introduction of public pan-European cellular digital land-based mobile communications in the Community

⁵ Directive 2009/114/EC of the European Parliament and of the Council.

⁶ 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.

⁷ 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.

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

- 2.11 Further, on 15 February 2012, the European Parliament and the Council adopted a Decision implementing the first Radio Spectrum Policy Programme⁹ (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.”
- 2.12 On 5 November 2012 the European Commission made Commission RSC Decision 2012/688/EU¹⁰ which requires Member States to designate and make available the 2100MHz band¹¹ under conditions that enable the use of 4G technology by no later than June 2014, or earlier if issuing/amending rights in these bands. These technical conditions are defined by a block edge mask approach.
- 2.13 The Competition Appeal Tribunal’s judgment in *Telefónica O2 Limited v Office of Communications*¹² finds that the obligation to “designate and make available” requires us to ensure that any legal impediment to the relevant 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 in respect of each of the 900 MHz, 1800 MHz and 2100 MHz bands.
- 2.14 The authorisation of particular undertakings to use the 900 MHz, 1800 MHz and 2100 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 Directive.
- 2.15 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”.
- 2.16 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.
- 2.17 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

⁹ 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://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:081:0007:0017:EN:PDF>

¹⁰ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:307:0084:0088:EN:PDF>

¹¹ 2100 MHz band: 1921-1980 MHz paired with 2110-2170 MHz.

¹² [2010] CAT 25, Case Number: 1154/3/3/10.

- 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

Duties

- 2.18 The requirements of Article 8 of the Framework Directive are given effect to by our duties under the 2003 Act (in particular section 3 and 4) and the 2006 Act (in particular section 3).
- 2.19 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.
- 2.20 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.
- 2.21 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.
- 2.22 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.
- 2.23 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.
- 2.24 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. It also requires us to ensure that wireless telegraphy licence conditions are objectively justified in relation to the networks and services to which they relate, non-discriminatory, proportionate and transparent.

Powers

- 2.25 Section 9 of the 2006 Act gives Ofcom the power to grant wireless telegraphy licences subject to such terms as Ofcom thinks fit.
- 2.26 Schedule 1(6) of the 2006 Act gives Ofcom a general discretion to vary wireless telegraphy licences and sets out the process that Ofcom must follow.
- 2.27 Ofcom has a broad discretion under Schedule 1(6) of the 2006 Act to agree to vary licences but there are some limitations on that discretion. These include the following:
- UK obligations under EU law or international agreements where use of spectrum has been harmonised: Ofcom will not agree to remove restrictions from licences

or other changes that would conflict with the UK's obligations under international law;

- Ofcom must comply with any direction from the Secretary of State under section 5 of the 2003 Act or section 5 of the 2006 Act;
- Ofcom must act in accordance with its statutory duties, including the duty to ensure optimal use of the spectrum;
- General legal principles, which include the duties to act reasonably and rationally when making decisions and to take account of any legitimate expectations;
- Any restrictions on variation contained in the relevant licences themselves, subject Schedule 1(8)(5) of the 2006 Act.

Process for considering a licence variation request

2.28 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).

2.29 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.

2.30 The 2006 Act sets out in Schedule 1 a process for the variation of wireless telegraphy licences. As noted in the consultation document, in the case where a variation is proposed by the licensee, we were under no obligation (under the 2006 Act) to consult on the proposal.

2.31 However, we did so in this case, as we considered that the variation of licences in the 900 MHz, 1800 MHz and 2100 MHz bands to allow LTE use of the relevant frequencies was not likely to be considered to be a minor variation by interested third parties and this was also likely to be the case for increasing the maximum permitted base station transmit power in the 900 MHz frequency band for 3G technology.

2.32 At the same time we consulted on our proposals to make certain administrative changes to the 900 MHz, 1800 MHz and 2100 MHz licences.

2.33 In reaching a decision in each case, we have applied the same analytical framework which reflects our relevant regulatory objectives and our statutory duties, as set out above. Of particular relevance to our assessment are: our principal duty, which is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition, and our duty to promote optimal use of spectrum.

Section 3

Liberalisation of Technical Conditions in 900 MHz, 1800 MHz and 2100 MHz licences for 4G technologies

- 3.1 The current 900 MHz and 1800 MHz licences held by Vodafone and Telefónica permit the use of 2G (GSM) and 3G technologies, the licences having been varied in January 2011 to permit the use of 3G. The 1800 MHz licences held by EE and H3G now permit the use of 4G technologies (as well as 2G and 3G), having been varied to this effect from September 2012. Meanwhile, the current 2100 MHz licences permit the use of 3G technologies only, reflecting the technical conditions in the licences auctioned in 2000.
- 3.2 Our Consultation set out proposals which would have the effect of bringing these licences to a position where all 900 MHz, 1800 MHz and 2100 MHz licences could permit the deployment of 4G services as well by:
- varying the 900 MHz and 1800 MHz licence of Vodafone (and of Telefónica when they request, or consent to, such a change) to add LTE and WiMAX to the list of permitted technologies in their 900 MHz and 1800 MHz licences; and
 - varying the 2100 MHz licences of H3G and Vodafone (and those of Telefónica and EE when they request, or consent to, such a change) so that the technical licence conditions are changed to a Block Edge Mask which will permit the use of both 3G and 4G technologies in the paired frequency ranges¹³ (and any other technologies which can, in future, meet these technical conditions).
- 3.3 As context for these proposals, we noted that Ofcom has had a long standing policy to avoid unnecessary technology restrictions in spectrum licences and to maximise the flexibility with which spectrum can be used, subject to the need to limit the risk of harmful interference (“liberalisation”). More specifically, in the case of the existing MNO licences used for the provision of public mobile services (at 900 MHz, 1800 MHz and 2100MHz) our policy goal has been to remove the regulatory barriers that prevent the deployment of the latest available technology in these bands. In pursuit of this policy goal we have actively promoted, and participated in, the CEPT and EU work that has led to the adoption of common technical conditions that enable 4G use and which are included in the relevant RSC Decisions.¹⁴

¹³ The unpaired, or TDD, frequency ranges included in the 2100 MHz licences are the subject of ongoing regulatory work in CEPT and RSC. They are not included within the scope of the liberalisation proposals set out in this document.

¹⁴ The European Commission’s Radio Spectrum Committee (“RSC”) Decision 2009/766/EC (the “3G RSC Decision”), as amended by Decision 2011/251/EU (the “LTE RSC Decision”), requires Member States to designate and make available the 900 MHz and 1800 MHz spectrum bands¹⁴ for LTE and WiMAX by 31 December 2011. On 5 November 2012 the European Commission made Commission RSC Decision 2012/688/EU¹⁴ which requires Member States to designate and make available the 2100 MHz band¹⁴ under conditions that enable the use of 4G technology by no later than June 2014, or earlier if issuing/amending rights in these bands. These technical conditions are defined by a block edge mask approach.

- 3.4 Our Consultation considered the potential impact on competition of varying the licences so as to permit 4G. We considered in turn the potential impact of varying the 900 MHz and 1800 MHz licences and the potential impact of varying the 2100 MHz licences. In both cases we came to the provisional view that, for the reasons set out in the Consultation, the benefits to consumers of permitting 4G deployment were likely to outweigh any potential detriment that might, in principle, arise from distortions to competition. This assessment was made before the completion of the auction of the 800MHz and 2.6GHz bands, but took into account the fact that this auction would lead to new spectrum becoming available for deployment of 4G services in the short term. This auction was successfully completed on 20 February 2013, well before the deadline for submission of responses to this Consultation, and stakeholders will therefore have been able to take account of the auction outcome in their responses to this Consultation.
- 3.5 Our Consultation explained that the proposed licence variations to permit 4G use should not adversely affect adjacent users by comparison with the existing position. This was because the interference potential from a UMTS base station (which can, and are, deployed under the existing licence terms) is, in practical terms, the same as that from a WiMAX or LTE base station transmitting in an equivalent bandwidth at the same power. Not only should the impact on adjacent users of the in-band power limit be equivalent, but:
- for the 900 and 1800 MHz bands, the out-of-band spectrum emission masks are identical for UMTS and for 5, 10, 15 and 20 MHz LTE¹⁵ carriers and there are only minor differences between UMTS and 5 and 10 MHz WiMAX carriers
 - for the 2100 MHz band, a technology neutral block-edge-mask was proposed, hence the out-of-band requirements are identical for UMTS, LTE and WiMAX.

Responses

- 3.6 All of the respondents, bar one, supported the proposals to vary the licences as proposed so as to permit the use of 4G technology available. In addition, Telefónica and EE have since requested that their licences also be varied as proposed.
- 3.7 The other respondent did not oppose the proposed variation but commented on the possible implication of the variation for the coordination procedures between the licences and adjacent use. We are writing separately to the parties that are covered by this coordination procedure.
- 3.8 In its response, EE suggested that variation to permit 4G should cover the TDD frequency ranges in the 2100 MHz licences as well as the FDD frequency ranges. In line with our general policy, we seek to avoid unnecessary technology restrictions in spectrum licences and to maximise the flexibility with which spectrum can be used, subject to the need to limit the risk of harmful interference. As observed in the footnote to paragraph 3.2 of the Consultation, there is ongoing regulatory work in Europe to examine potential future uses of the TDD frequency ranges included in the 2100MHz licences and the technical conditions that might be required to enable such uses. In the absence of concrete plans to deploy services using the TDD spectrum in these licences, we did not consider it sensible to consider variation of the technical conditions for UK operators until that work has concluded. However, we note that CEPT's SE42 project team did recommend a set of technical conditions that would

¹⁵ Note that 15 and 20 MHz LTE carriers are not included in the current 3GPP specifications for the 900 MHz band

be appropriate for 4G use of these TDD frequencies; it recommended significantly lower power limits than in the current licences (with these power limits being different for different TDD frequency blocks) in order to protect adjacent FDD use of the 2100MHz band. If EE (or other operators) make a formal application to vary their licences, the sole effect of which would be to reflect these technical conditions for 4G use of their TDD blocks, then we will consult on a proposal to make the appropriate licence variations.

Decision

- 3.9 In light of the assessment set out in our Consultation and the responses received we have decided, for the reasons set out above, to vary the mobile licences in the 900 MHz, 1800 MHz and 2100 MHz bands to permit the deployment of LTE and WiMAX (4G) services, where such licenses have not already been liberalised. Both H3G and Vodafone requested such variations prior to the publication of our consultation. As noted above, Telefónica and EE have since requested that the equivalent variations be made to their licences. Accordingly, we are varying the 900 MHz, 1800 MHz and 2100 MHz licences so that the licences of all operators will permit the deployment of LTE and WiMAX (4G) services.
- 3.10 This decision delivers a long standing objective to liberalise all mobile licences so as to remove the regulatory barriers to deployment of the latest available mobile technology. Even though operators may not seek to deploy 4G services in the newly liberalised bands in the immediate future, the interests of consumers will be served by the fact that these bands have been liberalised now, ahead of a market led transition to their use for 4G technology in future. As a result, operators can plan and implement a transition to 4G technology in these bands without having to engage in a further regulatory process.

Section 4

Increase in the 900 MHz maximum permitted base station transmit power for UMTS and 4G technology

- 4.1 Towards the end of 2012 we received a request from both Telefónica and Vodafone to vary their 900 MHz licences to increase the maximum permitted base station transmit power for UMTS 900 technology by 3 dB. Our Consultation set out our assessment of the competition and technical impacts of an increase in the current power limit from 62 dBm e.i.r.p. per carrier¹⁶ to 65 dBm e.i.r.p. per carrier for both 3G and 4G technology. This assessment suggested that the power increase could bring a number of benefits for consumers as a result of the greater flexibility this would provide to operators in meeting consumer demand; it also suggested that the scale of change would be unlikely to lead to consumer detriment through distortions to competition. Our technical assessment indicated that the power increase would be unlikely to lead to a significant increase in the interference environment experienced by existing systems operating in neighbouring spectrum. We consulted on our provisional view that the licences should be varied to permit the power increase.

Responses

- 4.2 The majority of the respondents supported the proposal to increase the maximum permitted power in the 900 MHz band. H3G was the only respondent that disagreed with the proposal although its reasons for objection were conditional as explained below. Three other respondents queried specific points raised by the proposal.
- 4.3 H3G objected to the power increase to 65 dBm e.i.r.p. per carrier for the 900 MHz licensees alone and argued that, instead, the power limits in each of the 800 MHz, 900 MHz and 1800 MHz licences should be increased to 65 dBm e.i.r.p. per carrier at the same point in time. In line with this position, H3G submitted a formal request for an increase in the current power limits in its 800 MHz and 1800 MHz licenses alongside its response to our Consultation.
- 4.4 H3G objected to an increase in the 900 MHz licence power limit on its own on the grounds that this could be an advantage for 900 MHz licensees with reference to the ICNIRP thresholds on shared sites (the ICNIRP thresholds set limits on the power flux density to which humans should be exposed). We understand the logic of H3G's comments to be as follows: if the cumulative transmissions of different operators at the current maximum permitted power levels are close to these ICNIRP thresholds (but do not exceed them so that this is still some headroom) – and if an increase of 3dB in the permitted maximum power at all frequencies had the effect of taking the cumulative transmissions above the ICNIRP threshold (i.e using up all the existing headroom) – then the act of increasing the maximum permitted power in the 900MHz band before doing so in other bands (such as 800MHz and 1800MHz) would give the 900MHz licensees an advantage in using up the existing headroom.

¹⁶ UMTS carriers use a nominal frequency separation of 5 MHz but operators have the option to squeeze carriers together (at the expense of overall performance) if there is a need – potentially down to 4.4 MHz.

- 4.5 H3G did not provide any analysis or practical evidence to support this argument. Ofcom's own analysis¹⁷ of theoretical deployments suggests that this situation is very unlikely to arise.
- 4.6 Accordingly, we consider that the risk of consumer detriment arising from a distortion to competition on these grounds is minimal and does not justify a delay in granting the Telefónica and Vodafone requests to increase the maximum permitted power in their 900MHz licences.
- 4.7 EE agreed with the proposed power increase at 900MHz but felt that the increased power limit should not be available to the 900 MHz licensees before the 30th June 2013 date at which all four MNOs are required to demonstrate their compliance with the 3G coverage obligation; it suggested that the 900MHz licensees might otherwise have an advantage over licensees in meeting this obligation. In practice, this will not now be a relevant consideration as that date has passed. EE also requested that the power limit in its 1800MHz licence be increased by 3 dBm.
- 4.8 Both H3G and EE were aware in December 2012 of the scope of the impending Consultation on variation of the 900MHz, 1800MHz and 2100MHz licences and that this scope included an increase in the maximum permitted power of the 900MHz licences. However, we note that neither company requested at that time that the scope of this Consultation be extended to consider an increase in the maximum permitted power in their 1800MHz licences as well. Now that we are in receipt of H3G's and EE's requests for a power increase we will consider this in the normal way as part of a new consultation process. In this context, our initial view is that there may be merit in reviewing the approach to setting the relevant technical conditions in all the mobile licences so as to manage interference risks without needing to specify in-band power limits. Subject to resource availability, we expect to commence this work in the autumn.
- 4.9 Another respondent did not oppose the proposed variation but commented on the possible implication of the variation for the coordination procedures between the licensed 900MHz and adjacent use. We are writing separately to the parties that are covered by this coordination procedure.
- 4.10 One response from a private individual suggested that increased power would create more radio frequency noise, suggesting taller masts might be a better alternative. However, this is an issue one for the operators themselves to assess when they plan their network deployments.

¹⁷ This analysis considered the power flux density that could be created by a site with multiple antennas operating simultaneously at different frequencies, all operating at maximum permitted power levels. It compared the resulting power flux density with the ICNIRP limits. The analysis showed that the power flux density represented a very small proportion of the ICNIRP limit and that this proportion remained very small when the maximum permitted power levels were increased by 3dB at all frequencies (and not just the 900MHz band).

Decision

- 4.11 In light of the assessment set out in our Consultation and the responses received, we have decided to vary the 900 MHz licences of Telefonica and Vodafone so as to increase the maximum permitted in-band power by 3dB from 62 dBm e.i.r.p. per carrier¹⁸ to 65 dBm e.i.r.p. per carrier for 3G technology and to 65 dBm e.i.r.p. per 5MHz for LTE and WiMAX technology (nb. the out of band power limits remain unchanged). We will consider the requests from H3G and EE to increase the power limit in the 1800MHz and 800MHz licences as part of a separate consultation exercise that we expect to undertake later this year.

¹⁸ UMTS carriers use a nominal frequency separation of 5 MHz but operators have the option to squeeze carriers together (at the expense of overall performance) if there is a need – potentially down to 4.4 MHz.

Section 5

Other proposed changes to the 900 MHz, 1800 MHz and 2100 MHz licences

5.1 The Consultation proposed a number of other “housekeeping” changes in order to align the terms and conditions in the existing licences (which were drafted many years ago) more closely with the terms and conditions in the licences awarded recently in the auction of 800 MHz and 2.6 GHz spectrum. In addition, we proposed to remove the 80% coverage obligation in the 2100 MHz licence in light of the new 90% coverage obligation.

Removal of 80% coverage obligation

5.2 The 2100 MHz (3G) licences awarded by auction in 2000 contained a condition requiring the provision of a Communication Service covering, from 31 December 2007, an area where 80% of the UK population live. We proposed to remove this 80% coverage obligation since:

- it provides no practical consumer benefit now that the new 90% coverage obligation is effective as from June 30th 2013 (defined as an obligation to cover, from 30th June 2013, 90% of the population with 90% probability of at least 768kbps outdoors in a lightly loaded cell); and
- the only practical significance of the 80% obligation is that it could constrain the flexibility of the MNOs to optimise their provision of services to customers using a combination of different frequency bands (as the 80% coverage obligation obliges the operators to meet this obligation using 2100MHz spectrum alone whereas the 90% coverage obligation allows the operators to meet the obligation more flexibly using any frequencies).

5.3 Most of the respondents, including the licensees themselves, supported the removal of the 80% coverage obligation for 2100 MHz (3G) licences and nobody opposed its removal. BEIRG commented on the implementation of the 90% obligation; however this licence condition was not a subject of this Consultation, having been introduced last year under Direction from the Secretary of State.

Closer alignment of terms and conditions across mobile licences

5.4 The purpose of the other changes proposed to the terms and conditions of the 900MHz, 1800MHz and 2100MHz licences were to align them more closely with the terms and conditions in the new licences awarded in the 800 MHz and 2.6 GHz spectrum. We explained that we would not expect these changes to have any significant practical impact on the licensees. We noted that the changes could only be made with the consent of the licensees.¹⁹

5.5 The responses from the licensees themselves indicated that they were content for the changes to be made with one exception mentioned below. Vodafone sought

¹⁹ Although Ofcom may give 5 years' notice of these changes in writing for spectrum management reasons (such notice not to be given before 31st December 2016 in the case of the 2100 MHz licences)

confirmation that these changes were for reasons of effective use and administrative convenience and not to introduce additional regulatory requirements. Ofcom is happy to confirm this is so. No other respondents objected to these changes.

- 5.6 The exception is that EE did not agree with the proposed change from 100m to 1m for the national grid reference resolution with which the licensee is required to maintain records in respect of these licences. As licensee consent is required to make this change, we have decided not to proceed with it. However, we do not consider this to be a material issue and note that Ofcom has powers to request information from licensees to this finer level of resolution should we need it in order to perform our functions.
- 5.7 One change to the licence conditions relates to clarification of the geographical coverage of the licences (the UK including territorial sea but not the Channel Islands or Isle of Man). EE questioned whether the licence coverage included the Channel Tunnel. Ofcom's understanding is that mobile operators have no physical or wireless telegraphy access to the Channel Tunnel, except through agreement with the tunnel operator, Eurotunnel Limited. Ofcom has secured assurance from Eurotunnel that any participating UK or French operator is eligible for inclusion in the authorisation of use within the tunnel(s) and this is reflected in an MoU we have concluded with the French regulatory authorities. In the event of any UK operator choosing to provide services in the Channel Tunnel, Ofcom will ensure that the appropriate authorisation is in place to enable this.
- 5.8 The licensees also noted the need for the following corrections to the draft licences:
- in Schedule 1, paragraph 8 of Public Wireless Network licence, we have included the condition: "the channel edge of any of their LTE carriers is 200 kHz or more inside any edge of their permitted frequency bands where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum";
 - In Schedule 1, Paragraph 11 of Public Wireless Network licence, we have amended the definition of "1800 MHz Spectrum" so that it refers only to the frequencies covered by the Public Wireless Network licences;
 - In Schedule 2, paragraph 11(a) of the 2100 MHz Licence, we have corrected the definition referring to "unpaired spectrum".

Decision

- 5.9 In light of the responses to our Consultation and for the reasons set out above, we have decided to remove the 80% coverage obligation from the 2100MHz licences and to proceed with the other changes to terms and conditions in 900MHz, 1800MHz and 2100MHz licences with the exception of the change in resolution for maintaining records (which will, accordingly, remain at 100m in these licences). A final version of the varied licence template is annexed to this Statement.

Annex 1

Template Public Wireless Network Licence

**Wireless Telegraphy Act 2006
Office of Communications (Ofcom)**

PUBLIC WIRELESS NETWORK LICENCE

This Licence replaces the Licence issued by the Office of Communications (Ofcom) on [date] to [Company Name]

Licence no. **XXXXX**
Date of issue: **[DATE]**
Fee payment date: **[DATE]** (annually)

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to

[Company Name]
(Company registration number xxxxxxxx)
("the Licensee")
xxxxxxxxxxxx
xxxxxxxxxxxx
xxxxxxxxxxxx
xxxxxx

to establish, install and use wireless telegraphy stations and/or wireless telegraphy apparatus as described in the Schedules to this Licence (together "the Radio Equipment") subject to the terms set out below.

Licence Term

2. This Licence shall continue in force until revoked by Ofcom or surrendered by the Licensee.

Licence Variation and Revocation

3. Pursuant to Schedule 1 paragraph 8 of the Wireless Telegraphy Act 2006 ("the Act"), Ofcom may not revoke or vary this Licence under Schedule 1 paragraph 6 of the Act except:
 - (a) at the request, or with the consent, of the Licensee;
 - (b) if there has been a breach of any of the terms of this Licence;
 - (c) in accordance with Schedule 1 paragraph 8(5) of the Act;
 - (d) if it appears to Ofcom to be necessary or expedient to revoke or vary the licence for the purpose of complying with a direction by the Secretary of State given to Ofcom under Section 5 of the Act or Section 5 of the Communications Act 2003;

- (e) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of regulations made by Ofcom under the powers conferred by section 30(1) and 30(3) of the Act²⁰;
 - (f) for reasons related to the management of the radio spectrum, provided that in such a case the power to revoke may only be exercised after at least five years' notice is given in writing.
4. Ofcom may only revoke or vary this Licence by notification in writing to the Licensee and in accordance with Schedule 1 paragraphs 6, 6A and 7 of the Act.

Transfer

5. This Licence may not be transferred. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act.²¹

Changes to Licensee details

6. The Licensee must give prior notice to Ofcom in writing of any change in the details of the name and/or address recorded in paragraph 1 of this licence.

Fees

7. The Licensee shall each year pay to Ofcom the relevant fee(s) as provided in section 12 of the Act and the regulations made thereunder on or before the fee payment date shown above, or on or before such dates as shall be notified in writing to the Licensee.

Radio Equipment Use

8. The Licensee shall ensure that the Radio Equipment is established, installed and used only in accordance with the provisions specified in Schedule 1 of this Licence. Any proposal to amend any detail specified in Schedule 1 of this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.
9. The Licensee must ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with, the terms of this Licence.

²⁰ These are regulations on spectrum trading.

²¹ See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

Access and Inspection

10. The Licensee shall permit a person authorised by Ofcom:
- (a) to have access to the Radio Equipment; and
 - (b) to inspect this Licence and to inspect, examine and test the Radio Equipment,
- at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

Modification, Restriction and Closedown

11. A person authorised by Ofcom may require the Radio Equipment, or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:
- (a) a breach of this Licence has occurred; and/or
 - (b) the use of the Radio Equipment is causing or contributing to undue interference to the use of other authorised radio equipment.
12. Ofcom may require the Radio Equipment to be modified or restricted in use, or temporarily or permanently closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may exercise this power by a written notice served on the Licensee or by a general notice applicable to holders of this class of Licence.

Geographical Boundaries

13. Subject to the requirements of any coordination procedures notified to the Licensee pursuant to paragraphs 5 and 6 of Schedule 1 to this Licence, the Licensee is authorised to establish, install and use the Radio Equipment in the United Kingdom. For the avoidance of doubt, the United Kingdom includes the United Kingdom's territorial sea (measured in accordance with section 1 of the Territorial Sea Act 1987) and does not include the Channel Islands or the Isle of Man.

Interpretation

14. In this Licence:
- (a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of wireless telegraphy stations and installation and use of wireless telegraphy apparatus for wireless telegraphy as specified in section 8(1) of the Act;
 - (b) the expression "interference" shall have the meaning given by section 115 of the Act;

- (c) the expressions “wireless telegraphy station” and “wireless telegraphy apparatus” shall have the meanings given by section 117 of the Act;
- (d) the schedule forms part of this Licence together with any subsequent schedule(s) which Ofcom may issue as a variation to this Licence; and
- (e) the Interpretation Act 1978 shall apply to the Licence as it applies to an Act of Parliament.

Issued by Ofcom

Office of Communications

SCHEDULE 1 TO LICENCE NUMBER: [XXXXXX]

Licence Category: **Public Wireless Network**

This schedule forms part of licence no [XXXXXX], issued to [Company name], the Licensee on [Date], and describes the Radio Equipment covered by the Licence and the purpose for which the Radio Equipment may be used.

Description of Radio Equipment Licensed

1. In this Licence, the Radio Equipment means the base transceiver stations or repeater stations forming part of the Network (as defined in paragraph 2 below).

Purpose of the Radio Equipment

2. The Radio Equipment shall form part of a radio telecommunications network ("the Network"), in which User Stations which meet the appropriate technical performance requirements as set out in the relevant Wireless Telegraphy (Exemption) Regulations made by Ofcom communicate by radio with the Radio Equipment to provide a telecommunications service.

Interface Requirements for the Radio Equipment

3. Use of the Radio Equipment shall be in accordance with the following Interface Requirements:

IR 2014 – Public Wireless Networks; and/or
IR 2019 – Third Generation Mobile; and/or
IR 2087 – 900 / 1800 MHz LTE and WiMAX;

or for equipment placed on the market before 8 April 2000, is required to be type approved in accordance with a recognised technical performance standard relating to the service licensed.

Special Conditions relating to the Operation of the Radio Equipment

4. (a) Subject to paragraph 4(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:
 - i) postal address (including post code);
 - ii) National Grid Reference, to at least 100 metre resolution;

- iii) antenna height (above ground level) and type, and boresight east of true north (if applicable); and
- iv) radio frequencies which the Radio Equipment uses;

and the Licensee must produce these above records if requested by a person authorised by Ofcom.

- (b) The conditions relating to the keeping of records contained in sub-paragraphs 4(a)i), 4(a)ii) and 4(a)iii), shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.
- (c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph (a) above at such intervals as Ofcom shall notify to the Licensee.

Co-ordination at Frequency and Geographical Boundaries and Compliance with Other Procedures Relating to Interference

- 5. The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

International Cross-Border Coordination

- 6. The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

Permitted Frequency Blocks

- 7. The Radio Equipment may only transmit on downlink frequencies within the following frequency bands (the Permitted Frequency Blocks):

Downlink frequencies	Uplink frequencies
[880 – 915 MHz]	[925 – 960 MHz]
[1710 – 1785 MHz]	[1805 – 1880 MHz]

Radio Frequency Carrier Spacing

- 8. In the absence of bilateral or multilateral agreements which have been notified to Ofcom specifying alternative arrangements between the licensee and the licensee(s) of neighbouring networks the licensee must ensure that in respect of the frequencies set out at paragraph 6 of this schedule:
 - the centre frequency of any of their GSM carriers is 100 kHz or more inside any edge of their permitted frequency blocks; and
 - the centre frequency of any of their UMTS carriers is 2.7 MHz or more inside any edge of their permitted frequency blocks where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum; and

- the centre frequency of any of their UMTS carriers is 2.5 MHz or more inside any other edge of their permitted frequency blocks;
- the channel edge of any of their LTE carriers is 200 kHz or more inside any edge of their permitted frequency blocks where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum; and
- the channel edge of any of their LTE carriers does not extend beyond their permitted frequency blocks;
- the channel edge of any of their WiMAX carriers is 200 kHz or more inside any edge of their permitted frequency blocks where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum; and
- the channel edge of any of their WiMAX carriers does not extend beyond their permitted frequency blocks.

ITU Class of Emission

9.	For GSM:	271KG7W
	For UMTS:	5M00D7W
	For 1.4 MHz LTE:	1M40D7W
	For 3 MHz LTE:	3M00D7W
	For 5 MHz LTE:	5M00D7W
	For 10 MHz LTE:	10M0D7W
	For 15 MHz LTE:	15M0D7W
	For 20 MHz LTE:	20M0D7W
	For 5 MHz WiMAX:	5M00D7W
	For 10 MHz WiMAX:	10M0D7W

Maximum Permissible Downlink Transmit Power

10. The power transmitted (in e.i.r.p.) in any direction on the downlink frequencies of the Permitted Frequency Blocks by the Radio Equipment shall not exceed:

Technology	900 MHz spectrum	1800 MHz spectrum
for GSM	62 dBm per carrier	62 dBm per carrier
for UMTS	65 dBm per carrier	62 dBm per carrier
for LTE	65 dBm per 5 MHz	62 dBm per 5 MHz
for WiMAX	65 dBm per 5 MHz	62 dBm per 5 MHz

Interpretation

11. In this Schedule:
- “900 MHz spectrum” means frequencies in the range 880 MHz to 915 MHz paired with 925 MHz to 960 MHz;
 - “1800 MHz spectrum” means frequencies in the range 1710 MHz to 1781.7 MHz paired with 1805 MHz to 1876.7 MHz;

- (c) “dBm” means the power level in decibels (logarithmic scale) referenced against 1 milliwatt (i.e. a value of 0 dBm is 1 milliwatt);
- (d) “e.i.r.p.” means the effective isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);
- (e) “A femtocell” means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm e.i.r.p. per carrier which may be established by customers of the Network but which is or will be used only by and under the control of the Network, following the establishment of a telecommunications link between the femtocell and the Network;
- (f) “GSM system” means an electronic communications network that complies with GSM standards, as published by ETSI, in particular EN 301 502 and EN 301 511 and “GSM” means pertaining to such a network or its Radio Equipment;
- (g) “GSM-R” means the variant of GSM for railways as specified in IR2064;
- (h) “IR” means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.
- (i) “ITU” means the International Telecommunications Union, and “Class of Emission” shall have the meaning as defined in the ITU Radio Regulations Appendix 1.
- (j) “LTE system” means an electronic communications network that complies with the LTE standards as published by ETSI, in particular EN 301 908-1, EN 301 908-13, EN 301 908-14, EN 301 908-15 and EN 301 908-11 and “LTE” means pertaining to such a network or its Radio Equipment;
- (k) “Permitted Frequency Blocks” has the same meaning given to it in paragraph 6 of this Schedule;
- (l) “User Station” means any vehicle mounted or hands portable mobile station designed for mobile use and/ or any station designed or adapted to be established and used from static locations which meet the appropriate technical performance requirements as set out in the Wireless Telegraphy (Exemption) Regulations and either complies with the appropriate Interface Regulation listed in paragraph 3, or for equipment placed on the market before 8 April 2000, is type approved in accordance with a recognised technical standard relating to the service licensed.
- (m) A “smart/intelligent low power repeater” means a repeater which operates with power not exceeding 24dBm e.i.r.p. per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:
- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;

- The repeater operates only on the Licensee's frequencies and with their valid Public Land Mobile Network Identifier;
 - Must not cause undue interference to other spectrum users; and
 - The repeater only transmits on the Licensee's Base Receive frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.
- (n) "UMTS system" means an electronic communications network that complies with the UMTS standards as published by ETSI, in particular EN 301 908-2, EN 301 908-3 and EN 301 908-11 and "UMTS" means pertaining to such a network or its Radio Equipment; and
- (o) "WiMAX system" means an electronic communications network that complies with the WiMAX standards as published by ETSI, in particular EN 301 908-1, EN 301 908-21 and EN 301 908-22 and "WiMAX" means pertaining to such a network or its Radio Equipment.

Ofcom

Annex 2

Template 2100 MHz Licence

**Office of Communications (Ofcom)
Wireless Telegraphy Act 2006**

SPECTRUM ACCESS 2100 MHz LICENCE

This Licence replaces the licence issued by the Office of Communications (Ofcom) on [date] to [Company Name].

Licence no: **xxxxxxx**

Date of issue: **[DATE]**

Fee payment date **1 January** (annually)
(from 1 January 2022)

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to

[Company Name]

(Company registration number xxxxxxxx)
("the Licensee")

xxxxxxxxxxxx

xxxxxxxxxxxx

xxxxxxxxxxxx

xxxxxxx

to establish, install and use wireless telegraphy stations and/or wireless telegraphy apparatus as described in the Schedules to this Licence (together "the Radio Equipment") subject to the terms set out below.

Licence Term

2. This Licence shall continue in force until revoked by Ofcom or surrendered by the Licensee.

Licence Variation and Revocation

3.
 - (1) Pursuant to Schedule 1 paragraph 8 of the Wireless Telegraphy Act 2006 ("the Act"), Ofcom may not revoke or vary this Licence under Schedule 1 paragraph 6 of the Act except:
 - (a) at the request, or with the consent, of the Licensee;
 - (b) if there has been a breach of any of the terms of this Licence;
 - (c) in accordance with Schedule 1 paragraph 8(5) of the Act;

- (d) if it appears to Ofcom to be necessary or expedient to revoke the licence for the purpose of complying with a direction by the Secretary of State given to Ofcom under Section 5 of the Act or Section 5 of the Communications Act 2003;
 - (e) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of regulations made by Ofcom under the powers conferred by section 30(1) and 30(3) of the Act²²;
 - (f) for reasons related to the management of the radio spectrum, provided that in such a case the power to revoke may only be exercised after at least five years' notice is given in writing (such notice not to be given before 31 December 2016).
- (2) In the period before 31 December 2021, pursuant to Schedule 1 paragraph 8(1) of the 2006 Act, Ofcom may not vary this Licence under Schedule 1 paragraph 6 of the 2006 Act save at the request or with the consent of the Licensee except:
- (a) in the circumstances specified in paragraphs (b), (c) and (d) of subparagraph (1) of the paragraph; or
 - (b) in relation only to paragraphs 7 and 8 of Schedule 1, if Ofcom has reasonable grounds for concluding that use of the Radio Equipment in accordance with either or both of these paragraphs is causing, or is likely to cause, undue interference to other authorised radio equipment.
4. After 31 December 2021, Ofcom may only vary this Licence by notification in writing to the Licensee and in accordance with Schedule 1 paragraphs 6, 6A and 7 of the Act.

Transfer

5. This Licence may not be transferred. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act²³.

Changes to Licensee details

6. The Licensee shall give prior notice to Ofcom in writing of any changes to the Licensee's name and/or address as recorded in paragraph 1 of this Licence.
7. If the Licence is surrendered or revoked no refund of the fee which was paid by xxxxx Limited whether in whole or in part will be made except at the absolute discretion of the Secretary of State in accordance with regulation 5 of the Wireless Telegraphy (Third Generation Licences) Regulations 1999.

²² These are regulations on spectrum trading.

²³ See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

Fees

8. From 1 January 2022, the Licensee shall each year pay to Ofcom the relevant fee(s) as provided in section 12 of the Act and the regulations made thereunder on or before the fee payment date shown above, or on or before such dates as shall be notified in writing to the Licensee.
9. The Licensee shall also pay interest to Ofcom on any amount which is due to Ofcom under the terms of this Licence or provided for in any regulations made by Ofcom under sections 12 and 13(2) of the Act from the date such amount falls due until the date of payment, calculated with reference to the Bank of England base rate from time to time. In accordance with section 15 of the Act any such amount and any such interest is recoverable by Ofcom.
10. If the Licence is surrendered or revoked, no refund, whether in whole or in part of any amount which is due under the terms of this Licence or provided for in any Regulations made by Ofcom under sections 12 and 13(2) of the Act will be made, except at the absolute discretion of Ofcom.

Penalty

11. Ofcom may impose a penalty on the Licensee in accordance with section 43A of the 2006 Act if the Licensee is or has been in contravention of the provisions specified in Schedule 1 paragraph 4(b) of this Licence.

Radio Equipment Use

12. The Licensee shall ensure that the Radio Equipment is constructed and used only in accordance with the provisions specified in Schedule 1 of this Licence. Any proposal to amend any detail specified in Schedule 1 of this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.
13. The Licensee shall ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with, the terms of this Licence.

Access and Inspection

14. The Licensee shall permit a person authorised by Ofcom:
 - (a) to have access to the Radio Equipment; and
 - (b) to inspect this Licence and to inspect, examine and test the Radio Equipment,

at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

Modification, Restriction and Closedown

- 15.** A person authorised by Ofcom may require the Radio Equipment or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:
- (a) a breach of this Licence has occurred; and/or
 - (b) the use of the Radio Equipment is, or may be, causing or contributing to undue interference to the use of other authorised radio equipment.
- 16.** Ofcom may require any of the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice has been served on the Licensee or by a general notice applicable to holders of this class of Licence has been published.

Geographical Boundaries

- 17.** Subject to the requirements of any coordination procedures notified to the Licensee pursuant to paragraphs 5 and 6 of Schedule 1 to this Licence, the Licensee is authorised to establish, install and use the Radio Equipment in the United Kingdom. For the avoidance of doubt, the United Kingdom includes the United Kingdom's territorial sea (measured in accordance with section 1 of the Territorial Sea Act 1987) and does not include the Channel Islands or the Isle of Man.

Interpretation

- 18.** In this Licence:
- (a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of wireless telegraphy stations and installation and use of wireless telegraphy apparatus for Wireless Telegraphy as specified in section 8(1) of the Act;
 - (b) the expression "interference" shall have the meaning given by Section 115 of the Act;
 - (c) the expressions "wireless telegraphy station" and "wireless telegraphy apparatus" shall have the meanings given by section 117 of the Act;
 - (d) the schedules form part of this Licence together with any subsequent schedule(s) which Ofcom may issue as a variation to this Licence; and
 - (e) the Interpretation Act 1978 shall apply to the Licence as it applies to an Act of Parliament.

Issued by Ofcom

Office of Communications

SCHEDULE 1 TO LICENCE NUMBER: [XXXXXXX]

Schedule date: xx xxxx 2013

Licence Category: **Spectrum Access Licence (2100 MHz – Paired Spectrum)**

Description of Radio Equipment Licensed

1. In this Licence, the Radio Equipment means the base transceiver stations or repeater stations forming part of the Network (as defined in paragraph 2 below).

Purpose of the Radio Equipment

2. The Radio Equipment shall form part of a radio telecommunications network ("the Network"), in which approved user stations communicate by radio with the Radio Equipment to provide a telecommunications service.

Approved Standards for the Radio Equipment

3. Use of the Radio Equipment shall be in accordance with the following Interface Requirements:

IR 2019 – Third Generation Mobile;

IR 2092 – Terrestrial systems capable of providing electronic communications services in the frequency bands 1920 – 1980 MHz and 2110 – 2170 MHz;

or for equipment placed on the market before 8 April 2000, is required to be type approved in accordance with a recognised technical performance standard relating to the service licensed.

Special Conditions relating to the Radio Equipment

4.
 - (a) The Licensee shall by no later than 30 June 2013 provide and thereafter maintain an electronic communications network that is capable of providing mobile telecommunications services to an area within which at least 90% of the population of the United Kingdom lives and with a 90% probability that users in outdoor locations within that area can receive the service with a sustained downlink speed of not less than 768kbps in a lightly loaded cell. Section 43A of the 2006 Act shall apply to any contravention of this provision.
 - (b) Subject to paragraph 4(d) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate records of the following details relating to the Radio Equipment:
 - i) postal address (including post code);
 - ii) National Grid Reference, to at least 100 metre resolution;
 - iii) antenna height (above ground level) and type, and boresight east of true north (if applicable);
 - iv) radio frequencies which the Radio Equipment uses; and

without prejudice to this paragraph (c), the Licensee shall furnish to Ofcom in such a manner and at such times as reasonably requested, information in the form of documents, accounts, estimates, returns and any other information, which may be reasonably required for the purposes of verifying compliance with this Licence and for statistical purposes.

- (c) The conditions relating to the keeping of records contained in sub-paragraphs 4(c)i), 4(c)ii) and 4(c)iii) shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.
- (d) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 4(c) above at such intervals as Ofcom shall notify to the Licensee.
- (e) The Licensee shall, upon request, supply Ofcom or any person authorised on their behalf with the name and address of any subscribing customers of the Network, or require its agents to provide such information on its behalf.

Co-ordination at Frequency and Geographical Boundaries and Compliance with Other Procedures Relating to Interference

- 5. The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

International Cross-Border Coordination

- 6. The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time

Permitted Frequency Blocks

- 7. Subject to the emissions permitted under paragraph 8 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the “Permitted Frequency Blocks”):

Downlink frequencies	Uplink frequencies
[1920 – 1980 MHz]	[2110 – 2170 MHz]

Maximum Permissible Transmit Power

- 8. The power transmitted in any direction in the Permitted Frequency Blocks by the Radio Equipment shall not exceed:

- (a) Downlink frequencies

	Maximum mean e.i.r.p.	Measurement bandwidth
Radio Equipment	65 dBm	5 MHz

(b) Uplink Frequencies

	Maximum mean
Mobile or nomadic Radio Equipment	24 dBm TRP
Fixed or installed Radio Equipment	24 dBm e.i.r.p.

Maximum Power outside the Permitted Frequency Blocks

9. For transmissions on the downlink frequencies, the e.i.r.p. emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirement and (b) the block specific requirements for that frequency;

(a) Baseline Requirements

	Maximum mean e.i.r.p.	Measurement bandwidth
Frequencies spaced more than 10 MHz from the lower or upper block edge	9 dBm	5 MHz

(b) Block-specific requirements

Frequency range	Maximum mean e.i.r.p.	Measurement bandwidth
-10 to -5 MHz from lower block edge	11.0 dBm	5 MHz
-5 to 0 MHz from lower block edge	16.3 dBm	5 MHz
0 to +5 MHz from upper block edge	16.3 dBm	5 MHz
+5 to +10 MHz from upper block edge	11.0 dBm	5 MHz

The baseline and block-specific requirements are defined per antenna and applicable to configurations with up to four antennas per sector.

Interpretation

10. In this Schedule:

- (a) "2100 MHz paired spectrum" means frequencies in the range 1920 MHz to 1980 MHz paired with 2110 MHz to 2170 MHz;
- (b) "dBm" means the power level in decibels (logarithmic scale) referenced against 1 milliwatt (i.e. a value of 0 dBm is 1 milliwatt);
- (c) "e.i.r.p." means the effective isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);
- (d) A "femtocell" means Radio Equipment transmitting on the downlink frequencies which operates at a power not exceeding 20dBm e.i.r.p. per carrier which may be established by customers of the Network but which is or will be used only by and under the control of the Network, following the establishment of a telecommunications link between the femtocell and the Network;
- (e) "Fixed or installed" means used or installed at specific fixed points;

- (f) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity;
- (g) "lower block edge" means, in relation to the Permitted Frequency Block, the lowest frequency in that Permitted Frequency Block;
- (h) "measurement bandwidth" means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;
- (i) "mobile or nomadic" means intended to be used while in motion or during halts at unspecified points;
- (j) "Permitted Frequency Blocks" has the same meaning given to it in paragraph 6 of this Schedule;
- (k) A "smart/intelligent low power repeater" means a repeater which operates with power not exceeding 24dBm E.I.R.P. per carrier, which may be established by customers of the Network who have written agreements with the Licensee and:
- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
 - The repeater operates only on the Licensee's frequencies and with their valid Public Land Mobile Network Identifier;
 - Must not cause undue interference to other spectrum users; and
 - The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.
- (l) "TRP" means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere;
- (m) "upper block edge" means, in relation to the Permitted Frequency Block, the highest frequency in that Permitted Frequency Block; and
- (n) "User Station" means any vehicle mounted or hands portable mobile station designed for mobile use and/or any station designed or adapted to be established and used from static locations which meet the appropriate technical performance requirements as set out in the Wireless Telegraphy (Exemption) Regulation in force from time to time and either complies with the appropriate Interface Regulation listed in paragraph 3, or for equipment placed on the market before 8 April 2000, is type approved in accordance with a recognised technical standard relating to the service licensed.

Annex 3

Template 2100 MHz Unpaired Schedule

SCHEDULE 2 TO LICENCE NUMBER: [XXXXXX]

Schedule date: xx xxxx 2013

Licence Category: **Spectrum Access Licence (2100 MHz – Unpaired Spectrum)**

Description of Radio Equipment Licensed

1. In this Licence, the Radio Equipment means the base transceiver stations or repeater stations forming part of the Network (as defined in paragraph 2 below).

Purpose of the Radio Equipment

2. The Radio Equipment shall form part of a radio telecommunications network ("the Network"), in which approved user stations communicate by radio with the Radio Equipment to provide a telecommunications service.

Approved Standards for the Radio Equipment

3. Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

IR 2019 – Third Generation Mobile;

or for equipment placed on the market before 8 April 2000, is required to be type approved in accordance with a recognised technical performance standard relating to the service licensed.

Special Conditions relating to the Radio Equipment

4.
 - (a) Subject to paragraph 4(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate records of the following details relating to the Radio Equipment:
 - i) postal address (including post code);
 - ii) National Grid Reference, to at least 100 metre resolution;
 - iii) antenna height (above ground level) and type, and boresight east of true north (if applicable);
 - iv) radio frequencies which the Radio Equipment uses; and

without prejudice to this paragraph (a), the Licensee shall furnish to Ofcom in such a manner and at such times as reasonably requested, information in the form of documents, accounts, estimates, returns and any other information, which may be reasonably required for the purposes of verifying compliance with this Licence and for statistical purposes.

- (b) The conditions relating to the keeping of records contained in sub-paragraphs 4(a)i), 4(a)ii) and 4(c)iii) shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.
- (c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 4(a) above at such intervals as Ofcom shall notify to the Licensee.
- (d) The Licensee shall, upon request, supply Ofcom or any person authorised on their behalf with the name and address of any subscribing customers of the Network, or require its agents to provide such information on its behalf.

Co-ordination at Frequency and Geographical Boundaries and Compliance with Other Procedures Relating to Interference

- 5. The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

International Cross-Border Coordination

- 6. The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time

Permitted Frequency Block

- 7. Subject to the emissions permitted under paragraph 8 of this Schedule, the Radio Equipment may only transmit within the following frequency band (the “Permitted Frequency Block”):

[1900 – 1920 MHz]

Maximum Permissible e.i.r.p.

- 8. For downlink transmissions, the power transmitted (in e.i.r.p.) in any direction in the Permitted Frequency Block by the Radio Equipment shall not exceed:

Maximum e.i.r.p. per carrier	Maximum e.i.r.p. per MHz
62 dBm	58 dBm/MHz

ITU Class of Emission Code

- 9. 5M00G7W

Maximum Power outside the Permitted Frequency Blocks

- 10. For transmissions on the downlink frequencies, the e.i.r.p. emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the following;

Offset from edge of block	Maximum permitted level	Measurement bandwidth
0 to 5 MHz	-23 dBm	1.0 MHz
Beyond 5 MHz	-30 dBm	1.0 MHz

Interpretation

11. In this Schedule:

- (a) "2100 MHz Unpaired spectrum" means frequencies in the range 1900 MHz to 1920 MHz;
- (b) "dBm" means the power level in decibels (logarithmic scale) referenced against 1 milliwatt (i.e. a value of 0 dBm is 1 milliwatt);
- (c) "e.i.r.p." means the effective isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);
- (d) A "femtocell" means Radio Equipment transmitting on the downlink frequencies which operates at a power not exceeding 20dBm e.i.r.p. per carrier which may be established by customers of the Network but which is or will be used only by and under the control of the Network, following the establishment of a telecommunications link between the femtocell and the Network;
- (e) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity;
- (f) "Maximum e.i.r.p. per carrier". The maximum e.i.r.p. in any direction from the base-station should be below this limit for any transmitted carrier. Power for this limit is defined as the mean modulated carrier power time averaged over any suitable time period in which the transmitter is continuously transmitting at its maximum operational power level;
- (g) "Maximum e.i.r.p. per MHz". The e.i.r.p. per MHz means the sum of the e.i.r.p. radiated by all transmitted carriers in any given direction within any contiguous 5 MHz block within an operator's spectrum allocation, divided by 5;
- (h) "measurement bandwidth" means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;
- (i) "Permitted Frequency Blocks" has the same meaning given to it in paragraph 7 of this Schedule;
- (j) A "smart/intelligent low power repeater" means a repeater which operates with power not exceeding 24dBm E.I.R.P. per carrier, which may be established by customers of the Network who have written agreements with the Licensee and:
 - The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
 - The repeater operates only on the Licensee's frequencies and with their valid Public Land Mobile Network Identifier;

- Must not cause undue interference to other spectrum users; and
 - The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.
- (k) “TRP” means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere; and
- (l) “upper block edge” means, in relation to the Permitted Frequency Block, the highest frequency in that Permitted Frequency Block; and
- (m) “User Station” means any vehicle mounted or hands portable mobile station designed for mobile use and/or any station designed or adapted to be established and used from static locations which meet the appropriate technical performance requirements as set out in the Wireless Telegraphy (Exemption) Regulation in force from time to time and either complies with the appropriate Interface Regulation listed in paragraph 3, or for equipment placed on the market before 8 April 2000, is type approved in accordance with a recognised technical standard relating to the service licensed.

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