analysys mason

aetha

Final report for EE

The impact of the 2015 German auction result on 1800MHz and 900MHz annual licence fees

7 August 2015

Ref: 2004755-326

www.analysysmason.com

Contents

Analysys Mason Limited
St Giles Court
24 Castle Street
Cambridge CB3 0AJ
UK
Tel: +44 (0)1223 460600
Fax: +44 (0)1223 460866
cambridge@analysysmason.com
www.analysysmason.com
Registered in England No. 5177472

Aetha Consulting Limited
Terrington House
13–15 Hills Road
Cambridge CB2 1NL
UK
Phone: +44 (0)1223 755 575
Fax: +44 (0)20 7183 3716
enquiries@aethaconsulting.com
www.aethaconsulting.com
Registered in England No. 7716768

1 Executive summary

Analysys Mason Ltd (Analysys Mason) and Aetha Consulting Ltd (Aetha) have been commissioned by EE Ltd (EE) to provide this joint report for use by EE in its response to Ofcom's Update regarding the potential inclusion of the 2015 German auction result in the determination of annual licence fees (ALFs) for 900MHz and 1800MHz spectrum.

In its Update, Ofcom suggests categorising the 2015 German benchmarks for both 900MHz and 1800MHz spectrum in its First Tier of evidence for determining the lump-sum values (LSVs).

However, there is strong evidence that the 2015 German auction prices did not reflect bidders' intrinsic valuation of the spectrum:

- It is clear that various strategic bids were placed during the auction – most notably, Vodafone's and Telefónica's bids in Rounds 172 and 173 appear to have led to a rapid conclusion of the auction. These bids were very similar in nature to bids placed in the 2010 German auction that have been identified by Ofcom as strategic; and were a major factor in Ofcom categorising benchmarks from the 2010 German auction in Tier 2.
- The spectrum cap of 2×15MHz is likely to have restricted competition in the 900MHz band and depressed final prices in this band, a view acknowledged by Ofcom in its Update.
- The final 900MHz prices were lower than the 1800MHz prices, a phenomenon that is unique amongst European benchmarks, and an indication that bidding in one or both of the bands departed considerably from bidding based on intrinsic value.

Furthermore the 2015 German benchmarks, namely the 1800MHz distance method and the 900MHz relative benchmark, continue to rely heavily on data points from the 2010 German auction. In this context we note that:

- Ofcom concludes that the results of the 2010 German auction vary from intrinsic valuation; and
- the relative value of 800MHz and 2.6GHz spectrum is likely to have changed since 2010.

Therefore, we believe that both the 900MHz and 1800MHz 2015 German benchmarks should be categorised as Tier 2 evidence, alongside the 2010 German auction benchmarks (which we agree should continue to be included in Ofcom's analysis as Tier 2 evidence for overall robustness).

Finally, we believe that the inclusion of the 2015 German auction benchmarks as Tier 2 evidence should have no impact on the proposed Ofcom LSVs, namely **GBP13 million per MHz** for 1800MHz spectrum and **GBP23 million per MHz** for 900MHz spectrum:

- In the case of the 1800MHz LSV, the inclusion of the 2015 German benchmark as Tier 2 evidence of course does not change the Tier 1 benchmarks (which are viewed as the most informative benchmarks). Although the average of the Tier 2 benchmarks does increase, its value remains below Ofcom's proposal of **GBP13 million per MHz**. Therefore, this proposal remains appropriate. Furthermore, a cross-check calculating the average LSV based on a weighting of each individual benchmark is unchanged by the inclusion of the 2015 German benchmark.

- In the case of the 900MHz LSV, the inclusion of the 2015 German benchmark as Tier 2 evidence again does not change the Tier 1 benchmarks. Further it only slightly decreases the average of the Tier 2 benchmarks and the results of the cross-check calculating the average LSV based on a weighting of each individual benchmark. Therefore, we consider that Ofcom's proposal of **GBP23 million per MHz** remains appropriate.

2 Introduction

Since Ofcom's February 2015 provisional decision and further consultation on mobile annual licence fees (ALFs) for 900MHz and 1800MHz spectrum,[1] a multiband spectrum auction concluded in Germany in June 2015.

While the 700MHz and 1500MHz (L-Band) bands were newly available for mobile use in Germany, the 900MHz and 1800MHz bands were already licensed to existing mobile network operators (MNOs), with current licences expiring on 31 December 2016. The only qualified bidders in the auction were the three incumbent MNOs, Telefónica Deutschland (Telefónica), Telekom Deutschland (Telekom) and Vodafone, with the result of the auction as follows:

Figure 2.1: Results of the June 2015 German multiband auction in MHz [Source: Analysys Mason and Aetha, 2015]

	Telefónica Deutschland	Telekom Deutschland	Vodafone	Total price (EUR millions)
700MHz	2×10MHz	2×10MHz	2×10MHz	1 000
900MHz	2×10MHz	2×15MHz	2×10MHz	1 345
1800MHz	2×10MHz	2×15MHz	2×25MHz	2 405
1500MHz	–	20MHz	20MHz	329

Subsequently, on 9 July 2015 Ofcom published an update on the ALFs for 900MHz and 1800MHz spectrum[2] (Update), inviting comments regarding its proposed approach to taking account of the 2015 German auction in its international benchmarking to determine lump-sum values (LSVs) for 900MHz and 1800MHz spectrum in the UK.

Analysys Mason Ltd (Analysys Mason) and Aetha Consulting Ltd (Aetha) have been commissioned by EE Ltd (EE) to provide this joint report for use by EE as part of its response to Ofcom. In this report, we consider if and how the German auction result provides relevant evidence for the purposes of determining LSVs for 900MHz and 1800MHz spectrum in the UK.

Analysys Mason and Aetha have provided three previous reports, submitted by both Hutchison 3G UK Ltd (Three) and EE as part of their respective responses to Ofcom's previous consultations on this topic. In these reports we critiqued Ofcom's overall approach to setting LSVs. While we continue to hold reservations about many aspects of Ofcom's approach, for simplicity we have adopted Ofcom's benchmarking approach and assumptions in this report as the basis of our review.

1 See http://stakeholders.ofcom.org.uk/consultations/annual-licence-fees-further-consultation/

2 See http://stakeholders.ofcom.org.uk/binaries/consultations/annual-licence-fees-further-consultation/2015-07_ALF_Update_Germany.pdf

This consideration notwithstanding, Ofcom's use of the 2015 German benchmark does raise two important issues relating to its overall approach, which we believe should at least be considered further, namely:

- Ofcom suggests that the inclusion of just one additional benchmark (i.e. the 2015 German auction) could result in a "material downward adjustment"[3] to its February 2015 estimate of the LSV of 900MHz spectrum. This is despite Ofcom's acknowledgement that the benchmark is "at risk of understatement of the value of 900MHz spectrum in the UK".[4] This demonstrates the volatility intrinsic to Ofcom's overall benchmarking approach, based as it is on a very small number of subjectively selected, tiered and weighted benchmarks. Consequently, Ofcom needs to be extremely confident that its tiering criteria have produced the correct outcome.

- Further upcoming European auctions are expected. For example the 800MHz and 2.6GHz auction ongoing in Poland, the 1800MHz and 900MHz auctions expected in Norway in November 2015 and mid-2016 respectively, and the 1800MHz auction in Denmark expected in 2016. It is a matter of pure happenstance that the 2015 German auction and not any of these auctions have concluded prior to issuance of Ofcom's final decision. In February 2015, Ofcom stated that it had come to a provisional decision regarding the LSVs (with the exception of consulting on the specific issue of the impact of the geographical coverage obligation on the full market value of the spectrum). Ofcom's decision to consult on what appeared a closed issue has accordingly come as somewhat of a surprise. Whilst the current lack of transparency, objectivity and consistency in Ofcom's categorisation of the benchmarks into tiers, makes it difficult to know for sure, arguments can probably be made both ways as to whether these, as well as potentially other future auctions, can or should be taken into consideration by Ofcom in setting ALFs. What is clear is that any material degree of volatility that can be caused by a single international auction result makes it very difficult for operators to forecast their expenditure on ALFs and creates regulatory uncertainty for 900MHz and 1800MHz licensees. For the reasons set out in this report, we therefore recommend that the methodology adopted by Ofcom in setting ALFs, including the weightings given by Ofcom to 2015 German benchmark, is designed so as to avoid producing any such arbitrary and volatile result.

The remainder of this document is laid out as follows:

- **Section** 3 discusses the suitability of including the 2015 German auction results within Ofcom's analysis, and how the results should best be incorporated.
- **Section** 4 discusses the implications of including the 2015 German spectrum auction for the calculation of the 1800MHz and 900MHz lump-sum values.
- **Section** 5 summarises our conclusions.

[3] Paragraph 69; Update on Annual licence fees for 900 MHz and 1800 MHz spectrum: German 2015 auction, 9 July 2015.

[4] Paragraph 53; Update on Annual licence fees for 900 MHz and 1800 MHz spectrum: German 2015 auction, 9 July 2015.

3 The suitability of the inclusion of the 2015 German auction

Ofcom has used the results of the 2015 German auction in conjunction with those for 800MHz and 2.6GHz spectrum from the 2010 auction in order to derive relative value benchmarks for Germany. In this section we consider the German 2015 auction result, analysing its general applicability as a benchmark to help establish LSVs for 1800MHz and 900MHz spectrum. Below we set out how these benchmark estimates could be applied to generate estimates of UK-equivalent LSVs, and raise some concerns with regard to their use. In particular, we:

- comment on the appropriate tiering categorisation of the 2015 German benchmark
- comment on the need for continued inclusion of the 2010 German benchmark.

3.1 The most appropriate tiering classification of the 2015 German benchmark

In its update, Ofcom proposes to derive new benchmarks for both 1800MHz and 900MHz spectrum, which we refer to in this report as the '2015 German benchmark'. For the 1800MHz LSV calculation, the 2015 German benchmark relies on one data point from the 2015 German auction (the 1800MHz price), and two data points from the 2010 German auction (the 800MHz and 2.6GHz prices). For the 900MHz LSV calculation one data point from the 2015 German auction (the 900MHz price) and one data point from the 2010 German auction (the 800MHz price) are relied upon.

Ofcom has classified both the 900MHz and 1800MHz results from the 2015 German auction as meeting its three criteria for placement in the First Tier of evidence (i.e. considered to be amongst the most useful evidence points for inference of full market value in the UK):[5]

1. the auction prices (900MHz, 1800MHz, 800MHz, and 2.6GHz) appear likely to have been primarily determined by a market-driven process of bidding in the auctions, in the sense that they were not set by reserve prices
2. based on the evidence available, the relative prices between these bands reflect bidders' intrinsic valuations of spectrum, rather than reflecting strategic bidding
3. 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.

We believe that there is evidence that the auction prices on which the 2015 German benchmark is based fail to meet criteria two and three. Therefore, we believe that a consistent application of Ofcom's current international benchmarking approach should result in the 2015 German benchmark being classified by Ofcom as, at most, Tier 2 evidence in the calculation of ALFs for 900MHz and 1800MHz spectrum.

[5] Paragraph 3.48; *Annual licence fees for 900 MHz and 1800 MHz spectrum: Provisional decision and further consultation*, 19 February 2015.

Failure of the 2015 German benchmark to meet Ofcom's Criteria Two

► *2015 German auction prices are likely to be based on strategic bidding rather than bidders' intrinsic valuations of spectrum*

In its various consultations, Ofcom concludes that the 2010 German auction benchmark should be classified as a Tier 2 benchmark. The primary rationale provided by Ofcom was that "strategic bidding for the available 1800MHz lots suggests a risk that the prices did not necessarily reflect the market value of the band".[6] In coming to this provisional decision, Ofcom provided evidence in the form of commentary on certain bids placed by E-Plus and Telefónica that it claimed were strategic bids in the form of signalling. For example, Ofcom stated that Telefónica's bids on the 1800MHz Block E "could be interpreted as an attempt at 'punishing' E-Plus for bidding aggressively in the 800MHz band, and that E-Plus responded by bidding aggressively for the 1800MHz Block D adjacent to Telefónica's holdings".

There is clear evidence that similar strategic bidding and signalling took place in the 2015 German auction. Below we provide examples of three instances (Round 134, Round 138 and Rounds 172/173) when bids patently departed from valuation-based bidding.

Round 134

Throughout the auction Telekom consistently bid for either three or four of the ten available lots in the 1800MHz band. However, in Round 134 it bid on eight lots in the band, increasing the standing high bids substantially – by EUR19–30 million per lot. This increased the average lot price by almost 10% in comparison to an average round increase of approximately 1%. Furthermore, it placed bids on all of Vodafone's 1800MHz standing high bids, despite the fact that these were not the cheapest lots. It also increased the price of its own standing high bids.

In a Simultaneous Multi Round Auction (SMRA) with generic lots, the dominant value-based bidding strategy is, when outbid on a lot, to then bid the minimum amount on the cheapest lot held by a competitor. There is no rationale, other than signalling, to bid on more expensive lots, to bid substantially more than the minimum bid, or to increase one's own standing high bid. Therefore, one can surmise that Telekom's bids in this round were to signal to Vodafone to reduce its demand in the 1800MHz band (and potentially the 900MHz band).

It was noticeable that following this round Vodafone reduced its demand in the 1800MHz band to four lots for several rounds; although bidding continued in the 900MHz band.

6 Paragraphs A8.113-118; *Annex 8 to Annual licence fees for 900 MHz and 1800 MHz spectrum: Further consultation*, 1 August 2014.

Round 138 Telefónica placed bids on six 1800MHz lots in this round, despite the fact that it had never been the standing high bidder on more than five lots up to this point. Furthermore, it placed bids only on Telekom's lots despite the fact that these were three of the four most expensive lots in the band.

Telefónica also became standing high bidder on three 900MHz lots for only the second time since Round 25, substantially increasing the standing high bids.

Again, there appears to be little value-based rationale for Telefónica's bids in this round. Rather it appears to have sent a signal to Telekom and Vodafone to reduce their demand in the 900MHz band.

Rounds 172/173 In Round 172, Vodafone substantially increased the standing high bid on all lots in the 700MHz band, including the lots where it was already the standing high bidder. This was clearly not a value-based bid but rather a signal to encourage competitors to drop demand in the 900MHz and/or 1800MHz bands – where there was excess demand.

In the next round, Telefónica responded by withdrawing on two lots and bidding on a cheaper lot in the 900MHz band, and withdrawing from one lot in the 1800MHz band. This appears to be a signal that it was prepared to accept just two lots in the 1800MHz band as long as it gained two lots in the 900MHz band.

This 'offer' was accepted by Vodafone (and Telekom) as Round 174 saw the final bids placed in the 700MHz, 900MHz and 1800MHz bands. Round 175 onwards simply saw small tactical bids placed in the 1.5GHz band, before the auction concluded.

The bids in Rounds 172 and 173 appear to have been significant. By increasing the prices of 700MHz lots, Vodafone again sent a signal to competitors to cease bidding. This time it was successful, with Telefónica choosing to cease competing for a third lot in the 1800MHz band, and the auction quickly coming to a close.

It is difficult to prove beyond any doubt that strategic bidding occurred in an auction, and whether it sufficiently influenced the relative prices between spectrum bands such that they did not reflect intrinsic valuations. However, Ofcom is sufficiently satisfied that this was the case in the 2010 German auction. The bids placed in the above rounds in the 2015 German auction (as well as potentially in other rounds) are very similar in nature to the strategic bids identified by Ofcom in the 2010 German auction. In both cases, bidders placed bids that patently were not valuation-based – i.e. on lots that they did not wish to win – with the aim of "punishing" other bidders for bidding in other bands (i.e. signals to reinforce the demand reduction incentives associated with the auction format). The result of this behaviour is that the relative prices between bands were distorted. We

consider the level of distortion likely to be material, in particular as the auction finished abruptly after the strategic bidding in Rounds 172 and173.

► *Ofcom considers the 2010 German auction prices to be based on strategic bidding*

In any case, as noted above, the 2015 German benchmark continues to be based on data points from the 2010 German auction as well as on those from the 2015 German auction. Ofcom has stated that it believes that the 2010 German auction result was influenced by strategic bidding. Given that (i) two out of the three data points required to produce the 2015 German 1800MHz distance method benchmark and (ii) one out of the two data points required to produce the 2015 German 900MHz relative benchmark in fact come from the 2010 German auction, this clearly suggests that the benchmarks do not accurately reflect intrinsic relative market values.

► *Price depression caused by the 900MHz spectrum cap in the 2015 German auction*

Further, Ofcom's own analysis of the 2015 German auction provides a second reason why the prices, particularly in the 900MHz band, did not reflect market value. Ofcom stated that "the spectrum cap introduces a risk that auction prices understate the forward-looking value of 900 MHz spectrum for a 2x10 MHz increment". We consider this risk to be very material since with only three bidders there are only two lots fewer than would be required to allow all operators to reach the spectrum cap. Therefore the evidence suggests that competition was significantly restricted and final prices for the 900MHz band **did** understate full market value. This is borne out by the fact that the 900MHz prices in Germany were very low, on an absolute level, when compared to other benchmark countries (appropriately normalised to a UK equivalent basis)[7].

► *Unique relative 900MHz to 1800 MHz prices in the 2015 German auction*

In addition to the above evidence that in isolation the 900MHz and 1800MHz auction prices departed significantly from market value, when considered together it becomes very evident that they did so relative to each other – i.e. that the prices paid for 900MHz spectrum were extremely low relative to 1800MHz prices. Indeed the 900MHz prices were in absolute terms lower than the 1800MHz prices, a phenomenon that is unique amongst European benchmarks, as acknowledged by Ofcom in Paragraph 50 of its July 2015 Update and shown in Figure 3.1 below. This surely must indicate that bidding in one or both of the bands departed considerably from bidding based on intrinsic value.

[7] See Figure 4.5

Figure 3.1: Summary of the difference in 900MHz and 1800MHz UK equivalent prices in benchmark countries for which both are available [Source: Analysys Mason and Aetha, 2015]

	900MHz benchmark UK-equivalent price (GBPm per MHz)	1800MHz benchmark UK-equivalent price (GBPm per MHz)	Difference in UK equivalent prices (GBPm per MHz)	Proportional difference in UK equivalent prices (%)
Austria	78.2	44.2	34.0	44%
Denmark	2.9	1.3	1.7	57%
Germany (2015)	15.5	20.0	–4.4	–29%
Greece	32.9	14.5	18.4	56%
Ireland	36.1	23.4	12.7	35%
Portugal	29.3	8.0	21.3	73%
Romania	44.3	47.7	28.5	60%

There is precedent for Ofcom categorising benchmarks as less important (Tier 2 or Tier 3) evidence on the basis of unexpected relative prices. In its October 2013 analysis of the Danish auction results, Ofcom stated:"*1800 MHz spectrum sold at a price which would, in UK terms, be well below the price of 2.6 GHz spectrum. 900 MHz spectrum also sold at a very low price... We provisionally conclude that the Denmark auctions provide less important evidence when deriving ALFs for 900 MHz and 1800 MHz licences in the UK.*"[5] As this is the only benchmark to date in which 1800MHz spectrum has sold for more than 900MHz spectrum, we believe the results of this auction should be treated with caution.

In summary, this sub-section provides multiple reasons for why prices set in the 2015 German auction were not based on intrinsic valuations of spectrum. Indeed, based on Analysys Mason's and Aetha's extensive experience of conducting spectrum valuations for mobile operators globally, we believe this to be the case. In particular, the fact that the 1800MHz price was higher than the 900MHz price strongly indicates that relative prices were not primarily based on intrinsic valuations.

Failure of the 2015 German benchmark to meet Ofcom's Criteria Three

- *2010 German auction outcome is still unlikely to be informative of forward-looking relative spectrum values in the UK*

As noted above, the 2015 German benchmarks continues to rely on data points from the 2010 German auction. One of the reasons provided by Ofcom in its February 2015 provisional decision for not classifying the 2010 German benchmark as Tier 1 evidence was because the auction occurred five years ago and that the LTE ecosystem has significantly developed since then, which according to Ofcom, "*is likely to have had a substantial effect on the relative value of the bands in*

the German auction… this provides a clear, evidence-based reason for relative auction prices in Germany to be less informative of forward-looking values in the UK".[8]

This change in the relative value of the bands is likely to have not only affected the value of the 1800MHz band, but also that of both the 800MHz and 2.6GHz bands. Such a change in value is acknowledged by Ofcom in its July 2015 Update on ALFs, in which it states that "*our measure of 800 MHz and 2.6 GHz spectrum in Germany is based on an auction from 2010. There is a risk that the value of 800 MHz spectrum may have increased or decreased in value since that date… We consider that there is a risk that the benchmark is an understatement or overstatement of the market value of 1800 MHz spectrum in the UK, but we cannot be sure of the likelihood or scale of this risk*."[9] Surely, this statement acknowledges that, due to their reliance on 800MHz and 2.6GHz auction results from five years ago, there is a substantial likelihood that the 2015 German 1800MHz distance method and 900MHz relative benchmarks do not reflect UK market values.

Therefore, in order to be consistent with previous categorisations of benchmarks into tiers, we believe that an 1800MHz distance method benchmark and a 900MHz relative value method benchmark that rely so heavily on 800MHz and 2.6GHz benchmarks from five years ago should be at best categorised as Tier 2.

3.2 Inclusion of the 2010 German benchmark

In its Update regarding the German auction, Ofcom includes both the 2010 and 2015 German benchmarks in its analysis. Subject to the 2015 German benchmark being categorised as Tier 2 evidence, as discussed above, we agree with this approach.

In our previous reports on this topic, we have strongly advocated that Ofcom should include more rather than fewer evidence points, as this increases the overall robustness of the analysis and resulting ALFs. Both the 2010 and 2015 German auctions provide potentially useful evidence points regarding the value of 1800MHz spectrum. As discussed in this report as well as in Ofcom's various consultations, neither benchmark is perfect. Each has specific reasons for why they may not be fully representative of market value in the UK. However, the inclusion of both benchmarks adds to the overall robustness of the analysis (although, as discussed in our previous report, our preference would be that Ofcom includes yet more benchmarks in its determination of the LSVs).

3.3 Conclusion on the inclusion of German auction results in the ALF determination

There is strong evidence that the prices raised in the 2015 German auction were not based on intrinsic valuations, and particularly that the relative prices between the 900MHz and 1800MHz

[8] See Annex 8; *Annual licence fees for 900 MHz and 1800 MHz spectrum: Provisional decision and further consultation*, 19 February 2015.

[9] Paragraph 61; *Update on Annual licence fees for 900 MHz and 1800 MHz spectrum: German 2015 auction*, 9 July 2015

bands were not based on intrinsic valuations. Further the elapsed time between the 2010 auction (which included the 800MHz and 2.6GHz bands) and the 2015 auction (which provides a 900MHz benchmark as well as a new 1800MHz benchmark) makes both the 1800MHz distance method and 900MHz relative calculations unreliable.

Therefore, we believe that if Ofcom chooses to include the 2015 German benchmarks within the evidence base for the ALFs, they should be categorised as Tier 2 evidence alongside the 2010 German auction benchmark. This should be the case for both the 900MHz relative and 1800MHz distance method benchmarks. Such an approach would be consistent with Ofcom's previous tiering categorisation decisions.

4 Implications for the calculation of the 1800MHz lump-sum values

In our previous reports we have raised concerns about Ofcom's qualitative approach for selecting its proposed LSVs. In its following consultations, Ofcom has continued to qualitatively select the LSVs, but with the additional calculation of a weighted average of the benchmarks to then cross-check its proposed LSVs.

As discussed in our response to Ofcom's August 2014 consultation, although in principle we continue to believe that determining the LSVs via a calculation is the most appropriate method, we consider that Ofcom's approach can be reconciled with Ofcom's aim of following a "conservative" approach, as long as a weighted average cross-check is used and the proposed LSVs are set conservatively when compared to the cross-check.

In this section, we therefore follow Ofcom's approach to choosing the LSVs – i.e. selecting values ("in the round"), before then conducting a weighted average cross-check of the benchmarks from its provisional decision on the LSVs in February 2015. The only difference is that we add the 2015 German benchmark as Tier 2 evidence, as suggested in Section 3.

4.1 Lump-sum values assuming Ofcom's UK values for 800MHz and 2.6GHz spectrum

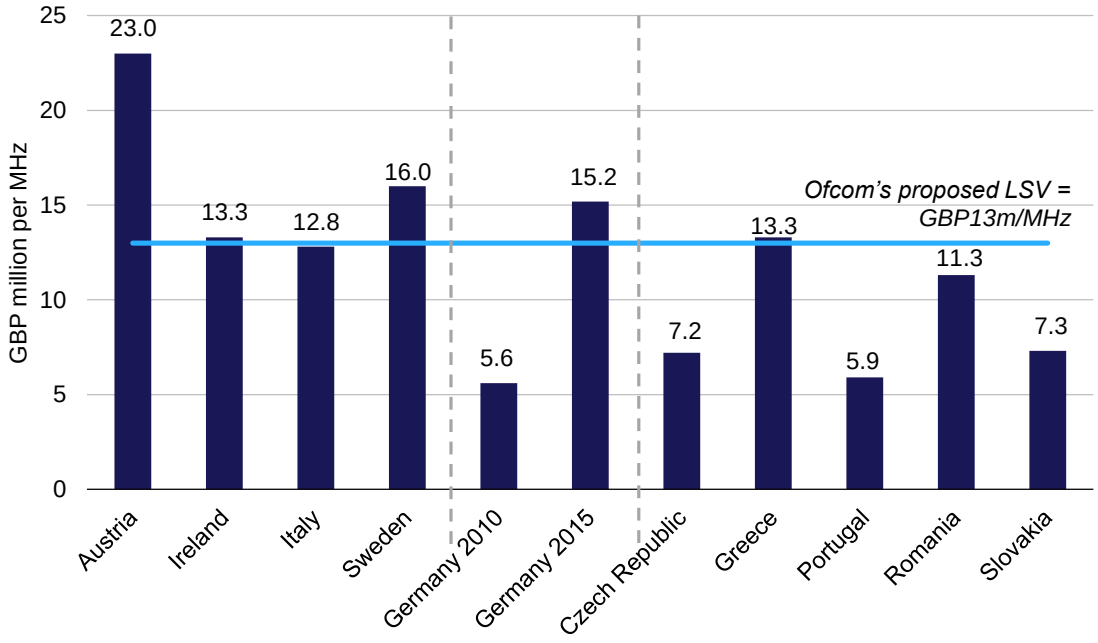
In this section we consider the implications of including the 2015 German benchmark in Tier 2 for the 1800MHz and 900MHz LSVs with the assumption that Ofcom's estimated UK market values for 800MHz and 2.6GHz spectrum are retained.[10]

4.1.1 1800MHz spectrum

Figure 4.1 below presents the 1800MHz distance method benchmarks, with both the 2010 and 2015 German benchmarks classified as Tier 2 evidence. This is equivalent to Figure 3.2 in Ofcom's February 2015 provisional decision and further consultation, but with the 2015 German benchmark added, and Figure 4 in Ofcom's July 2015 Update.

[10] Analysys Mason and Aetha have not considered whether or not these estimates are the most appropriate and their use in this report should not be read as any form of acknowledgement that we agree with the estimates.

Figure 4.1: 1800MHz distance method benchmarks assuming Ofcom's UK values for 800MHz and 2.6GHz [Source: Analysys Mason and Aetha, 2015]



In its February 2015 provisional decision and consultation, Ofcom concluded that GBP13 million per MHz would be an appropriate estimate of the UK 1800MHz LSV. This firstly considered that the mid-point of the lowest benchmark value in Tier 1 (GBP12.8 million) and the average of the Tier 1 benchmarks (GBP16.3 million) was GBP14.6 million. However, Ofcom thought that a lower LSV estimate was appropriate because the Irish benchmark risked overstatement of the UK market value.[11] Ofcom then considered that the Tier 2 benchmarks, at the time only consisting of the 2010 German benchmark of GBP5.6 million, did not provide it with "a strong basis to modify the view [derived] from the first-tier benchmarks".[12]

Relative to Ofcom's February 2015 provisional decision and consultation, the average of the Tier 1 benchmarks remains GBP16.3 million, whilst the average of the Tier 2 benchmarks rises to GBP10.4 million. Based on the Tier 1 benchmarks, the appropriate LSV estimate should remain GBP13 million per MHz. Although more weight could now be applied to Tier 2 due to the inclusion of an additional benchmark, the average remains below Ofcom's proposed LSV. Therefore we do not believe that there is any need for an adjustment to the previously proposed LSV.

11 As discussed in EE's responses to Ofcom's previous ALF consultations, this selection of a slightly lower LSV estimate only partly reflects the overstatement of UK market value inherent in the Irish benchmark and does not appear to reflect the large overstatement in the Austrian benchmark, which we have previously argued should in any event not be classified in Tier 1.

12 Paragraph 3.70; *Annual licence fees for 900 MHz and 1800 MHz spectrum: Provisional decision and further consultation*, 19 February 2015.

The average of the Tier 3 benchmarks remains unchanged, and the Tier 3 benchmarks continue to fall, for the most part, some way below Ofcom's proposed LSV.

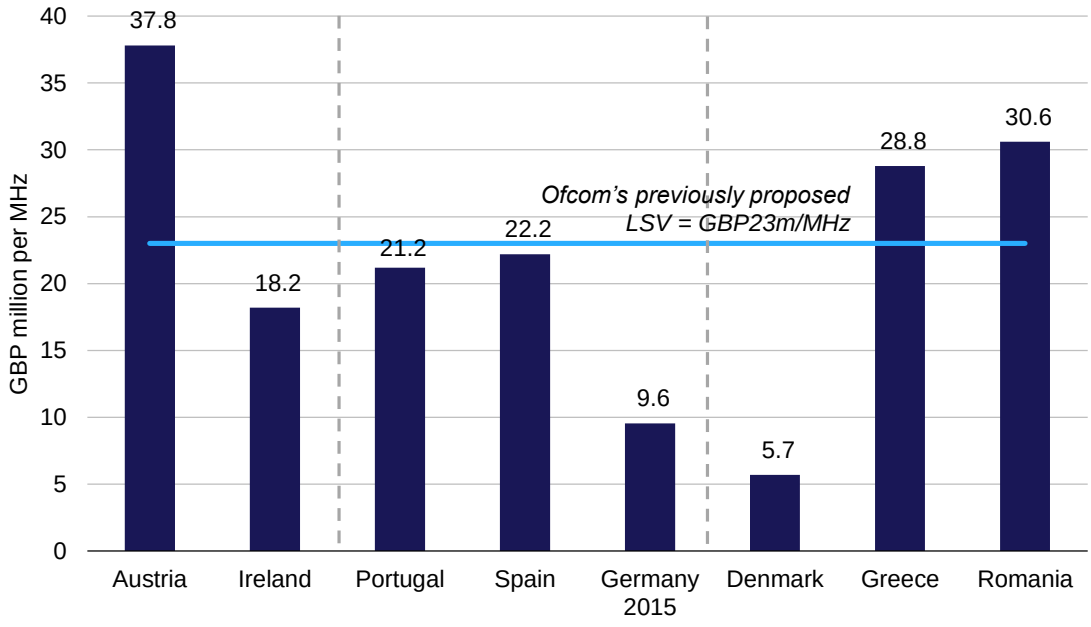
Therefore the inclusion of the 2015 German benchmark as Tier 2 evidence should have no impact on the LSVs proposed by Ofcom, namely **GBP13 million per MHz**.[13].

This appears consistent with Ofcom's view in its Update, in which it concludes that if the 2015 German benchmark is categorised within Tier 1 there may be a case either for a moderate upward adjustment to the 1800MHz LSV, or that such an adjustment is not necessary. Therefore, if the 2015 German benchmark is categorised within Tier 2, as we believe it should be, the case for non-adjustment appears strong.

4.1.2 900MHz spectrum

Figure 4.2 below presents the 900MHz relative benchmarks with the 2015 German benchmark classified as Tier 2. This is equivalent to Figure 3.1 in Ofcom's February 2015 provisional decision and further consultation, but with the 2015 German benchmark added, and Figure 3 in Ofcom's July 2015 Update.

Figure 4.2: 900MHz benchmarks assuming Ofcom's UK values for 800MHz and 2.6GHz [Source: Analysys Mason and Aetha, 2015]



In its February 2015 provisional decision and consultation, Ofcom concluded that GBP23 million per MHz would be an appropriate estimate of the UK 900MHz LSV. This considered that the mid-

[13] The appropriate LSV could be lower than this amount were Ofcom to take account of arguments previously made by EE, Analysys Mason and Aetha.

point of the lowest benchmark value in Tier 1 (~GBP18 million) and the average of the Tier 1 benchmarks of GBP28 million was GBP23 million. Ofcom then considered that the Tier 2 benchmarks, with an average of GBP21.7 million at the time, did not provide a strong basis to modify the figure of GBP23 million.

With the 2015 German benchmark added, the average of the Tier 1 benchmarks remains GBP28 million, whilst the average of the Tier 2 benchmarks falls to GBP17.7 million. Based on the Tier 1 benchmarks, the appropriate LSV estimate should remain GBP23 million per MHz. Although more weight could now be applied to Tier 2 due to the inclusion of one additional benchmark, the average of GBP17.7 million is not substantially below Ofcom's proposed LSV. Furthermore, the proposed LSV is already towards the lower end of the range of Tier 1 benchmarks and substantially below the Romanian and Greek Tier 3 benchmarks.[14] Therefore, and for the reasons regarding the likely departure of the 2015 German auction results from intrinsic value set out in Section 3 above, we do not believe that there should be any need adjustment to the previously proposed LSV on the basis of the Tier 2 and Tier 3 benchmarks.

In our view, Ofcom's proposed lump-sum value of **GBP23 million per MHz** therefore remains appropriate after the addition of the 2015 German benchmark.

Again, this conclusion appears consistent with Ofcom's view in its Update, in which it states that if it were "*to instead consider [the 2015 German benchmark] as a Tier 2 benchmark, it is less clear that its inclusion would cause us to adjust our estimate, and any such adjustment would likely be smaller*".[15]

4.2 Cross-checks of the lump-sum values

Similar to Ofcom's approach, we consider the following cross-checks of the LSV estimates set out in Sections 4.1.1 and 4.1.2 above:

- We compare the estimates of the value of 900MHz and 1800MHz in the UK to the weighted average of Tier 1 and Tier 2 countries, within each band.
- We compare the ratio of the estimates of 900MHz and 1800MHz LSVs in the UK to the corresponding ratio within benchmark countries where both bands were awarded.

For each cross-check, we consider whether it would be appropriate in light of our analysis of the cross-check to revise either of our estimates.

---

14 As Analysys Mason and Aetha have previously argued, the Danish benchmark categorised as Tier 3 by Ofcom should be given no weight whatsoever since incumbent operators were prevented from bidding in the auction, meaning that prices are in no way reflective of market value.

15 Footnote 21; *Update on Annual licence fees for 900 MHz and 1800 MHz spectrum: German 2015 auction*, 9 July 2015.

4.2.1 Weighted average cross-check of the lump-sum values

We have followed Ofcom's classifications for tiering each of the ten 1800MHz benchmark countries used in the February 2015 provisional decision and further consultation, designating the 2015 German benchmark as Tier 2 evidence in line with our analysis in Section 3. In Figure 4.3 below, we calculate the weighted average of the 1800MHz LSVs using our categorisation as set out above, with Tier 1 benchmarks receiving a weighting of 2, Tier 2 benchmarks a weighting of 1 and Tier 3 benchmarks a weighting of zero.

Country	Distance method benchmark (GBP million/MHz)	Ofcom weighting
Austria	23.0	2
Czech Republic	7.2	0
Germany 2010	5.6	1
Germany 2015	15.2	1
Greece	13.3	0
Ireland	13.3	2
Italy	12.8	2
Portugal	5.9	0
Romania	11.3	0
Slovakia	7.3	0
Sweden	16.0	2
Weighted average LSV (including 2015 German benchmark)	15.1	
Weighted average LSV (excluding 2015 German benchmark)	15.1	
Ofcom's proposed LSV	13.0	

Figure 4.3: Calculation of a weighted average LSV for 1800MHz using Ofcom's recommended tiering and weightings [Source: Analysys Mason and Aetha, 2015]

The result of the cross-check is a weighted average of GBP15.1 million per MHz, consistent with and slightly higher than the proposed LSV. This result is unchanged by the inclusion of the 2015 German benchmark, suggesting that no change to the LSV is appropriate on the basis of this benchmark.

In Figure 4.4 below, we provide the equivalent comparison for the 900MHz band.

Country	Distance method benchmark (GBP million/MHz)	Ofcom weighting
Austria	23.0	2
Denmark	7.2	0
Germany 2015	5.6	1
Greece	13.3	0
Ireland	13.3	2
Portugal	5.9	1
Romania	11.3	0
Spain	7.3	1
Weighted average LSV (including 2015 German benchmark)	23.6	
Weighted average LSV (excluding 2015 German benchmark)	25.9	
Ofcom's proposed LSV	23.0	

Figure 4.4: Calculation of a weighted average LSV for 900MHz using Ofcom's recommended tiering and weightings [Source: Analysys Mason and Aetha, 2015]

Both before and after inclusion of the 2015 German benchmark, the weighted average cross-check produces an LSV consistent with and slightly higher than the proposed LSV of GBP23 million per MHz. There is thus no obvious need to change the LSV on the basis of this benchmark. Furthermore, departing from Ofcom's February 2015 provisional decision on the basis of this single additional benchmark would risk creating regulatory volatility and uncertainty for 900MHz and 1800MHz licensees.

4.2.2 Within-country ratio cross-check of the lump-sum values

In its consultations, Ofcom includes a comparison of the ratio of its proposed 1800MHz to 900MHz LSVs to equivalent ratios in the benchmark sample. We apply a similar cross-check here to the LSVs proposed above.

As shown in Figure 4.5, seven European countries have now auctioned both 900MHz and 1800MHz spectrum, including Germany.[16]

[16] Although both 900MHz and 1800MHz spectrum have been awarded in Spain, 1800MHz spectrum was only awarded via a beauty contest. Therefore, consistent with Ofcom's analysis, we have excluded it from the 1800/900MHz cross-checks.

Figure 4.5: 900MHz and 1800MHz UK equivalent values, in GBP million per MHz [Source: Ofcom, Analysys Mason and Aetha, 2015]

	900MHz	1800MHz	1800MHz/900MHz ratio
Ireland	36.1	23.4	65%
Austria	78.2	44.2	56%
Greece	32.9	14.5	44%
Denmark	2.9	1.3	43%
Germany 2010	15.5	1.8	12%
Germany 2015	15.5	20.0	129%
Romania	47.7	19.2	40%
Portugal	29.3	8.0	27%
Geometric mean			**43%**

The ratio of the proposed 1800MHz and 900MHz LSVs is 57% (GBP13 million per MHz divided by GBP23 million per MHz). This is already significantly above the geometric mean of the benchmark ratios of 43%.

However, the 2015 German auction benchmarks ratio is clearly an outlier, at 129% relative to the 12%–65% range of the other seven benchmark ratios (27%–65% if the 2010 German benchmark is also excluded). As discussed in Section 3, we have serious concerns that the relative prices of the 900MHz and 1800MHz bands in this auction were not driven by intrinsic spectrum valuations. Removing this from the averaging produces a much lower geometric mean of 37%, even further below the 57% ratio of the proposed 1800MHz and 900MHz LSVs. This suggests that the proposed 1800MHz LSV remains, if anything, too high compared to the proposed 900MHz LSV.

5 Conclusions

There is strong evidence that the prices raised in the 2015 German auction were not based on intrinsic valuations, and particularly that the relative prices between the 900MHz and 1800MHz bands were not based on intrinsic valuations. Further the elapsed time between the 2010 auction (which included the 800MHz and 2.6GHz bands) and the 2015 auction (which provides a 900MHz benchmark as well as a new 1800MHz benchmark) makes both the 1800MHz distance method and 900MHz relative calculations unreliable.

Therefore, we believe that if Ofcom chooses to include the 2015 German benchmarks within the evidence base for the ALFs, they should be categorised as Tier 2 evidence alongside the 2010 German auction benchmark. This should be the case for both the 900MHz relative and 1800MHz distance method benchmarks. Such an approach would be consistent with Ofcom's previous tiering categorisation decisions.

Subject to the points above, we support Ofcom's proposed continued use of the 2010 German auction results in its benchmarks, as Tier 2 evidence, as the inclusion of both the 2010 and 2015 German benchmarks adds to the overall robustness of the analysis.

Finally, we believe that the inclusion of the 2015 German benchmarks as Tier 2 evidence should have no impact on the LSVs proposed by Ofcom, namely **GBP13 million per MHz for 1800MHz** spectrum and **GBP23 million per MHz for 900MHz** spectrum. In both cases, the Tier 1 benchmarks remain unchanged, and the Tier 2 benchmark averages do not change sufficiently to warrant an adjustment to Ofcom's existing LSV proposals. Furthermore, departing from Ofcom's February 2015 provisional decision on the basis of this single additional benchmark would risk creating regulatory volatility and uncertainty for 900MHz and 1800MHz licensees.