
Proposed annual licence fees for 2100 MHz spectrum

Annexes 5 - 10

CONSULTATION:

Publication Date: 14 July 2021

Closing Date for Responses: 8 September 2021

Contents

Annex

A5. Legal framework	3
A6. Paired 2100 MHz spectrum - Approach to international benchmarking	6
A7. Paired 2100 MHz – Relevant spectrum awards	13
A8. Annualisation	47
A9. Notice of the proposed regulations	53
A10. Draft of the proposed regulations	57

A5. Legal framework

Ofcom's power to set fees

- A5.1 Under Section 12 of the Wireless Telegraphy Act 2006 (the “**Wireless Telegraphy Act**”), Ofcom has power to require licensees to pay fees to Ofcom on the grant of a licence and subsequently. The requirement to pay fees at times after the grant of a licence must be imposed by way of regulations made by Ofcom. The timing of the fee payment must be set out in the regulations, and the amount of the fee can be prescribed in the regulations, or alternatively the regulations may provide for the amount to be determined by Ofcom in accordance with the regulations.
- A5.2 Section 12(5) of the Wireless Telegraphy Act provides that, where a licence has been awarded as part of an auction process, fees cannot ordinarily be charged for that licence. This is however subject to section 12(6) of the Wireless Telegraphy Act which provides that fees may be payable, even in respect of auctioned spectrum, in specific cases. This includes where provision has been included in the licence with the consent of the holder of that licence for fees to apply. Paragraph 8 of each of the 2100 MHz mobile licences states that, on or after 1 January 2022, annual licence fees will become payable in respect of those licences.
- A5.3 Section 13 of the Wireless Telegraphy Act provides for Ofcom to set fees at an amount that is higher than the cost to us of carrying out our radio spectrum functions. This power may be exercised if we think fit in the light (in particular) of the matters to which we must have regard under section 3 of the Wireless Telegraphy Act.
- A5.4 Section 122 of the Wireless Telegraphy Act is a general provision about matters relating to Ofcom's powers to make statutory instruments (including fees regulations under section 12 of that Act). It includes a requirement that where we are proposing to make regulations we must publish a notice setting out the general effect of the regulations and give a period of at least one month within which representations on the proposed regulations may be made to us.
- A5.5 The legal framework for the setting of fees derives from the Communications Act 2003 (the “**Communications Act**”) and the Wireless Telegraphy Act. However, in the case of licences for frequencies in the 2100 MHz band, the *Wireless Telegraphy Act 2006 (Directions to OFCOM) Order 2010* (the “**Direction**”) is also relevant. We discuss this below before setting out our statutory duties under the Communications Act and the Wireless Telegraphy Act.

The Direction

- A5.6 Under Section 5 of the Wireless Telegraphy Act, the Secretary of State may by order direct Ofcom to exercise its powers in such cases, in such manner, subject to such restrictions and constraints, and with a view to achieving such purposes as may be specified in, or determined by the Secretary of State in accordance with, the order.

- A5.7 In December 2010, as part of a package of reforms of spectrum management, the Government directed Ofcom to vary the 2100 MHz licences (subject to the MNOs' consent) so as:
- a) to include a mobile coverage obligation¹;
 - b) to make the licences continue in force indefinitely (unless and until revoked by Ofcom); and
 - c) to require the licensees to pay an annual charge for their licences (in respect of periods following 31 December 2021) which is set by Ofcom and which reflects the full market value of the frequencies in the 2100 MHz band.
- A5.8 In June 2011², the 2100 MHz licences were varied to give effect to the Direction. The mobile coverage obligation was stated to apply in respect of the paired 2100 MHz spectrum. Paragraph 8 of each licence included a new provision requiring the payment of annual licence fees from 1 January 2022.

The duties imposed by the Communications Act

- A5.9 Section 3 of the Communications Act sets out Ofcom's general duties including its principal duty:
- to further the interests of citizens in relation to communications matters; and
 - to further the interests of consumers in relevant markets, where appropriate by promoting competition.
- A5.10 In carrying out its functions, section 3(2) provides that Ofcom is required, amongst other things, to secure the optimal use for wireless telegraphy of the electro-magnetic spectrum, the availability throughout the UK of a wide range of electronic communication services and the availability throughout the UK of a wide range of television and radio services.
- A5.11 Section 3(3) of the Communications Act provides that in performing its duties, Ofcom must in all cases have regard to the principles of transparency, accountability, proportionality and consistency, as well as ensuring that its actions are targeted only at cases in which action is needed.
- A5.12 Section 3(4) of the Communications Act requires Ofcom, in performing its duties, to have regard to a number of factors as appropriate, including the desirability of promoting competition, encouraging investment and innovation in relevant markets, encouraging the availability and use of high speed data transfer services throughout the UK, the different interests of persons living in rural and in urban areas and the different needs and interests of everyone who may wish to use the spectrum for wireless telegraphy.

¹ In particular, that by 30th June 2013, the licensee must provide an electronic communications network that is capable of providing mobile telecommunications services to an area within which at least 90% of the population of the United Kingdom lives and with a 90% probability that users in outdoor locations within that area can receive the service with a sustained downlink speed of not less than 768kbps in a lightly loaded cell

² 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

- A5.13 In performing our duty under Section 3 of furthering the interests of consumers, we must have regard, in particular, to the interests of those consumers in respect of choice, price, quality of service and value for money.
- A5.14 Section 4 of the Communications Act requires Ofcom to act in accordance with six requirements when carrying out certain specified functions, including our functions under the Wireless Telegraphy Act 2006. These include a requirement to promote competition in relation to the provision of electronic communications networks and electronic communications services, and to take account of the desirability of carrying out its functions in a manner which, so far as practicable, does not favour one form of electronic communications network, electronic communications service or associated facility, or one means of providing these, over another.

The duties imposed by the Wireless Telegraphy Act

- A5.15 Section 3 of the Wireless Telegraphy Act imposes a number of further duties relating to spectrum management. Amongst other things, in carrying out its spectrum functions Ofcom is required to have regard to:
- a) the extent to which spectrum is available for use, or further use, for wireless telegraphy;
 - b) the demand for use of the spectrum for wireless telegraphy; and
 - c) the demand that is likely to arise in future for the use of the spectrum for wireless telegraphy.
- A5.16 Section 3 of the Wireless Telegraphy Act also requires Ofcom to have regard to the desirability of promoting:
- a) the efficient management and use of the part of the electromagnetic spectrum available for wireless telegraphy;
 - b) the economic and other benefits that may arise from the use of wireless telegraphy;
 - c) the development of innovative services; and
 - d) competition in the provision of electronic communications services.

A6. Paired 2100 MHz spectrum - Approach to international benchmarking

Introduction

- A6.1 In this annex we provide an overview of the structure of the international benchmarking analysis. To this end it provides an overview of the methodology employed in:
- the derivation of the relative value benchmarks for European auctions; and
 - the approach to tiering these benchmarks based on the quality of the evidence.
- A6.2 The methodology employed in these processes is consistent with that previously used in the 2018 Statement on 900 MHz and 1800 MHz ALFs.³
- A6.3 Our assessment of the informational value of individual European auctions is provided in Annex A7.

Overview

- A6.4 Our overarching methodology begins by identifying European auctions for the 700 MHz, 800 MHz, 2100 MHz, 2.3 GHz, 2.6 GHz, and 3.4-3.8 GHz bands that have taken place since 2010. We consider European awards to be the most relevant in informing us about the value of paired 2100 MHz spectrum in the UK. This is because we consider that European countries are more likely to share regulatory and other characteristics that affect the value of the paired 2100 MHz band in the UK. We consider that this approach gives us a sufficient and appropriate set of comparators.
- A6.5 Annex A7 lists all the auctions we have included in our sample to date. Where possible, we have used prices from these awards to derive relative value benchmarks to inform our assessment of the market value of UK paired 2100 MHz spectrum.
- A6.6 We express all UK-equivalent values in April 2021 prices.

Derivation of benchmarks

- A6.7 To derive our relative value benchmarks, we first take the individual results of European auctions which have been held since 2010 in the 700 MHz, 800 MHz, 2100 MHz, 2.3 GHz, 2.6 GHz, and 3.4-3.8 GHz spectrum bands. We then convert these into UK-equivalent absolute values. This means that, for a given country, when looking at the relative values of the different bands, we are doing so on a consistent basis, having taken account of factors such as different licence durations or auctions that happened at different times.

³ 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 and annexes https://www.ofcom.org.uk/data/assets/pdf_file/0021/130548/Annexes-1-6.pdf

A6.8 We then use these UK-equivalent absolute values to derive our relative value benchmarks.

UK-equivalent absolute values

- A6.9 In constructing the UK-equivalent absolute values for the European auctions, we make a series of adjustments to account for country-specific factors which have the potential to affect auction values in comparator countries relative to the UK.
- a) All payments associated with an auction are summed to get a final award value. Any payments not paid at the date of award, such as ALFs, are discounted from the date of initial payment to derive the present value of the award using the pre-tax nominal cost of debt⁴ for the respective country.⁵
 - b) Where there was a substantial delay between the auction and the date the spectrum became available to winning bidders, we calculate an adjustment to allow for the fact that observed auction prices likely reflect the value of the licence at the date the spectrum becomes available for use, discounted back to the date of the auction.⁶ The discount rate used here is a post-tax real weighted average cost of capital (WACC)⁷ for the respective country.⁸
 - c) The present value of any award is scaled by differences in licence duration between that award and the 20-year duration of the UK spectrum awards using the post-tax real WACC for the respective country.
 - d) All awards are converted from the domestic currency in which they were awarded to £ sterling using PPP exchange rate conversions in the year of the award.⁹
 - e) All awards are converted to today's prices by applying the UK CPI.¹⁰

⁴ The adjustment to incorporate the present value of annual fees into a lump sum for licences is essentially the reverse adjustment we make in annualising the lump sums into annual fees if there were no likelihood of review. Generally, annual fees in the benchmark countries do not appear to be adjusted annually for inflation in the same way we are adopting for ALFs in the UK. We therefore discount future fee payments using a nominal discount rate. We previously set out that the implications of using a pre-tax approach are broadly similar to using a post-tax approach with a separate adjustment for the differential tax treatment of ALFs. We therefore considered it a reasonable proxy to apply the pre-tax discount rate. [2018 Statement](#), Annex 1, A1.44. We also apply a liquidity risk premium adjustment of 50bp, consistent with our approach to annualisation in the lower polar case, as set out in Annex 8.

⁵ [BEREC Report on Regulatory Accounting in Practice 2020, Chapter 5, Section 5.2.4](#); [BEREC Report on Regulatory Accounting in Practice 2019, Chapter 5, Section 5.2.4](#); [BEREC Report on Regulatory Accounting in Practice 2018, Chapter 5, Section 5.2.4](#); earlier values as used in the 2018 Statement.

⁶ For this analysis, we consider a delay longer than a year between the auction date and the date at which spectrum becomes available to the winning bidders as likely to be factored into the auction prices.

⁷ In estimating an adjustment to an auction price for licence duration or delayed access to spectrum, we are adjusting for the difference in value an operator would place on having access to spectrum for a shorter (or longer) period. This will reflect the difference in cash flows they expect to earn. The risk of these expected cash flows should be reflected in this adjustment, and so we consider it appropriate to use the WACC in adjusting for licence duration and delayed access to spectrum. The appropriate WACC to use will reflect expectations at the time of the auction.

⁸ [BEREC Report on Regulatory Accounting in Practice 2020, Chapter 5](#); [BEREC Report on Regulatory Accounting in Practice 2019, Chapter 5](#); [BEREC Report on Regulatory Accounting in Practice 2018, Chapter 5](#); [European Central Bank: HICP inflation forecasts](#); earlier values as used in the 2018 Statement.

⁹ [The World Bank: PPP conversion factor, GDP](#)

¹⁰ [Office for National Statistics: CPI index](#)

- f) All awards are scaled from the size of the respective country's population to the UK population.¹¹
 - g) A single absolute per MHz value for each spectrum band in an auction is generally derived by averaging the values of all relevant lots sold, weighted by the size of a given lot, or a specific lot where it is more reflective of market value.
- A6.10 Despite making these adjustments, country-specific factors have the potential to affect auction prices in comparator countries relative to the UK. Absolute auction prices may therefore not provide reliable indicators of the value of spectrum in the UK. Some country-specific factors, such as general price levels, will be reflected in the PPP estimates which we have used to derive absolute value benchmarks. However, other differences in auction values are more difficult to address in a robust way – for example, the greater propagation characteristics of lower-frequency bands may be more or less important depending on the level of urbanisation and population density in a country.
- A6.11 In general, we expect that relative values are less likely to be affected by country-specific factors than absolute values.

Relative value benchmarks

- A6.12 To calculate the relative values of 2100 MHz we identify European countries in which the 2100 MHz spectrum band, either of the 700 MHz and 800 MHz bands (the “low frequency bands”) and preferably also any of the 2.3 GHz, 2.6 GHz and 3.4-3.8 GHz bands (the “high frequency bands”) have been auctioned since 2010.
- A6.13 We adopt the distance method as our preferred method for deriving benchmark values of 2100 MHz spectrum. Benchmark values of 2100 MHz generated by the distance method reflect the UK auction values of both a low frequency band (either 700 MHz or 800 MHz) and a high frequency band (either of 2.3 GHz, 2.6 GHz, and 3.4-3.8 GHz). We consider that, in principle, this is an advantage over a paired ratio¹² which reflects the UK auction value of only one other frequency band.
- A6.14 The distance method is applied by:
- a) calculating the “Y/X” ratio as the difference in value between 2100 MHz and the high frequency band (“Y”), divided by the difference in value between the low frequency band and the high frequency band (“X”), which is referred to as the “Y/X ratio” and expressed as a percentage; and
 - b) relating this to the corresponding values of the low frequency band and the high frequency band in the UK.
- A6.15 Expressed formulaically, the distance method takes the following expression, where the terms “L” and “H” and the number 2100 represent the value of the low frequency band,

¹¹ <https://data.worldbank.org/indicator/sp.pop.totl>

¹² By paired ratio we mean the relative value of one spectrum band to another. For example, in our 2018 Statement we used the paired ratio of 900 MHz to 800 MHz to estimate our market value of 900 MHz.

high frequency band and 2100 MHz band for a given benchmark country or the UK denoted by the subscripts “BC” and “UK”, respectively.

$$2100_{UK} = \frac{2100_{BC} - H_{BC}}{L_{BC} - H_{BC}} \cdot (L_{UK} - H_{UK}) + H_{UK}$$

Proxies for the value of high frequency bands

- A6.16 In countries where auction prices are available for a low frequency band and the 2100 MHz band but not a high frequency band, we derive a high frequency band proxy which we then use alongside the low frequency band and the 2100 MHz price to calculate relative value benchmarks.
- A6.17 Our principal approach starts by considering auction evidence from other countries and calculating a ratio between the price of a high frequency band and the price of a second band in those countries. We then apply this ratio to the price of the second band in the country where a proxy is needed. For example, to derive a proxy value of the 3.4-3.8 GHz band in a country where the price of this band is not available, we start by calculating the ratio of the 3.4-3.8 GHz band price relative to the 700 MHz band price in countries where both these prices are available; we then multiply the 700 MHz band price from the first mentioned country by the calculated ratio to arrive at a proxy value of the 3.4-3.8 GHz band in that country. This approach can be similarly applied to other combinations of bands for which prices are available in relevant countries.

The Netherlands and Norway

- A6.18 Auction prices in the Netherlands and Norway are available for the 700 MHz and 2100 MHz spectrum bands. In principle, either of these two bands could be used as the ‘second band’ in deriving a proxy for a high frequency band.
- A6.19 Auction evidence from other countries is available to calculate ratios for the following combinations of high frequency bands and ‘second bands’:

Table A6.1: Combinations of spectrum bands to derive a high frequency band proxy ratio for the Netherlands and Norway

Band combination	Number of ratios	Countries	Values	Comments
2.3 GHz / 700 MHz	3	Slovenia, Sweden, UK	Min: 0.07 Avg: 0.25 Max: 0.38	A relatively wide range of values generated by a sample of three benchmarks. The highest value is more than five times larger than the lowest value.
2.6 GHz / 700 MHz	3	Austria, Germany, UK	Min: 0.11 Avg: 0.22	A relatively wide range of values generated by a sample of three benchmarks. The highest value is

			Max: 0.44	approximately four times larger than the lowest value.
3.4-3.8 GHz / 700 MHz	7	Austria, Germany, Hungary, Slovenia, Sweden, UK (x2)	Min: 0.08 Avg: 0.31 Max: 0.67	A relatively wide range of values generated by a sample of seven benchmarks. The highest value is more than eight times larger than the lowest value. Ratios from Germany (0.67) and the UK (0.57) imply value of 3.4-3.8 GHz in the Netherlands is higher than 2100 MHz (0.52); ratio from Germany implies value of 3.4-3.8 GHz in Norway is higher than 2100 MHz (0.59).
2.3 GHz / 2100 MHz	1	Slovenia	0.27	A single data point for this combination of bands.
2.6 GHz / 2100 MHz	2	Austria, Germany	Min: 0.12 Avg: 0.14 Max: 0.16	A small sample based on two data points only.
3.4-3.8 GHz / 2100 MHz	4	Austria, Germany, Hungary, Slovenia	Min: 0.21 Avg: 0.37 Max: 0.66	A relatively wide range of values generated by a sample of four benchmarks. The highest value is more than three times larger than the lowest value. Consistent with auction evidence about relative values.

Source: Ofcom analysis

A6.20 Based on available evidence, we do not consider any of the band combinations to be clearly more informative of the relative market values in the Netherlands or Norway than the other band combinations. Consequently, we derive a range of relative value benchmarks based on the available proxies for the Netherlands¹³ and Norway¹⁴, which we then interpret in the context of all other international benchmarks.

Croatia

A6.21 Auction prices in Croatia are available for the 800 MHz and 2100 MHz spectrum bands. In principle, either of these two bands could be used as the 'second band' in deriving a proxy for a high frequency band.

¹³ See Annex A7, paragraphs A7.65, Table A7.15 and Table A7.16.

¹⁴ See Annex A7, paragraphs A7.100 and Table A7.20.

A6.22 In our 2018 Statement, we used a 2.6 GHz proxy for Croatia.¹⁵ We consider this remains appropriate in our current analysis.

Interpretation of benchmarks

Quality of evidence: tiers

A6.23 We categorise the available relative value benchmarks into three tiers, which reflect how informative of UK market values we consider them to be. Our criteria for placing a relative benchmark in **Tier 1** (highest quality) 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.

A6.24 Our criteria for placing a benchmark in **Tier 2** are that one or more of the criteria for Tier 1 are not met; but

- a) there is some evidence that the relative auction prices reflect bidders' relative intrinsic valuations of different bands; and
- b) 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.

A6.25 Our criterion for placing a benchmark in **Tier 3** is that it does not meet the criteria for Tier 1 or Tier 2.

Risk of understatement or overstatement

A6.26 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 the relevant band.

A6.27 We characterise the nature of the risks according to the:

- a) **Likelihood** of understatement or overstatement: we consider whether this can be categorised as a larger risk or a smaller risk, but in some cases, we cannot be sure of the likelihood of possible understatement or overstatement.

¹⁵ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, https://www.ofcom.org.uk/_data/assets/pdf_file/0021/130548/Annexes-1-6.pdf, Annex A2, paragraph A2.37.

- b) **Scale** of the potential understatement or overstatement: we consider whether this can be categorised as larger or a smaller understatement or overstatement, but in some cases, we cannot be sure of the scale of possible understatement or overstatement.
- c) **Direction** of potential effect: whether the risk is of an understatement or overstatement, or both. In some cases, there may be some reasons for considering the benchmark may be an understatement, and other reasons for considering it may be an overstatement. In these cases, we reach a view as to whether the effects tend to balance out, or one is likely to be stronger than the other.

A6.28 In assessing the risks, we consider both whether the auction outcomes are likely to reflect market value in the country concerned, and also whether there are other factors, such as country-specific factors or the date of the award, that might inform our interpretation of what the benchmark says about market value in the UK.

A7. Paired 2100 MHz – Relevant spectrum awards

Introduction

- A7.1 In this annex we discuss the results of mobile spectrum awards in Europe since the beginning of 2010 relevant to informing our relative value benchmarks for the 2100 MHz spectrum band in the UK. We focus on countries where the 2100 MHz band, at least one of the low frequency bands (700 MHz and 800 MHz) and, preferably, at least one of the high frequency bands (2.3 GHz, 2.6 GHz, and 3.4-3.8 GHz) have been auctioned in this period.
- A7.2 This annex contains separate sections for each of the countries considered. We begin with the countries (organised in alphabetical order) for which we can derive Tier 1 distance method benchmarks. For each of these countries, we set out the auction awards used to derive the distance method benchmarks, and include:
- a) A summary of our assessment of those auctions we have analysed in previous ALF Statements.¹⁶
 - b) Information on the circumstances and outcome of the auction or auctions that we have not analysed in previous ALF Statements. This includes a table summarising the amount of spectrum awarded to each winning bidder and the prices paid. Where relevant, we also report the final price mark-up over the reserve price. It also includes a table setting out the principal rules and features of the auction design.
 - c) Where relevant, a summary of our estimation of band-specific prices in CCA awards or other auction formats where band-specific prices were not fully disclosed.
 - d) Our provisional assessment of whether the values derived from each auction are likely to reflect the market value in the country concerned, and whether the relative market values of different bands in the country concerned are likely to reflect the UK relative market values.¹⁷
 - e) A summary of the relative value benchmarks and our assessment. This includes the tier of evidence to which the relative value benchmarks belong, and our interpretation of the benchmarks in terms of the likelihood, scale, and direction of any understatement or overstatement of the UK market value.

¹⁶ That is (i) Ofcom, *Annual licence fees for 900 MHz and 1800 MHz spectrum*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0033/79764/statement.pdf which we refer to in the remainder of this Annex as the **2015 Statement**; and (ii) 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. In the remainder of this Annex we refer to this as the **2018 Statement**.

¹⁷ We take into account the implications of coverage obligations on the auctioned spectrum in our assessment and discuss these in the circumstances where we consider that the coverage obligations require deployment significantly in excess of commercial levels, and as a result the auction price could risk understating the value of that band.

A7.3 We then briefly summarise the auction evidence from the countries for which we are not able to derive Tier 1 distance method benchmarks.

A7.4 Table A7.1 presents an overview of our relative value benchmarks for each relevant combination of spectrum bands in countries where we have been able to derive them.

Table A7.1: Overview of relative value benchmarks

Country	Low frequency award year	2100 MHz award year	High frequency award year	Risk of understatement or overstatement	Tiering
700 MHz-2.3 GHz					
United Kingdom	2021		2018		
Slovenia	2021	2021	2021	Risk of overstatement	1
700 MHz-2.6 GHz					
United Kingdom	2021		2013		
Austria	2020	2020	2010	Risk of under- or overstatement	1
Germany	2015	2019	2010	Larger risk of overstatement	1
Greece	2020	2020	2014	Risk of under- or overstatement	3
Iceland	2017	2017	2017	Risk of under- or overstatement	3
700 MHz-3.4-3.8 GHz					
United Kingdom	2021		2018		
United Kingdom	2021		2021		
Austria	2020	2020	2019	Risk of under- or overstatement	1
Germany	2015	2019	2019	Risk of overstatement	1
Greece	2020	2020	2020	Risk of under- or overstatement	3
Hungary	2020	2020	2020	Risk of under- or overstatement	1

Annual Licence Fees for 2100 MHz Spectrum

Slovenia	2021	2021	2021	Risk of overstatement	1
700 MHz-proxies					
Netherlands	2020	2020	proxies	Risk of under- or overstatement	1
800 MHz-2.6 GHz					
United Kingdom	2013		2013		
Austria	2013	2020	2010	Risk of understatement	1
Germany	2010	2019	2010	Larger risk of understatement	1
Greece	2014	2020	2014	Risk of under- or overstatement	3
Iceland	2017	2017	2017	Risk of under- or overstatement	3
800 MHz-2.6 GHz proxy					
Croatia	2013	2019	proxy	Risk of under- or overstatement	3
800 MHz-3.4-3.8 GHz					
United Kingdom	2013		2018		
United Kingdom	2013		2021		
Austria	2013	2020	2019	Risk of understatement	1
Germany	2010	2019	2019	Larger risk of larger understatement	1
Greece	2014	2020	2020	Risk of under- or overstatement	3

Source: Ofcom analysis

Austria

- A7.5 We are able to derive four distance method benchmarks for Austria, namely:
- a) 700-2100-2600;
 - b) 700-2100-3400/3600;
 - c) 800-2100-2600; and
 - d) 800-2100-3400/3600.
- A7.6 These are based on the following auction awards:
- a) 2.6 GHz was auctioned in October 2010;
 - b) 800 MHz was auctioned as part of May 2013 multiband auction;
 - c) 3.4-3.8 GHz were auctioned in March 2019; and
 - d) 700 MHz and 2100 MHz were auctioned as part of the September 2020 multiband auction.

Awards considered in previous ALF Statements

- A7.7 In our 2015 Statement we considered the October 2010 2.6 GHz auction, and the May 2013 multiband auction.
- A7.8 While the May 2013 multiband auction was a CCA format we were able to derive band-specific prices.¹⁸
- A7.9 Overall, our view was that:
- a) there were no specific risks identified to suggest the 2.6 GHz spectrum auction price over or understated market value in Austria;¹⁹
 - b) the linear reference price (LRP) results for the 800 MHz band showed that all lots sold well above reserve price to the three incumbent bidders and that the Austrian results were around twice as high as the UK LRP for the 800 MHz band. We discussed the potential for strategic bidding in all bands offered in the October 2013 multiband auction. We concluded that the 800 MHz price carried a risk of overstating the 800 MHz market value in Austria, the likelihood and scale of which are unknown;²⁰ and

¹⁸ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, p.12-62.

¹⁹ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraph A8.62.

²⁰ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraph A8.61

- c) the 1800 MHz distance method benchmark which used these 800 MHz and 2.6 GHz results met the Tier 1 criteria.²¹

A7.10 We derived the distance method benchmark using the revenue constrained LRP for the 800 MHz and 1800 MHz bands. Although we considered the unconstrained LRP to be more representative of the market value, we decided to use the revenue constrained LRP to take a conservative approach that resulted in a lower estimated value of the UK 1800 MHz band. In the present valuation of the 2100 MHz band, we use the unconstrained LRP for the 800 MHz band. Alongside being more representative of the market value of the 800 MHz band, it also produces a more conservative estimate of the UK 2100 MHz band.

March 2019 3.4-3.8 GHz auction

A7.11 In March 2019, regional licences in the 3.4-3.8 GHz spectrum band were auctioned in Austria using a clock auction format.

A7.12 The award information is set out in Table A7.2 and the auction features summarised in Table A7.3.

Table A7.2: March 2019 3.4-3.8 GHz auction results²²

	3.4 – 3.8 GHz (TDD) in all 12 regions (MHz)	3.4 – 3.8 GHz (TDD) in fewer than 12 regions (MHz)	Price Paid (EUR m)
Total available	390 in each region		
A1 Telekom Austria	100	20-40 (7 of 12 regions)	64.3
Hutchison Drei Austria	100	-	51.9
T-Mobile Austria	110	-	56.9
Regional bidders	-	30-80 (7 of 12 regions)	14.5
Unsold	-	10-60 (7 of 21 regions)	

Source: RTR

²¹ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraphs A8.138-A8.139 and A8.220.

²² The Austrian Regulatory Authority for Broadcasting and Telecommunications (RTR), *Award result: a successful step towards 5G*, March 2019, <https://www.rtr.at/TKP/presse/pressemitteilungen/pressemitteilungen/PI07032019TK.en.html>, and https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/5G_Frequenzvergabe_3_4-3_8GHz/5G-Auction-Outcome.en.html.

Table A7.3: March 2019 3.4-3.8 GHz auction features²³

	Description	Comments
Number of bidders, number of lots, lot sizes	7 bidders, including 3 incumbent MNOs. 39 lots of spectrum in total, auctioned in lots of 10 MHz.	The overall number of lots in each region exceeded the number of potential bidders.
Spectrum caps / restrictions	A1 and T-Mobile: 150 MHz in all regions. All other bidders: 170 MHz in all regions. ²⁴	The caps were not binding on any of the bidders.
Reserve prices	Reserve prices varied by region; from €19,700 (per 10 MHz) in rural Salzburg region to €311,400 (per 10 MHz) in urban Vienna/St Pölten region. ²⁵	All spectrum sold above reserve prices.
Obligations	Three levels: Level 1 all spectrum holders; level 2 holders of at least 50 MHz in one region (additional to level 1); level 3 for holders of at least 90 MHz in one region (additional to level 1 and 2). Each coverage obligation is associated with a minimum number of locations the licence holder must operate.	

Source: RTR

A7.13 Hutchison Drei Austria and T-Mobile Austria acquired each of their spectrum bands in all 12 regions. A1 Telekom Austria acquired most, but not all its spectrum bands in all 12 regions. To derive auction prices corresponding to a national licence, we used the prices paid by Hutchison Drei Austria and T-Mobile Austria.

²³ RTR, *Tender Document - Procedure for Spectrum Award in the 3410 to 3800 MHz Range*, September 2018, NON-BINDING TRANSLATION,

https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/5G_Frequenzvergabe_3_4-3_8GHz/Tender_Documents_3_4_-_3_8_GHz_EN.pdf.

²⁴ In case of an additional bidding round, the NRA had set alternative spectrum caps: 160 MHz in all regions for A1 and 170 MHz in all regions for all other bidders. RTR, *Tender Document - Procedure for Spectrum Award in the 3410 to 3800 MHz Range*, September 2018, NON-BINDING TRANSLATION,

https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/5G_Frequenzvergabe_3_4-3_8GHz/Tender_Documents_3_4_-_3_8_GHz_EN.pdf, p.25.

²⁵ RTR, *Tender Document - Procedure for Spectrum Award in the 3410 to 3800 MHz Range*, September 2018, NON-BINDING TRANSLATION,

https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/5G_Frequenzvergabe_3_4-3_8GHz/Tender_Documents_3_4_-_3_8_GHz_EN.pdf, p.24-25.

September 2020 multiband auction

A7.14 In September 2020, 700 MHz, 1500 MHz, and 2100 MHz spectrum bands were auctioned in Austria using an SMRA clock hybrid format.

A7.15 The award information is set out in Table A7.4 and the auction features summarised in Table A7.5.

Table A7.4: September 2020 multiband auction results²⁶

	700 MHz (TDD) (MHz)	1500 MHz (SDL) (MHz)	2100 MHz (TDD) (MHz)	Extended coverage obligation (cadastral municipalities)	Price Paid (EUR m)
Total available	2 x 30	80 + 10*	2 x 60	1,702	
A1 Telekom Austria	-	30	2 x 25	349	65.6
Hutchison Drei Austria	2 x 10	30	2 x 20	738	49.6
T-Mobile Austria	2 x 20	20 + 10*	2 x 15	615	86.7
Unsold	-	-	-	-	

* One lot of 10 MHz (B01) is subject to power restrictions and was assigned to the winner of lot B02 (10 MHz).

Source: RTR

Table A7.5: September 2020 multiband auction features²⁷

	Description	Comments
Number of bidders, number of lots, lot sizes	Three incumbent MNOs 700 MHz: six lots of 2 x 5 MHz 1500 MHz: 18 lots of 5 MHz 2100 MHz: 12 lots of 2 x 5 MHz	The overall number of lots exceeded the number of potential bidders.
Spectrum caps	700 MHz: 2 x 20 MHz (2 x 10 MHz for A1 Telekom) 1500 MHz: 60 MHz	None of the caps were binding.

²⁶ RTR, *Auction results*, September 2020, https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/Multibandauktion_700-1500-2100MHz_2020/FRQ5G_2020_Outcome.en.html.

²⁷

RTR, *Tender Document - in the procedure for awarding spectrum in the 700, 1500 and 2100 MHz ranges*, December 2019, NON-BINDING TRANSLATION, https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/Multibandauktion_700-1500-2100MHz_2020/TenderDocument-700_1500_2100_MHz-F_1_16_EN-non-binding-trans.pdf

	2100 MHz: 2 x 40 MHz (2 x 30 MHz for A1 Telekom)	The 1500 MHz cap excludes the power restricted lot of 10 MHz (B01).
Reserve prices	700 MHz: four lots €9.5m, one lot €7.125m and one lot €2.375m (per 2 x 5 MHz). 1500 MHz: €3.125m (per 5 MHz) 2100 MHz: €13.9m (per 2 x 5 MHz)	Spectrum sold above reserve prices.
Obligations	A mix of coverage obligations applicable for 700 MHz and 2100 MHz spectrum staggered over time; basic coverage obligations which do not need to be met using 700 MHz or 2100 MHz ²⁸ frequencies specifically, and extended coverage obligations for 700 MHz in exchange for a discount on spectrum fees. ²⁹	

Source: RTR

A7.16 The auction proceeded in four stages:³⁰

- a) In the **first stage**, the 700 MHz and 2100 MHz bands were auctioned as abstract 2x5 MHz spectrum blocks, with extended coverage obligation of 150 underserved cadastral municipalities associated with each block in the 700 MHz band. The total price achieved in the first stage was €231,400,00 across both bands.
- b) In the **second stage**, the 1500 MHz band was auctioned as abstract 10 MHz spectrum blocks. The total price achieved in the second stage was €55,706,000.
- c) In the **third stage**, specific frequencies within each band were assigned to the winning bidders from the first and the second stage. The total price achieved in the third stage was €2,543,420.
- d) In the **fourth stage**, additional extended coverage obligations not attached to specific frequencies were auctioned, comprising 802 underserved cadastral municipalities. The total discount achieved in the fourth stage was €87,800,000.

²⁸ A company assigned at least 2 x 15 MHz of 2100 MHz spectrum is expected to achieve specific population coverage and download/upload speeds by end of 2023 with higher coverage obligations expected by end of 2025. Companies assigned 2 x 10 MHz or less in the 2100 MHz must fulfil the coverage obligations at half of the stated data transmission rates for downloads and uploads.

²⁹ In the tender document, the NRA stipulates that given the 700 MHz band may be the last coverage spectrum to be awarded for mobile services for some time it considers it appropriate to set ambitious coverage obligations as part of the spectrum award. To reflect this, we have considered the impact of 700 MHz coverage obligations in our estimates. RTR, *Tender Document - in the procedure for awarding spectrum in the 700, 1500 and 2100 MHz ranges*, December 2019, NON-BINDING TRANSLATION, https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/Multibandauktion_700-1500-2100MHz_2020/TenderDocument-700_1500_2100_MHz-F_1_16_EN-non-binding-trans.pdf, p.4.

³⁰ RTR, *Award Decision No. F 1/16-394*, October 2020, https://www.rtr.at/TKP/was_wir_tun/telekommunikation/spectrum/procedures/Multibandauktion_700-1500-2100MHz_2020/F_1_16_Zuteilungsbescheid.pdf, section II.2 (in German)

A7.17 We used the published data about the outcome of the auction stages to infer band-specific prices and the value of extended coverage obligation attached to the 700 MHz band as follows:

- a) We estimated the average price of the 1500 MHz band based on the overall results of the second stage and a pro-rata share of the total price achieved in the third stage. This resulted in an estimated average price of €702,494 per MHz of the 1500 MHz band.
- b) We estimated the average price of the 2100 MHz band using the estimated average price of 1500 MHz and the results of the first three stages for A1 Telekom Austria who acquired spectrum only in the 1500 MHz and 2100 MHz bands. This resulted in an estimated average price of €1,541,624 per MHz of the 2100 MHz band.
- c) We estimated the auction price of the 700 MHz band using the estimated average prices of the 1500 MHz and 2100 MHz bands and the results of the first three stages for Hutchison Drei Austria and T-Mobile Austria who acquired spectrum in the 700 MHz band. This resulted in an estimated auction price of €48,455,071 per 60 MHz of spectrum in the 700 MHz band.
- d) To account for the extended coverage obligation attached to the 700 MHz band, we estimated the average value of extended coverage obligation based on the results of the fourth stage for Hutchison Drei Austria and T-Mobile Austria. This resulted in an estimated average value of extended coverage obligation of €121,623 per municipality covered for Hutchison Drei Austria and €129,545 per municipality covered for T-Mobile Austria.
- e) We adjusted the auction price of the 700 MHz band by adding the estimated value of the extended coverage obligation attached to that band, expressed as the number of municipalities to be covered multiplied by the estimated average value of extended coverage for Hutchison Drei Austria and T-Mobile Austria, respectively. This resulted in an adjusted price of €162,669,056 per 60 MHz of spectrum in the 700 MHz band (that is, €2,711,151 per MHz).

Whether award outcomes are likely to reflect market value in Austria

3.4-3.8 GHz spectrum award in March 2019

A7.18 For the 3.4-3.8 GHz band, we note that it sold above the reserve price, with all three national MNOs competing as well as bidders looking for regional licences. The spectrum caps were not binding on any of the bidders.

A7.19 We note that there were coverage obligations on 3.4-3.8 GHz linked to the amount of spectrum secured in the auction and varying by location, but we do not consider these to be overly onerous on operators.³¹ Therefore we consider it unlikely that the additional coverage obligations attached to this band could lead to a risk of understatement for the

³¹ In the tender document, RTR note that the coverage obligations were intended to ensure effective use of spectrum and prevent any hoarding of it, while also encouraging rapid roll-out of 5G infrastructure.

spectrum acquired above those thresholds. Overall, we have not identified any specific risks that we consider could risk under- or overstating the 3.4-3.8 GHz award.

700 MHz and 2100 MHz spectrum award in September 2020

- A7.20 Both the 700 MHz and 2100 MHz bands sold above the reserve price, and the spectrum caps were not binding on any of the bidders.
- A7.21 The 700 MHz band price with the extended coverage obligation carries a larger risk of larger understatement of the unencumbered market value of the 700 MHz band.
- A7.22 We have sought to address this risk by adjusting the 700 MHz band price by estimating the value of the extended coverage obligation attached to that band and adjusting the price accordingly.³²
- A7.23 The resulting 700 MHz band price excluding the extended coverage obligation carries a risk of under- or overstatement the likelihood or size of which we are unable to quantify.
- A7.24 We have not identified any specific risks of under- or overstatement for the 2100 MHz band although we note that the award is subject to basic and 2100 MHz specific coverage obligations.³³

Likelihood of reflecting relative market values in the UK

- A7.25 We have not identified and country-specific factors that would mean the Austrian relative values of 700 MHz, 2100 MHz or 3.4-3.8 GHz are not reflective of the UK relative values.

Assessment of the benchmarks

Risk of understatement or overstatement

- A7.26 We are combining auction prices from different auctions in different years. There is a risk that this gap in time affects the risk of understatement or overstatement, although we have not identified a clear direction or magnitude of the possible effects.
- A7.27 Based on the above, we provisionally consider that:
- a) The relative value benchmarks using 700 MHz (removing the effects of the extended coverage obligation), and 2100 MHz in combination with and either of 2.6 GHz or 3.4-3.8 GHz carry a risk of under- or overstatement, the likelihood or size of which we are unable to quantify.
 - b) The relative value benchmarks using 800 MHz, 2100 MHz and either of 2.6 GHz or 3.4-3.8 GHz carry a risk of understatement. This is due to the 800 MHz price carrying a risk of overstating the 800 MHz market value in Austria.

³² See paragraph A7.17 above.

³³ We do not consider these to be overly onerous and do not expect them to understate the award.

Tiering

A7.28 Considering the criteria for inclusion in Tier 1:

- a) The auction prices of 700 MHz, 800 MHz, 2100 MHz, 2.6 GHz, and 3.4-3.8 GHz were all above reserve. This would suggest that the auction prices were primarily determined by a market-driven process of bidding.
- b) Based on the evidence available to us, we consider that the relative prices in the auction are at least as likely to be based on bidders' intrinsic valuation of spectrum as on strategic bidding; and
- c) The auction outcome appears likely to be informative of forward-looking relative spectrum values in the UK, having considered country-specific circumstance and the timing of these awards.

A7.29 Considering the factors above, our provisional view is that the Tier 1 criteria are satisfied for the relative value benchmarks from Austria.

Summary

Table A7.6: Summary of evidence points from Austria

Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	21.7	12	2.3	0.50	10.1
Risk assessment; Tier	Risk of under- or overstatement	No specific risk identified	No specific risk identified	Risk of under- or overstatement Tier 1	
Band combination	700 MHz	2100 MHz	3.4-3.8 MHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	21.7	12	4.4	0.44	10.6 (UK 3.4 GHz) 8.6 (UK 3.6 GHz)
Risk assessment; Tier	Risk of under- or overstatement	No specific risk identified	Risk of under- or overstatement	Risk of under- or overstatement Tier 1	
Band combination	800 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	86.4	12	2.3	0.12	9.7

Annual Licence Fees for 2100 MHz Spectrum

Risk assessment; Tier	Risk of overstatement	No specific risk identified	No specific risk identified	Risk of understatement Tier 1	
Band combination	800 MHz	2100 MHz	3.4-3.8 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	86.4	12	4.4	0.09	10.6 (UK 3.4 GHz) 7.3 (UK 3.6 GHz)
Risk assessment; Tier	Risk of overstatement	No specific risk identified	Risk of under- or overstatement	Risk of understatement Tier 1	

Source: Ofcom analysis

Germany

A7.30 We are able to derive four distance method benchmarks for Germany, namely:

- a) 700-2100-2600;
- b) 700-2100-3600;
- c) 800-2100-2600; and
- d) 800-2100-3600.

A7.31 These are based on the following auction awards:

- a) 800 MHz and 2.6 GHz were auctioned as part of May 2010 multiband auction³⁴;
- b) 700 MHz was auctioned as part of the June 2015 multiband auction; and
- c) 2100 MHz and 3.6 GHz³⁵ were auctioned in June 2019.

Awards considered in previous ALF Statements

A7.32 In our 2015 Statement we considered the May 2010 and June 2015 multiband auctions.

A7.33 Overall, our view was that:

- a) that the price of 800 MHz was likely to reflect market value in Germany but that there was a larger risk that the market value of 800 MHz at the time of the auction was a larger overstatement of the forward-looking market value of 800 MHz;³⁶
- b) the price of 2.6 GHz may understate market value in Germany although we said we could not be sure of the likelihood and scale of this understatement;³⁷
- c) the auction prices in the 800 MHz and 2.6 GHz bands were significantly above reserve, and as such appeared likely to have been primarily determined by a market-driven process of bidding;³⁸ and
- d) the 700 MHz band sold significantly above reserve, although there was a possibility of strategic demand reduction in the band which suggested that 700 MHz prices could understate market value.³⁹

³⁴ 2100 MHz spectrum was also auctioned in the May 2010 multiband auction. In deriving the benchmarks for Germany we have used the more recent June 2019 auction data on 2100 MHz.

³⁵ 3420 MHz – 3690 MHz - in our analysis, we refer to this band as '3.6 GHz'.

³⁶ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraph A8.346 and A8.361(a), Table A8.4.4.

³⁷ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraphs A8.315-8.316, and A8.347.

³⁸ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraph A8.490.

³⁹ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraph A8.472(b).

June 2019 2100 MHz and 3.6 GHz auction

A7.34 In June 2019, 2100 MHz and 3.6 GHz spectrum bands were awarded in Germany through an SMRA.

A7.35 The award information is set out in Table A7.7 below and the auction features summarised in Table A7.8 below.

Table A7.7: June 2019 2100 MHz and 3.6 GHz award results⁴⁰

	2100 MHz (FDD) (MHz)	3.6 GHz (TDD) (MHz)	Price Paid (EUR m)
Total available	2 x 60	300	6,549.7
Telekom Deutschland	2 x 20	90	2,174.9
Telefónica	2 x 10	70	1,424.8
Vodafone	2 x 20	90	1,879.7
Drillisch Netz	2 x 10	50	1,070.2
Unsold	-	-	-
Total reserve price for band (EUR m)	57.5	49.6	
Total auction revenue (EUR m)	2,374.1	4,175.5	
% mark-up	4029%	8318%	

Source: BNetzA

Table A7.8: June 2019 2100 MHz and 3.6 GHz award features⁴¹

	Description
Licence duration	20 years (except for some 2100 MHz lots which are available from 2026, not 2021).
No of bidders; no. of lots; lot sizes	Four bidders. 2100 MHz (FDD): 12 lots of 2 x 5 MHz 3.6 GHz (TDD): one lot of 20 MHz ⁴² , 28 of 10 MHz ⁴³

⁴⁰ Bundesnetzagentur (BNetzA), *Auction results*, June 2019, https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/BNetzA/PressSection/PressReleases/2019/20190612_auction.pdf?__blob=publicationFile&v=4, and https://www.bundesnetzagentur.de/_tools/FrequenzXml/Auktion2019_XML/497.html.

⁴¹ BNetzA, *5G award – decisions III & IV (English translation)*, November 2018, https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/ElectronicCommunicationsServices/FrequencyAward2018/20181214_Decision_III_IV.pdf?__blob=publicationFile&v=3, Table 3 and paragraphs 632-636 for minimum price and licence duration.

⁴² 3400 MHz – 3420 MHz.

⁴³ 3420 MHz – 3700 MHz.

Spectrum caps/restrictions	No spectrum caps or other restrictions	
Reserve prices	2100 MHz: €3.75m (15 years) and €5m (20 years), per 2 x 5 MHz. 3.6 GHz: €2m for the 20 MHz lot; €1.7m for each 10 MHz lot.	All spectrum sold above reserve prices.
Obligations	All successful bidders were subject to coverage requirements including covering 98% of households, and coverage of roads, railways and waterways as well as operating a minimum number of base stations by end of 2022 or 2024 depending on the requirement. Less onerous obligations were in place for new entrants.	

Source: BNetzA

Whether award outcomes are likely to reflect market value in Germany

- A7.36 Both the 2100 MHz and 3.6 GHz spectrum sold well above the reserve price, with all incumbents able to participate. Drillisch Netz (an MVNO) also participated and won spectrum. There were no spectrum caps.
- A7.37 Consistent with our approach in previous ALF Statements, we have considered the implications of the coverage obligations qualitatively. In principle, if such obligations were likely to require deployments significantly in excess of commercial levels then we considered that the auction price could risk understating the value of that band (without coverage obligation) in the UK in our assessment. We do not consider that the obligations in this auction were likely to require deployments significantly in excess of commercial levels.
- A7.38 Overall, this would suggest that the auction is likely to have been competitive and reflective of market values in Germany. Based on the information available to us, we have not identified a risk associated with these awards.

Likelihood of reflecting relative market values in the UK

- A7.39 We are not aware of any country-specific factors that would mean the German 2019 2100 MHz or 3.6 GHz auctions to not be reflective of the value in the UK.

Assessment of the benchmarks

Risk of understatement or overstatement

- A7.40 We are combining auction prices from different auctions in different years. There is a risk that this gap in time affects the risk of understatement or overstatement, although we have not identified a clear direction or magnitude of the possible effects.
- A7.41 Based on the above, we provisionally consider that:
- a) The relative value benchmarks using 700 MHz, and 2100 MHz in combination with
 - i) 2.6 GHz: carry a larger risk of overstatement; or

- ii) 3.6 GHz: carry a risk of overstatement.
 - iii) This is due to the 700 MHz and 2.6 GHz prices both carrying a risk of understatement. We are not able to quantify the size of these risks.
- b) The relative value benchmarks using 800 MHz, and 2100 MHz in combination with
- i) 2.6 GHz: carry a larger risk of understatement; or
 - ii) 3.6 GHz: carry a larger risk of larger understatement.
 - iii) This is due to the 800 MHz price carrying a larger risk of larger overstatement of the 800 MHz market value in Germany.

Tiering

A7.42 Considering the criteria for inclusion in Tier 1:

- a) The auction prices of 700 MHz, 800 MHz, 2100 MHz, 2.6 GHz, and 3.6 GHz were all above reserve. This would suggest that the auction prices were primarily determined by a market-driven process of bidding.
- b) As there is evidence that the price of 700 MHz in the 2015 auction might have been affected by strategic bidding, this could indicate that the second criterion for inclusion in Tier 1 is not met for benchmarks including the 700 MHz auction. However, we note that we cannot be sure of the scale of any such effect on relative prices; and
- c) The auction outcomes appear likely to be informative of forward-looking relative spectrum values in the UK, having considered country-specific circumstance and the timing of these awards.

A7.43 We recognise that there are possible reasons why benchmarks using the 700 MHz price might not meet the second criterion from inclusion in Tier 1. Consistent with our approach in our 2015 ALF Statement, our provisional conclusion is to include these benchmarks in Tier 1 given they are market based information determined by bidding in the auctions in question.⁴⁴ We take account of the risk of strategic bidding through the risks of overstatement and understatement outlined above.

A7.44 Considering the factors above, our provisional view is that the Tier 1 criteria are satisfied for all the relative value benchmarks from Germany.

Summary

Table A7.9: Summary of evidence points from Germany

Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz

⁴⁴ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/_data/assets/pdf_file/0033/79764/statement.pdf, paragraphs 3.63-3.67 and 3.75-3.76.

Annual Licence Fees for 2100 MHz Spectrum

					(£m/MHz)
Value	16.4	16.5	1.9	1.01	14.1
Risk assessment; Tier	Risk of understatement	No specific risk identified	Risk of understatement	Larger risk of overstatement Tier 1	
Band combination	700 MHz	2100 MHz	3.4-3.8 MHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	16.4	16.5	10.9	1.02	14.2 (UK 3.4 GHz) 14.3 (UK 3.6 GHz)
Risk assessment; Tier	Risk of understatement	No specific risk identified	No specific risk identified	Risk of overstatement Tier 1	
Band combination	800 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	63	16.5	1.9	0.24	13.5
Risk assessment; Tier	Larger risk of larger overstatement	No specific risk identified	Risk of understatement	Larger risk of understatement Tier 1	
Band combination	800 MHz	2100 MHz	3.4-3.8 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	63	16.5	10.9	0.11	11 (UK 3.4 GHz) 7.7 (UK 3.6 GHz)
Risk assessment; Tier	Larger risk of larger overstatement	No specific risk identified	No specific risk identified	Larger risk of larger understatement Tier 1	

Source: Ofcom analysis

Hungary

- A7.45 We are able to derive a distance method benchmark for Hungary based on 700 MHz, 2100 MHz and 3.6 GHz.
- A7.46 This is based on the March 2020 multiband auction.

March 2020 700 MHz, 2100 MHz, 2.6 GHz and 3.6 GHz award

- A7.47 In March 2020, 700 MHz, 2100 MHz, 2.6 GHz and 3.6 GHz spectrum bands were awarded in Hungary through an ascending clock auction format. We understand that the bidding was conducted sequentially by band as follows: 1) 2.6 GHz, 2) 3.6 GHz, 3) 700 MHz, and 4) 2100 MHz.
- A7.48 The award information is set out in Table A7.10 below and the auction features summarised in Table A7.11 below.

Table A7.10: March 2020 700 MHz, 2100 MHz, 2.6 GHz and 3.6 GHz award results^{45,46}

	700 MHz (FDD) (MHz)	2100 MHz (FDD) (MHz)	2.6 GHz (TDD) (MHz)	3.6 GHz (TDD) (MHz)	Price Paid (HUF m)
Total available	2 x 25	2 x 15	15	310	128,490
Hungarian Telekom	2 x 10	2 x 10	-	120	54,240
Vodafone	2 x 10	2 x 5	-	50	38,650
Telenor	2 x 5	-	-	140	35,600
Unsold	-	-	15	-	
Total reserve price for band (HUF m)	25,000	12,000	1,000	46,500	
Total auction revenue (HUF m)	64,500	12,840	-	51,150	
% mark-up	158%	7%	-	10%	

Source: NMHH and Commsupdate

⁴⁵ Nemzeti Media- és Hírközlési Hatóság [Hungary's National Media & Infocommunications Authority] (NMHH), *Auction results*, March 2020, https://english.nmhh.hu/article/211179/Three_operators_to_pay_a_total_of_HUF_1285_bn_at_an_auction_of_the_NMH_H_for_the_spectrum_open_for_5G; and https://english.nmhh.hu/article/211267/UF191801972019_szamu_határozat_arveresi_eljaras_eredmenyenek_megallapit_asa_az_5G_bevezeteset_tamogato_es_tovabbi_vezetek_nelkuli_szelessavu_szolgaltatasokhoz_kapcsolodo_frekvenciahasznalati_jogosultsagok_targyaban

⁴⁶ Commsupdate, *Article on auction results*, March 2020, <https://www.commsupdate.com/articles/2020/03/27/hungarian-trio-awarded-700mhz-2100mhz-3600mhz-spectrum-in-5g-auction/>.

Table A7.11: March 2020 700 MHz, 2100 MHz, 2.6 GHz and 3.6 GHz award features⁴⁷

	Description	Comment
Licence duration	15 years with a five-year extension option. ⁴⁸	
No of bidders; no. of lots; lot sizes	Three bidders. 700 MHz: five lots of 2 x 5 MHz 2100 MHz: three lots of 2 x 5 MHz 2.6 GHz: one lot of 15 MHz 3.6 GHz: 31 lots of 10 MHz	
Spectrum caps/restrictions	700 MHz: 2 x 10 MHz 2100 MHz: 2 x 15 MHz (2 x 30 MHz including existing spectrum holdings) 2.6 GHz: 15 MHz 3.6 GHz: 140 MHz (including existing spectrum holdings); minimum bid of 20 MHz	700 MHz and 3.6 GHz spectrum caps were binding on Hungarian Telekom and Vodafone, and Telenor respectively.
Reserve prices	700 MHz: HUF 5.0bn (per 2 x 5 MHz) 2100 MHz: HUF 4.0bn (per 2 x 5 MHz) 2.6 GHz: HUF 1.0bn (per 15 MHz) 3.6 GHz: HUF 1.5bn (per 10 MHz)	Spectrum sold above reserve except for unpaired 2.6 GHz which did not sell.
Obligations	-	

Source: NMHH

A7.49 Additionally, bidders were entitled to a 50% annual licence fee discount for 10 years on the 700 MHz and 3.6 GHz bands, subject to meeting the 5G deployment requirements. ⁴⁹ We understand that all three bidders claimed this discount. ⁵⁰ The fees appear to be based on a fixed fee per MHz in each of the bands. ⁵¹

Whether award outcomes are likely to reflect market value in Hungary

A7.50 The 2100 MHz spectrum sold slightly above reserve price. We consider that the price is likely to be reflective of market value in Hungary.

A7.51 The 700 MHz spectrum sold well above reserve price. We note that the spectrum cap was binding for both Hungarian Telekom and Vodafone which could create a risk that the

⁴⁷ NMHH, *Documentation of the auction procedure*, June 2019,

https://english.nmhh.hu/document/205102/MFCN_draft_documentation_20190621_final_EN.pdf.

⁴⁸ The relative value benchmarks for Hungary are based on the extended licence duration. Using the initial licence duration would not have a material impact on the relative value benchmarks.

⁴⁹ NMHH, *Documentation of the auction procedure*, June 2019,

https://english.nmhh.hu/document/205102/MFCN_draft_documentation_20190621_final_EN.pdf, Table 1 in Annex 2.

⁵⁰ NMHH, *Decision on the auction outcome*, April 2020,

https://english.nmhh.hu/article/211267/UF191801972019_szamu_határozat_arveresi_eljaras_eredmenyenek_megallapitasa_az_5G_bevezeteset_tamogato_es_tovabbi_vezetek_nelkuli_szelessavu_szolgáltatásokhoz_kapcsolodo_frekvenciahasznalati_jogosultságok_targyaban.

⁵¹ NMHH, *Decision on the auction outcome*, April 2020,

https://nmhh.hu/cikk/211267/UF191801972019_szamu_határozat_arveresi_eljaras_eredmenyenek_megallapitasa_az_5G_bevezeteset_tamogato_es_tovabbi_vezetek_nelkuli_szelessavu_szolgáltatásokhoz_kapcsolodo_frekvenciahasznalati_jogosultságok_targyaban, section 7 on frequency fees.

auction price understates market value in Hungary. This may be mitigated in part by the presence of a third bidder (Telenor) for whom the cap was not binding.

- A7.52 The 3.6 GHz spectrum also sold slightly above reserve price. We note that the spectrum cap was binding on Telenor which could create a risk that the auction price understates market value in Hungary. This may be mitigated in part by the presence of two other bidders for whom the cap was not binding.
- A7.53 The prices we use in the model for 700 MHz and 3.6 GHz do not take into account the potential discount on annual licence fees available subject to meeting the 5G deployment criteria. As a result, there is a risk that these overstate market value.
- A7.54 On balance, we consider that these two risks offset each other to some extent, such that overall we consider the 700 MHz and 3.6 GHz prices to be at risk of under or overstatement, the likelihood and scale of which we are unable to determine.

Likelihood of reflecting relative market values in the UK

- A7.55 We are not aware of any country-specific factors that would cause the Hungarian 2020 auction results to not be reflective of the relative values of the spectrum bands in the UK.

Assessment of the benchmarks

Risk of understatement or overstatement

- A7.56 Based on the above, we provisionally consider that the relative value benchmark using 700 MHz, 2100 MHz and 3.6 GHz carries a risk of under- or overstatement the likelihood and scale of which we are unable to determine.
- A7.57 This is due to both the 700 MHz and 3.6 GHz prices carrying a risk of understatement due to binding spectrum caps on one or more bidders and a risk of overstatement due to the net impact of the potential discount on annual licence fees.

Tiering

- A7.58 Considering the criteria for inclusion in Tier 1:
- a) The auction prices of 700 MHz, 2100 MHz, 3.4-3.8 GHz were all above reserve. This would suggest that the auction prices were primarily determined by a market-driven process of bidding.
 - b) Based on the evidence available to us, we consider that 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 auction outcomes appear likely to be informative of forward-looking relative spectrum values in the UK, having considered country-specific circumstance and the timing of these awards.

A7.59 Considering the factors above, our provisional view is that the Tier 1 criteria are satisfied for the relative value benchmarks from Hungary.

Summary

Table A7.12: Summary of evidence points from Hungary

Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	3.4-3.8 MHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	80.1	33	10.1	0.32	9.9 (UK 3.4 GHz) 7.4 (UK 3.6 GHz)
Risk assessment; Tier	Risk of under- or overstatement	No specific risk identified	Risk of under- or overstatement	Risk of under- or overstatement Tier 1	

Source: Ofcom analysis

The Netherlands

- A7.60 The July 2020 Dutch multiband auction included 700 MHz and 2100 MHz spectrum.⁵²
- A7.61 In April 2010 there was an award of 2.6 GHz spectrum using a CCA auction format. As set out in our 2015 Statement, due to limits placed on the amount of spectrum that the three existing operators could win we do not consider that the auction prices reflected market value in the Netherlands.⁵³
- A7.62 As a result, in order to derive distance method benchmarks for the Netherlands we have estimated proxy values for the high frequency bands, as discussed in Annex 6, paragraphs A6.16-A6.20.

July 2020 700 MHz, 1400 MHz and 2100 MHz award

- A7.63 In July 2020, 700 MHz, 1400 MHz and 2100 MHz spectrum bands were awarded in the Netherlands through an SMRA-Clock hybrid auction format.⁵⁴
- A7.64 The award information is set out in Table A7.13 below and the auction features summarised in Table A7.14 below.

Table A7.13: July 2020 700 MHz, 1400 MHz and 2100 MHz award results^{55,56}

	700 MHz (FDD) (MHz)	1400 MHz (SDL) (MHz)	2100 MHz (FDD) (MHz)	Price Paid (EUR m)
Total available	2 x 30	40	2 x 60	1,219.7
KPN	2 x 10	15	2 x 20	415.8
Vodafone	2 x 10	15	2 x 20	415.8
T-Mobile	2 x 10	10	2 x 20	388.3
Unsold	-	-	-	

⁵² A 2 x 10 MHz of 2100 MHz spectrum was also auctioned in the Netherlands in December 2012 as part of the multiband auction using a CCA format. As discussed in [2015 Statement](#), Annex 8, paragraphs A8.648-A8.657 we were unable to derive band specific prices from that award.

⁵³ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, p. 175.

⁵⁴ DotEcon, *Recommended auction model for the award of 700, 1400 and 2100 MHz spectrum*, March 2020, <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2020/03/06/bijlagen-veiling-mobiele-communicatie/DotEcon+-+Final+recommendations+including+assessment+of+responses.pdf>.

⁵⁵ Deutsche Telekom article, *T-Mobile, KPN play 5G catch-up with VodafoneZiggo*, July 2020, <https://www.telcotitans.com/deutsche-telekomwatch/t-mobile-kpn-play-5g-catch-up-with-vodafoneziggo/1948.article>.

⁵⁶ Government Gazette of the Kingdom of the Netherlands, *Granting of multiband auction licenses by the Telecom Agency*, July 2020, <https://zoek.officielebekendmakingen.nl/stcrt-2020-41318.html#d17e52>, and <https://www.agentschaptelecom.nl/onderwerpen/multibandveiling/documenten/publicaties/2020/07/27/biedingen-en-data-multibandveiling-2020>.

Total reserve price for band (EUR m)	451.1	40.2	423.3	
Total auction revenue (EUR m)	473.9	251.9	493.9	
% mark-up	5%	526%	17%	

Source: Deutsche Telekom, Dutch Government Gazette.

Table A7.14: July 2020 700 MHz, 1400 MHz and 2100 MHz award features^{57,58,59}

	Description	Comment
Licence duration	20 years; 700 MHz and 1400 MHz after the auction until end of 2040. 2100 MHz: from end of January 2021, until end of 2040.	
No of bidders; no. of lots; lot sizes	Three bidders 700 MHz: six lots of 2 x 5 MHz 1400 MHz: eight lots of 5 MHz 2100 MHz: 12 lots of 2 x 5 MHz	
Spectrum caps/restrictions	700 MHz: 40 MHz for KPN, 40 MHz for Vodafone, and 30 MHz for T-Mobile Auction ⁶⁰ : 140 MHz for KPN, 120 MHz for Vodafone, and 80 MHz for T-Mobile.	Spectrum caps not binding
Reserve prices	700 MHz: €75.18m (per 2 x 5 MHz) 1400 MHz: €5.03m (per 5 MHz) 2100 MHz: €35.279m (per 2 x 5 MHz)	Spectrum sold above reserve.
Obligations	700 MHz: winners of 2 x 10 MHz (or more spectrum) are required to provide 98% of outdoor coverage with a minimum speed of 8Mbps after two years increasing to 10Mbps after six years. ⁶¹	

Source: State Secretary for Economic Affairs and Climate Policy, DotEcon, and Dutch Government Gazette.

⁵⁷ The Dutch State Secretary for Economic Affairs and Climate Policy, *The application and auction procedure*, March 2020, <https://www.government.nl/binaries/government/documents/publications/2020/03/06/non-binding-translation-auction-regulation-and-explanatory-notes-2020/Non-binding+translation+auction+regulation+and+explanatory+notes+2020.pdf>.

⁵⁸ DotEcon, *Recommended auction model for the award of 700, 1400 and 2100 MHz spectrum*, March 2020, <https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/rapporten/2020/03/06/bijlagen-veiling-mobiele-communicatie/DotEcon+-+Final+recommendations+including+assessment+of+responses.pdf>.

⁵⁹ Government Gazette of the Kingdom of the Netherlands, *Granting of multiband auction licenses by the Telecom Agency*, July 2020, <https://zoek.officielebekendmakingen.nl/stcrt-2020-41318.html#d17e52>.

⁶⁰ The total auction cap reflects participants' existing spectrum holdings and lot sizes of auctioned spectrum.

⁶¹ The coverage and speed requirement will only apply to parties that hold licences in the 800 and 900 MHz frequency bands and will be limited in time until 2030. The [Dutch] State Secretary for Economic Affairs and Climate Policy, *The application and auction procedure*, March 2020, <https://www.government.nl/binaries/government/documents/publications/2020/03/06/non-binding-translation-auction-regulation-and-explanatory-notes-2020/Non-binding+translation+auction+regulation+and+explanatory+notes+2020.pdf>.

Proxies for the value of high frequency bands

A7.65 We have derived proxies for the value of high frequency bands in the Netherlands using evidence about the relative prices from other countries. The range of proxy values for the available band combinations is summarised in Table A7.15.⁶²

Table A7.15: Proxies for the value of high frequency bands in the Netherlands

High frequency band	Band combination used to derive proxy	Relative value ratio based on international benchmarks	UK-equivalent absolute value of proxy (£m per MHz)
2.3 GHz	700 MHz-2.3 GHz	0.25	6.9
	2100 MHz-2.3 GHz	0.27	4.0
	Mid-point	-	5.5
2.6 GHz	700 MHz-2.6 GHz	0.22	6.1
	2100 MHz-2.6 GHz	0.16	2.2
	Mid-point	-	4.2
3.4-3.8 GHz	700 MHz-3.4/3.8 GHz	0.31	8.6
	2100 MHz-3.4/3.8 GHz	0.39	5.6
	Mid-point	-	7.1

Source: Ofcom analysis

Whether award outcomes are likely to reflect market value in the Netherlands

A7.66 Both the 700 MHz and 2100 MHz spectrum sold slightly above reserve price, and the spectrum caps were not binding.

A7.67 Consistent with our approach in previous ALF Statements, we have considered the implications of the coverage obligations on the 700 MHz spectrum qualitatively. In principle, if such obligations were likely to require deployments significantly in excess of commercial levels then we considered that the auction price could risk understating the value of that band (without coverage obligation) in the UK in our assessment. We do not consider that the obligations in this auction were likely to require deployments significantly in excess of commercial levels.

A7.68 We note that in both the 700 MHz and 2100 MHz spectrum bands the auction outcome was an equal split of the spectrum between the three MNOs. Given the price was just

⁶² For the 2.6 GHz band, the range of proxy values derived using international benchmarks is significantly higher than the auction price achieved in the April 2010 2.6 GHz auction in the Netherlands with a UK-equivalent absolute value of £0.3m per MHz.

above reserve this could be consistent with bidders tacitly colluding to obtain lower prices (market division) with the equal split of the spectrum in both bands being a focal point for this strategic demand reduction. While we cannot rule out the possibility of strategic demand reduction, we do not have clear evidence that it took place. Based on the information available to us, we consider that the auction is likely to have been competitive. We have not identified any specific risks associated with the 700 MHz and 2100 MHz awards, and this would suggest that they reflect market values in the Netherlands.

A7.69 As noted earlier, we do not consider that the 2.6 GHz auction prices reflected market value in the Netherlands. To derive a distance method benchmark, we use a proxy for the high frequency band. In the 2015 Statement, we discuss how using a proxy value carries a risk of under/overstatement to the distance method benchmark.^{63,64}

Likelihood of reflecting relative market values in the UK

A7.70 We are not aware of any country-specific factors that would cause the Dutch 2020 auction results to not be reflective of the relative values of the spectrum bands in the UK.

Assessment of the benchmarks

Risk of understatement or overstatement

A7.71 Based on the above, we provisionally consider that the relative value benchmark using 700 MHz, 2100 MHz and a high frequency proxy carry a risk of under/overstatement to the distance method benchmark. However, we are unable to determine the scale of this overstatement, the likelihood or size of which we are unable to quantify.

Tiering

A7.72 Considering the criteria for inclusion in Tier 1:

- a) The auction prices of 700 MHz and 2100 MHz were above reserve. This would suggest that the auction prices were primarily determined by a market-driven process of bidding.
- b) Based on the evidence available to us, we consider that 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 auction outcomes appear likely to be informative of forward-looking relative spectrum values in the UK, having considered country-specific circumstance and the timing of these awards.

⁶³ Ofcom, *Annual licence fees for 900 MHz and 1800 MHz spectrum Statement – Annex 8*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, paragraph A8.910 in relation to the Swedish distance method benchmark.

⁶⁴ There is a risk that the average ratio of 2.6 GHz to the low frequency spectrum, 700 MHz in this case may not reflect closely the relative value of these bands in the Netherlands.

A7.73 Considering the factors above, our provisional view is that the Tier 1 criteria are satisfied for the relative value benchmarks from the Netherlands which use a proxy for the high frequency band.

Summary

Table A7.16: Summary of evidence points from the Netherlands

Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.3 GHz proxy	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	27.7	14.4	4-6.9	0.36-0.44	8.5-9.2
Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.6 GHz proxy	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	27.7	14.4	2.2-6.1	0.38-0.48	9.2-10
Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	3.4-3.8 GHz proxy	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	27.7	14.4	5.6-8.6	0.31-0.40	9.8-10.4 (UK 3.4 GHz) 7.2-8.2 (UK 3.6 GHz)
Risk assessment; Tier	No specific risk identified	No specific risk identified	Risk of under- or overstatement	Risk of under- or overstatement Tier 1	

Source: Ofcom analysis

Slovenia

- A7.74 We can derive two distance method benchmarks for Slovenia, namely 700-2100-2300 and 700-2100-3400/3600.
- A7.75 These are based on the results of the April 2021 multiband auction.
- A7.76 We note that a single lot of 2x5 MHz 2100 MHz spectrum was auctioned with a five year licence duration in September 2016 alongside a 2x10 MHz lot of 1800 MHz spectrum.⁶⁵ In light of the short licence duration and the limited amount of spectrum available we do not consider this auction to be informative of the market value of 2100 MHz spectrum in Slovenia. As a result, we use the results from the April 2021 multiband auction in deriving distance method benchmarks for Slovenia.

April 2021 700 MHz, 1500 MHz, 2100 MHz, 2.3 GHz, 3.6 GHz and 26 GHz award

- A7.77 In April 2021, 700 MHz, 1500 MHz, 2100 MHz, 2.3 GHz, 3.6 GHz and 26 GHz spectrum bands were awarded in Slovenia. The auction was an enhanced SMRA (or eSMRA) format.^{66,67}
- A7.78 The award information is set out in Table A7.17 below and the auction features summarised in Table A7.18 below.

Table A7.17: April 2021 700 MHz, 1500 MHz, 2100 MHz, 2.3 GHz, 3.6 GHz and 26 GHz award results⁶⁸

	700 MHz (FDD) (MHz)	700 MHz (SDL) (MHz)	1500 MHz (SDL) (MHz)	2100 MHz (FDD) (MHz)	2.3 GHz (TDD) (MHz)	3.6 GHz (TDD) (MHz)	26 GHz (TDD) (MHz)	Price Paid (EUR m)
Total available	2 x 30	15	90	2 x 60	70	380	1000	164.2
A1 Slovenija	2 x 10	-	45	2 x 15	-	100	400	42.4
T-2				2 x 10	40			18.2
Telekom Slovenije	2 x 10	15	25	2 x 20		140	400	52.1

⁶⁵ We considered this award in [2018 Statement](#), Annex 2, paragraphs A2.259-A2.268.

⁶⁶ AKOS [Slovenian NRA], *Public Tender with public auction for the award of radio frequencies for the provision of public communications services in the 700 MHz, 1500 MHz, 2100 MHz, 2300 MHz, 3600 MHz and 26 GHz radio frequency bands*, December 2020, https://www.akos-rs.si/fileadmin/user_upload/Tender_documentation_multiband.pdf

⁶⁷ DotEcon advised AKOS on the auction design and characterised the auction as a "Combinatorial Clock Auction (CCA) with a relative cap activity rule". DotEcon, *AKOS announces results of spectrum auction*, April 2014, <https://www.dotecon.com/news/akos-announces-results-of-spectrum-auction/>

⁶⁸ AKOS, *Auction results*, April 2021, <https://www.akos-rs.si/en/akos-for-media/press-releases/news/results-of-multiband-auction>.

Telemach	2 x 10		20	2 x 15	30	140	200	51.6
Unsold	-	-	-	-	-	-	-	
Total reserve price for band (EUR m)	17.4	0.02	0.16	30.0	3.2	17.1	1.3	
Total auction revenue (EUR m)	31.4	0.035	2.81	70.6	11.2	46.5	1.7	
% mark-up	80%	75%	1655%	135%	255%	172%	38%	

Source: AKOS

Table A7.18: April 2021 700 MHz, 1500 MHz, 2100 MHz, 2.3 GHz, 3.6 GHz and 26 GHz award features⁶⁹

	Description	Implications
Licence duration	15 years	
No of bidders; no. of lots; lot sizes	Four bidders 700 MHz (FDD): six lots of 2 x 5 MHz 700 MHz (SDL): one lot of 10 MHz (+5 MHz ⁷⁰) 1500 MHz (SDL): six lots of 10 MHz and 2 lots of 10 MHz (+5 MHz ⁷¹) 2100 MHz (FDD): 12 lots of 2 x 5 MHz ⁷² 2.3 GHz (TDD): seven lots of 10 MHz 3.6 GHz (TDD): 38 lots of 10 MHz 26 GHz (TDD): five lots of 200 MHz	
Spectrum caps/restrictions	700/800/900 MHz (FDD): 2 x 35 MHz 3.6 GHz (TDD): 160 MHz 26 GHz: 800 MHz Auction cap (excl. SDL): 425 MHz.	A1 and Telekom acquired spectrum up to the sub-1 GHz cap; none of the other caps were binding
Reserve prices	700 MHz (FDD): €2.9m (per 2 x 5 MHz) 700 MHz (SDL): €20,000 (per 10 MHz) 1500 MHz (SDL): €20,000 (per 10 MHz) 2100 MHz (FDD): €2.5m (per 2 x 5 MHz) 2.3 GHz (TDD): €450,000 (per 10 MHz) 3.6 GHz (TDD): €450,000 (per 10 MHz) 26 GHz (TDD): €250,000 (per 200 MHz)	All spectrum sold above reserve.
Obligations	General coverage obligations apply to all but the 700 MHz SDL, 1500 MHz SDL and 26 GHz bands. In addition, winners of 700 MHz FDD are subject	

⁶⁹ AKOS, *Public Tender with public auction for the award of radio frequencies for the provision of public communications services in the 700 MHz, 1500 MHz, 2100 MHz, 2300 MHz, 3600 MHz and 26 GHz radio frequency bands*, December 2020, https://www.akos-rs.si/fileadmin/user_upload/Tender_documentation_multiband.pdf.

⁷⁰ An additional 5 MHz is included in the licence with restrictions applied.

⁷¹ 5 MHz is added to the lots at the lower and upper end of the band to protect the licences in the adjacent bands.

⁷² One lot is available from April 2023, rather than from September 2021 like the other 11 lots.

	to additional coverage obligations (including a requirement to cover 99% of motorways, highways and population by end of 2025 with less stringent requirement on providers with no existing sub-1 GHz spectrum holdings).
--	---

Source: AKOS

Whether award outcomes are likely to reflect market value in Slovenia

- A7.79 The 700 MHz spectrum sold above reserve price although the spectrum cap was binding on two of the bidders. This could create a risk that the auction price understates market value in Slovenia. This may be mitigated in part by the presence of a third bidder (Telemach) for whom the cap was not binding and a fourth bidder (T-2) who did not secure any spectrum in the 700 MHz band.⁷³
- A7.80 Consistent with our approach in previous ALF Statements, we have considered the implications of the coverage obligations on the 700 MHz spectrum qualitatively.
- A7.81 We note that general coverage obligations apply to most frequencies included in the 2021 auction.⁷⁴ In addition, there were additional coverage obligations on 700 MHz, which operators are able to meet using any spectrum holdings, and operators with no sub-1 GHz spectrum ahead of the auction have a longer timeframe for achieving these. Overall, we do not consider that the coverage obligations are likely to be over and above commercial levels.
- A7.82 On balance, we consider that there is a risk that the 700 MHz price understates market value in Slovenia, but the scale of this understatement is unknown.
- A7.83 The 2100 MHz, 2.3 GHz and 3.6 GHz spectrum all sold above reserve price, and there were no binding spectrum caps. Based on the information available to us, we have not identified any risks associated with these awards.

Likelihood of reflecting relative market values in the UK

- A7.84 We are not aware of any country-specific factors that would cause the Slovenian 2021 auction results to not be reflective of the relative values of the spectrum bands in the UK.

Assessment of the benchmarks

Risk of understatement or overstatement

- A7.85 Based on the above, we provisionally consider that the relative value benchmark using 700 MHz, 2100 MHz and either of 2300 MHz or 3.6 GHz carry a risk of overstatement to the distance method benchmark. However, we are unable to determine the likelihood or scale of this overstatement.

⁷³ Based on the available information we do not know whether T-2 sought to acquire any spectrum in the 700 MHz band.

⁷⁴ Excluding the 700 MHz SDL, 1500 MHz SDL and 26 GHz bands.

Tiering

A7.86 Considering the criteria for inclusion in Tier 1:

- a) The auction prices of 700 MHz, 2100 MHz, 2.3 GHz and 3.6 GHz were above reserve. This would suggest that the auction prices were primarily determined by a market-driven process of bidding.
- b) Based on the evidence available to us, we consider that 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 auction outcomes appear likely to be informative of forward-looking relative spectrum values in the UK, having considered country-specific circumstance and the timing of these awards.

A7.87 Considering the factors above, our provisional view is that the Tier 1 criteria are satisfied for the relative value benchmarks from Slovenia.

Summary

Table A7.19: Summary of evidence points from Slovenia

Band combination	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.3 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	27	30	8.2	1.16	15.5
Risk assessment; Tier	Risk of understatement	No specific risk identified	No specific risk identified	Risk of overstatement Tier 1	
Band combination	700 MHz	2100 MHz	3.4-3.8 MHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Value	27	30	6.3	1.14	15 (UK 3.4 GHz) 15.5 (UK 3.6 GHz)
Risk assessment; Tier	Risk of understatement	No specific risk identified	No specific risk identified	Risk of overstatement Tier 1	

Source: Ofcom analysis

Auction evidence from other countries

- A7.88 In addition to the five countries outlined above, there are eight other European countries that have auctioned paired 2100 MHz spectrum since 2010.
- A7.89 In the following section, we briefly summarise the results from the countries for which we can derive Tier 2 and Tier 3 distance method benchmarks.
- A7.90 In addition, we note:
- a) **Denmark** auctioned 2100 MHz spectrum in April 2021 as part of CMRA auction.⁷⁵ Given the format of the auction we are not able to derive band specific prices.
 - b) **Portugal** is currently auctioning a 2x5 MHz block of 2100 MHz spectrum as part of a multiband auction.⁷⁶
 - c) **Switzerland** auctioned 2100 MHz spectrum in February 2012 as part of a CCA auction. As set out in our 2015 Statement we were unable to derive band specific prices.⁷⁷
 - d) **Turkey** auctioned 2100 MHz spectrum in August 2015 as part of a multiband auction. Consistent with our approach in previous ALF Statements we have not included Turkey in our benchmarking exercise. We briefly discuss the auction in our 2018 Statement.⁷⁸

Tier 2 benchmarks

- A7.91 We have not identified any Tier 2 distance method benchmarks.

⁷⁵ Danish Energy Agency, *Danish press release on Auction results*, April 2021, <https://ens.dk/presse/danskerne-faar-bedre-daekning-og-hurtigere-adgang-til-5g> and Dotecon, *Completion of the 1500 MHz, 2100 MHz, 2300 MHz, 3.5 GHz and 26 GHz spectrum auction in Denmark*, April 2021,

<https://www.dotecon.com/news/completion-of-the-1500-mhz-2100-mhz-2300-mhz-3-5-ghz-and-26-ghz-spectrum-auction-in-denmark/>

⁷⁶ Autoridade Nacional de Comunicações [Portuguese NRA] (ANACOM), *Daily 5G auction update*, July 2021, <https://www.anacom.pt/render.jsp?categoryId=416583>

⁷⁷ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/_data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraphs A8.294-A8.940.

⁷⁸ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, https://www.ofcom.org.uk/_data/assets/pdf_file/0021/130548/Annexes-1-6.pdf, Annex 2, paragraphs A2.269-A2.279.

Tier 3 benchmarks

Croatia

- A7.92 We are able to derive a distance method benchmark for Croatia using the November 2013 800 MHz auction⁷⁹, the January 2019 2100 MHz auction⁸⁰ and the 2.6 GHz proxy we used for Croatia for our 2018 ALF Statement.⁸¹
- A7.93 We consider this benchmark to be Tier 3 evidence given that the primary determinant of the 800 MHz auction result was the level of the reserve price and the 2100 MHz award was a first price sealed bid auction⁸² for spectrum with a licence duration of only five years.

Greece

- A7.94 We are able to derive four distance method benchmarks for Greece, namely:
- 700-2100-2600;
 - 700-2100-3400/3600;
 - 800-2100-2600; and
 - 800-2100-3400/3600.
- A7.95 The 800 MHz and 2.6 GHz spectrum bands were auctioned in October 2014 and were discussed in our 2015 Statement.⁸³ The 700 MHz, 2100 MHz and 3.6 GHz bands were auctioned in December 2020.⁸⁴
- A7.96 We consider these benchmarks to be Tier 3 evidence. The 800 MHz and 2.6 GHz bands both sold at or very close to reserve price in 2014 as did the 700 MHz and 2100 MHz in 2020. As a result, we consider that the benchmarks largely reflect the relative value of reserve prices set by the regulator rather than market value or bidders' relative intrinsic valuations of different bands, and as such do not satisfy the first criteria for either Tier 1 or Tier 2.

⁷⁹ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, https://www.ofcom.org.uk/data/assets/pdf_file/0021/130548/Annexes-1-6.pdf, Annex 2, paragraphs A2.11-A2.46.

⁸⁰ Hrvatska regulatorna agencija za mrežne djelatnosti [Croatian NRA] (HAKOM), *Press release on bids received*, January 2019, <https://www.hakom.hr/hr/otvorene-su-ponude-zaprimljene-u-postupku-javne-drazbe-radiofrekvencijskog-spektra-434/434>.

⁸¹ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, https://www.ofcom.org.uk/data/assets/pdf_file/0021/130548/Annexes-1-6.pdf, Annex 2, paragraphs Annex A2.37.

⁸² In a single-round sealed-bid first price auction, bidders are highly likely to consider how others might bid. When determining what to bid, bidders will typically trade off the amount paid in the event of winning (which they would want to minimise) with the chance of having a higher bid than those of their rivals. In having these considerations, bidders will decide what share of their valuation they will bid. Making bids below valuation is referred to as “bid shading”.

⁸³ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, September 2015, https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf, Annex 8, paragraphs A8.493-A8.536.

⁸⁴ CommsUpdate, *Greece: lightning 5G sale – article on auction results*, December 2020, <https://www.commsupdate.com/articles/2020/12/17/greece-lightning-5g-sale/>, and The Hellenic Telecommunications and Post Commission (EETT), *Press release on auction results [in Greek]*, December 2020, https://www.eett.gr/opencms/opencms/admin/News_new/news_1353.html.

Iceland

- A7.97 We are able to derive two distance method benchmarks for Iceland, namely 700-2100-2600 and 800-2100-2600 as all four of those bands were auctioned in the May 2017 multiband auction.⁸⁵
- A7.98 We consider these benchmarks to be Tier 3 evidence. The 700 MHz, 800 MHz and 2100 MHz bands all sold at reserve price. As a result, we consider that the benchmarks largely reflect the relative value of reserve prices set by the regulator rather than market value or bidders' relative intrinsic valuations of different bands, and as such do not satisfy the first criteria for either Tier 1 or Tier 2.

Norway

- A7.99 There have been two awards of 2100 MHz in Norway in recent years. The first in November 2012⁸⁶ and the second in June 2019⁸⁷ when 2100 MHz was auctioned alongside 700 MHz.
- A7.100 We are able to derive distance method benchmarks using the 700 MHz and the 2100 MHz from the June 2019 auction and a proxy value for the high frequency band.⁸⁸ We could also derive distance method benchmarks using the 2100 MHz from the November 2012 auction.
- A7.101 We note that on both occasions when 2100 MHz has been auctioned it has sold at the reserve price. As a result, we consider that the benchmarks largely reflect the relative value of the reserve prices set by the regulator for 2100 MHz relative to different bands rather than market value or bidders' relative intrinsic valuations of different bands, and as such do not satisfy the first criteria for either Tier 1 or Tier 2. We therefore consider these benchmarks to be Tier 3 evidence.

Summary of Tier 3 benchmarks

- A7.102 Table A7.20 below summarises the distance method benchmarks for the Tier 3 benchmarks discussed above.

Table A7.20: Summary of Tier 3 benchmarks

	UK-equivalent absolute value (£m/MHz)			Relative value benchmark	
	700 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz

⁸⁵ Electronic Communications Office of Iceland (ECOI), *Press release on auction results [in Icelandic]*, May 2017, <https://www.pfs.is/fjarskipti/tidnir-og-taekni/upplýsingar-vegna-tidniuppbods-22.-mai-2017> and CommsUpdate, *Iceland concludes auction for LTE spectrum in four bands – article on auction results*, June 2017, <https://www.commsupdate.com/articles/2017/06/02/iceland-concludes-auction-for-lte-spectrum-in-four-bands/>

⁸⁶ CommsUpdate, *NPT confirms conclusion of 2GHz auction after one round – article on auction results*, November 2012, <https://www.commsupdate.com/articles/2012/11/20/npt-confirms-conclusion-of-2ghz-auction-after-one-round/>

⁸⁷ CommsUpdate, *Nkom announces results of 700MHz, 2100MHz spectrum auction - article on auction results*, June 2019, <https://www.commsupdate.com/articles/2019/06/06/nkom-announces-results-of-700mhz-2100mhz-spectrum-auction/>

⁸⁸ 800 MHz was auctioned in Norway in December 2013 but due to the auction format we were unable to derive band-specific prices. [2015 Statement](#), Annex 8, p. 179-181.

Annual Licence Fees for 2100 MHz Spectrum

					(£m/MHz)
Greece	24.8	8.7	4.1	0.22	7.9
Iceland	5.5	5.2	3.7	0.81	12.6
	700 MHz	2100 MHz	3.4-3.8 MHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Greece	24.8	8.7	2.5	0.28	9.6 (UK 3.4 GHz) 7 (UK 3.6 GHz)
	700 MHz	2100 MHz	proxies	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Norway	19	11.3	3.1-4.8 (2.3 GHz) 1.8-4.2 (2.6 GHz) 4.3-5.9 (3.4-3.8 GHz)	0.46-0.51 (2.3 GHz) 0.48-0.55 (2.6 GHz) 0.41-0.47 (3.4-3.8 GHz)	8.3-10.8
	800 MHz	2100 MHz	2.6 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Greece	44.4	8.7	4.1	0.11	9.3
Iceland	5.5	5.2	3.7	0.81	31.2
	800 MHz	2100 MHz	2.6 GHz proxy	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Croatia	86.2	34.7	9.2	0.33	15.3
	800 MHz	2100 MHz	3.4-3.8 GHz	"X/Y" ratio	UK 2100 MHz (£m/MHz)
Greece	44.4	8.7	2.5	0.15	11.7 (UK 3.4 GHz) 8.6 (UK 3.6 GHz)

Source: Ofcom analysis

A8. Annualisation

Proposed approach

- A8.1 In this section we set out our proposed approach to annualising our estimates of the lump-sum value of the spectrum.
- A8.2 We propose to adopt the same approach to annualisation that we used in the 2018 900 MHz and 1800 MHz ALF Statement⁸⁹ and in the 2019 3.4GHz ALF Statement.⁹⁰
- A8.3 The annualisation rate that we are consulting on draws on market evidence underpinning our most recent cost of capital determinations in telecoms (WFTMR 2021 and MCT 2021). We will update for latest market evidence, as appropriate, for the Statement.
- A8.4 We briefly summarise our approach before setting out the annualisation rate this would imply. In Section 4 we set out the annual licence fees we are proposing for the paired and unpaired 2100 MHz spectrum based on this annualisation rate.

The annualisation rate

- A8.5 In previous ALF decisions, we converted 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 was flat in real terms (i.e. adjusted for inflation). We applied a post-tax discount rate and a tax adjustment factor (to reflect the more favourable tax treatment of annual fees compared to a lump-sum payment). To allow for inflation, we used the consumer prices index (CPI) to adjust the base year ALF level each year when the licence fee comes due for payment.
- A8.6 We propose to use the same approach here. This means the value of ALF in year t is derived from the lump sum value (LSV) in 2021, annualisation rate and inflation as follows:

$$ALF_t = LSV * TAF * \underbrace{\left[\frac{r}{1 - (1+r)^{-t}} \right] * \left[\frac{1}{(1+r)} \right]}_{\text{Annualisation rate}} * \left[\frac{CPI_t}{CPI_{t0}} \right]$$

- A8.7 Where:

- ALF_t is the value of ALF in year t ;
- LSV is the lump-sum value of spectrum;

⁸⁹ 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.

⁹⁰ 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

- TAF is an adjustment factor that reflects the tax advantages of ALF over lump-sum payments;
- r is the real post-tax discount rate;
- t^* is the length of period over which we spread the LSV for the purposes of calculating ALF, i.e. 20 years; and
- CPI_{t_0} is the level of the CPI (all items) index in April 2021 and CPI_t is the latest available figure for the same index published in the Consumer Price Inflation Reference Tables by the Office for National Statistics.

A8.8 We refer to the expression on the right hand side of the formula which is multiplied by the LSV to derive the base level of ALF (i.e. before updating for inflation) as the “annualisation rate”.

Discount rate for annualisation

A8.9 The annualisation rate used to convert the lump sum value to an ALF is a function of the post-tax real discount rate and the tax adjustment factor. In spreading the lump sum over a 20-year period, we use a discount rate at which the present value of the resulting payment stream equals the lump-sum value if it had been paid today.

A8.10 The discount rate depends on, among other things, the uncertainty associated with this future ALF payment stream. One significant uncertainty relates to changes in the market value of the spectrum over time. The discount rate which will leave MNOs indifferent between paying ALFs and paying a lump-sum amount depends on the extent to which they (rather than the government) are exposed to the effect of such changes in market value over time on the level of ALF and, therefore, it is an important consideration in determining an appropriate discount rate.

A8.11 As in previous ALF decisions, we consider that the appropriate discount rate would sit somewhere between a lower polar case of the cost of debt (as an approximation of the case where the licensee would bear the risk associated with the variation in the market value of the spectrum) and, as an upper polar case, the weighted average cost of capital (WACC, which is an approximation of the case where the government would bear the full risk of variation in market value of the spectrum). We use a risk-sharing adjustment to determine where between these two polar cases the appropriate discount rate would lie.

A8.12 Consistent with our approach in recent ALF decisions, we propose to adopt the following approach to calculating the discount rate.

Lower polar case

A8.13 We use an estimate of the pre-tax nominal cost of debt for UK MNOs as our starting point for the discount rate in the lower polar case. We then apply several adjustments to this rate and convert it into a post-tax real figure.

- A8.14 For the pre-tax nominal cost of debt, we use observed market debt rates on 10-year bonds.⁹¹ We use a BBB sterling denominated bond index of 10-year maturity.⁹²
- A8.15 In the WFTMR 2021 Statement, we reviewed the latest evidence on corporate debt costs (to inform our estimate of the cost of new debt), and noted that the 12-month average yield on a 10-year BBB bond index was 1.9%.⁹³ We consider this figure to be a reasonable estimate of the pre-tax nominal cost of debt for this consultation. We will review the most recent market evidence on corporate bond yields for the Statement.
- A8.16 Consistent with previous ALF decisions, we propose to reduce the pre-tax nominal cost of debt by 10 basis points (i.e. 0.1%) to remove the estimated inflation risk premium.⁹⁴ We also propose a further reduction of 50 bps to remove the estimated liquidity risk premium from the debt premium. This is to reflect the fact that the government may not need compensation for liquidity risk in the lower polar case.⁹⁵ We calculate the average debt premium of 1.50% for the BBB index.⁹⁶ We then apply a 30% reduction to the debt premium for liquidity, as in previous decisions, which translates into a 50bp downward adjustment to the cost of debt.⁹⁷
- A8.17 These reductions produce an adjusted pre-tax nominal rate of 1.3%.
- A8.18 We then derive a post-tax nominal discount rate by allowing for our estimate of the average corporate tax rate which will prevail over the 20-year period (24.9%).⁹⁸ This gives a post-tax nominal rate of 1.0%. The equivalent post-tax real rate is -1.0% (using our CPI inflation forecast of 2%).

Upper polar case

- A8.19 Consistent with previous ALF decisions, we propose to base our estimate of the upper polar case on the forward-looking WACC which reflects the riskiness of a UK MNO. This is consistent with how we define the upper polar case, which is that, hypothetically, if the

⁹¹ We use a 10-year maturity, consistent with previous decisions, reflecting the fact that the duration of a 20-year annuity is close to 10 years.

⁹² In the 2018 900 and 1800 MHz Statement, we also considered evidence on bonds issued by parent companies of UK MNOs with a remaining maturity of around 10 years. For the purposes of this consultation, we consider that a 10-year BBB benchmark index provides a reasonable proxy for the cost of 10-year debt of UK MNOs.

⁹³ Ofcom, *Promoting competition and investment in fibre networks: Wholesale Fixed Telecoms Market Review 2021-26*, Annex 20, paragraph A20.92. https://www.ofcom.org.uk/data/assets/pdf_file/0021/216084/wftmr-statement-annexes-1-26.pdf Based on Bloomberg's BVCSGU10 Index and a 31 October 2020 cut-off date. We also note that we used the WFTMR 2021 input parameters to estimate the MNO cost of capital in the MCT 2021 charge control. Ofcom, *Wholesale Voice Markets Review 2021-26*, Annex 2. https://www.ofcom.org.uk/data/assets/pdf_file/0026/216791/annexes-1-4-2021-26-wholesale-voice-markets-review.pdf

⁹⁴ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, Annex 5, paragraph A5.30. https://www.ofcom.org.uk/data/assets/pdf_file/0021/130548/Annexes-1-6.pdf.

⁹⁵ Liquidity risk refers to the difficulties that a creditor may encounter when trying to sell an asset on the secondary market. This can restrict the creditor's ability to manage risk exposure, and so creditors may require a premium for bearing liquidity risk. In this case, the creditor is the government, and there is no realistic prospect of the government wanting to resell the ALF payment stream.

⁹⁶ Based on a 12-month average to 31 October 2020, consistent with our assumption for the cost of debt.

⁹⁷ Ofcom, *Annual Licence Fees for 900 MHz and 1800 MHz frequency bands*, December 2018, Annex 5, paragraph A5.53. https://www.ofcom.org.uk/data/assets/pdf_file/0021/130548/Annexes-1-6.pdf

⁹⁸ The tax rate is 24.9%, based on our estimate of the average tax rate over the 20-year period from the TAF calculation.

ALF payments were set up in such a way that they varied in line with the future after-tax cash flows of the licensee (e.g. through some form of net revenue sharing arrangement between the licensees and the government) the government would be fully exposed to the underlying systematic risk.

A8.20 We use the following parameter inputs to calculate the proposed WACC for the upper polar case:

- A pre-tax nominal cost of debt consistent with the lower polar case, i.e. 1.9%.
- A nominal risk-free rate consistent with our cost of debt. We calculate the average debt premium of 1.5% for the BBB index. This implies a nominal RFR of 0.4%.⁹⁹
- A total expected market return (EMR) consistent with our most recent cost of capital decisions in telecoms (WFTMR 2021 and MCT 2021).¹⁰⁰ A real EMR of 6.7% combined with a CPI inflation forecast of 2.0% produces a nominal EMR of 8.8%.
- A forward-looking gearing of 45%, consistent with WFTMR 2021 and MCT 2021.
- A forward-looking asset beta of 0.62 and a debt beta of 0.10, consistent with WFTMR 2021 and MCT 2021. Combined with our gearing assumption, this implies an equity beta of 1.05.

⁹⁹ Rounded to one decimal point.

¹⁰⁰ Ofcom, *Promoting competition and investment in fibre networks: Wholesale Fixed Telecoms Market Review 2021-26*, Annex 20, Table A20.1. https://www.ofcom.org.uk/data/assets/pdf_file/0021/216084/wftmr-statement-annexes-1-26.pdf

Table A8.1: WACC for UK MNO, upper polar case

WACC component	Estimate	Source or derivation
Nominal RFR	0.4%	Ofcom estimate
Nominal EMR	8.8%	Ofcom estimate
Nominal ERP	8.4%	= Nominal EMR – Nominal RFR
Debt beta (β_d)	0.10	Ofcom estimate
Asset beta (β_a)	0.62	Ofcom estimate
Gearing (g)	45%	Ofcom estimate
Equity Beta (β_e)	1.05	= $(\beta_a - \beta_d * g) / (1 - g)$
Pre-tax nominal cost of equity (Ke)	12.3%	= $(RFR + ERP * \beta_e) / (1 - t)$
Pre-tax nominal cost of debt (Kd)	1.9%	Ofcom estimate
Corporate tax rate (t)	24.9%	Ofcom estimate
Pre-tax nominal WACC	7.6%	= $Ke * (1 - g) + Kd * g$
CPI inflation forecast	2.0%	Ofcom estimate
Post-tax nominal WACC	5.7%	= pre-tax nominal WACC * (1-t)
Post-tax real WACC	3.6%	= $(1 + \text{post-tax nominal WACC}) / (1 + \text{CPI inflation}) - 1$

Source: Ofcom. All real values are with respect to CPI.

A8.21 Taken together, the various parameters imply a real post-tax WACC of 3.6%.

Risk-sharing adjustment

A8.22 We propose to make an adjustment for the degree of risk sharing between licence holders and the government – which arises due to the possibility of future fee reviews that could increase or decrease the ALF payments (subject to the completion of any such review). The possibility of a review of ALFs exposes the government to a degree of systematic risk of the cash flows from the operation of the licences. Therefore, we consider that a risk-sharing adjustment remains appropriate.

A8.23 In line with our previous ALF decisions, we propose to allow for a 25% risk sharing adjustment between the lower polar case and upper polar case to estimate the final discount rate.

Discount rate for annualisation

A8.24 Combining our discount rates in the lower and upper polar cases together with the 25% risk-sharing adjustment produces an overall post-tax real discount rate of 0.2% (rounding to one decimal place).

Tax adjustment

A8.25 We calculate a tax adjustment from the difference in tax benefits from ALF payments compared to the tax deductions available from amortisation of a lump-sum payment, converted to present values using the post-tax discount rate. The tax adjustment factor (TAF) is calculated as:

$$TAF = 1 + \left[\frac{(PV \text{ of tax benefits of ALF} - PV \text{ of tax benefits of the amortisation of LSV})}{LSV} \right]$$

A8.26 We estimate a tax adjustment factor of 1.06, which equates to an average tax rate of 24.9% over the 20 year period.

Annualisation rate

A8.27 As summarised in Table A8.2 below, the resulting annualisation rate is 5.40%.

Table A8.2: Summary of input values into formula for calculating base level of ALF

	Proposed values
Length of period over which we spread the LSV for the purposes of calculating ALF (t*)	20 years
Real post-tax discount rate (r)	0.2%
Adjustment factor that reflects tax advantages over lump-sum payments (TAF)	1.06
Annualisation rate	5.40%

Source: Ofcom

A9. Notice of the proposed regulations

Notice of proposals

- A9.1 This notice is given in accordance with section 122(4) and (5) of the Wireless Telegraphy Act and covers a proposal to make a statutory instrument.
- A9.2 The proposed statutory instrument set out in Annex A10 sets out how we would give effect to Ofcom's proposal to introduce fees for the Spectrum Access 2100 MHz licence class, as set out in this consultation document, if our final decisions following the overall consultation process were in line with our current proposals.
- A9.3 The Spectrum Access 2100 MHz licence class authorises use of the following radio frequencies:
- a) 1899.9 MHz to 1920.0 MHz ("**unpaired 2100 MHz**"); and
 - b) 1920.0 MHz to 1979.7 MHz and 2110.3 MHz to 2169.7 MHz ("**paired 2100 MHz**").

Proposed regulations

- A9.4 Ofcom has the power under section 12 and 122(7) of the Wireless Telegraphy Act to make regulations to prescribe sums payable in respect of wireless telegraphy licences.
- A9.5 Ofcom proposes to make regulations to prescribe the sums payable in respect of the licences for the use of the unpaired 2100 MHz and paired 2100 MHz spectrum.
- A9.6 A draft of the proposed regulations is set out in Annex A10 and their general effect is set out in this Annex.
- A9.7 Hard copies of this notice and the proposed regulations can be obtained from:
- ALF2021 Team
Ofcom
Riverside House,
2A Southwark Bridge Road,
London SE1 9HA
Email : ALF2021@ofcom.org.uk
Telephone : 0207 981 3066
- A9.8 Comments or representations with respect to the proposed regulations are invited by 5pm on 8 September 2021. Comments should be sent to the contact named above at the above address.
- A9.9 Following completion of the overall consultation process, Ofcom intends to make the final regulations as soon as practicable.

General effect of the proposed Wireless Telegraphy (Licence Charges for the 2100 MHz frequency band) Regulations 2021

The legislative framework

- A9.10 Under section 12 of the Wireless Telegraphy Act, Ofcom may make regulations to prescribe sums payable in respect of wireless telegraphy licences. When doing so, section 122(7) of the Wireless Telegraphy Act enables Ofcom to make different provisions for different cases and to make incidental provisions.
- A9.11 In 2000, following an auction process, Ofcom awarded national licences for use of the paired and unpaired 2100 MHz spectrum. In accordance with section 12(5) of the Wireless Telegraphy Act, no annual licence fees were initially payable in respect of that licence class. However, on 20 December 2010, the Secretary of State made directions pursuant to section 5 of the Wireless Telegraphy Act, which (among other things) require Ofcom to prescribe the sums by regulations which are required under section 12 of the Wireless Telegraphy Act for the paired and unpaired 2100 MHz frequency band, after 31 December 2021, so that they reflect the full market value of the frequencies in that band.
- A9.12 Therefore, Ofcom is now giving notice of its proposed Wireless Telegraphy (Licence Charges for the 2100 MHz frequency band) Regulations 2021 (the “**Proposed Regulations**”), which would give effect to Ofcom’s proposal to introduce annual licence fees in respect of the Spectrum Access 2100 MHz licence class.

The general effect of the Proposed Regulations

- A9.13 The Proposed Regulations will set out the annual licence fees for the unpaired 2100 MHz and paired 2100 MHz frequency bands.

Extent of application and entry into force of the Proposed Regulations (reg.1)

- A9.14 The Proposed Regulations will apply in the United Kingdom.
- A9.15 The Proposed Regulations will come into force as soon as practical after making. The final regulations will be made after Ofcom has concluded its consultation process on the fees and made final decisions as to the level of fees payable.

Interpretation (reg.2)

- A9.16 Regulation 2 defines the meaning of a number of terms which are relevant to understand the other provisions in the Proposed Regulations.
- A9.17 In particular, the definitions of “2100 MHz unpaired frequency band” and “2100 MHz paired frequency band” are relevant to define the scope of the Proposed Regulations.

The fee payable for the unpaired 2100 MHz spectrum on each payment date (reg.3)

- A9.18 Regulation 3 prescribes the fees payable by the holder of a “Spectrum Access 2100 MHz” licence on 1 January 2022 (and on each anniversary of that date) for one hundred kHz in the paired 2100 MHz spectrum band.
- A9.19 As explained in this consultation, we propose that these fees will be derived by means of the formula set out in regulation 3(2), which adjusts the “base level” of annual licence fee by inflation. The “base level” of ALF reflects Ofcom’s estimate of the market value of unpaired 2100 MHz spectrum at the “base date” of April 2021.
- A9.20 According to the formula specified in regulation 3, the fee payable on 1 January 2022 and on each anniversary of that date will incorporate an annual licence fee in line with inflation, as measured by the CPI index. The relevant figures for CPI will be published by the Office for National Statistics.
- A9.21 In particular, we propose that the base level of the ALF would be multiplied by the ratio between:
- a) the latest available figure (as at 1 December of the year preceding that in which the fees are due)¹⁰¹ for the CPI index; and
 - b) the corresponding inflation index related to April 2021 (which, as at the date of this notice, is 110.1).
- A9.22 This mechanism for the inflation adjustment should give sufficient time to allow Ofcom to notify licensees of the sum due approximately one month before the payment date.
- A9.23 The Proposed Regulations will specify the base level of ALF for unpaired 2100 MHz spectrum as decided by Ofcom in its final statement in light of stakeholders’ responses. For the purpose of the Proposed Regulations, this is equal to Ofcom’s proposal of setting such base level at £29,000 per 100 KHz. This translates to setting the base level at £290,000 per MHz.

The fee payable for the paired 2100 MHz spectrum on each payment date (reg.4)

- A9.24 Regulation 3 prescribes the fees payable by the holder of a “Spectrum Access 2100 MHz” licence on 1 January 2022 (and on each anniversary of that date) for one hundred kHz in the paired 2100 MHz spectrum band.
- A9.25 The fees will be calculated according to the same formula used for the unpaired 2100 MHz spectrum, where the “base level” of ALF reflects Ofcom’s estimate of the market value for paired 2100 MHz spectrum at April 2021. The indexation mechanism to ensure that ALFs

¹⁰¹ Inflation data related to each month is usually published between the 15th and the 20th of the following month. Therefore, the latest available CPI as at 1 December should normally relate to October of the prior year (i.e., two months before the fees are actually due).

will remain constant in real terms is the same as the one proposed for unpaired 2100 MHz spectrum band.

- A9.26 The Proposed Regulations will specify the base level of ALF for paired 2100 MHz spectrum as decided by Ofcom in its final statement in light of stakeholders' responses. For the purpose of the Proposed Regulations, this is equal to Ofcom's proposal of setting such base level at £56,700 per one hundred KHz. This translates to setting the base level at £567,000 per MHz.

Payment by instalments (reg.5)

- A9.27 Regulation 5 will offer the option of paying annual licence fees for the paired and unpaired 2100 MHz spectrum across ten equal monthly instalments (the first being due on 1 January).

Concurrent licences (reg.6)

- A9.28 Where a licence is held concurrently by two or more persons, then any references in the Proposed Regulations to the "holders of a licence" shall be to all the concurrent holders of the licence. This means that:
- a. any sum payable under the Regulations by the holder of a licence shall, in the case of a concurrent licence, be a sum for which both licence holders are jointly and severally liable; and
 - b. any notice required to be given under the Proposed Regulations by the holder of a licence may, in the case of a concurrent licence, be given by any of the licence holders and shall be deemed to have been given for and on behalf of them all.

A10. Draft of the proposed regulations

DRAFT OF THE PROPOSED REGULATIONS DRAFT
STATUTORY INSTRUMENT

2021 No.

ELECTRONIC COMMUNICATIONS

The Wireless Telegraphy (Licence Charges for the 2100 MHz frequency band) Regulations 2021

Made - - - - [date to be specified in the final regulations]

Coming into force - [date to be specified in the final regulations]

The Office of Communications (“OFCOM”) makes the following Regulations, in exercise of the powers conferred by sections 12, 13(2) and 122(7) of the Wireless Telegraphy Act 2006 (the “Act”) and as required by article 6(3) of the Wireless Telegraphy Act 2006 (Directions to Ofcom) Order 2010.

Before making these Regulations, OFCOM has given notice of its proposal to do so in accordance with section 122(4)(a) of the Act, published notice of its proposal in accordance with section 122(4)(b) of the Act, and have considered the representations made to them before the time specified in the notice in accordance with section 122(4)(c) of the Act.

Citation and commencement

1. These Regulations may be cited as the Wireless Telegraphy (Licence Charges for the 2100 MHz frequency band) Regulations 2021 and shall come into force on *[date to be specified in the final regulations]*.

Interpretation

2. In these Regulations —

“concurrent licence” means a licence held by two or more persons;

“KHz” means kilohertz;

“OFCOM” means the Office of Communications;

“2100 MHz paired frequency band” means the frequencies from 1920.0 MHz to 1979.7 MHz and 2110.3 MHz to 2169.7 MHz; and

“2100 MHz unpaired frequency band” means the frequencies from 1899.9 MHz to 1920 MHz.

Licence charges payable for the 2100 MHz unpaired frequency band

3.—(1) This regulation applies to each holder on 1 January 2022 (and on each anniversary of that date) of a wireless telegraphy licence of the Spectrum Access 2100 MHz licence class.

(2) Each holder of a wireless telegraphy licence to whom this regulation applies shall pay to OFCOM on 1 January 2022, and on each anniversary of that date, a total sum which comprises the amount in pounds sterling calculated in accordance with paragraph (3) for each authorisation under its licence of use of one hundred KHz of radio frequencies in the 2100 MHz unpaired frequency band.

(3) Subject to paragraph (4), the total sum mentioned in paragraph (2) should be calculated in accordance with the following formula¹⁰²—

$$S = [\text{£}29,000 - \text{see explanation in Notice}] \times [\text{CPIt}/\text{CPIo}]$$

Where —

(a) “S” means the total sum;

(b) “CPIo” means the CPI value for April 2021 [see explanation in Notice];

(c) “CPIt” means the most recent CPI value that is available on 1 December of the year preceding that in which the charges are due [see explanation in Notice]; and

(d) “CPI value” means the number given in respect of that month in the monthly all items consumer prices index published by the Office for National Statistics.

(4) If the total sum calculated in accordance with paragraph (3) is a fraction of a whole number, it shall be rounded down to the nearest whole number.

Licence charges payable for the 2100 MHz paired frequency band

4.—(1) This regulation applies to each holder on 1 January 2022 (and on each anniversary of that date) of a wireless telegraphy licence of the Spectrum Access 2100 MHz licence class.

(2) Each holder of a wireless telegraphy licence to whom this regulation applies shall pay to OFCOM on 1 January 2022, and on each anniversary of that date, a total sum which comprises the amount in pounds sterling calculated in accordance with paragraph (3) for each authorisation under its licence of use of one hundred KHz of radio frequencies in the 2100 MHz paired frequency band.

(3) Subject to paragraph (4), the total sum mentioned in paragraph (2) should be calculated in accordance with the following formula—

$$S = [\text{£}56,700 - \text{see explanation in Notice}] \times [\text{CPIt}/\text{CPIo}]$$

Where —

(a) “S” means the total sum;

(b) “CPIo” means the CPI value for April 2021 [see explanation in Notice];

(c) “CPIt” means the most recent CPI value that is available on 1 December of the year preceding that in which the charges are due [see explanation in Notice]; and

(d) “CPI value” means the number given in respect of that month in the monthly all items consumer prices index published by the Office for National Statistics.

(4) If the total sum calculated in accordance with paragraph (3) is a fraction of a whole number, it shall be rounded down to the nearest whole number.

¹⁰² Ofcom may decide, when finalising these regulations, to ‘hardcode’ the amount payable by the 2100 MHz licensees on 1 January 2022 (but not subsequent years) into the final regulations. This would mean that the actual amount of the annual licence fees would be set explicitly in writing and without the need to refer to the formulae at Regulations 3(2) and 4(2) respectively.

Payment by instalments

5.—(1) If OFCOM receive notice from the holder of a licence to which regulation 3 or regulation 4 applies of its intention to make payments in ten equal instalments of the total sum prescribed in any of those regulations, that holder of a licence—

(a) shall not be required to make payment of that total sum at the prescribed time other than in accordance with this paragraph; and instead

(b) shall make payment of the total sum in ten equal instalments with the first instalment to be paid to OFCOM on the day which shall be the same day as the total sum was due to be paid to OFCOM and each subsequent instalment to be paid on the same day in each of the nine consecutive months thereafter.

(2) Where at any time the holder of a licence fails to make payment in accordance with paragraph (1)(b), all of the outstanding instalment payments, if any, shall become immediately due for payment.

Concurrent licences

6.—(1) In the case of a concurrent licence, the “holder of a licence” in these Regulations shall refer to all the concurrent holders of the licence.

For and by the authority of the Office of Communications