# Request for variation of licence 0823615 issued to UK Broadband Limited for the use of 3605-3689 MHz and 3925-4009 MHz

## Non-confidential

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# Executive Summary.

**Making the licence variation requested will allow consumers to reap the benefits of cheaper, faster mobile and fixed wireless access services and permit the auction of more spectrum for 5G use by competitors.**

UK Broadband Limited ("UKB") is seeking permission: (i) to move its 3.6 GHz spectrum holding down by 5 MHz to be contiguous with part of its existing 3.5 GHz spectrum holding; and (ii) to have its 3.6 GHz licence put on the same technical basis as the various 3.4 GHz / 3.5 GHz licences and the 3.6 GHz licences to be awarded in the 3.6 GHz auction.

Approving the proposed variation would allow Three and UKB to offer a 100 MHz bandwidth 5G service to the benefit of UK consumers. UKB's customers would benefit from fast 5G fixed wireless access services from [✂]. Three's customers would receive fast 5G mobile services [✂]

Three estimates that these new services could offer average download speeds of as much as 475 Mbps – directly benefiting Three's and UKB's customers and forcing down prices for other consumers.

The variation would therefore benefit UK consumers by encouraging innovation, investment, and the availability and use of high speed data services throughout the UK; and improve choice, price, quality of service and value for money for consumers.

Although the proposed variation would be, for this reason, unambiguously positive for competition and consumers, UKB is prepared to go further by surrendering 4 MHz of its existing 3.6 GHz spectrum holding. Combined with the effect of moving its spectrum holding down by 5 MHz, this would allow Ofcom to award a 120 MHz contiguous block of spectrum in the 3.6 GHz auction scheduled for 2019, rather than the contiguous 110 MHz that it would otherwise have awarded. As such, the Government and competitors are likely to gain as well.

There is a long history of Ofcom making similar variations. Ofcom has already previously approved the delivery of mobile services under UKB's 3.6 GHz licence and has varied both UKB's 3.5 GHz and 3.6 GHz licences to update them to reflect new technical requirements in European Commission Decisions. The only difference on the technical side is that Ofcom has updated the 3.5 GHz licence to reflect the latest European Commission Decision but has not yet done the same for the 3.6 GHz licence. UKB is simply asking for it to be updated in the same way.

Similarly, moving UKB's spectrum holding down by 5 MHz is a logical move to avoid the unused 5 MHz block at the bottom of the 3.6 GHz band

going to waste, or having limited competition for it in the upcoming auction.

There is no question of UKB or Three gaining an unfair competitive advantage from the variation. Other mobile wholesalers will be able to offer their own 5G services at the same time with their recently acquired 3.4 GHz spectrum. Ofcom must also take account of the impending release of additional 5G spectrum in the 700 MHz and 3.6 GHz bands, currently scheduled for the second half of 2019.

# Contents.

# 1. Background.

This section describes the regulatory position for the frequency band 3600-3800 MHz (the "3.6 GHz band"), part of which UKB is licensed to use, as well as the history and main features of UKB's licence.

**Executive summary**

In summary, the 3.6 GHz band has been identified as part of one of the first three primary bands to become available for 5G use in Europe, and probably the first to be so used in practice. Compatible radio equipment is likely to be available from 2019 and Ofcom has noted that consumers will benefit more the earlier services can be provided. Conditions for the future use of the band have been harmonised at a European level and given effect in the UK, but UKB's licence has not been updated to reflect the relevant harmonised technical requirements.

**3.6 GHz band – international and UK regulatory position**

In ITU Region 1, which includes Europe, the 3.6 GHz band is currently allocated to the fixed service and to the fixed-satellite service (space-to-Earth) on a primary basis and to the mobile service on a secondary basis. The European Common Allocation Table (ECA) shows that the 3400-3800 MHz band (including the 3.6 GHz band) is also allocated on a primary basis to the mobile service.

On 21 May 2008, the European Commission adopted Commission Decision 2008/411/EC, which seeks to harmonise the conditions for the availability and efficient use of the 3.4 to 3.8 GHz band for terrestrial systems capable of providing electronic communications services in Europe, mainly targeting wireless broadband services for end-users (the "2008 Decision").[1]

In relation to the 3.6 GHz band, the 2008 Decision provides that Member States should designate the band by 21 November 2008, on a non-exclusive basis, for terrestrial electronic communications networks in compliance with the parameters set out in the annex to the decision. These parameters include the deployment of fixed, nomadic, or mobile networks.

The 2008 Decision was implemented in the UK by way of the 3400 MHz-3800 MHz Frequency Band (Management) Regulations 2008[2], which required Ofcom to exercise its functions under the Wireless Telegraphy

[1] Commission Decision of 21 May 2008 on the harmonisation of the 3 400-3 800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (notified under document number C(2008) 1873) (2008/411/EC).
[2] SI 2008/2794.

Act 2006 so as to give effect to the obligations of the United Kingdom under the 2008 Decision. Any award of the 3.4 to 3.8 GHz band has to be compliant with the 2008 Decision.

Subsequently Decision 243/2012/EU of the European Parliament and the Council (the "2012 Decision")[3] required EU Member States to make the band available for electronic communication services by 31 December 2012. These authorisations should be subject to market demand, without prejudice to existing deployments of services, and under conditions that allow consumers easy access to wireless broadband services.

The 2008 Decision was amended in May 2014, when the European Commission adopted Commission Implementing Decision 2014/276/EU (the "2014 Decision")[4], which established technical parameters for electronic communication services that are authorised to use the 3.4 to 3.8 GHz band. EU Member States must make sure that spectrum licences issued for electronic communication services in these bands are aligned with these parameters. For the 3.6 GHz band, these parameters correspond to TD-LTE spectrum access technology.

The 2014 Decision notes that the 3.4 to 3.8 GHz band "*offers significant potential for deploying dense and high-speed wireless broadband networks to provide innovative electronic communications services to end users*"[5].

The 2014 Decision was implemented in UK law by way of the 1452-1492 MHz and 3400-3800 MHz Frequency Bands (Management) Regulations 2016[6]. This statutory instrument states that Ofcom must designate and make available, on a non-exclusive basis, the 3.4 to 3.8 GHz frequency band for terrestrial electronic communications networks, in compliance with the technical parameters for high power TD-LTE mobile networks.

In July 2017, Ofcom reached a decision – in accordance with the 2014 Decision – to make the 3.6 GHz band available for mobile use as soon as practicable, and to award for future mobile services the 116 MHz in the band that were not already licensed to UKB under the 3.6 GHz Licence.[7]

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[3] Decision No 243/2012/EU of the European Parliament and of the Council of 14 March 2012 establishing a multiannual radio spectrum policy programme
[4] Commission Implementing Decision of 2 May 2014 on amending Decision 2008/411/EC on the harmonisation of the 3400 - 3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community (notified under document C(2014) 2798) (2014/276/EU).
[5] Recital 4.
[6] SI 2016/495.
[7] *Improving consumer access to mobile services at 3.6GHz to 3.8GHz* (Ofcom Statement and Consultation, 28 July 2017) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0017/103355/3-6-3-8ghz-statement.pdf.

Ofcom noted in the July 2017 statement,[8] and repeated in a further Statement in October 2017,[9] that it expected that making the 3.6 GHz band available for mobile would support meeting increasing consumer demand for mobile data, as well as delivering new and improved mobile services, including future 5G services.

Ofcom noted that the 3.6 GHz band is particularly suitable for future mobile services including 5G because:

a) the large bandwidth can support higher data rates and provide increased capacity to support large numbers of connected devices, and enable higher speeds to concurrently connected devices;

b) it can support mobile services including 5G across wide areas, as it can be deployed using macro cells over existing grids; and

c) it has already been harmonised for mobile and identified together with 3400-3600 MHz as the first primary band for introducing 5G in Europe by the Radio Spectrum Policy Group ("RSPG")[10], with potential for devices to become available as early as 2019-20, and economies of scale for these.

Ofcom concluded, in the circumstances, that making the band available for mobile would result in greater benefits for UK citizens and consumers, ensure optimal use of the spectrum, and give effect to our duties regarding the promotion of competition and innovation. It also noted that the benefits resulting from its decision would be greater the sooner the spectrum could be used for mobile services.

As a result of its decision to make the band available for mobile, Ofcom reached a decision in the July 2017 statement to close the band to new applications for fixed link licences, Permanent Earth Station ("PES") licences and grants of Recognised Spectrum Access ("RSA") for satellite earth stations with a receive component in the 3.6 GHz band with immediate effect.

Ofcom subsequently decided in the October 2017 statement to write to individual licensees and grantholders to propose to revoke or vary their licence(s)/grant(s) as follows:

[8] Section 5, ibid.
[9] Paragraphs 2.18-2.21, *Improving consumer access to mobile services at 3.6GHz to 3.8GHz* (Ofcom Statement, 26 October 2017) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0019/107371/Consumer-access-3.6-3.8-GHz.pdf.
[10] *Strategic Roadmap Towards 5G for Europe: Opinion on spectrum related aspects for next-generation wireless systems (5G)* (RSPG, November 2016) available at: http://rspg-spectrum.eu/wp-content/uploads/2013/05/RPSG16-032-Opinion_5G.pdf.

a) It would propose to revoke current authorisations for fixed links in the 3.6 GHz band, with a notice period of 5 years; and

b) It would propose to vary existing authorisations for receiving satellite earth stations operating under PES licences and grants of RSA for Receive Only Earth Stations ("ROES") such that, with effect from 1 June 2020, it would no longer take registered satellite earth stations with a receive component in this band into account for frequency management purposes.

Ofcom confirmed in February 2018 that it had issued notices: to revoke all fixed links licences in the band with an effective date of 23 December 2022; varied 12 Permanent Earth Station licences and three grants of RSA with an effective date of 1 June 2020; and varied one grant of RSA with an effective date of 1 September 2020.[11] Ofcom plans to award the spectrum in the 3.6 GHz band that is not already licensed to UKB in 2019.

In a further opinion issued in January 2018, the RSPG has reiterated the importance of the 3400-3800 MHz band in the development of 5G, opining that it will be "*key for the success of 5G in Europe*".[12]

### UKB's licence

UKB holds a Wireless Telegraphy Act licence to use the frequencies 3605-3689 MHz and 3925-4009 MHz (2 x 84 MHz of spectrum)[13] (the "3.6 GHz Licence"). The 3.6 GHz Licence is indefinite in duration, continuing in force until revoked by Ofcom in accordance with the licence provisions or otherwise until surrendered by the licensee. The rights and obligations under the 3.6 GHz Licence can be traded and leased.

UKB is the latest in a succession of companies to have held the 3.6 GHz Licence since it was initially granted in 1992 by the Radiocommunications Agency. Most previous licence holders trialled Fixed Wireless Access technology but did not develop commercial services in the band.[14]

As well as the 3.6 GHz Licence, UKB also holds a Wireless Telegraphy Act licence to use the frequencies 3480-3500 MHz and 3580-3600 MHz

[11] Paragraph 1.5, *Improving consumer access to mobile services at 3.6GHz to 3.8GHz: Update on timing of spectrum availability* (Ofcom, 2 February 2018).
[12] *Strategic spectrum roadmap towards 5G for Europe: RSPG second opinion on 5G networks* (RSPG, 30 January 2018) available at: https://circabc.europa.eu/sd/a/fe1a3338-b751-43e3-9ed8-a5632f051d1f/RSPG18-005final-2nd_opinion_on_5G.pdf.
[13] Licence no. 0823615 issued on 11 January 2018 as a replacement for the licence issued to UKB on 5 April 2013.
[14] Paragraph 3.7, *Freedom4 application for licence variation* (Ofcom Consultation, 9 June 2009) available at https://www.ofcom.org.uk/__data/assets/pdf_file/0013/32305/main.pdf.

(the "3.5 GHz Licence"). UKB acquired the 3.5 GHz Licence through an auction in 2003[15] but only acquired the 3.6 GHz licence through the acquisition of the spectrum holdings of the Freedom4 Group in 2010.[16]

The 5 MHz of spectrum between the spectrum licensed under the 3.5 GHz Licence and that which is licensed under the 3.6 GHz Licence (that is, 3600-3605 MHz) has remained unused. It was left unused in order to provide a buffer between the two licensed users, having effectively the same function as a guard band.

The original 3.6 GHz Licence was issued on a technology- and application-specific basis as it pre-dated the era of spectrum liberalisation and technology neutral licensing. It was issued specifically for the use of Public Fixed Wireless Access transceivers operating to a Frequency Division Duplex (FDD) scheme, i.e. using one block of spectrum for the uplink and the other block of spectrum for the downlink.

The 3.6 GHz Licence has been gradually liberalised over time through Ofcom decisions granting licence variation requests. In particular:

- In 2004, Ofcom agreed to a request from Pipex Communications, the licence holder at the time, to remove the technical restrictions limiting use to FDD systems so as to allow Pipex to develop WiMAX technology.[17]

- In 2009, Ofcom agreed to a request from Freedom4 to allow mobile use. It agreed to increase the central station maximum power, remove a requirement to co-ordinate low-power terminals and allow them to be used for providing mobile services.[18]

The variation in 2009 increased the power limits to the levels required by the 2008 Decision.

As noted above, however, the 2008 Decision has since been amended by the 2014 Decision. The 2014 Decision increased the central station permissible maximum power from +60 dBm / 5 MHz EIRP[19] to +65 dBm / 5 MHz EIRP and also introduced new transmission mask arrangements, frame structures and synchronisation requirements.

[15] It was technically held jointly by UK Broadband Limited and by UKB Networks Limited until a recent transfer.
[16] *UK Broadband Limited response to Ofcom consultation on licence exemption of wireless telegraphy devices* (16 June 2011) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0021/71652/uk_broadband_response.pdf.
[17] Referred to in Paragraph 3.9, *Freedom4 application for licence variation*, op. cit. n. 1.
[18] Paragraph 1.1, *Freedom4 application for licence variation* (Ofcom Statement, 6 October 2009) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0020/36308/freedom4.pdf.
[19] Shown in the 3.6 GHz Licence as the equivalent amount of +53 dBm/MHz e.i.r.p..

The 3.5 GHz Licence has been amended to reflect the new technical requirements in the 2014 Decision but the 3.6 GHz Licence has not been updated and is, in consequence, inconsistent with the requirements of the 2014 Decision. If the 3.6 GHz Licence were updated to be consistent with the 2014 Decision it would no longer be necessary to have buffer frequencies separating use under the 3.6 GHz Licence from use under adjacent licences. Further, the approach of the European Commission and standardisation bodies of treating 3400-3800 MHz as a single band for 5G services implies that there should be harmonised technical requirements across the whole range from 3400-3800 MHz.

# 2. Ofcom's duties and functions.

This section provides an overview of the main UK and European legislative provisions relevant to wireless telegraphy licensing and to the requested variation.[20]

**Executive summary**

The applicable legal framework derives from both domestic and European legislation, specifically from:

- the Communications Act 2003 (the "2003 Act") and the Wireless Telegraphy Act 2006 (the "2006 Act"); and
- the European Common Regulatory Framework[21] 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 (as already referred to above).

Ofcom has a broad discretion to vary a wireless telegraphy licence where consistent with its duties, including because it furthers interests that Ofcom is obliged to promote.

Ofcom has a well-established policy to liberalise the use of spectrum, removing unnecessary and outdated restrictions in wireless telegraphy licences.

**Ofcom's general duties**

Section 3 of the 2003 Act states the general duties of Ofcom. Under section 3(1) it is the principal duty of Ofcom in carrying out its functions:

- 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.

[20] This recitation of the legal requirements is taken in large part from Ofcom's consultation on a proposed variation to one of EE's spectrum licences and ought therefore to be largely uncontroversial. See Section 4, *EE application for licence variations in support of enhanced mobile communications for the emergency services* (Ofcom Consultation, 30 September 2016) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0027/91575/EE-2100-MHz-Variation-Consultation_final.pdf.

[21] The European 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.

In doing so, Ofcom is required to secure, amongst others (under section 3(2)):

- the optimal use for wireless telegraphy of the electro-magnetic spectrum;
- the availability throughout the UK of a wide range of services;

In performing its duties, Ofcom must have regard to, amongst others, the following matters:

- the desirability of promoting competition (section 3(4)(b));
- the desirability of encouraging investment and innovation (section 3(4)(d));
- the desirability of encouraging availability and use of broadband services throughout the UK (section 3(4)(e)); and
- the different needs and interests of persons in different parts of the UK (section 3 (4)(l)).

The management of the UK radio spectrum is carried out within a framework set out by the European Common Regulatory Framework, which aims to harmonise the regulation of electronic communications networks and services throughout the European Union. Related to that, Section 4 of the 2003 Act requires Ofcom when carrying out its spectrum functions to act in accordance with "six community requirements" when managing the wireless spectrum within the UK. These include:

- the requirement to promote competition (section 4(3));
- the requirement to secure that Ofcom's activities contribute to the development of the European internal market (section 4(4));
- the requirement to promote the interests of all persons who are citizens of the European Union (section 4(5)).

**Ofcom's duties when carrying out spectrum functions**

In carrying out its spectrum functions it is the duty of Ofcom (under section 3 of the 2006 Act) to have regard in particular to:

- the extent to which the spectrum is available for use or further use, for wireless telegraphy;

- the demand for use of that spectrum for wireless telegraphy; and
- the demand that is likely to arise in future for the use of that spectrum for wireless telegraphy.

It is also the duty of Ofcom to have regard, in particular, to the desirability of promoting:

- the efficient management and use of the spectrum for wireless telegraphy;
- the economic and other benefits that may arise from the use of wireless telegraphy;
- the development of innovative services; and
- competition in the provision of electronic communications services.

Where it appears to Ofcom that any of its duties in section 3 of the 2006 Act conflict with one or more of its general duties under sections 3 to 6 of the 2003 Act, priority must be given to its duties under the 2003 Act.

### Ofcom's spectrum functions

Ofcom's powers to carry out its spectrum functions are set out in the 2006 Act. Such powers include, under paragraph 6 of Schedule 1 of the 2006 Act, the general discretion to revoke or vary any wireless telegraphy licences by serving a notice in writing on the licence holder or by way of general notice to licensees in a class.

Ofcom also has a duty set out in section 9(7) of the 2006 Act, reflecting Article 6 of the EU Authorisation Directive 2002/20/EC, to ensure that wireless telegraphy licence conditions are objectively justified in relation to networks and services to which they relate, non-discriminatory, proportionate and transparent. Ofcom has observed, we consider correctly, that it considers that this obligation is ongoing and must be assessed against market circumstances and the state of technology development at the time.[22]

Ofcom has a broad discretion under paragraph 6 of Schedule 1 of the 2006 Act to agree to vary licences, but legal rules operate to limit that

[22] Paragraph 4.11, *EE application for licence variations in support of enhanced mobile communications for the emergency services*, op. cit. n. 18.

discretion. These legal rules on licence variation include the following, in summary:

- Pursuant to paragraph 6A of Schedule 1 of the 2006 Act, any variation of a wireless telegraphy licence must be objectively justifiable;

- UK obligations under European 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. This includes changes in use or technology that would contravene binding Community measures, such as directives or harmonisation measures adopted under the Radio Spectrum Decision (676/2002/EC) and ITU Radio Regulations.

- Ofcom must comply with any direction from the Secretary of State under section 5 of the 2003 Act and 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, the duties under section 3 of the 2006 Act and obligations under the Authorisation Directive.

- General legal principles, which include the duties to act reasonably and rationally when making decisions and to take account of any legitimate expectations.

Paragraph 8 of Schedule 1 to the 2006 Act also allows Ofcom to include in a wireless telegraphy licence terms restricting the exercise of its power to revoke or vary the licence. Pursuant to this provision, the 3.6 GHz Licence provides that Ofcom may not revoke the licence except:

a) at the request of, or with the consent of, the licensee;

b) if there has been a breach of any terms of the licence;

c) in accordance with Schedule 1 paragraph 8(5) of the 2006 Act [revocation for national security reasons or to comply with international obligations];

d) to comply with a direction from the Secretary of State given to Ofcom under section 5 of the 2003 Act or section 5 of the 2006 Act;

e) where there has been any breach of spectrum trading regulations; or

f) for reasons related to the management of the radio spectrum, provided that in such case the power to revoke may only be exercised after at least five years' notice is given in writing to the licensee.

**Liberalisation and the framework for analysis of licence variation requests**

The radio spectrum is a finite resource of considerable economic and social value. Where possible, Ofcom has adopted market-based mechanisms, including trading and liberalisation, which empower spectrum users to take more decisions on spectrum. Ofcom has indicated that it considers that this is likely to lead to optimal use of the radio spectrum.[23]

Ofcom has noted that liberalisation, i.e. the removal or reduction of restrictions in licences, is central to this approach to spectrum management.[24] Together with incentive pricing, auctions and spectrum trading, it makes spectrum available on a more flexible and dynamic basis for new wireless applications. It is also consistent with Ofcom's aim to deregulate or simplify regulation wherever possible.[25]

Ofcom's approach to liberalisation must still operate within the legal rules described above that limit Ofcom's discretion to vary licences. It has said, in that context, that in considering requests for the variation of individual licences it will therefore take into account the following factors in particular:

- impact on spectrum users in adjacent bands;
- benefits for consumers and citizens;
- optimal spectrum use;
- impact on competition;
- objective justification for licence conditions; and

[23] See, for example, paragraph 4.13, *EE application for licence variations in support of enhanced mobile communications for the emergency services*, op. cit. n. 18.
[24] Paragraph 4.14, ibid.
[25] An objective specified by section 3(3)(a) of the 2003 Act.

- legal considerations that limit Ofcom's discretion to vary licence conditions.

We apply these factors to the present request for a licence variation in section 5 of this request.

### Impact assessment

Section 7 of the 2003 Act requires Ofcom to undertake an impact assessment where, broadly, its proposals would be likely to have a significant impact on businesses or the public. UKB considers that an impact assessment would be appropriate in this case as its proposed licence variation would have a significant positive impact on consumers.

### Equality impact assessment

Ofcom is also required by statute to assess the potential impact of proposals on race, disability and gender equality. UKB does not believe that its proposals are likely to have a particular impact on one group of stakeholders as opposed to another. Additionally, UKB does not believe that its proposal raises any issues in relation to equality schemes in Northern Ireland.

# 3. UKB's variation request.

This section sets out how UKB wants Ofcom to vary the 3.6 GHz Licence. The timing for the variation and transitional issues are dealt with in section 4. UKB's assessment of the variation against Ofcom's legal framework follows in section 5 of this document.

**Executive summary**

There are three elements to UKB's variation request. UKB is asking Ofcom to vary the 3.6 GHz Licence as follows:

a) Inclusion of the frequencies 3600-3605 MHz within those in which it is authorised to operate the relevant radio equipment (the "First Element");

b) Modification of certain technical requirements to align with those in the 3.5 GHz Licence (the "Second Element"); and

c) Surrender of UKB's rights to use the frequencies 3680-3689 MHz (the "Third Element").

Each of the elements is complementary even though the proposed timing for the changes varies (as discussed in section 4). As such, UKB is making a single request for all three elements and reserves the right to refuse its consent to a variation that includes only some and not all elements requested.

As UKB is only proposing to make changes to the Lower Frequency Block (as defined in the 3.6 GHz Licence) it is likely to be convenient to establish separate licences for the Upper and Lower Frequency Blocks. Three would be happy to provide copies of the proposed new licences but we briefly explain the changes below.

**The First Element: addition of 3600-3605 MHz**

UKB seeks to move its spectrum holding in the 3.6 GHz band (the "Lower Frequency Block") down by 5 MHz so that it is immediately adjacent to UKB's existing spectrum holdings under the 3.5 GHz Licence. Specifically, as part of the process to accomplish this move, UKB asks Ofcom to vary paragraph 5 of schedule 1 to the 3.6 GHz Licence to provide that the Lower Frequency Block starts at 3600 MHz.

Moving the 3.6 GHz band spectrum holding down by 5 MHz will allow UKB to use 3580-3680 MHz as a single 100 MHz contiguous block of spectrum. UKB would otherwise need to use carrier aggregation to be able to use both blocks of spectrum together and that is likely to delay the

point at which they can be used together, at least for 5G purposes, as well as leading to a degree of spectral inefficiency.

If both blocks of spectrum are used for the same technology and in accordance with the same transmission mask, frame structure and synchronisation requirements there would no longer be any need for a buffer of unused spectrum between the two blocks.

UKB does not propose any changes to the frequencies covered by the Upper Frequency Block (3925-4009 MHz) as there is no need to maintain the same spacing between the blocks given that it is not used for FDD services.

**The Second Element: modification of technical requirements**

For the Lower Frequency Block only, UKB requests that Ofcom delete paragraphs 2, 6 and 7 of Schedule 1 to the existing 3.6 GHz Licence and replace them with paragraphs 2 and 8 to 15 inclusive of the 3.5 GHz Licence (with the frequency offsets referenced in paragraph 14 of the 3.5 GHz Licence amended appropriately for the 3.6 GHz Licence variation).

The proposed changes would update the reference to the Interface Requirements (from IR2015 to IR2097), increase the maximum power for base stations and introduce specific transmission masks, frame structures and inter-operator synchronisation requirements as a replacement for more basic restrictions on out of band emissions.

Making these changes would make the 3.6 GHz Licence consistent with the requirements of the 2014 Decision and align it with the 3.5 GHz Licence, facilitating the use of the 3.6 GHz spectrum for 5G technology.

Although Ofcom previously approved variations to the predecessor of the 3.6 GHz Licence designed to allow use of the relevant frequencies for mobile services,[26] the remaining licence restrictions severely limit the extent to which the spectrum is currently useable for that purpose. In particular, as UKB noted in January 2017:

> "*UKB's licence contains a transmit (EIRP) power limit of 53 dBm/MHz. This equates to 60 dBm / 5 MHz and is thus lower than the power limit currently specified in the 3.4 GHz licence (65 dBm/ 5 MHz)* [referred to here as the "3.5 GHz Licence"]*. A mobile*

[26] *Freedom4 application for licence variation*, op. cit. n. 18.

> *operator would therefore have to invest in an additional, denser layer of cells to achieve coverage with the 3.6 GHz spectrum.*"[27]

In the absence of a modification to the technical requirements, any deployment by UKB of the 3.6 GHz spectrum on the same sites as those used for the 3.4 GHz spectrum would potentially leave large gaps in coverage because of the lower power levels.

Aligning the transmission mask, frame structure and synchronisation requirements with those applicable in the 3.5 GHz Licence and which will presumably be applicable in future 3.6 GHz licences (since they must comply with the 2014 Decision) will do away with any need for buffers of unused frequencies, or guard bands, at both the top and bottom of the existing block of frequencies licensed under the 3.6 GHz Licence.

UKB does not propose any changes to the technical requirements for the Upper Frequency Block of 3925-4009 MHz. It notes that it is likely to be at least a few years before the Upper Frequency Block can be used for 5G services and, in any event, IR2097 is currently not drafted to extend to the relevant frequencies so referring to it would not make any sense.

**The Third Element: surrender of 3680-3689 MHz**

As noted above, UKB seeks to move its spectrum holding in the 3.6 GHz band down by 5 MHz so that it is immediately adjacent to its existing spectrum holdings under the 3.5 GHz Licence. Completing this move implies surrender of UKB's rights to use 3684-3689 MHz. UKB is, however, prepared to go further and request Ofcom to vary paragraph 5 of schedule 1 to the 3.6 GHz Licence to provide that the Lower Frequency Block ends at 3680 MHz (instead of 3684 MHz).

If the technical requirements of the 3.6 GHz Licence were to remain permanently as they are now, the 4 MHz from 3680-3684 MHz would be required as a de facto guard-band between UKB's existing use of its spectrum and the use made by new licensees of adjacent spectrum to be auctioned in the forthcoming 3.6 GHz award. No such guard-band would be needed if the variations requested were granted to align the technical requirements of the 3.6 GHz Licence with those of the 3.5 GHz Licence and the new 3.6 GHz licences.

UKB anticipates that the 4 MHz could be highly valuable to a competitor as the combined effect of moving UKB's spectrum holding down by 5

[27] *UK Broadband's Response to Ofcom's consultation on proposals to make regulations under section 122 of the Wireless Telegraphy Act 2006* (January 2017) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0017/102743/uk-broadband.pdf.

MHz and surrendering the 4 MHz is to allow Ofcom to auction a single contiguous block of 120 MHz of spectrum (rather than one block of 110 MHz and another isolated block of 5 MHz).

In the circumstances, UKB is prepared to consent to the surrender of the additional 4 MHz of spectrum if Ofcom agrees to grant each of the other elements of the variation sought with this request. UKB notes that it would resist any non-consensual revocation process and, in any event, that five years' notice would be required.

# 4. Timing and transitional arrangements

In this section, we address the timing for our proposed variation and certain transitional arrangements for moving between the existing arrangements and the proposed new arrangements.

**Executive summary**

In principle, it is desirable to make the proposed variation as soon as practicable because it will allow the early delivery of the benefits of innovation and facilitate inclusion of the surrendered spectrum in the proposed 3.6 GHz award.

There are, however, some limits to how quickly the changes can be effected. In particular:

- There is expected ordinarily to be [✂] lead time for delivery of the radio equipment needed to move frequencies and [✂] will be needed for deployment;
- It is impracticable to effect a hard cut-over to new arrangements on a single fixed date. A period of transition will be required where equipment on some sites continues to operate temporarily in the 3605 – 3689 MHz range to avoid adversely affecting existing UKB customers, while equipment on upgraded sites operates in the new 3600 – 3680 MHz range; and
- Existing users of the 3.6 GHz band need to be protected until such time as the pending licence/grant variations and revocations take effect (unless they agree otherwise).

The practical effect is that, to ensure a smooth transition and minimise the risk of an adverse impact on customers, UKB requires access to 3600 – 3605 MHz before it can surrender its rights to 3680-3689 MHz. UKB therefore proposes a phased approach to introduction of the different elements of licence variation as follows:

a) Variation of the relevant technical requirements immediately;

b) Addition of the 3600-3605 MHz frequencies immediately;

c) Withdrawal of the right to use 3680-3689 MHz from the later of:

   a. 1 September 2019, on the assumption this is the date on which Ofcom currently expects successful bidders in the 3.6 GHz award to be permitted to use their new licences; or

b. nine months after Ofcom's decision approving this licence variation request.

For the avoidance of doubt, UKB is not seeking to increase the frequencies it will use for any particular customer at any one time. Any particular customer will use either 3605-3689 MHz or 3600-3680 MHz. There simply needs to be a temporary arrangement to allow a smooth transition between frequencies.

UKB will in any event use reasonable endeavours to stop using 3680-3689 MHz as soon as possible. UKB will commit to ensure that existing licensees and grant-holders in the 3.6 GHz band will not experience any greater interference than is currently the case prior to the date on which their licences or grants are revoked or varied to remove their protection from interference. UKB will continue to be subject to the existing coordination obligations until all existing licences and grants have been varied or revoked to remove their protection from interference.

UKB considers that a phased transition along these lines strikes a fair balance between the interests of its existing customers and those of new licensees who win licenses in the 3.6 GHz award.

UKB expects that the proposed arrangements should allow enough time for it to remove all equipment operating in the 3605-3689 MHz range without materially adversely impacting existing customers, whilst also having no adverse impact on the plans of new 3.6 GHz licensees. New licensees will have absolute certainty on the bandwidth and technical conditions for the 3.6 GHz band under an eventual spectrum auction and will gain access to the 3680-3689 MHz frequencies at the same time as they are permitted to use other 3.6 GHz frequencies (unless there is considerable delay in making the variation requested in this document).

### The benefits of early variation

Ofcom has previously noted on many occasions that consumers benefit more the sooner new services can be provided.[28] It has also noted that it considers it has a legal duty not to preserve wireless telegraphy licence conditions which cease to be objectively justifiable or proportionate, unless there are compelling reasons to do so.[29]

[28] See, for example: paragraphs 6.48-6.52, *UK Broadband application for a licence variation* (Ofcom Consultation, 18 June 2007) and references cited therein; paragraph 6.4, *Freedom4 application for licence variation*, op. cit. n. 1; paragraph 2.20, *Improving consumer access to mobile services at 3.6GHz to 3.8GHz*, op. cit. n. 9.
[29] Paragraph 3.95, *UK Broadband application for a licence variation*, op. cit. n. 28.

In principle, therefore, there should be a presumption in favour of making the proposed variations as soon as practicable.

In this case, specifically, there is an opportunity to deliver wide-band 5G services earlier than would otherwise be the case. UKB anticipates that it should be able to start rolling out 5G equipment for 3580-3680 MHz [✂]. UKB will have little incentive to do so and, in any event, could only provide an inferior service with large gaps in coverage if the licence variation was not approved.

The existing licence technical restrictions, imposed to be consistent with the 2008 Decision, are no longer necessary and thus not objectively justifiable or proportionate. Similarly, there is no longer any good reason to leave 3600-3605 MHz unused (at least if the technical restrictions are varied).

Further, and in any event, it would obviously defeat the purpose of surrendering 3680-3689 MHz if it could not be done in time to include it in the forthcoming award but there is little reason for it to be surrendered earlier.

**Immediate implementation of the Second Element**

Subject to the protection of existing 3.6 GHz licensees and grant-holders, discussed further below, UKB can see no reason for delaying the element of the proposed licence variation concerned with technical requirements, what we have referred to above as the Second Element.

For the 3.5 GHz Licence, Ofcom took the approach that UKB "*could have*" licence conditions consistent with, first, the 2008 Decision and, second, the 2014 Decision if it wished to have them.[30] UKB can see no proper reason for taking a different approach to the 3.6 GHz Licence. Ofcom previously accepted that there was no good reason not to apply the terms of the 2008 Decision to the 3.6 GHz Licence in 2009. In its request, UKB is seeking simply for Ofcom to apply the terms of the 2014 Decision in 2018 (much later after the relevant Decision than for the previous variations).

UKB understand that its existing radio equipment in the 3.6 GHz band can comply with the proposed new technical requirements. If a new frame structure or synchronisation is required, it can be implemented with an over-the-air software update.

[30] Paragraphs 14.6 and 14.8, *Public Sector Spectrum Release (PSSR): Technical coexistence issues for the 2.3 and 3.4 GHz award* (Ofcom Consultation, 19 February 2014) available at: https://www.ofcom.org.uk/__data/assets/pdf_file/0026/33497/pssr.pdf.

Early implementation of the Second Element of the variation and, in any event, implementation no later than implementation of the First Element, would give UKB the ability to upgrade its relevant radio equipment as soon as it is technically possible and commercially justifiable.

**Immediate implementation of the First Element**

UKB can also see little reason to delay implementation of the First Element of the proposed licence variation, namely inclusion of 3600-3605 MHz within the licensed spectrum, as its proposed use by UKB will not impact any other spectrum users. So long as it is not made available to UKB, it will continue to remain unused.

[✂]

**Delayed implementation of the Third Element of the variation**

UKB is restricted in its ability to vacate the frequencies 3680-3689 MHz because of equipment availability, the logistics of upgrading and the need to avoid interference with existing licensees and grant-holders in the 3.6 GHz band.

The radio equipment that UKB currently uses for the 3.6 GHz band cannot readily be configured to use the frequencies 3600-3605 MHz and, in any event, there are filters on each site which physically prevent it using those frequencies. As such, if UKB lost access to 3680-3689 MHz before it had installed new equipment on a site, it would need to reduce the frequencies available to existing users served by that site, significantly reducing throughput speeds for some users – which has the potential to damage UKB's brand reputation and cause customer churn.

It is not going to be economically feasible to install new 4G equipment to cover 3580-3680 MHz given that it will shortly be superseded by 5G equipment (and it may not be quicker anyway). UKB would move directly to 5G equipment. This has the following timing implications:

- UKB's equipment supplier has indicated that it will typically need [✂] to deliver equipment after a purchase order has been placed;

- It will take UKB at least [✂] to complete the necessary site visits to build the new structures necessary to hold heavier 5G equipment, to replace the existing equipment and to take the measures necessary to protect other existing users of the 3.6 GHz band; and

- Compatible customer premises equipment ("CPE") will need to have been distributed to all existing UKB 3.6 GHz customers in an area before the signal is switched over.

UKB anticipates that it should be able to complete the surrender of 3680-3689 MHz before new licensees are awarded spectrum in the 3.6 GHz band given that Ofcom's latest indication is of an award later rather than earlier in 2019. If so, there would be no adverse impact at all on the new licensees from UKB continuing to have access to 3680-3689 MHz in the meantime.

In order to do so, however, UKB would need at least nine months after a decision to grant the variation sought in this request[31]. Ofcom will understand that UKB cannot commercially commit to purchasing new radio equipment before it has certainty that it will be able to use it.

### Transitional arrangements

Beyond the need for a delay in giving effect to part of the Third Element of the variation, for the reasons discussed immediately above, it will be essential in any event that there is a lag between giving effect to the First and Third Elements because it would never be practical to shift all customers across from 3605-3689 MHz to 3600-3680 MHz instantaneously and at the same time. To even attempt to do so would cause considerable churn and have the potential to damage UKB's brand reputation.

For the avoidance of doubt, UKB is not seeking to increase the frequencies it will use for any particular customer at any one time. Any particular customer will use either 3605-3689 MHz or 3600-3680 MHz. There simply needs to be a temporary arrangement to allow a smooth transition between frequencies.

UKB accepts that it should be under an obligation to complete the transition as soon as reasonably practicable.

### Protection of existing licensees

UKB acknowledges that PES licensees and RSA grant-holders for ROES have the right to protection from interference until 1 June 2020 or, in one case, 1 September 2020. Similarly, although much less of an issue for use of 3580-3680 MHz because they use higher frequencies in the band,

[31] The time would need to be extended if anyone challenged the decision to approve the variation.

fixed link licensees in the 3.6 GHz band are entitled to protection from interference until 23 December 2022.

UKB will ensure that implementing the proposed variations will not increase interference for other licensees and grant-holders prior to the dates mentioned above unless with their explicit consent. UKB will continue to be subject to the existing coordination obligations until all existing licences and grants have been varied or revoked to remove their protection from interference.

# 5. Assessment of the proposed variation.

This section sets out UKB's view of how its proposed variation should be assessed on the basis of the criteria that Ofcom has said it will use for licence variation requests.

**Executive Summary**

Applying the criteria that Ofcom has said it will use in assessing requests for licence variation, it is clear that the proposed variation ought to be approved in all respects. In particular:

- There will be no adverse impact on other spectrum users. The only potential impact on existing licensees and grant-holders in the 3.6 GHz band will be avoided by our commitment not to increase existing interference levels and continue to comply with existing coordination obligations.

- UKB and Three customers will benefit from faster speeds. Other consumers will benefit from competition bringing down prices and incentivising early launch of 5G by competitors.

- The proposed licence variation will allow more efficient use of spectrum in that it will make available an additional 10 MHz of spectrum that would otherwise have been effectively useless to anyone except UKB/Three.

- The proposed variation will have a positive impact on competition. There is no question of Three getting an unfair head-start, especially by comparison to what Ofcom previously allowed in relation to EE's launch of 4G services.

- There is no objective justification for leaving 3600-3605 MHz unused or for not bringing the 3.6 GHz Licence into compliance with the 2014 Decision.

- UKB has a legitimate expectation that Ofcom will allow it to have the 3.6 GHz Licence amended to reflect the terms of the 2014 Decision.

**Impact on spectrum users in adjacent bands**

Varying the technical requirements in the 3.6 GHz Licence, the Second Element of the proposed variation, will allow UKB to increase its base station power levels to a level comparable to that for licensees in the 3.4

GHz / 3.5 GHz band. This need not, however, imply any adverse impact for spectrum users in adjacent bands for the following reasons:

- The only licensee that might be affected below the Lower Frequency Block (i.e. below 3600/3605 MHz) is UKB itself. Logically, therefore, this ought to be of no concern to Ofcom. In any event, however, the proposal is to apply the same transmission mask, frame structure and synchronisation requirements in the 3.6 GHz Licence as in the 3.5 GHz Licence and that will prevent any adverse impact in circumstances where the spectrum is used separately rather than as a single contiguous block.

- It is anticipated that new licensees winning spectrum rights in the 3.6 GHz award will have technical licence conditions identical to those in the existing 3.4 GHz / 3.5 GHz licences and, therefore, the same as those proposed in the Second Element of the variation. If this is correct, there would again be no risk of adverse effects. It is difficult to see much scope for different technical licence conditions to be applied given the 2014 Decision and, in any event, it would seem to be improbable that the same technical licence conditions would not ultimately be applied throughout the 3400-3800 MHz frequencies given that they are being harmonised and standardised for use as a single 5G band. If the technical licence conditions changed for the other 3.6 GHz and 3.4 GHz / 3.5 GHz licences, such as because the 2014 Decision is superseded, UKB would expect to see its 3.6 GHz Licence conditions change as well.

- Existing licensees and grant-holders in the 3.6 GHz band, satellite stations and fixed link users, will not be affected by the Second Element of the variation because UKB will undertake not to increase existing interference levels experienced by them without their consent and to continue to comply with existing coordination obligations.

The First and Third Elements of the proposed variation will not adversely affect users in adjacent bands. Moving lower in the 3.6 GHz band will increase the frequency separation between UKB's services and those of existing users in the 3.6 GHz band, thus reducing the potential interference faced by them.

The separation between UKB and new licensees above the Lower Frequency Block (i.e. above 3680/3689 MHz) will remain the same as it is now. The loss of the 5 MHz of unused spectrum below the Lower

Frequency Block (i.e. below 3605 MHz) will make no difference to other users.

**Benefits for consumers and citizens**

Approval of the proposed variation and, in particular, early approval will provide substantial benefits for Three and UKB customers and for consumers more broadly.

Benefits for customers of UKB and Three

Approval of the First and Second Elements of the proposed variation will allow Three and UKB to roll-out a 100 MHz continuous bandwidth 5G service, widely considered to be the optimal bandwidth for 5G services. It would mean that the UK would be the first, or one of the first countries, to achieve the IMT2020 ITU objective of 100 MHz bandwidths for 5G.

Without the Second Element of the proposed variation, it is doubtful whether UKB and Three would deploy 5G at all using UKB's 3.6 GHz Licence because, even if technically possible, the restriction to lower power would leave many gaps in the network requiring additional densification as an expensive means of mitigation against this technical deficiency. Certainly, it would not be such a high priority as if the Second Element of the proposed variation were approved.

Without the First Element of the proposed variation, the speeds achievable by Three and UKB customers would be significantly lower than they would otherwise be. It will be possible in the longer term to carrier aggregate the existing 20 MHz under the 3.5 GHz band (3580-3600 MHz) with the Lower Frequency Block in the 3.6 GHz band (3605-3689 MHz) but it is not expected that carrier aggregation will be supported in the first 5G release.

As such, without the First Element of the proposed variation, the initial roll-out would be of an 80 MHz bandwidth 5G service rather than a 100 MHz bandwidth service. Upgrade to a 100 MHz service would follow only when technically possible and subject to any commercial constraints at the time. Further, carrier aggregation typically results in a loss of spectral efficiency in at least some circumstances so a future 100 MHz service achieved through carrier aggregation would never be quite as good for consumers as a service delivered through a contiguous 100 MHz block.

Early approval of the First and Second Elements of the proposed variation would allow UKB to deploy wide-band fixed wireless access 5G

services as soon as it is technically possible and commercially practicable. As noted above, UKB anticipates that [✂].

Early availability of wide-band 5G services would have a substantial intrinsic value in itself for consumers in that those who purchase 5G services from UKB and/or Three are likely to benefit from faster speeds. Three estimates that a 100 MHz 5G service in the 3.6 GHz band that is lightly used, as it will be in [✂], could deliver average user download speeds as high as 475 Mbps. This compares to a maximum of 380 Mbps with the 80 MHz 5G service that would be possible if Ofcom approved the Second Element but not the First Element of the proposed variation and is obviously much faster than anything UKB or Three could offer if none of the elements of the variation were granted.

As noted above, Ofcom has historically taken the view (correctly) that consumers benefit more the sooner new services can be provided.

Benefits for other consumers

Even beyond Three/UKB customers, there will still be considerable benefits for consumers from the proposed variation.

Facilitating UKB's launch of 5G services, particularly if it were able to do so in [✂] , will increase the competition in 5G, mobile and home broadband services generally.

An early wide-band launch may have an impact on the speed with which competitor 5G services are launched. It may be that some or all of Three's competitors will hold back on launching 5G either because of technical or commercial constraints or to avoid cannibalising revenues from 4G services. A wide-band 5G launch by Three/UKB could spur competitors to launch their own 5G services sooner rather than later. It is also likely to reduce prices for existing, slower 4G services.

Approval of the First and Third Elements would also have a longer-term benefit for consumers in allowing more productive use of the 3600-3605 MHz frequencies than is otherwise likely to occur and increasing the amount of 3.6 GHz spectrum available for use by competitors. Further, rights to use 3680-3690 MHz are likely to sell for a much higher price at auction than rights to use 3600-3605 MHz and 3689-3690 MHz, delivering a financial benefit to the Government that will benefit citizens more broadly. These points are discussed further below under the heading of "optimal spectrum use".

### Optimal spectrum use

As matters stand at present, the 3.6 GHz Licence is liable to contribute to significant inefficiency in the use of the 3.6 GHz band. In particular:

- 3600-3605 MHz may have little, if any, value to any mobile wholesaler apart from Three/UKB. With the current technical restrictions in the 3.6 GHz Licence, and the equipment currently deployed by UKB, it is unlikely that any other licensee could make effective use of 3600-3605 MHz because of interference issues. In any event, though, such a small amount of spectrum on its own would have little value. As noted above, the initial 5G release is unlikely to include carrier aggregation and/or the first handsets are unlikely to include it. It is unlikely to make sense to anyone to launch 5G services in a single 5 MHz bandwidth. When carrier aggregation does become available, it is likely that it will become available gradually: first allowing aggregation of two carriers, then three and so on. Operators will prioritise aggregating larger carriers first so 5 MHz on its own will only get aggregated when there are no other options and only then if it makes economic sense.

- If Ofcom did not approve the Second Element of the proposed variation, and UKB continued with its existing equipment, 3685-3689 MHz probably could not be used by any other operator because of the interference issues even if UKB did not continue to hold a licence to use it.

- Even if Three/UKB were able to access 3600-3605 MHz and 3685-3690 MHz, it may not have as much value for the extra 10 MHz of bandwidth available to it as other mobile wholesalers would have for the same amount of spectrum contiguous with their existing 5G-capable holdings. This is both because it will not be technically possible in the short term to deploy 5G carriers of more than 100 MHz.

Approving all three elements of the proposed variation would allow Ofcom to auction a contiguous 120 MHz block of 3.6 GHz spectrum between 3680 MHz and 3800 MHz, with the result that all holdings in the 3.6 GHz band could be contiguous, maximising the efficiency of the assignments.

### Impact on competition

Approving the proposed licence variation will not hinder competition but, rather, will promote it by encouraging other mobile wholesalers to launch 5G services and/or by reducing the cost of 5G and/or high-speed mobile services (as discussed above).

This is not a situation where UKB will have an opportunity to launch a new service before anyone else. All the other mobile wholesalers have obtained spectrum in the 3.4 GHz / 3.5 GHz band which can be used to launch 5G services at the same time as UKB could do using its 3.6 GHz licence. Ofcom must also take account of the impending release of additional 5G spectrum in the 700 MHz and 3.6 GHz bands, currently scheduled for the second half of 2019.

The only difference is in the bandwidth that UKB would be able to provide. UKB notes that:

- Ofcom has already approved the provision of mobile services using the 3.6 GHz Licence for mobile use so, in theory at least, Three and UKB ought to be able to provide 80 MHz-wide 5G services without any further licence variation – albeit less easily and less effectively;

- The highest speeds will only be available to consumers that have terminals compatible with 5G use in the 3.6 GHz band. This is likely to be a small group in the period before others are able to launch their own 3.6 GHz 5G services. Indeed, Three's best estimate is that [✂] of its customers will have 5G handsets before late 2020.

### Objective justification for licence conditions

Any objective justification for leaving 3600-3605 MHz unused passed when the 3.5 GHz and 3.6 GHz Licences fell into the common ownership of UKB.

There is no objective justification for not approving the Second Element of the proposed variation to bring the 3.6 GHz Licence into line with the requirements of the 2014 Decision provided existing 3.6 GHz licensees and grant-holders and protected from any increase in interference including by continued compliance with coordination obligations, as UKB has committed to do.

### Legal considerations that limit Ofcom's discretion to vary licence conditions

UKB considers that it has a legitimate expectation, because of the previous variations to the 3.5 GHz and 3.6 GHz Licences, that Ofcom will promptly vary the 3.6 GHz Licence to reflect the updated requirements of the 2014 Decision unless there are good reasons why it would not be appropriate to do so.

UKB also considers that it would be unfairly discriminatory to refuse at least the Second Element of the proposed variation given Ofcom's previous decision to liberalise EE's 1800 MHz licences.