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Proposed annual licence fees for 2100 MHz spectrum

CONSULTATION:

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Contents

Section

Annex

1. Overview

In this consultation, we set out our proposals for the level of annual licence fees for 2100 MHz spectrum, and on draft regulations to implement them.

The 2100 MHz licences, consisting of paired spectrum and unpaired spectrum, were auctioned in 2000 for a fixed period of 20 years. We consider that both the paired and unpaired 2100 MHz spectrum are highly valuable mobile spectrum.

In 2011, and in light of a Government Direction, Ofcom varied each of the 2100 MHz licences to make them indefinite and to include a new provision requiring the payment of annual licence fees which reflect the full market value of the 2100 MHz spectrum from 1 January 2022.

We consider that setting fees which reflect the market value (opportunity cost) of the underlying spectrum will best achieve our statutory duties, including our duty to secure the optimal use of the spectrum. It is also in line with our general policy on spectrum pricing as well as the Government's Direction.

In brief

We propose:

- that, whilst the paired and unpaired spectrum will both be useable for the deployment of mobile services on a forward-looking basis, they have different technical characteristics which mean that they will not necessarily have the same market value;
- to set an annual licence fee of **£0.567m per MHz for paired 2100 MHz spectrum and £0.290m per MHz for unpaired 2100 MHz spectrum**; and
- that the annual licence fees would apply from 1st January 2022, with an option to pay across ten equal monthly instalments.

We aim to publish our decision and fee regulations by the end of 2021.

The overview section in this document is a simplified high-level summary only. The proposals we are consulting on and our reasoning are set out in the full document

2. Introduction

Background

2.1 The 2100 MHz spectrum was auctioned in April 2000 for deployment of third generation (3G) national mobile networks. It consists of both paired spectrum[1] and unpaired spectrum.[2]

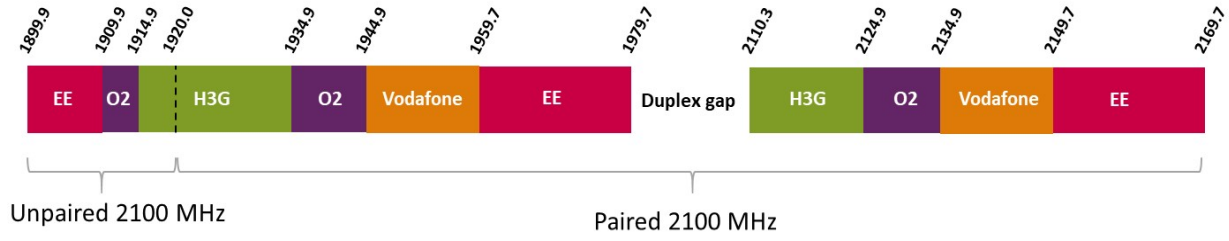
2.2 This was the first mobile spectrum auction in the UK and generated £22.5 billion. To promote a new fifth entrant into the mobile market, some spectrum was reserved for a new entrant (and was ultimately won by Hutchison 3G UK Ltd ("**H3G**")). The licences were initially granted for a fixed period of 20 years.

2.3 Since the auction, a number of mergers and acquisitions have occurred in the mobile market resulting in the existing four mobile network operators ("**MNOs**"); Everything Everywhere Ltd ("**EE**"), H3G, Telefónica UK Ltd ("**O2**") and Vodafone Ltd ("**Vodafone**"). Their 2100 MHz spectrum holdings are shown in Table 2.1 and Figure 2.1 below.

Table 2.1: Spectrum holdings in the 2100 MHz spectrum

2100 MHz band	EE	H3G	O2	Vodafone
Paired spectrum	40 MHz	29.5 MHz	20 MHz	29.6 MHz
Unpaired spectrum	10 MHz	5.1 MHz	5 MHz	-

Figure 2.1: Spectrum holdings in the 2100 MHz spectrum



2.4 In June 2011, Ofcom varied[3] each of the 2100 MHz licences in order to give effect to a Government Direction ("**the Direction**").[4] Amongst other things, each of the licences was made indefinite (subject to revocation notice by Ofcom), and included a new provision requiring the payment of annual licence fees ("**ALF**") from 1 January 2022.

[1] 1920 - 1979.7 MHz paired with 2110.3 - 2169.7 MHz
[2] 1899.9 – 1920 MHz
[3] Ofcom, *Statement on variation of 2100 MHz Third Generation Mobile Wireless Telegraphy Act Licences*, July 2011 https://www.ofcom.org.uk/__data/assets/pdf_file/0027/73854/statement.pdf
[4] https://www.legislation.gov.uk/uksi/2010/3024/article/5/made

Annual licence fees for 2100 MHz spectrum

2.5 In this consultation, we make proposals on the level of annual licence fees applicable to the 2100 MHz spectrum from 1 January 2022. These proposals are in line with our spectrum pricing policy to set fees based on opportunity cost[5] for spectrum.

2.6 Our spectrum pricing policy is set out in our Strategic Review of Spectrum Pricing ("**SRSP**") in 2010[6] which included our approach to setting licence fees. In the SRSP, we said that this would be used in future as a guide to setting fees above administrative cost (which we referred to in the SRSP as administered incentive pricing ("**AIP**")). The SRSP was itself established as part of meeting our statutory duties when imposing spectrum licence fees.

2.7 We explained in the SRSP that the purpose of AIP was to set fees for spectrum holdings to reflect the market value of the spectrum (based on its opportunity cost) in order to promote the optimal use of spectrum, in line with our duties. We set out a high-level framework for setting AIP fees which we have adopted in this consultation and noted that we would need to take account of the particular circumstances of a case when setting specific fees. In this consultation, we use the terms AIP and ALF interchangeably.

2.8 The Government Direction requires Ofcom to set the annual licence fees for the 2100 MHz spectrum (both the paired and unpaired spectrum) so that they reflect the full market value of the frequencies in the band. The approach we propose to adopt in this case is therefore also consistent with and reinforced by the Government's Direction.

Relevant legal framework

2.9 Ofcom has the power pursuant to the Wireless Telegraphy Act 2006 (the "**Wireless Telegraphy Act**") to require spectrum licensees to pay fees to Ofcom on the grant of a licence and subsequently. This includes the power to set fees at an amount that is higher than the cost to us of carrying out our radio spectrum functions, if we think this is appropriate in light of our statutory duties at Section 3 of the Wireless Telegraphy Act.

2.10 These duties include having regard to:

a) the extent to which the electromagnetic spectrum is available for use, or further use, for wireless telegraphy;

b) the demand for use of the spectrum for wireless telegraphy;

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

d) the desirability of promoting:

[5] Opportunity cost is the value of alternative spectrum use forgone by society due to the current spectrum use.
[6] Ofcom, *SRSP: The revised Framework for Spectrum Pricing*, December 2010, https://www.ofcom.org.uk/__data/assets/pdf_file/0024/42909/srsp-statement.pdf

i) the efficient management and use of the part of the electromagnetic spectrum available for wireless telegraphy;

ii) the economic and other benefits that may arise from the use of wireless telegraphy;

iii) the development of innovative services; and

iv) competition in the provision of electronic communications services

2.11 Ofcom also has a number of statutory duties under the Communications Act 2003 (the "**Communications Act**") which are relevant to its spectrum management functions. These include its principal duty to further the interests of citizens and consumers (where appropriate by promoting competition) and its duties to secure the optimal use for wireless telegraphy of the electro-magnetic spectrum and to promote competition. It is also required to have regard to the desirability of encouraging investment and innovation in relevant markets and encouraging the availability and use of high speed data transfer services throughout the UK.

2.12 Further detail on the relevant legal framework is set out in Section 5 and Annex A5 of this consultation.

Structure of this document

2.13 The rest of this document is set out as follows:

- **Section 3** sets out our approach to determining annual licence fees.
- **Section 4** outlines our proposed fees in relation to the paired and unpaired 2100 MHz spectrum, based on their market value.
- **Section 5** sets out our further consideration of ALFs based on market value, in light of our statutory duties.
- **Section 6** summarises our provisional conclusions and discusses implementation.
- **Annexes A1-A4** outline how to respond to this consultation, and provide Ofcom's overall consultation principles, a cover sheet for responses and a copy of the questions we ask throughout this document.

2.14 Supporting material and draft regulations (on which we are also seeking stakeholders' views) are set out in the following separate annexes:

- **Annex A5** outlines the relevant legal framework.
- **Annex A6** outlines our approach to international benchmarking for the paired 2100 MHz spectrum.
- **Annex A7** sets out our provisional assessment of spectrum awards relevant to the paired 2100 MHz spectrum.
- **Annex A8** outlines our approach to annualisation for both the paired and unpaired 2100 MHz spectrum.
- **Annex A9-A10** provide a notice and draft of the regulations which we are proposing to make in order to implement the 2100 MHz annual licence fees.

3. Approach to determining annual licence fees

Introduction

3.1 As explained in Section 2 above, the purpose of AIP is to to set fees for spectrum holdings to reflect the market value of the spectrum (based on its opportunity cost) in order to promote the optimal use of spectrum, in line with our duties. When we refer to opportunity cost, and as discussed in more detail in our SRSP, we mean the value to the next highest value use or user that is denied access to the spectrum.[7]

3.2 This section first sets out our provisional view on the next highest value use or user for both the paired and unpaired 2100 MHz spectrum. We then explain our general approach to determining the annual licence fees payable in respect of the paired and unpaired 2100 MHz spectrum, based on that next highest value use or user of that spectrum.

Next highest value use or user for the 2100 MHz spectrum

3.3 As explained in Section 2 above, the paired and unpaired 2100 MHz spectrum were auctioned together in 2000 for the deployment of 3G national mobile networks.

Paired 2100 MHz spectrum

3.4 In July 2013, Ofcom varied[8] the paired 2100 MHz 3G spectrum licences to permit deployment of 4G mobile technology. Mobile operators are currently migrating from 3G to 4G/5G technology in this spectrum, and together with the 900 and 1800 MHz band, these are mainstream coverage bands providing national mobile services, as well as anchor bands[9] for deployment of non-standalone 5G in the 3.4 - 3.8 GHz band.

3.5 Our provisional view is therefore that the next highest value use case for the paired 2100 MHz spectrum comes from mobile services and we expect that the next highest value user for the 2100 MHz spectrum would be another MNO.

Unpaired 2100 MHz spectrum

3.6 The unpaired 2100 MHz spectrum is currently unused for high power mobile services (and has not been used since its award in 2000).

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[7] We define market value as the market-clearing price in a well-functioning market, or the forward-looking marginal opportunity cost of the spectrum, and we use the terms "full market value", "market value" and "marginal opportunity cost" interchangeably in this document.

[8] Ofcom, *Statement on the Requests for Variation of 900 MHz, 1800 MHz and 2100 MHz Mobile Licences*, July 2013, https://www.ofcom.org.uk/__data/assets/pdf_file/0023/63932/statement.pdf

[9] 1800 MHz and 2100 MHz

3.7 In 2017, and following a request from EE, Ofcom varied[10] the terms of EE's 2100 MHz licence to allow for the unpaired spectrum to be used for TD-LTE[11] to support the provision of the emergency services network across the UK. The European Conference of Postal and Telecommunications Administrations ("**CEPT**") has also studied potential alternative uses for the unpaired 2100 MHz spectrum and, in November 2020, designated part of the band for railway communication.[12]

3.8 Although the unpaired spectrum is not currently being used to provide mobile services, we have considered whether this spectrum could be used to provide mobile services in the future. This reflects the fact that ALFs are intended to provide a long-term signal of the value of spectrum.

3.9 Ofcom did consider the use of unpaired 2100 MHz spectrum in its 2020 statement regarding the award 700 MHz and 3.6 GHz.[13] The purpose of our analysis was to inform our mobile competition assessment and, in particular, our view on whether competition tools (such as spectrum caps) should be incorporated into the award process. We considered which frequencies would be useable for mobile at the time of this award or soon after and decided that the unpaired 2100 MHz spectrum was *"unlikely to be able to be used for high power macro sites in practice due to compatibility with the adjacent uplink band of the paired 2100 MHz spectrum"*.

3.10 Notwithstanding the above, our provisional view is that it should be possible to use the unpaired 2100 MHz spectrum for the deployment of high-power mobile services in the future. This is for the following reasons:

a) the licence conditions permit deployment of a high power 3G mobile network;

b) MNOs are currently migrating from 3G to 4G technology and we expect this to result in improved base station selectivity[14] in the paired 2100 MHz spectrum. This would, in turn, enable deployment of a 4G macro network in the adjacent unpaired 2100 MHz spectrum. Furthermore, the equipment ecosystem already exists for mobile terminals and the band is deployed for mobile in China; and

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[10] Ofcom, *Statement on EE application for licence variations in support of enhanced mobile communications for the emergency services*, January 2017, https://www.ofcom.org.uk/__data/assets/pdf_file/0032/96566/Statement-EE-application-for-licence-variations-in-support-of-enhanced-mobile-communications-for-the-emergency-services.pdf. Our decision was predicated on the basis that additional technical conditions were included in EE's licence to prevent interference to other users of adjacent spectrum. These additional technical conditions limit the power available for TD-LTE use to a level typical of small cells and lower than would normally be considered necessary for macro sites.

[11] TD-LTE means the TDD variant of LTE (Long Term Evolution or 4G technology).

[12] CEPT, *Harmonised use of the paired frequency bands 874.4- 880.0 MHz and 919.4-925.0 MHz and of the unpaired frequency band 1900-1910 MHz for Railway Mobile Radio (RMR)*, December 2020, https://docdb.cept.org/download/1446. 1900-1910 MHz were harmonised for railway communication, and harmonisation was intended to facilitate transition from Global System for Mobile Communications-Railway (GSM-R) to its successor Future Railway Mobile Communications System (FMRCS) expected from 2024 onwards.

[13] Ofcom, *Statement on the award of the 700 MHz and 3.6-3.8 GHz award – annexes*, March 2020, https://www.ofcom.org.uk/__data/assets/pdf_file/0017/192410/annexes-award-700mhz-3.6-3.8ghz-spectrum.pdf, paragraphs A4.59-A4.62.

[14] Ability to process wanted signal while rejecting unwanted signal in an adjacent frequency channel.

c) should the existing licence holders request to vary the terms of their licence so as to allow the unpaired 2100 MHz spectrum to be used for TD-LTE, we would be minded to approve this to the same in-block power level as the adjacent 2100 MHz paired spectrum. We expect that, an added synchronization requirement in the licence variation, along with improved base station selectivity, would enable MNOs to use the unpaired 2100 MHz spectrum for mobile services in a similar way to the unpaired 2.3 GHz mobile spectrum.

3.11 As noted above, CEPT designated the 1900-1910 MHz spectrum for railway communication in 2020. However, this spectrum is currently held by EE and our provisional view is that the opportunity cost of foregone use by another MNO is higher than any potential use for railway communication or emergency services.

3.12 Our provisional view is therefore that the next highest value use case for the unpaired 2100 MHz spectrum also comes from mobile services and we expect that the next highest value user for the 2100 MHz spectrum would be another MNO.

Question 1: Do you agree that mobile services are the highest value use for both the paired and unpaired 2100 MHz spectrum? If not, please provide evidence to support your answer.

Structure of our approach to determining the level of fees

3.13 Having provisionally determined the next highest value use or user, and following the framework we set out in the SRSP, our starting point when calculating the appropriate fee for a spectrum band is to first determine the market value (based on its opportunity cost to that next highest use or user) of the spectrum concerned.

3.14 Given our provisional view that the next highest value use for each of the paired and unpaired 2100 MHz spectrum is from mobile services (and therefore from another MNO), our starting point when considering the value of the spectrum concerned is to consider the evidence on the market value of mobile spectrum bands which have been auctioned in the UK alongside other evidence (where available).[15]

3.15 We note that there are some technical differences between the paired (also known as FDD) and unpaired (also known as TDD) 2100 MHz spectrum (see paragraph 4.59 onwards) which mean that they are likely to have different market values. We have therefore considered the annual licence fees for the paired and unpaired 2100 MHz spectrum (and, in particular, the evidence on their market value in Section 4) separately.

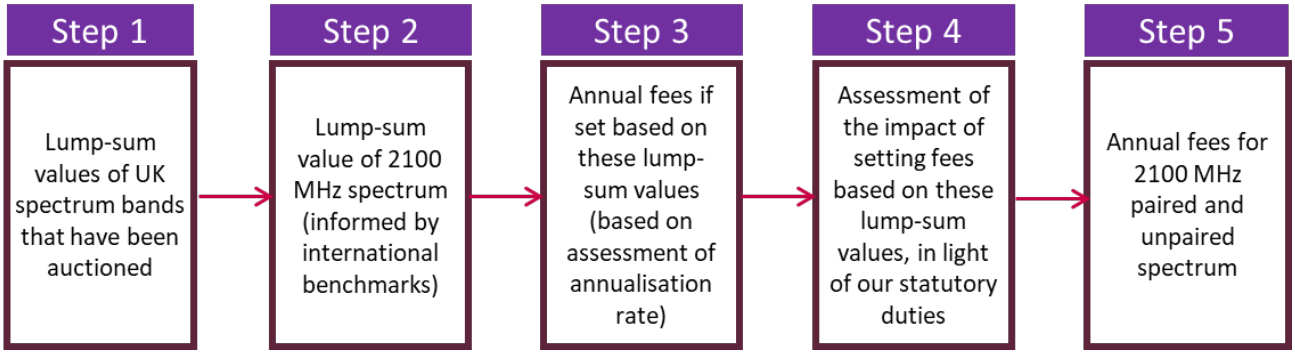
3.16 Having provisionally estimated the market value of each of the paired and unpaired spectrum, we then convert these lump-sum market values into equivalent annual rates by applying an annualisation rate. We then consider, in light of our statutory duties, what the likely impact of setting fees at that level would be, and whether in light of that assessment

[15] This is consistent with our approach in other recent ALF decisions for mobile spectrum bands.

there is any reason for us to set fees at a different level. Taking all the above into account, we then reach a provisional view on the appropriate level of fee in the specific case.

3.17 This overall approach is illustrated in Figure 3.1 below.

Figure 3.1: Framework of steps



3.18 Steps 1 and 2 are outlined in the next section (Section 4) separately for the paired and unpaired 2100 MHz spectrum. Section 4 then concludes with Step 3. Section 5 sets out our impact assessment under Step 4 for both the paired and unpaired 2100 MHz spectrum, with Step 5 set out in Section 6.

4. Provisional assessment of the market value of 2100 MHz spectrum

Introduction

4.1 This section sets out our provisional assessment of the market value of the paired and unpaired 2100 MHz spectrum, based on the framework set out in Section 3.

4.2 In light of our provisional view that the highest value use for both the paired and unpaired 2100 MHz spectrum will be mobile services, we first outline our approach to determining the market value of mobile spectrum and identify the UK mobile spectrum bands that have been auctioned in the UK in recent years (the "**auction bands**"). We then consider the technical characteristics of the paired and unpaired 2100 MHz spectrum (and the impact that this has on our analysis of their market value), before considering the market values of the paired and unpaired 2100 MHz spectrum in turn.

Market value of mobile spectrum bands which have been auctioned

4.3 As explained in Section 3 above, Step 1 in determining the market value of the paired and unpaired 2100 MHz spectrum is to consider the evidence on the market value of mobile spectrum bands which have been auctioned in the UK alongside other evidence (where available).

4.4 In considering evidence on the market value of mobile spectrum bands which have been auctioned in the UK, we note:

a) when setting the ALF for 3.4 GHz and 3.6 GHz spectrum already held by UK Broadband Ltd ("**UKB**") in 2019, we based our estimate of market value on the results of the 2018 auction of 3.4 GHz spectrum;[16] and

b) when setting ALFs for 900 MHz and 1800 MHz spectrum in 2018, neither of those bands had been auctioned in the UK. In that case we used the results of the 2013 UK auction of 800 MHz and 2.6 GHz spectrum, alongside the results of auctions involving 800 MHz, 900 MHz, 1800 MHz and 2.6 GHz in other European countries, to derive our estimates of the value of the 900 MHz and 1800 MHz bands.[17]

[16] Ofcom, *Annual Licence Fees for UK Broadband's 3.4 GHz and 3.6 GHz spectrum*, June 2019, https://www.ofcom.org.uk/__data/assets/pdf_file/0013/151231/statement-annual-licence-fees-uk-3.4-ghz-and-3.6-ghz-spectrum.pdf

[17] Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands,* December 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0020/130547/Statement-Annual-licence-fees-900-MHz-and-1800-MHz.pdf

4.5 The 2100 MHz spectrum was auctioned in the UK in 2000.[18] However, our view is that it would not be appropriate to use this 20-year old auction result to inform our forward-looking view of the market value of this spectrum.

4.6 There is no directly relevant UK auction evidence since 2000 to inform the market value of either the paired or unpaired 2100 MHz spectrum, which means that we cannot adopt the same approach as we did when setting ALF for UKB's 3.4 and 3.6 GHz spectrum.

4.7 We therefore consider the more appropriate approach is to take a similar approach to that used for 900 MHz and 1800 MHz ALFs. That is, to use the results of recent UK auctions of mobile spectrum in other bands alongside other relevant evidence, including the results of auctions in other European countries (in each case, where available).

Recent UK mobile spectrum auctions

4.8 Since the 3G auction of the 2100 MHz spectrum in 2000, we have carried out three mobile spectrum auctions:

a) award of 800 MHz (paired) and 2.6 GHz (paired and unpaired) spectrum in March 2013;

b) award of 2.3 GHz (unpaired) and 3.4 GHz (unpaired) spectrum in April 2018; and

c) award of 700 MHz (paired and supplemental downlink) and 3.6 GHz (unpaired) spectrum in March 2021.

4.9 Table 4.1 below sets out the auction prices (in April 2021 prices) from these auctions.

Table 4.1: Auction prices from recent UK mobile spectrum auctions

Spectrum band	Auction date	Price (per MHz)
700 MHz	March 2021	£14.1m[19]
800 MHz	March 2013	£37.0m[20]
2.3 GHz	April 2018	£5.4m
2.6 GHz	March 2013	£6.2m[21]
3.4 GHz	April 2018	£7.9m
3.6 GHz	March 2021	£4.2m

[18] https://webarchive.nationalarchives.gov.uk/20080715010941/http://www.ofcom.org.uk/static/archive/spectrumauctions/press/200427.htm

[19] Market value for 700 MHz paired spectrum

[20] This is gross of expected DTT co-existence costs. See Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands,* December 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0020/130547/Statement-Annual-licence-fees-900-MHz-and-1800-MHz.pdf, paragraphs 4.6 and 4.7

[21] Market value for 2.6 GHz paired spectrum

Source: Ofcom[22]

4.10 In December 2018, we set ALFs for 900 MHz based on a lump sum value of £19.8m, and for 1800 MHz based on a lump sum value of £14.6m (in April 2021 prices). These were informed by the UK auction values from the March 2013 auction.

4.11 The UK auction results show that there can be significant variation in the prices achieved for similar spectrum bands, reflecting the fact that auction values are in practice affected to a significant extent by factors specific to the particular award. This feature in turn illustrates the complexity of the challenge we have in determining the appropriate market value for UK 2100 MHz spectrum, and the fact there is no one "correct" value that can be mechanistically derived from the data we have. Instead, we have to exercise considerable regulatory judgement in arriving at an appropriate estimate.

4.12 Notwithstanding significant price variation for mobile spectrum bands, the UK auction results indicate that sub-1 GHz spectrum is more highly valued than high frequency spectrum.

Market value of paired 2100 MHz spectrum

4.13 We consider below the market value of the paired 2100 MHz spectrum.

4.14 As we did in the case of 1800 MHz, we propose to take the evidence from recent UK auctions of low and high frequency mobile spectrum as a starting point for the bounds within which the paired 2100 MHz value is likely to lie, and then to use evidence from international auctions to inform our view of where within this range it is likely to sit in the UK. We have previously referred to this as a "distance method benchmark".[23]

4.15 In the case of 1800 MHz, we used one low frequency band (800 MHz) and one high frequency band (2.6 GHz) in the benchmark. As we now have more UK auction bands - two UK sub-1 GHz auction bands (700 MHz and 800 MHz), and four higher frequency UK auction bands (2.3 GHz, 2.6 GHz, 3.4 GHz and 3.6 GHz), there are more possible combinations of benchmarks that we can use.

4.16 We propose to consider the relative benchmarks from each of these combinations on their merits. We do not consider there are strong *a priori* reasons to believe that a particular distance method would be more informative of the forward-looking market value of UK

[22] March 2013 auction prices derived from Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands,* December 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0020/130547/Statement-Annual-licence-fees-900-MHz-and-1800-MHz.pdf, paragraphs 4.7 and 4.10. April 2018 auction prices derived from Ofcom, *Award of 2.3 and 3.4 GHz spectrum bands - Publication under regulation 111 of the Wireless Telegraphy (Licence Award) Regulations 2018 of results of auction https://www.ofcom.org.uk/__data/assets/pdf_file/0018/112932/Regulation-111-Final-outcome-of-award.pdf*. March 2021 auction prices derived from Ofcom, *Award of the 700 MHz and 3.6-3.8 GHz spectrum bands – Publication of the results of the Principal Stage of the auction under regulation 49 of the Wireless Telegraphy (Licence Award) Regulations 2020* https://www.ofcom.org.uk/__data/assets/pdf_file/0017/216107/publication-ps-results-reg-49.pdf

[23] The distance method consists of (a) calculating the Y/X ratio (calculated as the difference in value between (in this case) 2100 MHz and the higher frequency comparator band ("Y"), divided by the difference in value between the lower frequency comparator band and higher frequency comparator bands ("X")), and (b) relating this to the corresponding lower and higher frequency band values in the UK to solve for the UK value of 2100 MHz. Further details on these calculations are set out in Annex A6.

paired 2100 MHz spectrum than another. We also note that considering each of these combinations in the round enables us to take into account the widest range of relevant UK and European auction evidence.

UK mobile spectrum auctions

4.17 As discussed in Section 3, the paired 2100 MHz spectrum was last auctioned in the UK over 20 years ago and our provisional view is that it is not appropriate to base our estimate of market value on that auction.

4.18 There have however been a number of more recent UK mobile spectrum auctions which may be useful when estimating the market value of the paired 2100 MHz spectrum. We have summarized all of the recent auctions of mobile spectrum bands in Table 4.1 above.

4.19 Our expectation is that the value of the paired 2100 MHz spectrum would lie somewhere between the value of the higher frequency spectrum bands and sub-1 GHz spectrum – that is, somewhere between £4.2m per MHz and £37.1m per MHz. We also consider it would be unlikely to be valued at significantly more than the lowest value sub-1 GHz auction price (£14.1m per MHz) and unlikely to be valued at significantly less than the highest value higher frequency band auction price (£7.9m per MHz).

4.20 We would also expect the value of the paired 2100 MHz spectrum to be relatively close to the value of the 1800 MHz spectrum given both bands are mainstream coverage bands with similar propagation characteristics and established equipment ecosystem.

Relevant international benchmarks

4.21 We have identified European countries in which there has been a recent spectrum award of paired 2100 MHz for which it has been possible to derive band specific prices and where there have also been spectrum awards of at least one of the auction bands (700 MHz, 800 MHz, 2.3 GHz, 2.6 GHz, 3.4 GHz and 3.6 GHz). The auction results from these countries provide potentially useful information on the relative value of the different spectrum bands to help inform our view on where the value of the paired 2100 MHz is likely to sit relative to spectrum bands which have been auctioned in the UK.

4.22 Consistent with our approach in 900 MHz and 1800 MHz ALFs, we have categorised these benchmarks into three tiers. These categorisations reflect how informative of relative UK market values we consider the benchmarks to be, with Tier 1 most informative and Tier 3 least. Our criteria for placing a relative benchmark in Tier 1 are that:

a) the auction prices appear likely to have been primarily determined by a market-driven process of bidding in the auctions (generally this means the prices were not set by reserve prices);

b) based on the evidence available to us, the relative prices in the auction are at least as likely to be based on bidders' intrinsic valuations of spectrum as on strategic bidding; and

c) the outcome appears likely to be informative of forward-looking relative spectrum values in the UK, having regard to country-specific circumstances and auction dates. [24]

4.23 In addition to our assessment of which tier a benchmark is in, we have assessed whether there is a risk that each benchmark is an understated or overstated estimate of the UK value of paired 2100 MHz. For example, a binding spectrum cap could create a risk of that auction understating the market value in that country.

4.24 We explain above that we have adopted a "distance method benchmark". As explained in Annex A7, we have four countries for which we can derive Tier 1 distance method benchmarks; Austria, Germany, Hungary, and Slovenia.[25] Table 4.2 below sets out the distance method benchmarks we can derive for each of these countries.

Table 4.2: Distance method benchmarks we can derive for each Tier 1 country

	Date of 2100 MHz auction	700-2300	700-2600	800-2600	700-3400/3600	800-3400/3600
Austria	2020		Y	Y	Y	Y
Germany	2019		Y	Y	Y	Y
Hungary	2020				Y	
Slovenia	2021	Y			Y	

4.25 We also have good (Tier 1) quality 700 MHz and 2100 MHz evidence from the Netherlands, but we have not been able to derive a Tier 1 distance method benchmark because we do not have a Tier 1 quality high frequency auction result. As discussed below, we have sought to take this evidence from the Netherlands into account alongside our Tier 1 benchmarks by deriving Dutch relative value benchmarks for 2100 MHz using proxy values for the high frequency bands.

Provisional assessment of the market value of paired 2100 MHz spectrum

4.26 We now explain our provisional view on the lump-sum market value of the paired 2100 MHz spectrum, taking account of the evidence from the UK and international relative benchmarks.

4.27 Reaching our provisional view has involved considerable exercise of our judgement, reflecting the fact that trying to determine a forward-looking estimate of market value for

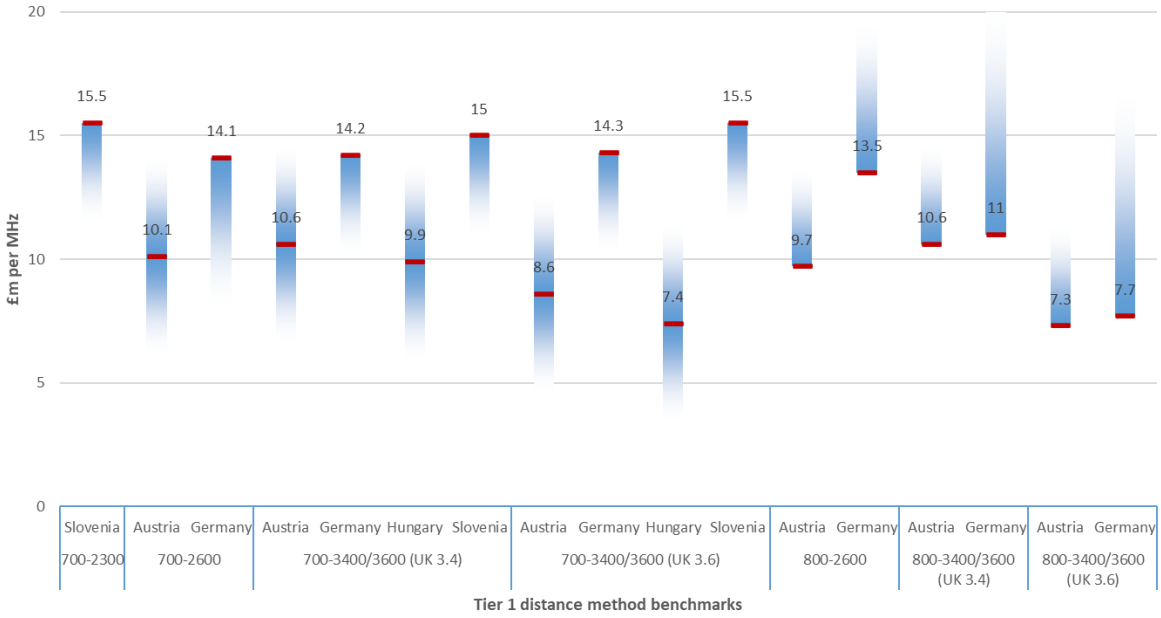
[24] Our criteria for placing a benchmark in Tier 2 are that one or more of the criteria for Tier 1 are not met; but i) there is some evidence that the relative auction prices reflect bidders' relative intrinsic valuations of different bands; and ii) while there is a clear, evidence-based reason for considering that the outcome is less informative of forward-looking relative spectrum values in the UK, the outcome is not obviously uninformative of forward-looking relative spectrum values in the UK. Our criterion for placing a benchmark in Tier 3 is that it does not meet the criteria for Tier 1 or Tier 2.

[25] We also have four countries for which we can derive Tier 3 distance method benchmarks. We have not identified any countries for which we can derive Tier 2 distance method benchmarks. See Annex A7.

a specific spectrum band is not a precise science. In using our judgement, we have (consistent with our approach in previous ALF determinations) adopted a conservative approach to interpreting the evidence.[26]

4.28 We begin by looking at evidence from all possible Tier 1 distance method benchmarks, presented in Figure 4.1 below. Whilst there is considerable variation in these results, the majority of benchmarks (10 out of 17) fall within a relatively narrow range of £9.5m - £14.5m per MHz. This too is consistent with our view (discussed in paragraph 4.19 above) that the market value for paired 2100 MHz should lie between the market value for low frequency and high frequency bands in the UK.

Figure 4.1: 2100 MHz Tier 1 distance method benchmarks in £m per MHz



The Tier 1 distance method benchmarks for paired 2100 MHz are shown grouped by the spectrum bands used in the benchmark. The shaded areas illustrate our assessment of the likelihood or scale of possible understatement and overstatement associated with each benchmark.

4.29 Given the way our dataset is constructed, we need to exercise some caution when looking at summary statistics such as averages across all benchmarks.

a) Firstly, as we will discuss in more detail below, some benchmark values are at larger risk of under- or over- statement. Where this is the case, we should exercise caution to ensure that these results are not exerting an undue influence on the overall outcome.

a) Secondly, the dataset we observe in this context is significantly expanded compared to previous ALF determinations as we are using a larger number of relatively recent UK spectrum awards to use to calculate the relative value of the paired 2100 MHz spectrum. One consequence of this is that we can derive multiple results from

[26] We take a conservative approach to interpreting the evidence to reflect the asymmetry of risk as between the effects on spectrum efficiency from inadvertently setting ALFs either above or below market value, given the uncertainty about the correct estimates for market value.

countries that have auctioned more comparator bands. We need to exercise caution to ensure that we do not place disproportionate weight on countries that have auctioned more comparator bands.

4.30 Nonetheless, we need some way of putting structure on a range of outcomes in our dataset and consider these measures potentially informative. In this context, we observe that the average over all possible Tier 1 benchmarks is £11.5m per MHz, and that the large majority of benchmarks (13 out of 17) lie above £9.5m per MHz. As a starting point, this provides further support for our view about the likely relative value of this spectrum.

4.31 In previous ALF determinations, we have looked at the mid-point between the average and the lowest benchmarks as a starting point for our analysis. We continue to consider this a useful way of putting structure on any individual distance method calculation (e.g. 700-2100-2300 or 700-2100-3600) and present our results for each combination of frequency bands below in Table 4.3.[27]

4.32 These results, again, provide considerable support for our initial assessment: four out of the seven possible combination of frequency bands have a lower midpoint of between £10.5m - £11.5m per MHz. One distance method is higher at £15.5m per MHz but based on only one data point. The remaining two distance method calculations, both based on UK auction values for the 3.6 GHz band, have midpoints which are lower than this, at £7.4m and £9.4m per MHz. We note that one of these has a wide spread of values, with a maximum value of £15.5m per MHz and an average of £11.5m per MHz.

Table 4.3: Summary statistics by spectrum bands used in the benchmark

Spectrum bands used in benchmark	Number of results	Average	Lowest	Midpoint between average and lowest
700-2100-2300	1	15.5	15.5	15.5
700-2100-2600	2	12.1	10.1	11.1
700-2100-3400/3600 (using UK 3400)	4	12.4	9.9	11.2
700-2100-3400/3600 (using UK 3600)	4	11.4	7.4	9.4
800-2100-2600	2	11.6	9.7	10.7
800-2100-3400/3600 (using UK 3400)	2	10.8	10.6	10.7

[27] We note we do not consider the lower-midpoint an appropriate way of looking at all of our distance method benchmarks in the round. This is in part for the same reason we don't place much weight on summary statistics across the sample in its entirety (i.e. not wishing to over-weight a particular country without good reason), and also that in the context of an expanded dataset it then places very significant weight on the single lowest value.

800-2100-3400/3600 (using UK 3600)	2	7.5	7.3	7.4

4.33 We now consider the individual benchmarks in more detail to assess their relative merit, before presenting our overall assessment.

Benchmarks using 2.3 and 2.6 GHz spectrum

4.34 As shown in Figure 4.1 above, we are able to derive five benchmarks from three different countries using 700 MHz or 800 MHz as the low frequency spectrum and 2.3 GHz or 2.6 GHz as the high frequency spectrum:

a) Slovenia 700-2100-2300 benchmark gives a lump-sum value estimate for 2100 MHz of £15.5m per MHz;

b) For Austria and Germany, we can derive both 700-2100-2600 and 800-2100-2600 benchmarks. For both countries, the results are fairly similar whether looking at the 700-2100-2600 or 800-2100-2600. For Austria it is £10.1m per MHz using 700 MHz and £9.7m per MHz when using 800 MHz; for Germany it is £14.1m per MHz using 700 MHz and £13.5m per MHz using 800 MHz.

4.35 These benchmarks suggest a fairly narrow range of values for the paired 2100 MHz spectrum between £9.7m and £15.5m per MHz, with the average being £12.6m per MHz. We note that both the Slovenian and highest German benchmarks are at risk of overstatement and the lowest Austrian and lowest German benchmarks are at risk of understatement.

Benchmarks using 3.4-3.8 GHz spectrum

4.36 When looking at benchmarks using 3 GHz spectrum, there are four different Tier 1 countries which have auctioned spectrum in the 3.4 - 3.8 GHz band for which we can derive relative benchmarks; Austria, Germany, Hungary and Slovenia.

4.37 As shown in Table 4.4 below, because there have been two separate UK auctions in the 3.4-3.8 GHz band (the 2018 3.4 GHz and 2021 3.6 GHz auction) we get two different estimates for the value of 2100 MHz for each country depending on which UK auction results we use in the calculation.

Table 4.4: Benchmarks using 3 GHz spectrum

Estimate of UK value of 2100 MHz (£m per MHz)	Using UK 3.4 GHz auction result	Using UK 3.6 GHz auction result	Average
Austria 700-2100-3400/3600	10.6	8.6	9.6
Austria 800-2100-3400/3600	10.6	7.3	9.0

Germany 700-2100-3400/3600	14.2	14.3	14.2
Germany 800-2100-3400/3600	11.0	7.7	9.4
Hungary 700-2100-3400/3600	9.9	7.4	8.7
Slovenia 700-2100-3400/3600	15.0	15.5	15.3
Average	**11.9**	**10.1**	**11.0**

4.38 The difference in the UK auction results has a particular impact on the estimates the closer the paired 2100 MHz value in the comparator country is to the 3.4 - 3.8 GHz spectrum value in that country.

4.39 Consistent with the benchmarks derived using 2.3 GHz and 2.6 GHz spectrum, the results when using the UK 3.4 GHz auction suggest a fairly narrow range of values for 2100 MHz between £9.9m and £15m per MHz. There is a bigger range when using the UK 3.6 GHz auction result with four of the results being between £7.3m and £8.6m per MHz, and the other two results being over £14m per MHz.

Additional Dutch benchmark using proxy values

4.40 As set out in paragraph 4.25 above, in addition to the four countries for which we have been able to derive Tier 1 benchmarks, we also have good (Tier 1) quality 700 MHz and 2100 MHz evidence from the Netherlands, but we have not been able to derive a direct Tier 1 distance method benchmark because we do not have a Tier 1 quality high frequency auction result.

4.41 We have therefore sought to estimate proxy values for 2.3 GHz, 2.6 GHz and 3.4 - 3.8 GHz for the Netherlands and use these to derive a relative value benchmark for 2100 MHz for inclusion alongside our Tier 1 benchmarks.[28]

4.42 The resulting relative benchmarks range from £7.2m per MHz to £10.4m per MHz, with an average of £9.1m per MHz.[29] It is the same Dutch data (the 700 MHz and 2100 MHz auction results) that is being used in all benchmarks with the difference in results being driven by the proxies, and, in the case of the 3 GHz spectrum benchmarks, the difference in the UK auction results. Notwithstanding that, these results suggest that the available auction

[28] In 2018 when looking at the international benchmark evidence to inform our view of the value of UK 1800 MHz spectrum, for countries where we had auction evidence for 800 MHz and 1800 MHz but not 2.6 GHz, we derived a 2.6 GHz proxy value to enable us to then calculate a relative value for 1800 MHz. We have used a similar approach here – see Annex A6 for more information.

[29] See Annex A7, Table A7.16 for more information.

evidence from the Netherlands points to a lump-sum value estimate of UK 2100 MHz below £10.5m per MHz.

Reaching a provisional view

4.43 In the preceding paragraphs we have summarised the data that we have available to inform our view on the appropriate lump sum value of UK 2100 MHz paired spectrum for the purposes of ALFs.

4.44 Looking at all the estimates we have, we note that the majority of international benchmarks we have considered suggest a market value for the paired 2100 MHz spectrum of between £9.5 and £14.5m per MHz. This is consistent with our view that the value of the 2100 MHz should lie between the low and high frequency bands auctioned in the UK, and should probably be closer to the market value of the lower frequency spectrum bands similarly used for coverage.

4.45 The overall average across all of our benchmarks is £11.5m per MHz, and seven of the 17 benchmarks lie above this average. The overall average shifts down slightly if we include an estimate based on our Dutch proxy values – however, even if we use the lowest of the Dutch proxy values this would only shift the overall average down to £11.2m per MHz.

4.46 10 of the 17 benchmarks are between £9.7m per MHz and £14.3m per MHz. The three Slovenian benchmarks are all above £15m per MHz but we consider these to all be at risk of overstatement. The four benchmarks below £9.7m per MHz are all benchmarks which use the UK 3.6 GHz auction results, and the corresponding benchmarks using the UK 3.4 GHz auction results are between £9.9m and £11m per MHz. We consider both sets of these results to be informative but we are cautious about placing too much weight on either set of values in isolation. At a high level, we do not think it appropriate for the value for the high frequency spectrum to have a strong influence on the resulting value we set for the 2100 MHz. Given that it is a mainstream coverage band we think it is more similar to the lower frequency spectrum used for coverage and should be influenced to a greater extent by the value of spectrum at this end of the range.[30]

4.47 We consider that, given the evidence available to us at this point in time, our best estimate of a forward-looking market value for the paired 2100 MHz spectrum is likely to lie somewhere between £9.5m per MHz and £13m per MHz. We do not consider that a value above £13m per MHz would be appropriate given the risk of overstatement of the six benchmarks above £14m per MHz and we consider it would be inconsistent with taking a conservative approach to interpreting the evidence.

4.48 At the same time, we consider that a value below £9.5m per MHz would be an overly conservative interpretation of the evidence and would involve putting undue weight on the Dutch proxy values and some of the benchmarks using the UK 3.6 GHz auction results.

[30] As a more detailed point, we note the wide dispersion around one of the 3.6 GHz benchmarks, the average of which would be more consistent with a market value closer to where the density of other benchmarks lie.

4.49 While we are cautious about placing too much weight on the proxy values derived for the Netherlands, we consider that they support a value towards the lower end of the range we consider plausible. In light of this, and the lower value benchmarks which use the UK 3.6 GHz auction results, our regulatory judgement is that a lump-sum value estimate of £10.5m per MHz is appropriate. This value is towards the lower end of the range we set out above, consistent with our view we should take a conservative interpretation of the evidence, but not at the very bottom: reflecting our view that we should not place disproportionate weight on the values below £9.5m per MHz and that the majority of benchmarks point towards a higher value.

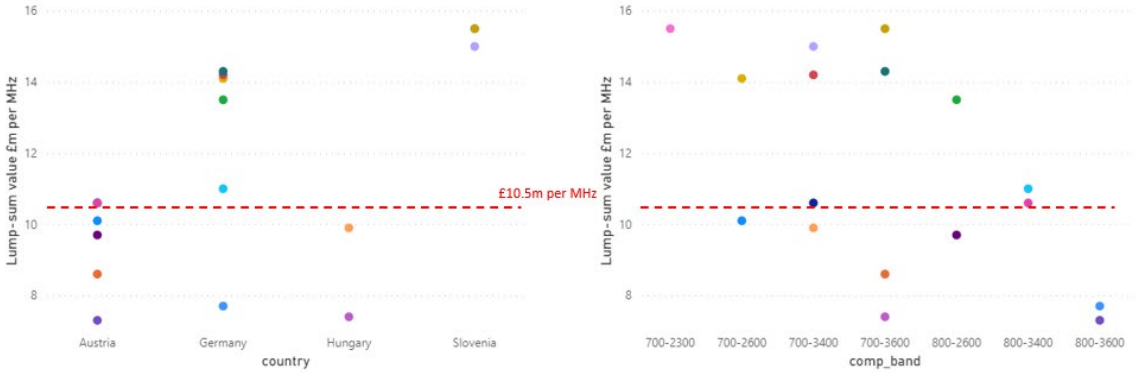
4.50 We note that a value of £10.5m per MHz is below the average of our Tier 1 benchmarks, which we consider to be appropriate given our conservative approach to interpreting the evidence. However, we also do not consider it appropriate to go too far below the average given the number of benchmarks we have and that a significant number point to a value above the average.

4.51 In addition, as the charts below illustrate a value of £10.5m per MHz is consistent with the evidence from the different benchmark countries, and from the different comparator spectrum bands. In both cases, the majority of observations lie above this point and those which lie below are not, in the context of the overall dispersion we see, significantly below this point. We note that £10.5m per MHz is below the country average for Slovenia (£15.3m per MHz[31]) and Germany (£12.5m per MHz). It is above the country average for Austria (£9.5m per MHz) and Hungary (£8.7m per MHz) but is within the range of values for Austria and just slightly above the higher of the two values we have for Hungary (which is £9.9m per MHz).

4.52 We also note that £10.5m per MHz is below the average for six of the seven combination of frequency bands (see Table 4.3 above). If we were to reduce the lump sum value estimate of paired 2100 MHz spectrum down to £10m per MHz, that would mean our estimate would be lower than the lowest value for three of the seven combination of frequency bands.

[31] Although as noted above at paragraph 4.46 we consider this to be a risk of overstatement.

Figure 4.2: Scatterplot of data points by country and distance method benchmark[32]



4.53 We have also considered the values from the Tier 3 benchmarks (set out in Annex A7).[33] Our view is that they do not consistently point to a different value, and in any case, we consider it appropriate to place less weight on these benchmarks than we did in the case of 900 MHz and 1800 MHz given we have far more Tier 1 evidence.

Comparison with 1800 MHz annual licence fees

4.54 Both the 1800 MHz and 2100 MHz band are mainstream coverage bands, therefore it might be expected that the values of the two spectrum bands would be similar given proximity in frequency.

4.55 The ALF for 1800 MHz which we set in 2018 is based on a lump sum value of £14.6m (in April 2021 prices). Our proposed lump-sum value for 2100 MHz is 28% less than this. We note this is a fairly significant difference for what we consider to be similar spectrum bands.

4.56 As a sense check, we have compared this to our Tier 1 benchmark countries. In all three countries for which we have band-specific prices for both 1800 MHz and 2100 MHz (Austria, Germany and Hungary), the value of 2100 MHz is less than the value of 1800 MHz. In Germany it is 28% less and Hungary 20% less. In Austria it is 80% less although we consider that this significantly overstates the difference in value between the bands - we concluded previously that the 1800 MHz Austrian auction was at larger risk of overstatement and also note that there were structural changes in the Austrian market between the two auctions.

4.57 In light of the German and Hungarian relative values, we do not consider the relative values of 2100 MHz and 1800 MHz implied by our proposed lump sum value for 2100 MHz paired spectrum is inconsistent with the available international evidence.

[32] Note these scatterplots do not include the Dutch proxy values.
[33] As set out in Annex A7 we do not have any Tier 2 benchmarks.

Question 2: Do you agree with our proposed market value for the paired 2100 MHz spectrum? If not, please provide evidence to support your view.

Market value of unpaired 2100 MHz spectrum

4.58 We consider below the market value of the unpaired 2100 MHz spectrum. As with the paired 2100 MHz spectrum, we propose to take the evidence from recent UK auctions of low and high frequency mobile spectrum. However, unlike the paired 2100 MHz spectrum, and as explained later from paragraph 4.64, there is no international benchmark evidence regarding the relative value of unpaired 2100 MHz spectrum which could inform our assessment of its market value. We therefore, refer to the UK market value of other spectrum bands with similar technical characteristics to inform our estimate of the UK market value of unpaired 2100 MHz.

UK mobile spectrum auctions

4.59 As discussed in Section 3, the unpaired 2100 MHz spectrum was last auctioned in the UK over 20 years ago and our provisional view is that it is not appropriate to base our estimate of market value on that auction.

4.60 There have however been a number of more recent UK mobile spectrum auctions which may be useful when estimating the market value of the unpaired 2100 MHz spectrum. We have summarized all of the recent auctions of mobile spectrum bands at Table 4.1 above.

4.61 Similar to the paired 2100 MHz spectrum, our expectation is that the value of the unpaired 2100 MHz spectrum would lie somewhere between the value of the higher frequency spectrum bands and sub-1 GHz spectrum – that is, somewhere between £4.2m per MHz and £37.0m per MHz.

4.62 We also expect that the unpaired 2100 MHz is unlikely to be valued at more than the paired 2100 MHz spectrum. This is because, while the physical propagation properties of unpaired 2100 MHz are similar to the paired 2100 MHz spectrum band (and both could provide additional *capacity* for mobile services), unpaired spectrum utilises time division duplex (TDD) which means that the base station and mobile terminal operate in the same channel at different time slots. This makes it less flexible to address *coverage* issues[34] in the mobile uplink compared to using paired spectrum (FDD), where the base station and mobile terminal are transmitting using different frequencies.

4.63 Given the unpaired 2100 MHz spectrum may not be as useful for MNOs as compared to the paired 2100 MHz when addressing *coverage* issues, we consider that the value of the

[34] For example, assuming average cell-edge throughput of 2Mbps and TDD downlink/uplink ratio of 7:3, an instantaneous rate of nearly 7Mbps is required to achieve 2 Mbps of average cell-edge throughput given the mobile terminal only has a 30% time opportunity to transmit uplink data. As a result, this increases the mobile uplink signal to noise requirement and impacts (reduces) the coverage when compared to an FDD system operating in the same band.

unpaired 2100 MHz spectrum would be closer to the value of another unpaired frequency (which is close in proximity) than to the paired 2100 MHz spectrum.

Relevant international benchmarks

4.64 Whilst there is a significant amount of international evidence on which we can draw to estimate the market value of the paired 2100 MHz spectrum (see paragraphs 4.24 to 4.25 above), we do not consider that it would be appropriate to rely on this information to inform our estimate of the market value of the unpaired spectrum. Those benchmarks provide a useful indicator of the market value of the paired spectrum relative to other spectrum but, in light of the technical differences between the paired and unpaired spectrum, reliance on these indicators would risk setting fees for the unpaired spectrum above market value.

4.65 We have considered whether there are any other international benchmarks which might inform our estimate of the market value of the unpaired spectrum. We recognise that a limited number of countries in Europe auctioned unpaired spectrum in this band in the early 2010s.[35]

4.66 Our provisional view is therefore that there is no relevant international benchmark evidence regarding the relative value of unpaired 2100 MHz spectrum which could inform our assessment of its market value.

Provisional assessment of the market value of unpaired 2100 MHz spectrum

4.67 Absent any relevant international benchmark evidence on the unpaired 2100 MHz spectrum, we consider it appropriate to refer to the UK market value of other spectrum bands with similar technical characteristics (and which have been recently auctioned) to inform our estimate of the UK market value of unpaired 2100 MHz.

4.68 So as to avoid inadvertently setting fees too high (and above market value), we have considered evidence on UK auction prices for other unpaired spectrum. We have identified auction prices for 2.3 GHz, 2.6 GHz, 3.4 GHz and 3.6 GHz unpaired spectrum. Given that the unpaired 2100 MHz spectrum is closest in frequency to the 2.3 GHz unpaired spectrum, our provisional view is that its value would be closer to the 2.3 GHz unpaired spectrum than the other higher frequency unpaired spectrum (which would have a shorter reach compared to the unpaired 2100 MHz or 2.3 GHz spectrum). Furthermore, we have no reason to consider that the market value of unpaired 2100 MHz is going to be lower than that of unpaired 2.3 GHz given that the unpaired 2100 MHz would have slightly better propagation characteristics than the unpaired 2.3 GHz spectrum.

4.69 The auction of 2.3 GHz unpaired spectrum took place in April 2018, and there were five entrants. There was however a cap on the amount of immediately useable spectrum after

[35] The 2010 German multiband auction included 5 MHz of unpaired 2.1 GHz spectrum in 1900.1-1905.1, which sold above reserve (for the auction outcome, see here, and details on spectrum holdings, see here). In 2011, Portugal auctioned the 1900-1910 MHz frequencies (the same part of the band where EE's licence in the UK is), but the spectrum was unsold (for the auction results, see here, and auction regulations, here).

the auction, which could understate the market value of the spectrum. [36,37] O2 won all 40 MHz spectrum of the 2.3 GHz spectrum for a total of £205.9m.[38] The market clearing price was £5.1474m per MHz and was considerably above the reserve price of £10m for each 10 MHz 2.3 GHz lot. Noting these, we have no reason to consider that the 2.3 GHz auction would not provide a reliable indicator of the forward-looking market value of the spectrum. Adjusting the 2018 lump sum value for inflation gives a market value for 2.3 GHz spectrum of £5.377m per MHz (in April 2021 prices).

4.70 We consider the value of 2.3 GHz unpaired spectrum to be a good approximation of the value of the unpaired 2100 MHz spectrum. We therefore propose to set the market value of unpaired 2100 MHz equal to the inflation adjusted auction price of the 2.3 GHz from 2018, namely £5.4m per MHz. As we would expect the unpaired 2100 MHz to have slightly better propagation characteristics than the unpaired 2.3 GHz spectrum, our provisional view is that this is a conservative estimate of the market value of the unpaired 2100 MHz spectrum.

Question 3: Do you agree with our proposed market value for the unpaired 2100 MHz spectrum? If not, please provide evidence to support your view.

Annualisation

Proposed approach

4.71 In this section, we set out the approach we propose to adopt to annualise our estimates of the lump-sum value of the spectrum, that is, to derive the annual licence fee based on our estimate of the market values of the paired and unpaired 2100 MHz spectrum.

4.72 We propose to adopt the same approach to annualisation as we have used for 900 MHz, 1800 MHz and 3.4 - 3.8 GHz ALFs, updating the input values as appropriate. This approach involves converting the lump-sum values into an equivalent annual rate by spreading the lump-sum value of spectrum over 20 years, using an ALF profile that is flat in real terms (i.e. adjusted for inflation). We apply a post-tax discount rate and tax adjustment factor (to reflect the more favourable tax treatment of annual fees compared to a lump-sum payment). To allow for inflation, we use the consumer prices index (CPI) to adjust the base year ALF level each year when the licence fee comes due for payment. Our approach is summarised in more detail in Annex A8.

[36] Ofcom, *Award of the 2.3 GHz and 3.4 GHz spectrum bands – Notice under regulation 16(4) of the Wireless Telegraphy*, March 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0016/112165/update-list-bidders.pdf
[37] Ofcom, *2.3 GHz and 3.4 GHz award: Competition issues and Auction Regulations*, July 2017, https://www.ofcom.org.uk/__data/assets/pdf_file/0022/103819/Statement-Award-of-the-2.3-and-3.4-GHz-spectrum-bands-Competition-issues-and-auction-regulations.pdf
[38] Ofcom, *Award of 2.3 and 3.4 GHz spectrum bands*, April 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0018/112932/Regulation-111-Final-outcome-of-award.pdf.

Converting from a lump sum into an annual amount

4.73 As summarised in Table 4.5 below, the updated input values result in an annualisation rate of 5.40%.[39]

Table 4.5: Summary of input values into formula for calculating base level of ALF and comparison with input values used in previous ALF determinations

	Proposed values	Values used for 900 MHz, 1800 MHz and 3.4-3.8 GHz ALFs
Length of period over which we spread the LSV for the purposes of calculating ALF (t*)	20 years	20 years
Real post-tax discount rate (r)	0.2%	1.0%
Adjustment factor that reflects tax advantages over lump-sum payments (TAF)	1.06	1.049
Annualisation rate	5.40%	5.75%

Source: Ofcom

4.74 Multiplying the lump sum value by the annualisation rate gives us the base level of ALFs if set at market value (expressed in April 2021 prices). Consistent with our approach to the other mobile spectrum ALFs, we derive the base level of ALFs rounded to three decimal places in £m per MHz.

4.75 Based on the annualisation rate of 5.40% and lump-sum values of £10.5m per MHz for paired 2100 MHz, and £5.4m per MHz for unpaired 2100 MHz, the base level of ALFs are:

a) **paired 2100 MHz: £0.567m per MHz** (in April 2021 prices), and

b) **unpaired 2100 MHz: £0.290m per MHz** (in April 2021 prices).

4.76 These would then increase in line with Consumer Price Index inflation in subsequent years.

4.77 In the following section, we consider whether ALFs set at this value are appropriate in light of our statutory duties.

Question 4: Do you agree with our proposed annualisation rate? If not, please provide evidence to support your view.

[39] See Annex A8 for further details. This compares to an annualisation rate of 5.75% used for 900 MHz, 1800 MHz and 3.4-3.8 GHz ALFs.

5. Provisional assessment of ALFs in light of our statutory duties

Introduction

5.1 For the reasons explained in Sections 4 and 5 above, we are provisionally estimating that:

a) the lump-sum market value of the paired 2100 MHz spectrum is £10.5m per MHz, corresponding to an ALF (if set at market value) of £0.567m per MHz (in April 2021 prices); and

b) the lump-sum market value of the unpaired 2100 MHz spectrum is £5.4m per MHz, corresponding to an ALF (if set at market value) of £0.290m per MHz (in April 2021 prices).

5.2 We explain in Section 2 above that as set out in the SRSP our existing spectrum pricing policy is to set fees for spectrum holdings to reflect the market value of the spectrum (based on its opportunity cost) in order to promote the optimal use of spectrum. We also note that this approach is consistent with and reinforced by the Government's Direction requiring Ofcom to set the annual licence fees for the 2100 MHz spectrum (both the paired and unpaired spectrum) so that they reflect the full market value of the frequencies in the band.

5.3 We explained in the SRSP however that we would need to take account of the particular circumstances of the frequency bands and licence types under review. In this section, we therefore present our assessment (in light of all our statutory duties) of setting ALFs for the paired and unpaired 2100 MHz spectrum based on our estimates of the full market value of the spectrum.

5.4 As explained in Section 2 (and in more detail in Annex A5 of this consultation), when we exercise our powers in relation to setting spectrum fees, a number of statutory duties are relevant. Broadly speaking, these can be categorised as follows:

a) *Optimal use of spectrum*: The Communications Act requires Ofcom to secure the optimal use for wireless telegraphy of the electro-magnetic spectrum. The Wireless Telegraphy Act also requires Ofcom to have regard to: (i) the desirability of promoting the efficient management and use of spectrum, and (ii) the extent to which spectrum is available for use, and the demand (current and likely future) for use of the spectrum.

b) *Furthering the interests of citizens and consumers*: Ofcom's principal duty in the Communications Act is to further the interests of citizens in relation to communication matters and of consumers in relevant markets, where appropriate by promoting competition.

c) *Encouraging investment and innovation:* Ofcom is required by the Communications Act to have regard to the desirability of encouraging investment and innovation in relevant markets and to encouraging the availability and use of high speed data transfer

services throughout the UK. It is also required by the Wireless Telegraphy Act to have regard to the desirability of promoting the development of innovative services.

d) *Promoting competition:* Ofcom is required by the Communications Act to promote competition when managing the radio spectrum, and to have regard to the desirability of promoting competition in relevant markets. It is also required by the Wireless Telegraphy Act to have regard to the desirability of promoting competition in the provision of electronic communications services.

5.5 We therefore consider in this section the specific effects of our proposed ALFs on:

a) securing the optimal use of spectrum;

b) consumers;

c) investment and innovation; and

d) competition.

Securing the optimal use of spectrum

Efficiency of existing spectrum use and users

5.6 We recognise that operators may be incentivised to make the *most efficient use* possible of spectrum they currently hold, in the absence of fees set at market value. However, this does not necessarily rule out the possibility that they may not be the highest-value users of this spectrum (i.e. even if they are incentivised to maximise the value of their use of that spectrum, they are not necessarily the *most efficient user*).

5.7 The purpose of setting spectrum fees based on market value is to provide users with a sustained long-term signal of spectrum value (as indicated by its opportunity cost to the highest value alternative use or user) and, as a result, to give them incentives to use it in a way that maximises benefits for society over time. If the price charged for any limited resource does not reflect its opportunity cost, there will be less incentive to use it efficiently, and this can result in wasteful use of resources which ultimately impacts consumers.

5.8 We consider that, in general terms, benefits to society will be maximised over time if spectrum is priced to reflect opportunity cost, and that AIP fees set in this way have an effect similar to the prices that would emerge in a well-functioning spectrum market.[40]

5.9 In this case, we recognise that:

a) whilst the licence holders of the paired 2100 MHz spectrum may be particularly high-value users of that spectrum (given that they are using it to provide mobile services to consumers), efficient use of this spectrum may also come from other users accessing

[40] Ofcom, *SRSP: The revised Framework for Spectrum Pricing*, December 2010, https://www.ofcom.org.uk/__data/assets/pdf_file/0024/42909/srsp-statement.pdf, paragraph 3.41.

this spectrum in the future and/or from trades of the spectrum between the existing licence holders; and

b) whilst the licence holders of the unpaired 2100 MHz spectrum may also be particularly high-value users of that spectrum (on the basis that it could in future be used by them to provide mobile services to consumers), efficient use of this spectrum may (similar to the paired spectrum) also come from other users accessing this spectrum in the future and/or from trades of the spectrum between the existing licence holders. We are mindful that this spectrum is currently unused and there is interest to access the spectrum from other users.

AIP plays a complementary role to spectrum trading

5.10 We recognise that mobile operators can trade or acquire spectrum licences and that, in principle, this creates incentives for operators to only hold licences for which they are the highest-value users. However, we considered in the SRSP (and in subsequent ALF decisions) that it is appropriate to impose ALFs based on market value even if there is the possibility of spectrum trading.

5.11 We also note that MNOs may be less responsive to trading than to AIP. Where there may be less importance placed on realising untapped revenue sources such as might arise from selling spectrum, AIP can provide a more powerful incentive for licensees to use spectrum efficiently than the possibility of selling unwanted spectrum. We are particularly mindful of the fact that, while some of the spectrum (in particular, the unpaired spectrum) is not currently in use and has not been used since the award of the spectrum back in 2000, no trades have taken place to date.

5.12 Our provisional view is therefore that we cannot rely on trading alone to secure the optimal use of either the paired or unpaired 2100 MHz spectrum.

Could ALFs based on our estimate of market value adversely impact optimal use?

5.13 Notwithstanding our provisional view above regarding the value of ALFs set at market value in incentivising efficient use of each of the paired and unpaired 2100 MHz spectrum, we have also considered the risks to spectral efficiency of the ALFs identified in Section 4 above. In particular, we have considered:

a) the risks to spectral efficiency of setting the fees too high or too low; and

b) whether setting ALFs at market value could deter efficient spectrum trades.

<u>Risks of setting fees too high or too low on optimal use of the paired and unpaired 2100 MHz spectrum</u>

5.14 We said in the SRSP that we would assess the role of spectrum fees on a case-by-case basis. We recognised that - where there is uncertainty in our estimates of opportunity

cost[41] - we will consider the risks from setting fees too high, or too low, in light of the specific circumstances.

5.15 We have considered these risks with respect to each of the paired and unpaired 2100 MHz spectrum and recognise, consistent with our previous ALF determinations, that fees set *above* market value would not secure the optimal use of spectrum.

5.16 We also recognise however that fees set *below* market value risk spectrum not being efficiently utilised, and that higher value users may be prevented from obtaining access to spectrum because the fee level is too low to encourage existing users to consider other options. In this context, we note that setting ALFs below market value would effectively give the licensees a subsidy. We consider this point further in paragraph 5.22 below.

5.17 Identifying the market value of spectrum necessarily involves us exercising regulatory judgement when considering the evidence. In this specific case, however, we do not consider that the fees that we are proposing are too high or low:

a) in respect of the paired 2100 MHz spectrum, we have taken a conservative approach when interpreting the UK and international auction evidence to arrive at our estimate of market value. This takes account of potential uncertainty around our estimate of market value, which could result in us inadvertently setting ALFs above market value.

b) in respect of the unpaired 2100 MHz spectrum, we have carefully considered its technical capabilities and recognize that it will have a lower market value than the paired 2100 MHz spectrum. Without directly relevant UK and international auction evidence on its market value, we have estimated its value by reference to the results of the recent 2.3 MHz unpaired spectrum auction. This is the closest unpaired frequency band to the unpaired 2100 MHz spectrum, and we have no reason to consider that the market value of the unpaired 2100 MHz spectrum would be lower than the unpaired 2.3 GHz spectrum. Indeed, as noted in Section 4 above, the unpaired 2100 MHz spectrum has slightly better propagation characteristics than the unpaired 2.3 GHz. Our provisional view is therefore that the market value of the unpaired 2.3 GHz spectrum provides a reliable but conservative proxy for the market value of the unpaired 2100 MHz spectrum, and we would not expect that ALFs based on this would likely to be too high or too low.

Whether setting ALFs at market value could deter efficient spectrum trades

5.18 We have considered whether setting ALFs at market value could deter efficient spectrum trades, for instance by revealing new information about the opportunity cost of spectrum, which, if fully reflected in future ALFs, could in theory deter the trade from occurring or create a risk of circularity.[42] However, as explained in our UKB's 3.4 GHz and 3.6 GHz

[41] For example, arising from uncertainty in the likelihood of demand for feasible alternative uses appearing or potential estimation errors (although in our assessment of the paired 2100 MHz the likelihood of estimation error is low given the broad evidence base that points to our market value being correct).

[42] By this we mean that the trading price depends on expectations of the future level of AIP, but the trade price itself affects that future level. See paragraph 4.264 of the SRSP.

spectrum consultation[43], this risk has been addressed in our SRSP principles, in particular by making clear that we will interpret such market valuations with care and not apply them mechanically to set AIP fees. [44]

Overall provisional view on the impact of ALFs on optimal use of spectrum

5.19 We propose to base the ALF for the paired 2100 MHz spectrum on a conservative interpretation of the evidence on market value, which we do not consider would be above market value. Similarly, in reference to the unpaired 2100 MHz, we propose setting a fee based on the market value of similar spectrum (i.e. the 2.3 GHz unpaired spectrum), and have no reason to believe that the market value of the unpaired 2100 MHz would be lower than this. Having considered all the evidence in the round, we do not consider that the proposed fees risk the 2100 MHz spectrum being priced too low.

5.20 Our view is that setting ALFs in the 2100 MHz band based on our proposed market valuations will secure optimal spectrum use. We recognise that although the existing licence-holders may be high-value users of the 2100 MHz spectrum, efficient use of this spectrum may also come from changes to current spectrum allocations in the future (be it from trades between the existing licensees or from other users). Furthermore, while trading of spectrum licences is possible in the UK, limited trading in the mobile spectrum bands to date together with the fact that parts of the unpaired 2100 MHz spectrum remain unused, would suggest that there is a risk that the opportunity cost of holding spectrum (through forgoing the revenue from trading it) is less effective in inducing efficient spectrum holdings and that ALFs based on market value may provide a more powerful incentive for licensees to use the spectrum efficiently.

Impact on consumers

5.21 In general, and consistent with our wider policy on spectrum fees, we consider that retail prices should reflect the input cost of spectrum, and this does not reflect a market failure, or markets failing to work in the interests of consumers. As such, we do not consider that it would be appropriate to maintain the price of the paired or unpaired 2100 MHz spectrum below its market value in order to artificially suppress consumer prices through a spectrum subsidy (discussed in previous decisions).[45]

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[43] Ofcom, *Annual Licence Fees for UK Broadband's 3.4 GHz and 3.6 GHz spectrum*, December 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0013/130540/Annual-Licence-Fees-for-UK-Broadbands-3.4-GHz-and-3.6-GHz-spectrum.pdf.

[44] "*AIP Principle 7 (use of market valuations): We will take account of observed market valuations from auctions and trading alongside other evidence where available when setting reference rates and AIP fee levels. However, such market valuations will be interpreted with care and not applied mechanically to set reference rates and AIP fees."* Ofcom, *SRSP: The revised Framework for Spectrum Pricing*, December 2010, https://www.ofcom.org.uk/__data/assets/pdf_file/0024/42909/srsp-statement.pdf, p.4.

[45] For example, see: Ofcom, Annual Licence Fees for UK Broadband's 3.4 GHz and 3.6 GHz spectrum, December 2018, https://www.ofcom.org.uk/__data/assets/pdf_file/0013/130540/Annual-Licence-Fees-for-UK-Broadbands-3.4-GHz-and-3.6-GHz-spectrum.pdf

5.22 We note that existing paired 2100 MHz holdings are used by MNOs to provide mobile services for consumers, and that EE has plans to use its unpaired 2100 MHz spectrum to provide emergency services for the Home Office. We do not consider that the nature of these services justifies a decision to set the ALFs below market value; our view is that, insofar as a subsidy might be appropriate for certain services or in order to support wider policy objectives, it is more efficient to do this via an explicit subsidy from general taxation, rather than through concessions on the fee charged. Furthermore, charging ALFs at market value may incentivize MNOs to use the currently unused mobile spectrum to provide better mobile services for consumers.

5.23 Pricing 2100 MHz spectrum below its opportunity cost risks the existing licence-holders continuing to hold this spectrum even if they are not the highest value users of the asset. This is harmful to consumers and society more widely, as sub-optimal allocation of spectrum amongst MNOs may mean that operators are not be able to offer the best price mobile packages and technology to consumers available in the market through time. We consider this harm to the prospects for long-term efficiency and consumer welfare to be enough to set ALFs based on our estimate of market value even if consumer prices for today's mobile services might be lower with subsidised use of 2100 MHz spectrum. Setting ALFs at market value could encourage MNOs to utilise existing assets such as the unpaired 2100 MHz spectrum which could benefit mobile consumers. Alternatively, this spectrum could be used for other non-mobile use bringing broader benefits to consumers and citizens in the UK.

5.24 We have sought to apply a policy based on efficient price signals which, in general, should lead to better consumer welfare outcomes. We have not identified in this particular case any reasons to consider that there could be adverse implications on consumer welfare from setting ALFs based on our estimate of market value (and which would cause us to depart from our policy of ALFs based on market value). Our provisional view is therefore that the ALFs proposed in Section 4 would be consistent with our principal duty to further the interests of citizens and consumers.[46,47]

[46] We note that Ofcom is also required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief and sexual orientation. We refer to groups of people with these protected characteristics as 'equality groups'. We fulfil these obligations by carrying out an Equality Impact Assessment ('EIA'), which examines the impact our policy is likely to have on people, depending on their personal circumstances. EIAs also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers, regardless of their background and identity. We consider that our proposed annual licence fees for the 2100 MHz spectrum would have an over-arching positive impact on all consumers and citizens, given that our objective is to secure the optimal use of spectrum for the benefit of society as a whole. We consider that our proposals would not have a detrimental impact on any defined equality group.

[47] We have also considered the impact of our proposals on vulnerable consumers, including those with protected characteristics under the Equality Act 2010. We have no reason to believe that any impact on prices would disproportionately affect such consumers.

Impact on investment and innovation

5.25 Our view is that investment decisions should reflect the true costs of inputs. This is achieved by setting ALFs based on market value, as this requires operators to pay the opportunity cost of their spectrum holdings.

5.26 We recognise that setting ALFs at market value may in some cases disincentivise existing licence-holders from making investments which they would otherwise have made. However, we consider that outcome is likely to be efficient because the licence-holder will either pursue alternative, more efficient solutions (taking account of the true cost of all inputs) or will choose not to invest (thereby avoiding over-investment in spectrum-based solutions). This position is explained in the SRSP.[48]

5.27 Our provisional view is that ALFs for the paired and unpaired 2100 MHz spectrum which are based on market value will not necessarily lead to lower investment levels. On the contrary, ALFs set at market value could encourage MNOs to innovate and utilise existing assets such as the unpaired 2100 MHz spectrum that is currently unused. Furthermore, even if lower ALFs freed up internal funding for additional investment, which would not be available were ALFs set at market value, our provisional view is that this would not be a sufficient reason to set ALFs below market value and provide an unconditional subsidy for operators holding such spectrum.

Impact on competition

5.28 Our view on spectrum fees and competition, as set out in the SRSP, is that fees are unlikely to introduce distortions to competition in downstream markets when they reflect the opportunity cost of spectrum.[49] However, we said in the SRSP that we would consider the potential effect of spectrum fees on competition on a case-by-case basis.

5.29 We are mindful of the fact that the existing 2100 MHz spectrum licence holders (the MNOs) hold a variety of mobile spectrum; some of that spectrum will have been won in auctions and (where it is in its initial term) will not be subject to ALFs, whilst the remainder of that spectrum will be subject to ALFs. The MNOs relative holdings of ALF and non-ALF spectrum are different, and we consider that subsidising ALF spectrum (by setting it below market value) could risk distorting competition on the basis that it would be giving a different level of subsidy to different MNOs.

5.30 As we are setting all ALFs on the same basis i.e. to reflect the market value (or forward-looking opportunity cost) of that spectrum, we do not consider that any operator will be disadvantaged by this approach, relative to other mobile operators. We also note that, whilst we are proposing different fees for the paired versus the unpaired 2100 MHz

[48] Ofcom, SRSP: The revised framework for spectrum pricing, December 2010, https://www.ofcom.org.uk/__data/assets/pdf_file/0024/42909/srsp-statement.pdf, paragraph 4.213-4.214 and 4.239.
[49] Ofcom, *SRSP: The revised Framework for Spectrum Pricing*, December 2010, https://www.ofcom.org.uk/__data/assets/pdf_file/0024/42909/srsp-statement.pdf, paragraph 4.68.

spectrum, this should not distort competition on the basis that the difference reflects differences in the market values of the paired and unpaired spectrum.

5.31 Furthermore, if ALFs set at market value revealed differences in value for different MNOs, they can buy or release spectrum to enhance their competitive position.

5.32 Our provisional view is that setting ALFs for the paired and unpaired 2100 MHz spectrum based on our estimate of their market value is consistent with promoting competition.

Provisional view on setting ALFs based on market value

5.33 For the reasons set out in this section, we provisionally consider that setting ALFs for the paired and unpaired 2100 MHz spectrum based on market value is in line with our statutory duties. In particular it:

a) will secure the optimal use of spectrum, which we consider to be in the interests of UK citizens and consumers;

b) benefit consumers in the long run by ensuring that spectrum is used in the most efficient way for the provision of downstream services for which there is greatest value. We recognise that this could lead to higher consumer prices than if ALFs were set at a discount to market value. However, we consider that retail prices should reflect all input costs including the resource costs of spectrum, and this does not represent a market failure, or markets failing to work in the interests of consumers;

c) can be expected to promote efficient investment and innovation; and

d) are consistent with promoting competition.

Question 5: Do you agree with our provisional conclusion that fees set based on our estimates of market value is in line with our statutory duties?

6. Summary and implementation

Proposed ALF

6.1 Our provisional view is that setting ALFs for 2100 MHz spectrum at £0.567m per MHz and £0.290m per MHz (in April 2021 prices) for paired and unpaired 2100 MHz spectrum respectively is in line with our statutory duties in setting licence fees.

6.2 It would mean that the MNOs would, based on their current 2100 MHz spectrum holdings (and based on April 2021 prices), be liable for the following annual licence fees:

a) EE: £25,580,000

b) H3G: £18,205,500

c) O2: £12,790,000

d) Vodafone: £16,783,200.

Proposed implementation

6.3 This section sets out how we propose to implement the fees proposed in this consultation, including:

a) phasing in;

b) implementation of inflation indexation; and

c) application of revised fees.

Phasing in

6.4 We have considered whether it is appropriate to phase in the new fee rates over time for the unpaired and paired 2100 MHz spectrum. Our provisional view is that there should not be a phase-in period for these new fee rates, with the full fees becoming payable from the fee payment date of 1 January 2022. In taking this view, we take into account that:

a) the 2100 MHz spectrum licences were varied in 2011 to give effect to a Government Direction requiring the setting of ALFs after 31 December 2021. We consider that the existing licensees have therefore had sufficient notice (over ten years) of the fact that they would be liable for ALFs reflecting the full market value of the spectrum;

b) similar to ALFs in other mobile spectrum, we are proposing in the draft Proposed Regulations (provided at Annex A10) that licensees have the option to pay their annual licence fees across ten equal monthly instalments (rather than as a single, upfront payment).

Implementation of inflation indexation for 2100 MHz

6.5 We have converted the lump sum value of ALF to an annual figure that is specified in real terms consistent with our previous ALF determinations in other mobile spectrum which increase the ALF to reflect inflation.

6.6 Specifically, we propose a formula for calculating each year's ALF (ALF_t) that would incorporate an annual increase in ALF in line with inflation, as measured by the CPI. In particular, we propose that the nominal value of ALF would be inflated by the ratio:

$$\left[\frac{CPI_t}{CPI_0}\right]$$

where:

- CPI_0 is the level of the CPI (all items) index in April 2021 (which is currently 110.1); and
- CPI_t is the latest available figure for the same index published by the Office for National Statistics ("**ONS**").

6.7 The draft fees regulations published at Annex A10 set out the formula that we propose to use to derive inflation-adjusted ALF rates. The accompanying notice set out at Annex A9 explains how this formula would work in further detail.

Application of the fees

6.8 The fees in the draft fees regulations would remain applicable until we amend or revoke them. This means that, in effect, ALFs are set for an indefinite period and are not time limited. We consider that there is benefit in a period of certainty for licensees. We would therefore be unlikely to review the 2100 MHz ALFs in the five years after implementation save in very exceptional circumstances, and would also propose to retain them beyond that date unless there were grounds to believe that a material misalignment had arisen between the level of these fees and the value of the spectrum, in keeping with our general policy on fee reviews.

This consultation

6.9 We invite comments on our proposals and the basis for them, and on the drafting of our proposed fee regulations.

Question 6: Do you have further comments that you wish to make in respect of the proposals that we make in this consultation?

A1. Responding to this consultation

How to respond

A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 22 September 2021.

A1.2 You can download a response form from https://www.ofcom.org.uk/consultations-and-statements/category-2/proposed-annual-licence-fees-2100-mhz-spectrum.You can return this by email or post to the address provided in the response form.

A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to ALF2021@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet.

A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:

ALF 2021 Team
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

A1.5 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:

- Send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files. Or
- Upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.

A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)

A1.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt if your response is submitted via the online web form, but not otherwise.

A1.8 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.

A1.9 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex A4. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

A1.10 If you want to discuss the issues and questions raised in this consultation, please contact the ALF2021 team by email to ALF2021@ofcom.org.uk.

Confidentiality

A1.11 Consultations are more effective if we publish the responses before the consultation period closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish all responses on the Ofcom website as soon as we receive them.

A1.12 If you think your response should be kept confidential, please specify which part(s) this applies to, and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.

A1.13 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.

A1.14 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our Terms of Use.

Next steps

A1.15 Following this consultation period, Ofcom plans to publish a statement by the end of 2021.

A1.16 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

Ofcom's consultation processes

A1.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex A2.

A1.18 If you have any comments or suggestions on how we manage our consultations, please email us at consult@ofcom.org.uk. We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.

A1.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:

Corporation Secretary
Ofcom
Riverside House
2a Southwark Bridge Road
London SE1 9HA
Email: corporationsecretary@ofcom.org.uk

A2. Ofcom's consultation principles

Ofcom has seven principles that it follows for every public written consultation:

Before the consultation

A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

During the consultation

A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.

A2.3 We will make the consultation document as short and simple as possible, with a summary of no more than two pages. We will try to make it as easy as possible for people to give us a written response. If the consultation is complicated, we may provide a short Plain English / Cymraeg Clir guide, to help smaller organisations or individuals who would not otherwise be able to spare the time to share their views.

A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.

A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.

A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish all the responses on our website as soon as we receive them. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

A3. Consultation coversheet

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing ☐

Name/contact details/job title ☐

Whole response ☐

Organisation ☐

Part of the response ☐

If there is no separate annex, which parts? _____

_____

If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name Signed (if hard copy)

A4. Consultation questions

Question 1: Do you agree that mobile services are the highest value use for both the paired and unpaired 2100 MHz spectrum? If not, please provide evidence to support your answer.

Question 2: Do you agree with our proposed market value for the paired 2100 MHz spectrum? If not, please provide evidence to support your view.

Question 3: Do you agree with our proposed market value for the unpaired 2100 MHz spectrum? If not, please provide evidence to support your view.

Question 4: Do you agree with our proposed annualisation rate? If not, please provide evidence to support your view.

Question 5: Do you agree with our provisional conclusion that fees set based on our estimates of market value is in line with our statutory duties?

Question 6: Do you have further comments that you wish to make in respect of the proposals that we make in this consultation?