



NON-CONFIDENTIAL VERSION

## Annual Licence Fees for 900 MHz and 1800 MHz frequency bands

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## Executive Summary

1. Ofcom's proposals for annual licence fees ('ALFs') for 900 MHz and 1800 MHz spectrum follow the 2017 Court of Appeal decision to quash the fees regulations Ofcom introduced in 2015. Ahead of its 2015 decision, Ofcom had mistakenly concluded that the Government's 2010 Direction (the 'Direction') required it to disregard its wider regulatory duties and set fees at market value.
2. BT<sup>1</sup> is disappointed that Ofcom has concluded that it should still set fees at a level that is substantially the same as it concluded in its 2015 assessment. This is because Ofcom follows an approach that in our view is flawed: rather than considering with an open mind how to reflect market value alongside its other regulatory objectives, Ofcom begins by estimating market value, and only then considers whether there is any reason to depart from market value. A broader approach in which Ofcom sought to set fees that would pursue its regulatory objectives, as well as reflect market value, would be less vulnerable to the risk of error than a single assessment of benchmarks and would properly reflect the Court's findings. Ofcom reduces what should be a process of using expert judgement to consider the impact and implications of setting fees at particular levels to a pseudo-factual one of estimating market value.
3. The clarification from the Court that the Direction does not require Ofcom to consider only market value affords Ofcom a fresh opportunity to consider the significant costs the 1800 MHz licensees have in meeting the Geographical Coverage Obligation ('GCO'). As Ofcom demonstrates in its analysis of auction benchmark data, a licence with a coverage obligation is generally worth less than a licence without. The GCO was only agreed on the basis that Ofcom would consider adjusting ALFs to take account of the costs of meeting the GCO, thus it is wrong to consider the point solely at the margin and ex post facto as though the GCO had been agreed irrespective of ALFs.
4. BT is of the view that ALFs set at full market value, even if appropriately estimated, are not required to secure efficient use of spectrum. BT believes ALFs set at market value are at best unhelpful and at worst damaging, in terms of impact on network investment, and are ultimately not in consumers' best interests. This is very relevant in the context of Ofcom considering its wider statutory duties when Ofcom can, and should, return to relying more on market mechanisms for management of mobile spectrum. To the extent that Ofcom finds that the Direction could be a barrier to this, we strongly believe that Ofcom should reassess with Government how the Direction and more broadly Ofcom's policy on ALFs could be evolved to support mobile infrastructure investment for consumer benefit. As we have indicated to both Ofcom and Government, we stand ready to engage with Ofcom and Government on how these ideas can be taken forward.
5. Notwithstanding our fundamental concerns with Ofcom's approach above, we also have specific concerns regarding the inputs to Ofcom's adopted methodology for determining an estimate of market value. Some of the key inputs and assumptions that Ofcom have used to arrive at the proposed fee levels are far too high, unrealistically so, particularly for the 1800 MHz band. Ofcom's findings imply that Vodafone or Telefónica would be willing to swap

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<sup>1</sup> BT including its subsidiary mobile network operator EE Limited

2x10MHz of 900 MHz for 2x13MHz of 1800 MHz - Ofcom must ask itself whether this is credible.

6. If the results of steps 1 and 2 in Ofcom's process are modified as BT proposes, instead of an 1800 MHz lump sum value of £15m / MHz as proposed by Ofcom, the appropriate value would be in the range £8m - £12m / MHz. Our evidence also demonstrates that a discount rate no higher than 1.2% would be more appropriate than Ofcom's proposed rate of 1.5%. Were Ofcom to stick to its methodology, Ofcom needs to review its data points and methodology and select values within these more realistic ranges.
7. Finally, we urge Ofcom to consider with Government how, while ALFs continue to be used, they could be used to promote policy goals such as improving mobile coverage. It is an odd situation we find ourselves in whereby on the one hand Ofcom and Government would extract £210m per annum from the mobile industry whilst on the other hand Ofcom and Government have a stated policy objective for mobile network operators (MNOs) to invest more in the expansion of coverage.

## 1 Introduction

The UK mobile market is highly competitive with low retail prices and no excess profits. However, the useful value of a mobile spectrum licence only arises when coupled with network investment. Therefore, the question of ALFs needs to be viewed in a broader context.

We believe that Ofcom has not reached the correct conclusions when considering its wider duties under UK law and the European regulatory framework. The most relevant value of spectrum is the benefit its use brings to the UK *when coupled with investment*. We set out important areas where we believe Ofcom should further consider its position and lower the fees in light of these wider considerations in **section 2**.

Notwithstanding our view that Ofcom should re-assess its proposals in light of its wider regulatory duties and the need for an impact assessment, in **section 3** we explain a number of points on which we believe Ofcom needs to reconsider its assumptions and adopt different values when applying its methodology to develop ALFs. Finally, we set out in **section 4** why we believe Ofcom must provide a phase-in period for what would be a very large fee increase.

## 2 Fundamental reappraisal of ALFs needed following the Court of Appeal's judgement

### 2.1 Judgment of the Court of Appeal and Ofcom's statutory duties

Following the judgment of the Court of Appeal, Ofcom now recognises that the Direction<sup>2</sup> to set fees that reflect full market value does not relieve Ofcom of its other statutory duties in relation to spectrum management and setting of ALFs. Ofcom has now chosen to seek to apply the 2010 Direction and these wider statutory duties by adopting an approach under which (i) it estimates what fees correspond to full market value; and (ii) it will set fees at that level unless a positive regulatory reason is identified to set fees below the level of market value. This approach gives undue prominence to market value, rather than allowing Ofcom to consider its statutory duties with an open mind as well as reflecting market value, and it leads to Ofcom mechanistically setting fees at its estimate of market value using exactly the same approach as it did for the purpose of the 2015 fees regulations that were quashed by the Court. In short, Ofcom reduces what should be a process of using expert judgement to consider the impact and implications of setting fees at particular levels to a pseudo-factual one of estimating market value. This approach is flawed.

#### ***Ofcom's duties***

The legal framework for the setting of ALFs derives from both European and domestic legislation, specifically from:

- The Common Regulatory Framework for electronic communications networks and services, in particular the Framework Directive (Directive 2002/21/EC) and the Authorisation Directive (Directive 2002/20/EC). Article 8 of the Framework Directive requires Ofcom to take all reasonable measures which are aimed at achieving the objectives set out in paragraphs 2, 3 and 4 of that Directive. The most relevant of those objectives in Paragraph 2 include

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<sup>2</sup> [https://www.legislation.gov.uk/ukxi/2010/3024/pdfs/ukxi\\_20103024\\_en.pdf](https://www.legislation.gov.uk/ukxi/2010/3024/pdfs/ukxi_20103024_en.pdf)

promoting competition by: ensuring that users, including disabled users, derive maximum benefit in terms of choice, price, and quality; ensuring that there is no distortion or restriction of competition in the electronic communications sector; encouraging efficient investment in infrastructure, and promoting innovation; and encouraging efficient use and ensuring the effective management of radio frequencies and numbering resources; and

- The Communications Act 2003 and the Wireless Telegraphy Act 2006. Section 3 of the Communications Act 2003 requires Ofcom to further the interests of citizens in relation to communications matters, where appropriate by promoting competition, with regard to factors including: choice, price, quality of service and value for money, encouraging investment and innovation in relevant markets, promoting competition, facilitating the development and use of effective forms of self-regulation. Section 3 of the Wireless Telegraphy Act 2006 requires Ofcom, in carrying out its functions in Subsection (1), to have regard to competition, the efficient use of spectrum, the economic and other benefits from the use of spectrum and the development of innovative services.

Ofcom's duties have nothing to do with getting a return on a public asset (spectrum);<sup>3</sup> rather, they are to secure optimal and efficient use of spectrum including promotion of the wide availability of services (which requires investment in sites and equipment) and promotion of competition where relevant. It is important to recall that the reason Ofcom generally uses auctions for primary assignment of mobile spectrum is that it considers this is the allocation form that offers the best scope for achieving an efficient allocation that will get mobile spectrum into productive use; it is not because it realises a value for a public asset.

S.7 of the Communications Act 2003 requires Ofcom to conduct an impact assessment for any important proposals. Doing so would provide Ofcom with a framework within which to exercise its expert judgement to consider the impact and implications of setting fees at particular levels. At the time of the last consultation process on ALFs, Ofcom rejected the view that it was required to conduct an impact assessment on the basis that the Government had directed Ofcom to set fees at market value, so it did not have any relevant discretion.<sup>4</sup> Following the Court of Appeal judgment, that rationale for failing to conduct a full impact assessment of the actual level of fees proposed must fall away. Although Ofcom refers at one point to the present consultation as being an impact assessment, it states that its only purpose is "*to consider the effect of ALFs being at or below market value*". That is, it addresses only the question of principle of whether ALFs set at such levels would *breach* Ofcom's regulatory objectives. It does not aim to consider how ALFs set at the specific levels which correspond to Ofcom's estimate of full market value would impact the regulatory objectives

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<sup>3</sup> At EU level, Recital 32 to the Authorisation Directive provides that "In addition to administrative charges, usage fees may be levied for the use of radio frequencies and numbers as an instrument to ensure the optimal use of such resources. Such fees should not hinder the development of innovative services and competition in the market". Article 13 provides that "Member States may allow the relevant authority to impose fees ...which reflect the need to ensure the optimal use of these resources." The clear implication is that, as a matter of EU law, Member States may not allow the relevant authority to impose fees for other reasons, e.g. as an instrument for simple revenue raising. In UK law, maximising revenue is not reflected as an objective in ss.3 or 4 Communications Act 2003 or in s.3 Wireless Telegraphy Act 2006.

<sup>4</sup> See August 2014 Consultation at paragraph 1.43

by first considering its statutory duties with an open mind and then considering a full range of potential fee levels (including no fees) before making a final decision.

Given the inherent uncertainty in determining market values through an administrative process, the impact assessment would enable Ofcom to carry out a full and balanced cost-benefit assessment. That assessment must include an assessment of the risks involved in setting fees too high or too low. The risks involved in setting fees too high are greater than the risks involved in setting fees too low, suggesting that Ofcom should adopt a far more cautious and conservative fees estimate than it has done in its present consultation. This is explained further below with reference to two specific issues. The impact of the GCO on ALFs would also be best appraised within a properly reasoned impact assessment.

### ***The Direction***

The Court of Appeal has confirmed that the Direction does not overrule or relieve Ofcom of its statutory duties. It is important to recall that the Direction was issued in the context of there having been delay in achieving several important pieces of spectrum reform: chiefly the liberalisation of 900 MHz for 3G and some form of settlement on access to sub-1GHz spectrum. In that context, the Direction to Ofcom simply told Ofcom to get on with this and that as part of these reform measures it should review fees for the spectrum that hadn't originally been auctioned as it would otherwise do in applying its Spectrum Pricing framework. That was clearly reflected in the fact that the accompanying impact assessment<sup>5</sup> included the revision of fees in both Option 0 (where no Direction was made) and Option 1 (where the Direction was made). Ofcom already had the ability to levy administrative fees on spectrum to incentivise efficient use, in accordance with regulatory powers originally introduced in to the Wireless Telegraphy act in 1998 and implemented following the subsequent Cave review of spectrum management. Ofcom's Strategic Review of Spectrum Pricing in 2010<sup>6</sup> set out its approach to this (a policy which in our view is overdue for review). The Direction therefore never required Ofcom to constrain its assessment of ALFs to a pseudo-factual one of estimating market value.<sup>7</sup> Since 800 MHz and 2600 MHz was to be auctioned imminently, the more detailed instructions included to take particular regard of that auction result in estimating market value of spectrum. However, with the passage of time and other UK auctions now having been held (as well as a relevant spectrum trades), Ofcom should not look narrowly at the 2013 auction of 800 MHz and 2600 MHz when setting ALFs. Ofcom needs to give significantly more weight to later market evidence, including the 2018 auction and the secondary trade that took place in 2015 as setting ALFs too high impacts investment and is potentially distortive of competition as we describe below.

## **2.2 Application of those statutory duties**

In the consultation, Ofcom focuses on the expert report of Professor Maarten Janssen submitted as part of EE's appeal to set out its position on the various issues that are relevant when considering

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<sup>5</sup> [http://www.legislation.gov.uk/ukia/2010/390/pdfs/ukia\\_20100390\\_en.pdf](http://www.legislation.gov.uk/ukia/2010/390/pdfs/ukia_20100390_en.pdf)

<sup>6</sup> Ofcom, "SRSP: The revised Framework for Spectrum Pricing Our policy and practice of setting AIP spectrum fees", 17 December 2010

<sup>7</sup> This question of the purpose of the paragraph of the Direction that requires Ofcom to set fees for 900, 1800 and 2100 MHz, was considered in the Court of Appeal, with the judgment concluding that Ofcom could revise the fees with or without a direction from Government, see *EE LIMITED v OFFICE OF COMMUNICATIONS* [2017] EWCA Civ 1873 pp. 27 & 28

Ofcom's wider duties. Ofcom has sought to dismiss each point, and in some cases mentions lack of evidence. However, the report was not a submission to Ofcom's consultation process setting out proposals and evidence as to precisely what positions Ofcom could take, rather it was submitted to assist the Court on one specific question, namely whether in principle setting fees by reference to the statutory objectives could lead to different fees to those set solely by reference to market value. Thus it is only a high level consideration of the various issues and an explanation of why they are relevant and important. Whilst it is helpful that Ofcom has set out its thinking in response to the points of principle raised in the Expert Report, this approach does not reflect a genuine reappraisal of the issues with an open mind in line with the correct approach we outline above.

***ALFs are not necessary to promote efficient use***

ALFs are not necessary to ensure that MNOs make efficient use of their spectrum holdings. MNOs face the implicit price – or own use 'opportunity cost' – of spectrum irrespective of any administratively imposed fee. MNOs are faced with a constant trade-off - in meeting growing demand for coverage, data capacity and higher quality service (including 5G) – between the efficiency of use of existing spectrum and investment in new sites and acquisition of new spectrum. Mobile spectrum is intensively used in the areas where traffic demand requires this as it is generally less costly to deploy more spectrum that is already available than to build new sites. As described by Williamson, Marks and Chan (2010):

*"ALF is unnecessary to promote efficient use of spectrum since operators face a constant trade-off between efficient use of spectrum, capital expenditure and acquisition of new spectrum i.e. they face the market value of spectrum holdings without ALF"<sup>8</sup>*

Further spectrum availability via the market, whether through new awards (primary market) or through spectrum trading opportunities (secondary market), also helps ensure that spectrum is allocated efficiently between operators.

In principle, there is the possibility that some alternative use is of higher value at the margin than mobile use, but in practice it is accepted by Ofcom and Government that spectrum should be reallocated from other uses including government use and terrestrial broadcasting to mobile use because mobile offer higher value use. The 'own use' opportunity cost which operators face is therefore the market opportunity cost.

An administratively imposed ALF on mobile use is not therefore required or proportionate to promote the optimal use of spectrum when assessed against the costs and risks that high ALFs may ultimately have for consumers. This is an important point for Ofcom to grapple with as the Court's judgment requires Ofcom to consider its wider statutory duties with an open mind as well as reflecting market value.

***Ofcom has reached the wrong conclusion on the adverse impact of ALFs on spectrum trading and investment***

Ofcom has focused on, and overstated, the theoretical risks/costs of reducing ALFs below full market value and has not sufficiently balanced those perceived risks against its wider duties.

In terms of the risks/costs of reducing ALFs, Ofcom has focused on the concern that if full opportunity cost is not reflected in the fees it is possible that an MNO will not release spectrum to another MNO that has higher value use. (Ofcom's other theoretical argument that some spectrum

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<sup>8</sup> Williamson, B., Marks, P. and Chan, Y.S.. "Annual licence fees - you cannot have your cake and eat it", Plum Consulting, January 2014



has an alternative higher value outside telecoms is not credible given the harmonised use of the bands concerned and the obligations attached to the licence but also given that it is generally acknowledged that mobile use has the highest value.) We have explained above why we do not consider that ALFs are necessary for efficient use as operators face their own use opportunity cost which is the market cost.

However, against those perceived downsides, Ofcom has not sufficiently considered the benefits, in line with its duties, of reducing ALFs. These include:

- **Improved potential for spectrum trading:** at full market value, there is a risk that ALFs could inhibit spectrum trading, since operators may be more wary of inadvertently revealing their true spectrum valuations during trades if these valuations are likely to result in higher ALFs later on. Marks and Williamson (2009) also demonstrate that ALFs may reduce spectrum trading in markets where fees are adjusted to reflect new information about spectrum value over time (e.g. revealed by new uses or traded prices).<sup>9</sup> Reducing ALFs below market value thereby encourages more spectrum trading.
- **Increased ability to make investments:** Ofcom's consultation does not sufficiently deal with the affect ALFs have on the ability to make investments, a concern that would be mitigated not just by taking a conservative view when determining market value (accounting for the risk of over/under estimation of these which Ofcom already has considered) but explicitly adjusting the fees downwards.

On the latter point on investment, the ALFs act as a direct cost to each MNO such that an MNO's net profits, and free cash flows, are reduced by a fixed amount in each year of the term of the licence. MNOs finance much of their capital expenditure through free cash flows generated through business operations, and any reduction in free cash flows hinders the ability to finance network investment. BT's capital expenditure is currently at a ten-year high, and any reduction in free cash flows through ALFs will threaten BT's ability to deliver its long-term programme of network investment.

The positive relationship between a firm's profitability and capital expenditure has been extensively documented in the academic literature. Llewellyn and Llewellyn (2016) recently examined a dataset of US firms between 1971 and 2009,<sup>10</sup> finding strong evidence that cash flows positively impact investment. Their study highlighted that the relationship holds both for capital constrained and unconstrained firms, albeit with a less strong impact for firms without capital constraints. The paper contradicts Ofcom's previous argument that MNOs are unlikely to be constrained in their ability to finance capital expenditure if their profitability falls, because of their access to capital markets for financing. Ofcom's position implicitly assumes that the cost of internal financing is the same as external financing. However, in reality, even large companies face a lower cost of internal financing relative to external financing and tend to prefer financing capital expenditure through internally generated cash flows.

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<sup>9</sup> Marks, P. and Williamson, B. "Is spectrum pricing compatible with spectrum markets?", Plum Consulting, June 2009, <http://plumconsulting.co.uk/spectrum-pricing-compatible-spectrum-markets>

<sup>10</sup> Llewellyn, J. and K. Llewellyn. "Investment and Cash Flow: New Evidence", Journal of Financial and Quantitative Analysis", Vol. 51, No. 4, August 2016, p1135-1164.

The research conducted by Llewellyn and Llewellyn (2016) is part of a larger body of academic literature supporting the positive relationship between cash flows and capital expenditure. Fazzari, Hubbard and Petersen (1988) and Kaplan and Zingales (1997) both estimate positive investment-cash flow sensitivities, even for firms without capital constraints.<sup>11,12</sup> Even at an aggregate level, Kothari, Lewellen and Warner (2017) have found that investment growth for US firms is predictable from past profits and stock returns, implying that firms tend to finance their capital expenditure from past profits.<sup>13</sup>

The effect of different forms of taxation on investment has also been documented in the academic literature. For example, Djankov et al (2010) presents evidence of higher corporate tax rates having a detrimental effect on investment in a dataset comprising 85 countries.<sup>14</sup> Since ALFs act in a similar way to a direct tax in reducing MNOs' cash flows, we may expect Ofcom setting ALFs at a higher level would limit MNOs' ability to conduct network investment.

Finally, we note that credit rating agencies have highlighted the risk of lower cash flows when determining BT's credit rating. Moody's downgraded BT's credit rating from Baa1 to Baa2 in March 2018 citing risks associated with an increase in capital expenditure being one of the key drivers of the downgrade.<sup>15</sup> In particular, Moody's noted:

*"The ratings downgrade reflects our expectation that BT's credit metrics will remain weak due to a deterioration in its underlying operating performance trends, a significant capital spending risk, and the sustained large pension deficit, further weakening the company's cash flow generation and delaying the company's deleveraging prospects"*

Source: Moody's, "Moody's downgrades BT's and EE's ratings to Baa2; stable outlook", Moody's website, 23 March 2018.

## 2.3 Recognition of the geographic coverage obligation (GCO)

### ***Impact of the GCO on market value***

Ofcom considers that the GCO does not impact the values of 900 MHz and 1800 MHz spectrum (and hence should not impact ALFs) because the value of spectrum to the marginal operator is unaffected as each existing MNO already has the obligation in its spectrum licence.

We do not agree that the correct approach is to assess value *after* the point when a GCO has been agreed. In our response to the 2015 consultation we explained that in general market value of

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<sup>11</sup> Fazzari, S., R. G. Hubbard, and B. Petersen. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity*, 1 (1988), 141–195.

<sup>12</sup> Kaplan, S., and L. Zingales. "Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *Quarterly Journal of Economics*, 112 (1997), 169–215.

<sup>13</sup> Kothari, S., J. Llewellyn and J. Warner. "The Behavior of Aggregate Corporate Investment" Simon Business School Working Paper No. FR 14-18, Tuck School of Business Working Paper No. 2511268, MIT Sloan Research Paper No. 5112-14

<sup>14</sup> Djankov, S., T. Ganser, C. McLiesh, R. Ramalho and A. Shleifer. "The Effect of Corporate Taxes on Investment and Entrepreneurship" *American Economic Journal: Macroeconomics*, vol. 2, (July 2010), 31-64.

<sup>15</sup> Moody's: "Moody's downgrades BT's and EE's ratings to Baa2; stable outlook", 23 March 2018.

spectrum with a coverage obligation attached will be lower than spectrum without an obligation, reflecting the net costs of uneconomic coverage. We also set out in our response to the 2015 consultation how the GCO involves considerable costs to deliver and why the costs to EE and H3G are much greater than those of Telefónica and Vodafone, which if ignored by Ofcom would be discriminatory. These costs are what drives the reduction in licence value.

The MNOs' acceptance of the GCO are not simply part of the history: the operators agreed to extend geographic coverage in circumstances where they were under no obligation to do so, specifically on the basis that (inter alia) Ofcom would take this into account in setting ALFs. Although it later became apparent that Ofcom at that time was taking the view that ALFs should be set solely by reference to market value and thus that the GCO could only be relevant to the extent that it affected market value, that was not the common understanding of the MNOs at the time that they agreed to the GCO, and it has subsequently proved that Ofcom's understanding of its legal obligations was incorrect. Thus it is not an issue that Ofcom should address solely *ex post facto*.

It is striking that the only basis which Ofcom now advances for refusing to reduce ALFs to take account of the costs of implementing the GCO was that the GCO was a "voluntary commitment" and that other benefits to MNOs in terms of reforming the ECC were agreed at the same time. With respect, the logical inconsistency is glaring. The fact that the commitment was given voluntarily simply reflects the fact that, given the terms of EE's licence, it could not be imposed without EE's consent. It does not mean that the commitment was given gratuitously. By analogy, the fact that a contract is entered into voluntarily, does not mean that there are no obligations under it or that it is not reciprocal. Indeed, the fact that the acceptance of the GCO was part of a *quid pro quo* is clear from the very fact that Ofcom goes on to refer to the other benefits to the MNOs, in terms of reform to the ECC, which were agreed at the same time. It is wholly wrong and unfair of Ofcom now to refuse properly to do that which was promised, both by Government and by Ofcom, at the time of acceptance of the GCO, which is that Ofcom would consider adjusting ALFs to take account of the costs of implementing the GCO.

Ofcom has thus failed properly to consider the point that EE had a legitimate expectation on this point. The issue we raise relate to significant costs and incentives to make investments.

### ***The GCO as reason for setting ALFs below market value***

In the current consultation (para 5.96), Ofcom simply repeats its previous arguments given in its 2015 Statement (issued at the time when it also still maintained that it had only to consider the need to reflect full market value when setting fees and it did not consider the issue in the context of its wider duties). Ofcom concludes (para 5.96) that imposing ALFs at market value "does not have the effect of penalising mobile operators" and that it "does not consider that it is appropriate to reduce ALFs to reflect the incremental cost of the GCO". Ofcom also argues that the obligation was a voluntary commitment for which no compensation was offered when it was agreed, it rejects the suggestion that it or Government behaved "so as to create a substantial new cost to operators" and notes that Government did commit to reforming regulations relating to upgrading/sharing infrastructure access to sites.

Ofcom has failed to properly consider the impact of the GCO in setting ALFs, despite its note within the present consultation (para 5.95) reminding that in its Statement of September 2015 it had said that "...we are confident that through our February 2015 consultation and responses to it we have considered whether the GCO should impact future ALFs, taking account of the associated incremental costs incurred by the MNOs". The February 2015 consultation and September 2015

Statement made it abundantly clear<sup>16</sup> that Ofcom only considered whether the costs associated with the obligation affects the market value of the 900MHz and 1800MHz bands. Ofcom's Decision contained at Para 4.10 and 4.111 of its September 2015 Statement again makes it clear that its decision not to reduce the future level of ALFs in the light of the GCO is because it is unlikely to affect market value. Ofcom did not and has still not considered the impact of the costs of meeting the coverage obligation in relation to its wider statutory duties.

We maintain our view that the costs of meeting the GCO has damaged our ability to commit internal funds to network investments. Ofcom should adjust fees downwards to offset this consequence of the GCO and its adverse impact on our ability to invest. The benefits of doing so outweigh any downside of ALFs being below market value.

### ***Impact of GCO on competition and equal treatment between operators***

Ofcom discussed at paras 5.111 – 5.112 whether setting ALFs at market value will impact competition as a result of GCO costs being greater for some operators (EE/Three) than others (Telefónica/Vodafone). It concludes that it will not and that if it did exist the distortion would be due to the GCO not ALFs. Ofcom also considers that if the GCO did not exist the argument that different investments that improve competition would be made is not supported by evidence and that it relies on the argument that investment is adversely affected by reducing internal funds available for investment, which Ofcom also disagrees with.

However, this approach is wrong because it fails to consider two points.

First, as noted above, the GCO was only agreed on the basis that Ofcom would consider adjusting ALFs to take account of the costs of meeting the GCO. Thus it is wrong to consider the point solely *ex post facto* as though the GCO had been agreed irrespective of ALFs.

Secondly, Ofcom has failed to consider its obligation of equal treatment in respect of MNOs. Insofar as operators who do not have good access to sub-1 GHz spectrum incur greater net costs in meeting the GCO than those who do, the GCO affects MNOs differently. Ofcom's obligation of equal treatment extends not only to ensuring that like cases are treated alike but also that dissimilar cases are treated differently. Insofar as MNOs incur different levels of costs in meeting the GCO, it is appropriate to consider whether ALFs should be differentially adjusted to take account of those costs.

## **2.4 The future of ALFs**

Given our views that ALFs do not promote efficiency, inhibit spectrum trading and harm investment we instructed Brian Williamson on an appropriate way forward. In summary he suggests that (his full paper is appended at Appendix 1):

- The Government review the spectrum annual licence fees element of the Direction, in light of current priorities, with a view to rescinding this aspect of the Direction;
- The Government consider issuing a statement of strategic priorities to Ofcom under the Digital Economy Act 2017 setting out priorities in relation to investment in mobile infrastructure and a supporting policy environment.

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<sup>16</sup> For example Para 6.3 of the February 2015 Consultation [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0022/83146/annual-licence-fees-900MHz-1800-further-consultation.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0022/83146/annual-licence-fees-900MHz-1800-further-consultation.pdf) and para 4.3 of September 2015 Statement [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0033/79764/statement.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0033/79764/statement.pdf)

- Ofcom review the 2010 framework for spectrum pricing, in particular regarding the conditions under which explicit spectrum pricing should be imposed, having regard to the full set of circumstances in which spectrum users face the implicit price of spectrum.
- Ofcom put on hold the application of recurring spectrum fees in relation to 900 MHz and 1800 MHz spectrum, pending the outcome of the review of the 2010 framework for spectrum pricing.

Were ALFs to be retained, we believe that as a matter of policy, they could at least be used to solve mobile coverage issues. It is common ground that the mobile industry faces significant challenges in deploying coverage in uneconomic areas especially in hard to reach rural areas. Rather than extracting resource from the mobile industry we encourage Ofcom and Government to look at innovative ways in which the ALFs could be used to increase mobile coverage. We suggest that an appropriate means to achieving this could be through a mechanism whereby ALFs are rebated to operators that deploy in hard to reach rural areas that currently do not have coverage.

### 3 Our concerns with Ofcom's methodology and its application

Notwithstanding that Ofcom should re-assess its proposals in light of its wider duties, in this section we provide our views on the approach Ofcom has adopted to calculate ALFs for 1800 MHz spectrum.

#### 3.1 Lump sum value of 800 MHz and 2600 MHz in UK

The Direction requires fees payable for 900 MHz and 1800 MHz spectrum to reflect full market value, paying particular regard to sums bid in the UK auction of the 800 MHz and 2600 MHz bands. Ofcom previously established from its analysis of the 2013 auction that the lump sum values of 800MHz and 2600MHz spectrum (at 2013 prices) were:

- £33m per MHz (gross of DTT co-existence costs) for 800 MHz
- £5.5m per MHz for 2600 MHz

In the 2015 Statement Ofcom used these reference values (at 2013 prices) and scaled them using international benchmark data to produce lump sum values for 900 MHz (based on a ratio to 800 MHz value) and for 1800 MHz (using a distance method) before annualising these lump sums to derive a yearly fee commencing in 2015 (which starts and increases by CPI referenced back to 2013).

Ofcom now proposes to inflate the 2013 lump sum values derived from the 2013 auction by CPI to establish the lump sum values of 800 MHz and 2600 MHz today (2018). These values would form the first step in determining ALFs that are proposed to commence in 2018 (and would become inflated according to CPI in future years relative to the starting 2018 figure to form constant real payments).

Ofcom's proposal implicitly assumes that the nominal value of 800 MHz and 2600 MHz spectrum has increased since 2013 in line with general inflation and the real value of this spectrum has not changed. However, Ofcom has presented no evidence to support the assumption that 800 MHz and 2600 MHz have increased in nominal value by CPI. Nor has it provided any evidence that the real value has not changed. BT's and EE's independently audited financial statements show no change in the nominal value of spectrum arising from inflation. The adjustment to the value of spectrum in BT's balance sheet since 2013 is due to the acquisition of new spectrum and amortisation of existing licences. This implies that, according to BT's and EE's independently audited financial statements, the nominal value of 800 MHz and 2600 MHz spectrum has not changed since 2013.

Moreover, even if Ofcom were to apply some inflation adjustment to real values, we think it unlikely that the real value of 800 MHz and 2600 MHz spectrum would have remained constant since 2013.

A number of factors are likely to have reduced the real value, including: (i) increased supply of spectrum relative to 2013 expectations, leading to a lower number of sites that further spectrum can save (due to diminishing marginal returns); (ii) reduced data traffic projections compared to 2013 expectations, again reducing the number of sites saved by additional spectrum compared to 2013 expectations; and (iii) technology improvements leading to decreasing equipment costs and operational efficiencies. These factors are discussed in more detail below.

### ***Supply of spectrum has increased significantly beyond that anticipated in 2013***

Ofcom dismissed this issue in 2015<sup>17</sup> however there is now more compelling evidence to indicate that expectations in 2013 regarding future spectrum would have been substantially different to those of today.

- In the case of 800 MHz, there is now clarity that 700 MHz band will be available by 2020 and that the 700 MHz centre gap spectrum will now be awarded for SDL rather than other purposes.
- In the case of 2600 MHz, a band of interest mainly for capacity, the availability of new TDD bands at higher frequencies, which are technically best suited for such 5G technology and deployable now (a point explained in section 3.2.8 below) or firmly planned to be made available within the next few years.

The changed situation on expected spectrum availability means the market value of 800MHz and 2600MHz spectrum if assessed today could be reduced compared to the market value back in 2013.

### ***Mobile data traffic rate of growth shows signs of slowing***

Ofcom discusses past and future mobile data growth within the consultation (at para 4.39) and states “Over the last five years, demand for mobile capacity has grown at a cumulative annual rate of more than 50%, and we expect this sort of increase in demand to continue”.

Our own experience is that the rate of growth in mobile data shows signs of slowing given a mature mobile data customer base and we are considering a [3%] growth rate in our internal forecasts for the next few years. In 2016 our mobile data traffic growth reduced to [3%] from [8%] the year before but then increased back to [8%] in 2017. The most recent mobile forecast by Ericsson predicts a growth in mobile data traffic in Western Europe of 36% CAGR for the period 2017-2023<sup>18</sup>. Other commentators have also suggested that growth rates will slow or are slowing in mature markets<sup>19</sup>.

The relevant issue, in terms of how traffic growth predictions may affect the assumed real market value of the 800/2600MHz spectrum, is whether the traffic forecasts an MNO would use today to value the spectrum would differ from those used at the time of the auction. We contend that the slowing in growth rate of mobile data traffic observed since 2013 would indicate that this factor may tend to reduce forward looking real value today.

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<sup>17</sup> 2015 Statement Annex 9 (A95-A9.35)

[https://www.ofcom.org.uk/data/assets/pdf\\_file/0017/80711/annual-licence-fees-annexes\\_9-11.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0017/80711/annual-licence-fees-annexes_9-11.pdf)

<sup>18</sup> Ericsson Mobility Report, June 2018, page 35 <https://www.ericsson.com/assets/local/mobility-report/documents/2018/ericsson-mobility-report-june-2018.pdf>

<sup>19</sup> For example LS Telecom Report on “When will exponential mobile growth stop?”, October 2017. [https://www.lstelcom.com/fileadmin/content/marketing/news/2017\\_LStelcom\\_Report\\_WhenWillExponentialMobileGrowthStop.pdf](https://www.lstelcom.com/fileadmin/content/marketing/news/2017_LStelcom_Report_WhenWillExponentialMobileGrowthStop.pdf)

Given the magnitude of the increases in spectrum availability described above and the decline in mobile data growth, it seems unlikely that the value of 800 MHz and 2600 MHz spectrum has remained unchanged in real terms.

### ***Technology improvements lead to decreasing equipment costs and operational efficiencies***

As set out above, the value of additional spectrum partly depends on the level of avoided costs for network equipment that absent the additional spectrum would have been required to achieve the same level of coverage and network quality. EE's experience shows, consistent with Ofcom's own Mobile Call Termination cost model, that equipment costs decrease over time and that technology improvements lead to improved efficiencies and lower operational costs. Consequently, the value of avoided network equipment costs may have decreased since 2015, in real terms.

### ***Proposed conclusion on lump sum 800 MHz and 2600 MHz UK values at today's prices***

Given the complexity of factors affecting the market valuation of spectrum over time, it is difficult to estimate a precise value by which the 2013 nominal lump sum values should be adjusted. It is clear, however, that assuming constant real values is an over simplification, in particular in light of there being more recent UK auction and trading evidence suggesting values could be much lower (as set out in section 3.2.7).

To assume an increase in the nominal value of 800 MHz and 2600 MHz bands, when more recent auction evidence from the auction of 2300 MHz would suggest otherwise, seems fundamentally at odds with Ofcom's stated aim of adopting a conservative approach.

## **3.2 Derivation of 1800MHz lump sum value from international benchmarks**

### ***3.2.1 Our views on Ofcom's methodology***

In principle we consider that the distance method to estimate UK 1800 MHz lump sum value is still a valid approach. However, the limitations of this method need to be considered more fully, more so as some of the auction data is now up to 8 years old and technological developments would have affected the relative value of bands on a forward looking basis.

Although many international auctions are considered in the benchmarking work, in practice Ofcom has actually used very few (those it considers as "Tier 1") in justifying its proposed UK lump sum value. The inclusion of just one new auction result (Denmark, a data point we disagree with as explained below) appears to contribute around £1m of the £2m per MHz increase Ofcom proposes since its 2015 decision (the balance of approximately £1m resulting from inflating the UK Lump Sum Values by CPI since 2013). A £1m/MHz increase constitutes a 7% increase of the UK 1800MHz fees (£143m 20 year NPV). This illustrates just how sensitive the analysis is to a single auction result and this is in itself a concern.

Our specific concerns with Ofcom's proposed 1800MHz lump sum value of £15m/MHz are explained in the following sections. These include the appropriateness of the added Denmark benchmark; the omission of other relevant recent auction results (e.g. Greece 2017); concerns with some other country benchmarks; and the inconsistent and seemingly selective approach to designating auction results as Tiers 1, 2 or 3, leading to skewed Tier 1 results dominated by two outliers and the effective disregard of other relevant results relegated to Tiers 2 and 3. Also the consideration of other cross checks, including other recent UK market information, suggests that Ofcom should take a more conservative approach and should select a lower estimate of full market value of 1800MHz, particularly in view of the asymmetric risks of setting too high ALFs.



### 3.2.2 Concerns with inclusion of the new Danish benchmark

The distance benchmarks can only be as reliable as the three auction results used to calculate them, for Denmark namely the 2600MHz in 2010, the 800MHz in 2012 and the 1800MHz in 2016. These auctions span some 6 years and the number of operators / bidders in these auction has changed over time.

The Danish 2016 1800MHz distance method benchmark<sup>20</sup> is clearly an outlier. We note the exceptionally low price in 2012 of the 800MHz and high price in 2010 of the 2600MHz when compared to other countries and the large difference in the two sets of 1800MHz prices from 2010 (when there was only one bidder) and 2016 (when some lots had a coverage obligation).

Our concern with inclusion of the Danish benchmark as a Tier 1 result stems from the unreliability of the Danish 800MHz data point and the inconsistent treatment of coverage obligations imposed on the 800 MHz spectrum and parts of the 1800 MHz spectrum. Ofcom seems not to have appreciated and has not properly taken this into account in its consideration of the Denmark 2016 benchmark.

Ofcom previously considered that “On balance, we considered that the absolute 800 MHz price in Denmark carried an unknown risk of understatement of Danish market value of unknown scale”<sup>21</sup>. Accordingly it did not therefore use it previously to influence the 900/800MHz ratio (it put it as a Third Tier, where it still remains in the latest consultation in respect of 900MHz benchmarking). However, for the purpose of the 1800MHz distance benchmark, Ofcom now proposes to use the same 800MHz result, despite the unknown risk of being too low, to derive a Tier 1 benchmark to determine the distance of 1800MHz value relative to 800MHz and 2600MHz.

Aside from the concern that Ofcom already identified a risk in relation to 800MHz understatement of value, Ofcom does not even discuss the risk of understatement in the Danish 800MHz benchmark arising from its inclusion of a coverage obligation (see paragraph A4.45 of the consultation where Ofcom only mentions the Telenor-Telia joint venture as an 800 MHz understatement risk). It would suggest that the risk of understatement in the Danish 800 MHz benchmark is even more significant than assumed by Ofcom.

In fact, the Danish 800MHz benchmark is at significant risk of understatement and is therefore not representative of market value. Quotes from Ofcom’s consultants, DotEcon<sup>22</sup>, in the context of the 800MHz award describe the coverage obligation as “demanding” and “fairly onerous” and state that *“...by enforcing bids that could fulfil the coverage obligation as a pre-condition for participating in the auction, and only selecting outcomes in which the coverage obligation was fully met. **The low licence prices are thus simply a feature of these restrictions**”*

The summary table A4.7 exemplifies our concern: if the 800MHz number carries a risk of understatement and the 1800MHz a risk of overstatement (identified by Ofcom) with no risk identified for 2.6GHz, then the distance method benchmark must carry a larger risk of larger overstatement, not a “risk of over or under-statement”.

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<sup>20</sup> We checked the Danish calculation in detail but couldn’t replicate the 800MHz value in the Table A4.7.

<sup>21</sup> Para 8.185 of Annex 8 to Ofcom’s provisional decision and further consultation of 19 February 2015. [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0023/78323/annual-licence-fees-annex\\_8.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0023/78323/annual-licence-fees-annex_8.pdf)

<sup>22</sup> See: <https://www.dotecon.com/publications/digital-dividend-the-danish-way/>



With regard to the Danish 1800 MHz benchmark Ofcom considered only lots without a coverage obligation (“B lots”) to eliminate the risk of understatement. Since Ofcom does not have this option for the Danish 800 MHz benchmark it applied the Danish 1800/800 ratio to the UK 800 MHz value with a coverage obligation. This assumes that the Danish 800 MHz coverage obligation had a similarly low cost as the coverage obligation imposed on 800 MHz in the UK one (which is not true, as demonstrated by the above quotes). We dispute this inherent assumption, based on DotEcon’s assessment of the Danish 800 MHz auction above. We also note that, in the UK, O2 bid largely the same amount for 800 MHz spectrum with and without the UK coverage obligation.

In view of the above considerations, Ofcom should therefore either:

- relegate this Danish benchmark to a lower tier since the 800MHz price is not reflective of market value and there can be no presumption that the cost of the coverage obligation on the Danish 800 MHz is equivalent to that on the UK 800 MHz; or
- use the 1800MHz “all lots” result to derive the ratio for 1800/800 MHz and apply that ratio to the UK 800 MHz value excluding the coverage obligation. In other words the impact on value of the 1800MHz Danish coverage obligation is a better proxy than the UK 800MHz coverage obligation for the impact on value of the Danish 800MHz coverage obligation. This is likely to reduce the asymmetric risk of large overstatement for the UK 1800 MHz distance benchmark, meaning it could potentially remain in Tier 1.

### *3.2.3 Other relevant new international benchmarks not considered*

#### **Greece**

Ofcom has overlooked the recent Greek auction of 1800 MHz that concluded in November 2017. This new data point, taken with the existing data points from 2014 for 800 MHz and 2600 MHz, enables a new distance benchmark (Greece 2017) to be added to the international benchmarks. This would be an improved benchmark relative to the previous Greece benchmark as, unlike for the previous 1800 MHz data point from 2011, the 1800 MHz spectrum sold above the reserve price in this recent auction.

If we apply the same calculation methodology Ofcom has used for other countries (and for now assume Ofcom does inflate the UK 800MHz and 2600 MHz values derived from the 2013 auction data to 2018 values using CPI), the new benchmark provides both a distance method value and an absolute value (as part of a cross-check) as follows:

- Distance method UK value is £12.3m per MHz
- Absolute UK value is £13.5m per MHz

BT proposes that the Greek benchmark should be added. This new Greek 1800 MHz auction result provides a clear and recent 1800 MHz market value benchmark. It is a good market driven benchmark and the absolute value should have high importance attached to it in any cross-check. The resulting distance method benchmark has some uncertainties because of the previous 800 MHz and 2600 MHz awards sold at reserve price, although these are of unknown scale and direction. We believe the Greece 2017 benchmark could be considered as a Tier 1 or Tier 2 benchmark and should certainly be consistent with the Tier choice for Denmark which also has limitations (but noting that for the B-lots case we think that should be Tier 2 at best).

#### **Czech Republic**

The 1800 MHz and 2.6 GHz auction in June 2016 provides an additional “Czech Rep. (2016)” benchmark when used with the 800 MHz and 2600 MHz data points from the previous Czech Republic auction of 2013.

Two 2x2.9 MHz and two 2x5 MHz lots in the 1800 MHz band were available, as well as one 2x10 MHz and two 25 MHz (TDD) lots in the 2.6 GHz band.

Only the total price paid by each MNO has been reported; this makes it difficult to extract a reliable 2.6 GHz benchmark. However, Vodafone only won 2x5 MHz in the 1800MHz band, allowing a reliable price to be extracted in this case. This 1800 MHz benchmark appears robust and has an absolute value of GBP18.1m per MHz, which can be used as part of Ofcom's cross-check.

A distance method benchmark is best calculated using the previous 2.6 GHz (and 800 MHz) benchmarks, along with the new 1800 MHz benchmark; this yields a value of £14.6m per MHz.

We consider there is a strong case for this benchmark being Tier 1 (the Tier 3 designation for the older Czech benchmark was mostly due to perceived deficiencies with the previous 1800 MHz auction).

### **Sweden**

We note there has been a further 1800 MHz auction in 2016 in Sweden, which Ofcom have not included. The award was a first price single round sealed bid auction, with only one operator choosing to bid (H3G). The auction gives an absolute UK 1800 MHz value of £8.4m per MHz (and implied distance method benchmark of GBP15.2m per MHz). Since this was a single round auction, the value of the sealed bid could not have reflected a lack of competition.

Whilst Ofcom may not put much weight on this result, it is noteworthy that only one operator chose to bid for new 1800 MHz spectrum (2x10 MHz) at a modest reserve price. This suggests that the market value for additional 1800 MHz spectrum in Sweden is low.

This result also suggests that the previous 1800 MHz price, which Ofcom derives a Tier 1 distance method benchmark from, is more likely than previously thought to be an overstatement of market value in Sweden (of potentially larger scale) – in fact Ofcom currently considers it to be a smaller understatement. On this basis, Ofcom should be particularly conservative in setting the 1800 MHz lump sum value with regard to the existing Tier 1 Swedish benchmark (for which we also detailed other concerns with in section 3.2.4 below).

### **Turkey**

In its September 2015 statement, Ofcom considered the August 2015 multi-band award in Turkey<sup>23</sup>. Ultimately Ofcom excluded this benchmark on the basis that no UK operator asked for it to be included and that the evidence would be considered "Tier 3 at best" and therefore wouldn't make a difference to Ofcom's conclusions

Now that Ofcom is including additional data points, Turkey should be fully considered and incorporated appropriately.

Looking at the auction information we have calculated the following benchmarks:

- Distance benchmark UK 1800 MHz value of £4.4m/MHz
- Absolute benchmark UK value of £7.0m/MHz

We acknowledge that this award may be considered Tier 3 evidence because: the 800 MHz value is based on reserve prices with spectrum caps (i.e. not market driven). In its 2015 statement Ofcom also notes that the spectrum caps mean that 'incremental price' analysis is needed for the 1800 MHz

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<sup>23</sup> 2015 Statement Annex 8 Section A8.956

[https://www.ofcom.org.uk/data/assets/pdf\\_file/0032/78629/annex\\_8.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0032/78629/annex_8.pdf)

and 2.6 GHz, which shows the 2.6 GHz to have higher incremental value than the 1800 MHz. This contradicts Ofcom's view of relative valuations of these two bands in the UK. However, this pre-conceived view of relative valuations appears to be based on two main considerations:

- First, that the 1800 MHz has more favourable propagation characteristics
- Second, that the benchmarks (8 out of 9 in September 2015) support this assumption – the exception being Denmark

With regard to the first consideration, the evidence from recent UK spectrum acquisitions (1.4 GHz, 2.3 GHz, 3.4 GHz) shows that the situation can be more nuanced (discussed further in section 3.2.7).

With regard to the second, in 2015 Ofcom suggested that the Swedish 2.6 GHz benchmark did not represent relevant evidence because it did not accord with the axiom that 1800 MHz must be more valuable than 2.6 GHz. Now, in relation to the Turkish auction, Ofcom argues that the benchmark is not relevant to forward-looking market value in the UK because it again breaks Ofcom's axiom that 2.6 GHz must be less valuable than 1800 MHz. This is problematic because Ofcom's evidence supporting this axiom is in part that benchmarks support it; however, whenever a benchmark does not support it, Ofcom argues that the benchmark is inadmissible because it breaks the axiom.

There is a circularity of argument here. Evidence should not be excluded because it does not conform to Ofcom's pre-conceived view.

This is all in stark contrast to Ofcom's approach in relation to 900 MHz and 1800 MHz: in auctions where 1800 MHz has sold for a greater amount than 900 MHz Ofcom appears to view this as evidence that the values of these two bands are converging. In fact, there appears no more reason to assume that 1800 MHz having greater value than 900 MHz in some markets is any more reasonable than 2.6 GHz having greater value than 1800 MHz in others. Any arguments about the LTE ecosystem in the 900 MHz band not being developed are certainly not applicable on a forward-looking basis.

In the case of Turkey, what we can discern is that 1800 MHz is at best the same value and arguably lower value than 2.6 GHz – this is based on evidence from bids in the same auction where bidders traded off one band against the other. However, even though the 800 MHz band does not provide a market driven price Ofcom should not exclude this potentially important benchmark entirely on the grounds that it is inconsistent with its presumption that 1800 MHz spectrum must be more valuable than 2600 MHz. This demonstrates an inherent problem with Ofcom's framework for deriving Lump Sum Values based on its tiering approach.

### *3.2.4 Concerns with other country benchmarks*

#### ***Austria***

We have previously noted the limitations of the Austrian auction and have now looked further at some of the details. This was a combinatorial auction where a breakdown of prices by band wasn't available. We remain uncomfortable that Ofcom has given this Tier 1 status and so put extra weight on the benchmark compared to some other countries, distorting the end conclusion of the UK benchmark value for 1800 MHz (upwards). We note that Telekom Austria Group, which won 50% of the spectrum in the auction of 800 MHz, 900 MHz and 1800 MHz in 2013, commented at the time that the prices were high due to "internationally unique intransparency (*sic*) paired with high reserve

prices and increments”<sup>24</sup>. Strategic behaviour leading to high prices was clearly an issue as also noted by the Austrian regulator RTR in the quote below. Ofcom should re-consider moving this benchmark to Tier 2.

*“The three bidders [in the Austrian 2013 auction sealed-bid stage] actually submitted a total of more than 4,000 supplementary bids. More than 65% of these supplementary bids were submitted for the largest permissible combinations of frequency blocks, with a share of some 50% of available frequencies. In addition, the bidders utilised almost to the full the price limits that had applied to these large packages during the sealed-bid stage. On the other hand, price limits for smaller packages were at times only utilised to the extent of between 60% and 70%. These supplementary bids submitted on large frequency packages had a significant effect on the prices offered by the other bidders. At the same time, such bids generally only have a marginal likelihood of winning out in the end. If these bids for very large numbers of frequencies had been ignored when determining the winners and prices, the revenue from the auction would have settled at a level of about EUR 1 billion.”*

Source: RTR, press release titled “Result of the 2013 multiband auction driven by consistently offensive bidding strategy on the part of all three contenders”, 28 October 2013<sup>25</sup>

### **Sweden**

In 2015 Ofcom suggested that the Swedish 2.6 GHz benchmark did not represent relevant evidence because it did not accord with the axiom that 1800 MHz must be more valuable than 2.6 GHz. This was supplemented by Ofcom’s view that the timing of the Swedish 2.6 GHz award in 2008 meant that little was known about the ecosystem, and led Ofcom to prefer using a ‘proxy’ for the Swedish 2.6 GHz value, rather than the actual award data (resulting in a materially higher distance method benchmark for, Tier 1, Sweden). EE has previously argued that this proxy value (average based on benchmarks in other markets) is less appropriate than actual data, albeit from 2008, and that if a proxy is needed, Sweden should not be seen as Tier 1 evidence. The evidence from the recent UK auctions (discussed further in section 3.2.7) and the 2015 Turkish auction both indicate that spectrum value does not necessarily fall with rising frequency. This gives further weight to the view previously expressed by EE that it is not appropriate to class the Swedish auction as Tier 1 while ignoring the 2.6 GHz auction result and replacing it with a proxy value. We therefore propose to move the Swedish distance method benchmark to Tier 2.

### **3.2.5 Concerns with selective use and interpretation of international benchmarks**

In addition to our proposals above, in which we identify auctions Ofcom appears to have overlooked and propose adjustments to tiering, we also have particular concerns about the way the benchmarks are interpreted.

Ofcom has interpreted the set of international benchmarks of 1800 MHz distance method prices taken from other European countries and has arrived at a result that we believe is too heavily

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<sup>24</sup>

[https://cdn1.telekomaustria.com/final/de/media/pdf/TKA\\_acquires\\_austrian\\_spectrum\\_Presentation.pdf](https://cdn1.telekomaustria.com/final/de/media/pdf/TKA_acquires_austrian_spectrum_Presentation.pdf)

<sup>25</sup> <https://www.rtr.at/en/pr/PI28102013TK>

skewed by two countries for which we are concerned that the auction benchmarks are unrepresentative due to the circumstances of those auctions., i.e. Austria and Denmark.

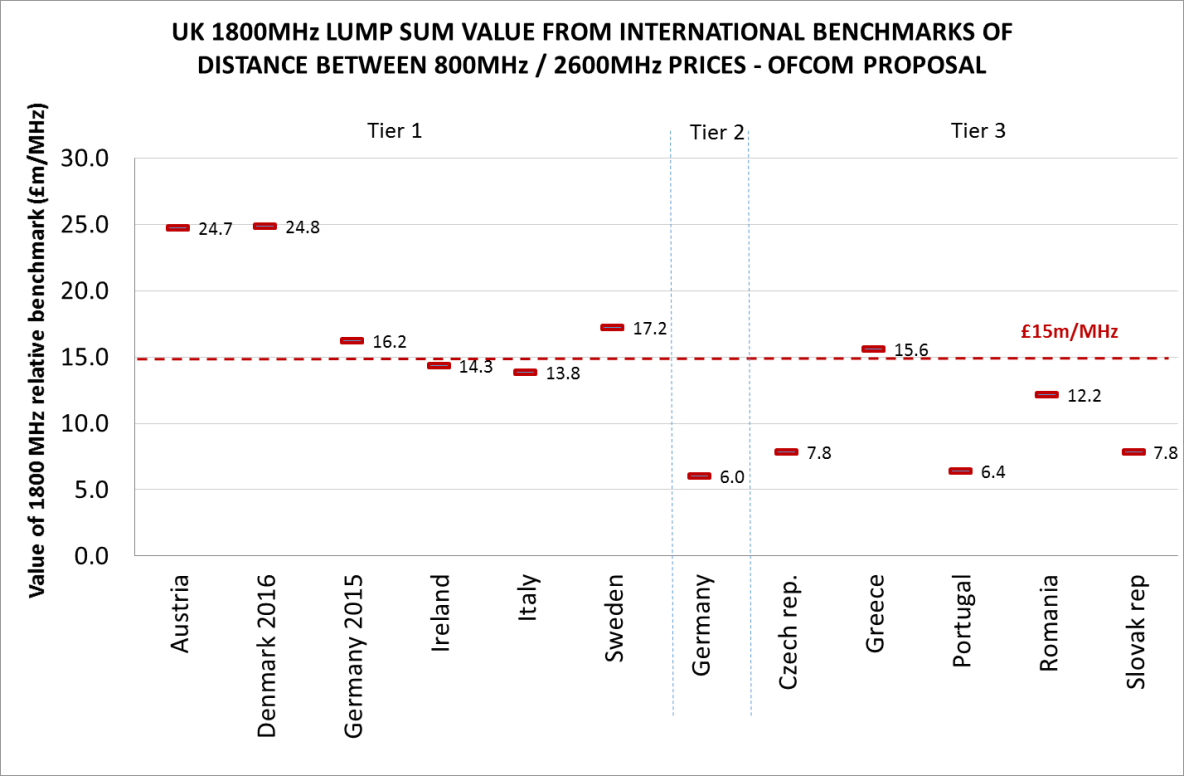
A further concern is that some of the auctions that Ofcom uses for its benchmarking exercise are now 8 years old, and in some cases for a given country different auctions spaced many years apart are compared. The market and economic conditions may have changed in this period and so this calls for a conservative approach in assessing the information given the asymmetric risks and harm of over estimating UK market values for ALFs.

The availability of additional new auction data points and other evidence we have now provided, including analysis of UK spectrum auctions and trades, and technology developments, calls for a more cautious interpretation of the international benchmarks.

**Existing Ofcom proposal for 1800 MHz Lump Sum Value using distance benchmark**

Ofcom has categorized the countries for which an 1800 MHz distance method price benchmark can be calculated within three Tiers, as illustrated in Figure 3 and Table 1 below.

**Figure 3**



**Table 1**

1800 MHz lump sum value (from distance benchmarks) as proposed by Ofcom						
Tier 1	£m/MHz	Tier 2	£m/MHz	Tier 3	£m/MHz	
Austria	24.7	Germany	6.0	Czech rep.	7.8	
Denmark 2016	24.8			Greece	15.6	
Germany 2015	16.2			Portugal	6.4	
Ireland	14.3			Romania	12.2	
Italy	13.8			Slovak rep	7.8	
Sweden	17.2					
<b>Averages</b>			<b>6.0</b>		<b>9.9</b>	<b>All Tiers</b>
Max	24.8		6.0		15.6	18.5
Min	13.8		6.0		6.4	6.0

Midpoint of Tier 1 average and Tier 1 lowest	16.2	Ofcom's selected point within range between T1 midpoint and T1 lowest	15
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Ofcom explains its approach to interpreting the 1800 MHz distance benchmark information in section 4.42-4.47 of the consultation. Ofcom ultimately proposes to use a value of £15m/MHz as the lump sum value of 1800 MHz, based on its judgement to pick a number from within the range between the Tier 1 midpoint and lowest reference values.

Ofcom considers the Tier 2 benchmark but dismisses it because there is a risk of understatement and there is another German Tier 1 value. Ofcom acknowledges that four (i.e. all but one) of the Tier 3 benchmarks is below the £15m/MHz proposed value, but dismisses these Tier 3 benchmarks on the basis that they “do not provide a sufficient basis” for adjusting the lump sum estimate derived from the Tier 1 benchmarks. In other words, Tier 2 and 3 benchmarks have no impact whatsoever on Ofcom’s proposed valuation of 1800 MHz spectrum, begging the question of why Ofcom considered identified Tier 2 and 3 benchmarks in the first place. It also casts doubt on the objectivity of Ofcom’s approach, given that the higher benchmarks consistently appear in Tier 1.

Ofcom has considered other cross-checks of the 1800 MHz distance benchmark conclusion using the new data from Norway and Denmark. Ofcom considered cross checks of absolute values, 1800 MHz / 900 MHz ratio and averages across Tiers. It concluded that none of its cross-checks give a reason to amend the £15m/MHz value selected from the Tier 1 distance benchmarks, casting doubt on the value of Ofcom’s cross-checks.

Below, we propose a pragmatic alternative approach that calculates weighted averages across all Tiers, assigning progressively lower weights to Tiers 2 and 3. We also propose a broader range of cross-checks, the results of which challenge the robustness of Ofcom’s estimates.

#### ***BT’s alternative proposal for 1800 MHz Lump Sum Value from distance benchmarks***

In the preceding sections we presented some new auction data that we consider to be relevant to Ofcom’s task and should be considered when estimating the UK 1800MHz Lump sum value using distance benchmarks. The new data is for Greece (2017), Czech Republic (2016) and Turkey (2015).

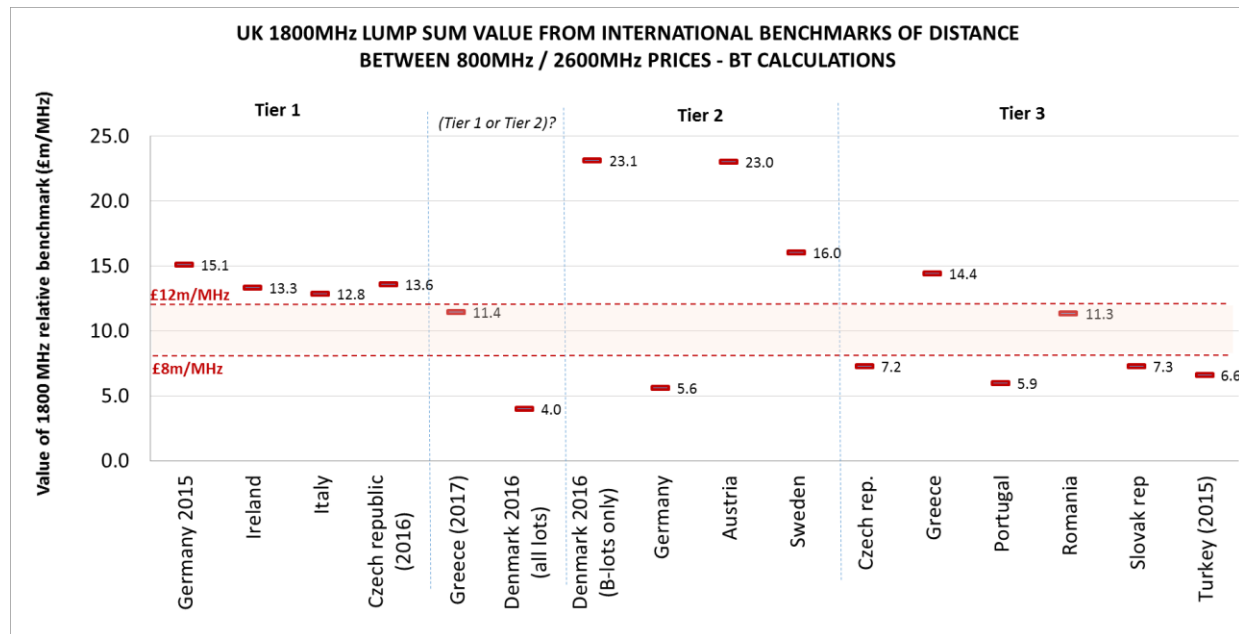
We think the Czech Republic (2016) meets the Tier 1 criteria, whereas Turkey (2015) is Tier 3. Greece (2017) should be treated similarly to Denmark 2016 and could be Tier 1 or Tier 2 (both should be in the same Tier, assuming that the Danish benchmark is derived using the 1800 MHz benchmark based on ‘all lots’). We are less confident in the Danish benchmark if derived, as Ofcom has done, using an 1800 MHz based only on the B lots, as explained above, and consider that such a benchmark should be assigned, at best, Tier 2 status. This is reflected in the options put forward in our alternative proposals below.

As also set out above, we think that Austria and Sweden should be moved from Tier 1 to Tier 2.

Our proposal as to how the new and changed 1800 MHz distance benchmarks should be interpreted is illustrated in Figure 4 and Table 2a, 2b and 2c below.

The proposals below are based on using the 800 MHz and 2600 MHz reference values at their 2013 prices, in line with our views expressed in section 3.1.

**Figure 4**



Ofcom has said it seeks to adopt a conservative approach where alternative, equally-valid methods for setting the level of ALFs are available. In paragraph 5.16 a) (iii) of the 2018 consultation, Ofcom says:

*“While there is a risk of inefficiency from spectrum lying fallow if ALFs were too high, there are a number of reasons why this risk may be limited. However, on balance this risk may be greater than the risk that efficiency-improving changes would not occur if ALFs were too low. We have addressed this risk to the optimal use of spectrum by taking a conservative approach when interpreting the evidence, given the uncertainty about the correct estimates for market value in the 2015 Statement (paragraphs 5.63 and 5.65).”*

Source: Ofcom, “Annual Licence Fees for 900 MHz and 1800 MHz frequency bands”, 8 June 2018, paragraph 5.16 a) (iii)

Mindful of the need to take a conservative approach in view of the risks of wrongly estimating the value and the harm that an over estimate will cause, and notwithstanding our disagreement with Ofcom’s overall approach, within the confines of the framework it has adopted we agree with Ofcom’s proposed approach to focus on the interval between the average and lowest value of each Tier. However, we do not agree that it makes sense to (in effect) exclusively consider the Tier 1 benchmarks. Paragraph 4.26 of the 2018 consultation suggests that Tier 3 is without any informative value to UK spectrum values. If this was the case, then there would be a clear case for ignoring Tier 3 (but not Tier 2). However, this isn’t how Ofcom has applied its tiering approach in practice: Ofcom actually placed some benchmarks in Tiers 1, 2 and 3 and other benchmarks in no tier at all, because they were deemed to be irrelevant. This implies that Tier 3 benchmarks must still have *some* informative value, a case in point being Turkey, as explained above. We therefore propose a refined



approach that takes the weighted average of the midpoints of the average and lowest value of each Tier, weighting these in a Tier 1 : Tier 2 : Tier 3 ratio of 2 : 1 : 0.5<sup>26</sup>.

Noting the different possibilities for how the Greece 2017 and Denmark (2016) benchmarks could be considered, we set out below four Options in our illustration below:

- Option 1 treats Greece (2017) and Denmark 2016 (all lots) as Tier 1
- Option 2 treats Greece (2017) and Denmark 2016 (all lots) as Tier 2
- Option 3 treats Greece (2017) and Denmark 2016 (B lots only) as Tier 2.
- Option 4 treats Greece (2017) as Tier 1 and Denmark 2016 (B-lots only) as Tier 2.

In all the options we have added the new Czech Republic (2016) result as Tier 1 and the new Turkey (2015) result as Tier 3, and have moved Austria and Sweden to Tier 2.

**Table 2a**

<b>Option 1</b>						
<b>1800 MHz lump sum value (from distance benchmarks) as proposed by BT</b>						
	<b>Tier 1</b>	<b>£m/MHz</b>	<b>Tier 2</b>	<b>£m/MHz</b>	<b>Tier 3</b>	<b>£m/MHz</b>
	Denmark 2016 (all lots)	4.0	Germany	5.6	Czech rep.	7.2
	Germany 2015	15.1	Austria	23.0	Greece	14.4
	Ireland	13.3	Sweden	16.0	Portugal	5.9
	Italy	12.8			Romania	11.3
	Greece (2017)	11.4			Slovak rep	7.3
	Czech republic (2016)	13.6			Turkey (2015)	6.6
<b>Averages</b>		<b>11.7</b>		<b>14.9</b>		<b>8.8</b>
<b>Max</b>		<b>15.1</b>		<b>23.0</b>		<b>14.4</b>
<b>Min</b>		<b>4.0</b>		<b>5.6</b>		<b>5.9</b>
Midpoint of average and minimum		7.8		10.2		7.4
Weighted average (2 : 1 : 0.5) of Tier midpoints			8.4			

<sup>26</sup> This ratio was used by Ofcom as an illustration in Annex 7 to Ofcom's 2015 Statement, following MNOs' suggestions, although ultimately Ofcom decided not to use a weighting approach.



Table 2b

<b>Option 2</b>						
<b>1800 MHz lump sum value (from distance benchmarks) as proposed by BT</b>						
	Tier 1	£m/MHz	Tier 2	£m/MHz	Tier 3	£m/MHz
	Germany 2015	15.1	Germany	5.6	Czech rep.	7.2
	Ireland	13.3	Austria	23.0	Greece	14.4
	Italy	12.8	Sweden	16.0	Portugal	5.9
	Czech republic (2016)	13.6	Greece (2017)	11.4	Romania	11.3
			Denmark 2016 (all lots)	4.0	Slovak rep	7.3
					Turkey (2015)	6.6
						<b>All Tiers</b>
<b>Averages</b>		<b>13.7</b>		<b>12.0</b>		<b>8.8</b>
Max		15.1		23.0		14.4
Min		12.8		4.0		5.9
Midpoint of average and minimum		13.3		8.0		7.4
Weighted average (2 : 1 : 0.5) of Tier midpoints			10.9			

Table 2c

<b>Option 3</b>						
<b>1800 MHz lump sum value (from distance benchmarks) as proposed by BT</b>						
	Tier 1	£m/MHz	Tier 2	£m/MHz	Tier 3	£m/MHz
	Germany 2015	15.1	Germany	5.6	Czech rep.	7.2
	Ireland	13.3	Austria	23.0	Greece	14.4
	Italy	12.8	Sweden	16.0	Portugal	5.9
	Czech republic (2016)	13.6	Greece (2017)	11.4	Romania	11.3
			Denmark 2016 (B-lots only)	23.1	Slovak rep	7.3
					Turkey (2015)	6.6
						<b>All Tiers</b>
<b>Averages</b>		<b>13.7</b>		<b>15.8</b>		<b>8.8</b>
Max		15.1		23.0		14.4
Min		12.8		5.6		5.9
Midpoint of average and minimum		13.3		10.7		7.4
Weighted average (2 : 1 : 0.5) of Tier midpoints			11.7			

Table 2d

<b>Option 4</b>						
<b>1800 MHz lump sum value (from distance benchmarks) as proposed by BT</b>						
	Tier 1	£m/MHz	Tier 2	£m/MHz	Tier 3	£m/MHz
	Germany 2015	15.1	Germany	5.6	Czech rep.	7.2
	Ireland	13.3	Austria	23.0	Greece	14.4
	Italy	12.8	Sweden	16.0	Portugal	5.9
	Czech republic (2016)	13.6	Denmark 2016 (B-lots only)	23.1	Romania	11.3
	Greece (2017)	11.4			Slovak rep	7.3
					Turkey (2015)	6.6
						<b>All Tiers</b>
<b>Averages</b>		<b>13.2</b>		<b>16.9</b>		<b>8.8</b>
Max		15.1		23.1		14.4
Min		11.4		5.6		5.9
Midpoint of average and minimum		12.3		11.3		7.4
Weighted average (2 : 1 : 0.5) of Tier midpoints			11.3			

We conclude that the UK lump sum value of 1800 MHz should be considerably lower than the value Ofcom has proposed. The four Options we have looked at suggest a value in the range £8m - £12m / MHz.

We think that this range is reasonable considering the absolute values of 1800 MHz from international benchmarks, the 1800 / 900 MHz ratios and the averages of the three tiers. The range is consistent with another cross check that we discuss further in chapter 3.2.6, namely how the UK 1800 MHz value would fit if the distance method were applied using 900 MHz and 2600 MHz international data, along with Ofcom's proposed UK 900 MHz Lump Sum Value (and the UK 2600 MHz auction benchmark).

### *3.2.6 Sense check of 900 MHz and 1800 MHz relative UK values*

#### ***Practical implication of the proposed relative 900 MHz and 1800 MHz values***

There is unfortunately no available evidence of market value from trades in the UK for 900 MHz and/or 1800 MHz spectrum<sup>27</sup> that Ofcom can draw on. However, Ofcom must carefully consider whether it believes that in a UK scenario, where two of the four UK national MNOs each have less than 8% of available sub-1GHz spectrum, sufficient for just a single 2x5 MHz LTE carrier, the proposed ratio of estimated market value of 1800 MHz to 900 MHz of £15m/MHz to £19m/MHz (79%) would be considered a realistic estimate? This would imply that Vodafone or Telefónica would be willing to swap 2x10MHz of 900 MHz for 2x13MHz of 1800 MHz. BT encourages Ofcom to explore this.

#### ***Ofcom's proposed ratio of values of 800 MHz to 900 MHz to 1800 MHz seem implausible***

The price ratio of £35.5m : £19m : £15m per MHz for the bands 800 : 900 : 1800 MHz looks odd when considering the technical properties of these spectrum bands and the technologies available and suggests a problem in the suitability of the reference and benchmark data and/or how Ofcom has chosen to interpret it.

The 800 MHz and 900 MHz are immediately adjacent bands and have very similar technical properties in terms of radio propagation characteristics, yet Ofcom estimates the 900 MHz value to be about half (53%) of the 800 MHz value. Unlike in 2015 when Ofcom last considered this issue, LTE900 technology is now widely available from network equipment suppliers and is supported in devices. LTE900 networks are now deployed in several European countries, e.g. Germany<sup>28</sup>, Czech Republic<sup>29</sup> and The Netherlands<sup>30</sup> and dynamic sharing of GSM and LTE at 900 MHz has been reported in Turkey<sup>31</sup>. In light of the above it would seem more likely that the value of 900 MHz

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<sup>27</sup> The specific circumstances of the trade of 2x15MHz of 1800 MHz spectrum from EE to Three in relation to discharging a commitment associated with the T-Mobile UK/ Orange UK merger means this is not a relevant example.

<sup>28</sup> <https://www.telegeography.com/products/commsupdate/articles/2017/03/23/telekom-deutschland-embarks-on-lte-900-rollout/>

<sup>29</sup> <https://www.telegeography.com/products/commsupdate/articles/2013/12/12/vodafones-czech-unit-extends-lte-900-coverage/>

<sup>30</sup> <https://www.telegeography.com/products/commsupdate/articles/2015/05/27/t-mobile-activates-900mhz-band-for-lte-in-amsterdam-utrecht-to-follow-this-month/>

<sup>31</sup> <https://www.vodafone.com/content/index/what/technology-blog/spectrum-sharing1.html>

spectrum is closer to 800 MHz than to 1800 MHz, a band with much less good coverage than 800 / 900 MHz making it less valuable: coverage deep in to buildings is much more limited and maximum cell sizes are much smaller, which impacts roll-out costs where used to deliver coverage. The 900 MHz value might only be reasonable if the 800 MHz value has fallen (as seems likely, given the above) and if 1800 MHz value is lowered.

As explained below, there is good evidence to suggest that Ofcom's estimated value of 1800 MHz is too high and should be much lower in relation to 900 MHz than Ofcom has proposed.

***International benchmarking data demonstrates that if the UK market value of 900 MHz is £19m/MHz then the proposed 1800MHz value of £15m/MHz is too high***

There are many European countries for which auction data for all of the bands 900 MHz, 1800 MHz and 2600 MHz is available. Therefore in the same way that Ofcom used international benchmarks of 800 MHz, 1800 MHz and 2600 MHz prices to work out the distance of the UK 800 MHz price between the UK 800 MHz and 2600 MHz auction values, the same method can be used to work out where the UK 1800 MHz value should fall between the UK 900 MHz market value (which Ofcom proposes is £19m/MHz) and the UK 2600 MHz market value (for which Ofcom has used £5.9m/MHz). The results of this analysis are summarised in the Table 3 and Figure 6 below.

We consider this is evidence that if Ofcom uses £19m/MHz as the estimated UK market value of 900 MHz then a consistent estimate of 1800 MHz market value would be about £9m/MHz (£8m/MHz if, consistent with our earlier proposal, CPI is not applied to the UK 2013 auction values<sup>32</sup>).

**Table 3**

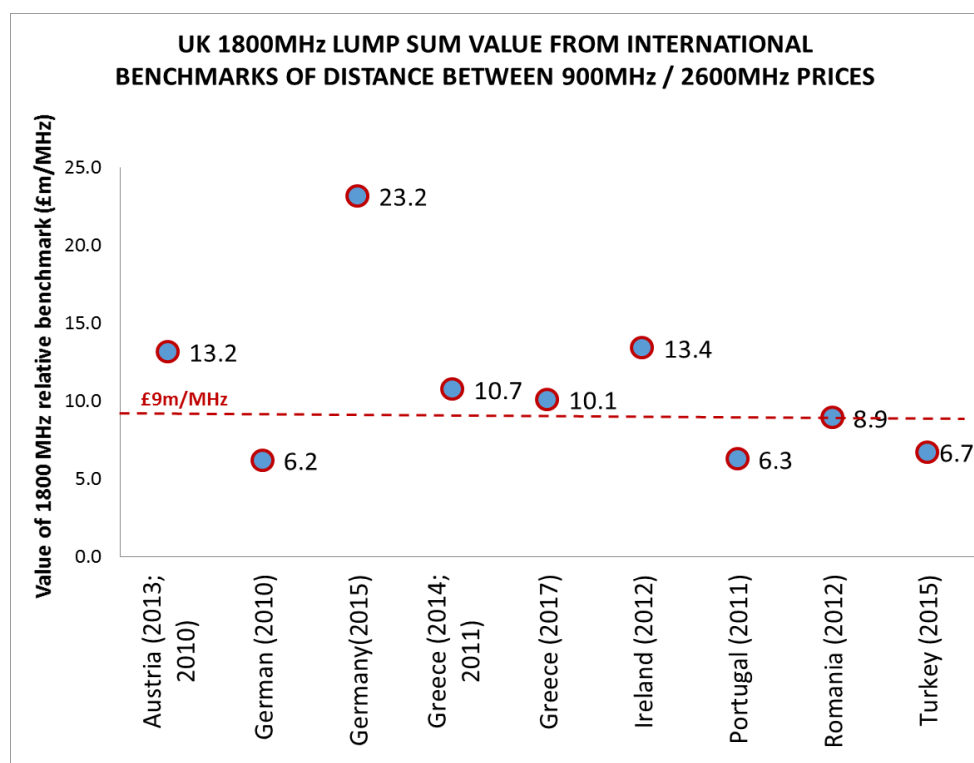
Distance method using 900MHz/1800MHz/2600MHz				1800MHz
Country	X	Y	Y/X	£m/MHz
Austria (2013; 2010)	98.7	54.7	55%	13.2
German (2010)	16.8	0.4	2%	6.2
Germany(2015)	16.8	22.2	132%	23.2
Greece (2014; 2011)	31.8	11.7	37%	10.7
Greece (2017)	31.8	10.2	32%	10.1
Ireland (2012)	31.5	18.0	57%	13.4
Portugal (2011)	23.9	0.6	3%	6.3
Romania (2012)	40.2	9.2	23%	8.9
Turkey (2015)	4.8	0.3	6%	6.7
		<b>Average</b>		<b>11.0</b>
		Minimum		6.2
		<b>Midpoint of Av. And Min.</b>		<b>8.6</b>

Note: figures are calculated with similar assumptions and method used by Ofcom /DotEcon, but using the UK and international values for 900MHz (rather than 800MHz) as the lower frequency reference. Consistent with Ofcom's methodology, the reference values are adjusted by CPI.

In Figure 6 below we illustrate the benchmarks listed in Table 3.

<sup>32</sup> In other words the calculation of the UK 1800MHz lump sum value uses a distance benchmark where UK 900MHz lump sum value is reduced from £19m/MHz to £17.7m/MHz and the 2600MHz value reduces from £5.9m/MHz to £5.5m/MHz).

Figure 6



Source: BT

Note: consistent with Ofcom's methodology, the reference values are adjusted by CPI.

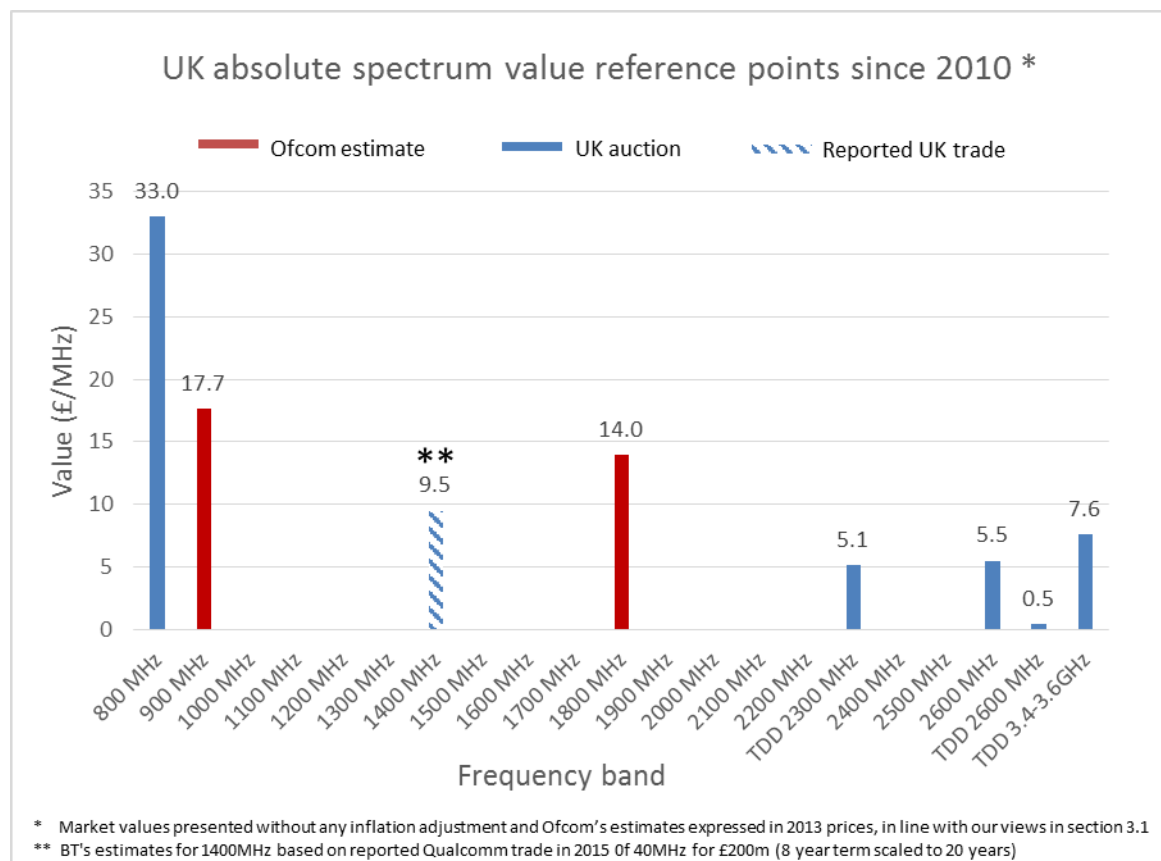
It is notable that the Germany 2015 benchmark is a significant outlier (over 70% above the second highest benchmark) whilst all other benchmarks are clustered between £6.2m and £13.4m per MHz. The reason that the benchmark from Germany 2015 provides such a counter-intuitive result stems from the fact that the 900 MHz component of this benchmark is not representative of market value in Germany. Indeed Ofcom have identified it as being at larger risk of understatement of the 900 MHz market value in Germany. As such, it leads to a low quality benchmark in the context of this relative value cross-check. This could suggest excluding the Germany 2015 benchmark from this cross-check, or assigning it a low weight. We have however continued to include it in recognition that some of the other benchmarks may also be imperfect (even though their impact on the average is less distortive).

### 3.2.7 Evidence from UK market values of other spectrum bands

#### **UK 2300 MHz auction price indicates that market value of 1800 MHz is less than Ofcom assumes**

Ofcom has not properly considered how its proposed UK lump sum values of 900 MHz and 1800 MHz spectrum derived from international benchmarks align with UK market values of other bands that have been awarded or traded since 2010. These market values are illustrated in Figure 5 below. The market values are presented without any inflation adjustment and Ofcom's estimates are expressed in 2013 prices, in line with our views expressed in section 3.1.

Figure 5



A striking feature of this chart is that Ofcom's proposed lump sum reference value of 900 MHz<sup>33</sup> (which is immediately adjacent to 800 MHz and has similar technical properties and will most likely use the same technology in future) has a value estimated by Ofcom of just over half that of 800 MHz.

Another notable feature is that Ofcom's estimate of the 1800 MHz lump sum value is 79% of the 900 MHz value, despite being double the frequency, and is much greater than the market value of bands above and below 1800 MHz.

Ofcom's benchmark price of 1800 MHz<sup>34</sup> is 171% higher than the value of the TDD spectrum at 2300 MHz that was recently auctioned and is 47% more than the lower frequency 1400 MHz spectrum (assuming the trade price reported in the press at the time<sup>35</sup> is correct).

There is an argument that TDD spectrum is more valuable than FDD spectrum, since spectrum value is largely based on the additional downlink capacity that it provides rather than the uplink. So assuming a TDD downlink/uplink ratio of 3:1, each MHz of TDD spectrum would be worth 50% more to an operator concerned with downlink capacity compared to 1MHz of FDD spectrum, meaning that

<sup>33</sup> Expressed in 2013 prices, in line with our views explained in section 3.1

<sup>34</sup> Ibid.

<sup>35</sup> <https://www.bloomberg.com/news/articles/2015-08-25/qualcomm-said-to-sell-300-million-in-spectrum-to-u-k-carriers>

in the above chart the TDD 2300 MHz value of £5.1m/MHz would correspond to an equivalent FDD value of £3.4m/MHz.

The above evidence shows that the value of £15m/MHz on which Ofcom proposes to base its calculation of fees for 1800MHz spectrum is excessive when looked at in the context of UK specific market evidence.

### *3.2.8 Impact of technology on 900/1800MHz market values*

Ofcom is required to set ALFs based on a forward looking view of full market value of 900 MHz and 1800 MHz spectrum as it is viewed today, not as it may have been viewed in 2010 when the Direction was written nor as it may have been in 2013 when the auction of 800 MHz and 2600 MHz took place.

At best the international benchmarking of 1800 MHz prices (based on the distance method) gives an indication of the observed relative values of given bands at the different times they were auctioned. The older and greater the interval between the auctions, the more questionable it is whether those relative prices still hold true today and accurately represent current UK market values.

An important factor that affects relative value of different spectrum bands as viewed today is the technology developments that have occurred in recent years and the view of the utility of different bands as understood today. In this regard there is an additional factor that Ofcom needs to consider in terms of technology development that does not seem to be sufficiently addressed within the consultation document: the impact of 5G technology and in particular the preference of TDD bands to deploy this and the different abilities of given bands to support the different MIMO antenna schemes (a key factor that impacts spectral efficiency and hence relative value of different bands used to deliver capacity).

It is widely accepted that spectrum configured for TDD is better suited for advanced MIMO antenna schemes with beamforming than spectrum configured for FDD<sup>36</sup> due to reciprocity of the radio channel that enables the system to operate more efficiently. The second important point about MIMO antenna schemes is that the spectral efficiency of the system increases with the larger MIMO schemes and the schemes available depend on the frequency band. Whilst the schemes available for 1800 MHz are typically 4T4R MIMO, massive MIMO schemes with much greater spectral efficiency are not suited to 1800 MHz but are becoming available for the 3400-3800 MHz band<sup>37</sup>. The consequence of this is that additional capacity is most efficiently delivered using the 3400-3800 MHz band given the much higher spectral efficiency that can be achieved compared to the 1800 MHz band. This holds even if 5G technology were deployed in both bands (overlooking the fact that in practice 1800 MHz is encumbered by 4G use and is not currently harmonised as a 5G band other than for potential future Supplementary Uplink use) because of the potential to use massive MIMO at 3400-3800 MHz.

The above suggests that for capacity provision, 3400-3800 MHz might have greater future potential than 1800 MHz, meaning that the value of 1800 MHz is more likely have reduced now compared to the value it would be perceived to have had when looked at in the past. The evidence from the recent auction that 3.4GHz was more valuable than 2.3GHz shows the shift in value towards 5G-NR compatible spectrum, which 1800MHz is not (other than for Supplementary Uplink, as above).

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<sup>36</sup> For example see Page 7 of [https://www.detecon.com/sites/default/files/op\\_5g\\_new\\_radio.pdf](https://www.detecon.com/sites/default/files/op_5g_new_radio.pdf)

<sup>37</sup> For example see Page 8 of [https://www.huawei.com/minisite/hwmbbf17/assert\\_25/files/Target\\_Network\\_in\\_5G\\_Era.pdf](https://www.huawei.com/minisite/hwmbbf17/assert_25/files/Target_Network_in_5G_Era.pdf)

This point in relation to 5G technology, and MIMO/TDD in particular, together with the points we have raised in section 3.1 in relation to the significantly changed view of available bands and traffic growth, calls in to question the validity of the conclusion reached at section 4.41 of the consultation concerning whether commercial or technical factors provide evidence that forward looking values of 900MHz and 1800MHz should be lower or higher than Ofcom's 2015 assessment. In fact we believe the question Ofcom needs to consider is not just whether technical and commercial factors have changed the view of 900 MHz and 1800 MHz value from that in 2015, but whether these have changed the view of the value of 800 MHz and 2600 MHz since 2013 (since these are a reference used to set 900 MHz and 1800 MHz ALFs) as well as how these factors may have changed values of 900 MHz and 1800 MHz relative to 2010 (the date of the earliest international auction benchmarks that Ofcom has considered). These considerations and the fact that it is more damaging to overestimate than underestimate the market value of the ALF bands would again suggest that a conservative approach to estimating market value is appropriate.

### *3.2.9 Summary of BT's position on 1800 MHz lump sum value*

Looking at all evidence in the round, we believe the evidence supports an estimate of full market value of 1800MHz (for Ofcom's purposes) of £8m - £12m / MHz.

## **3.3 Annualisation of lump sum value**

BT acknowledges the reduction of the annualisation rate to reflect the fall in the cost of debt. However, available evidence suggests a further reduction is appropriate.

Ofcom has maintained its 2015 approach to determining the discount rate used for annualisation in its June 2018 consultation. Ofcom's estimate of the post-tax discount rate declined from 2.0% in its 2015 determination to 1.5% in its June 2018 consultation, driven by a decline in Ofcom's cost of debt estimate. In this section we have reviewed Ofcom's approach and remain of the view that Ofcom's method does not recognise the low risk associated with the ALF payments, as a result of which Ofcom overestimates the discount rate.

### *3.3.1 Risk sharing between MNOs and the Government*

Ofcom estimates a discount rate in between the cost of debt and the WACC, on the basis that the ALF payments to the Government are more risky than corporate debt because of the possibility that the ALF is adjusted during the 20-year term for changes in the market value of spectrum.

We agree with Ofcom's view that "the discount rate used to annualise the lump-sum value should reflect the risk of the cash flows coming from Licensees to the Government through the ALF". In other words, the discount rate should reflect the risk facing the Government from the receipt of ALF payments. However, Ofcom fails to recognise the low risk properties of the ALF, specifically not considering:

- The secured loan properties of the ALF; and
- That the discount rate should not depend on the WACC even if the ALF payments may be reset due to changes in the market value of spectrum.

Ofcom has in part recognised that the ALF payments have properties like a secured loan, in that they represent a stream of constant payments with repayment of the principal over time. The licensees have the right to return the spectrum to the Government, as a result of which the Government has an asset that the ALF payment is secured against. Because of these debt like properties, the discount rate associated with the ALF payment should be proxied by the cost of debt for MNOs. Ofcom has accepted the cost of debt is an appropriate reference point for setting the ALF discount rate.

Indeed there are good reasons why the discount rate should be set lower than the cost of debt for MNOs. Ofcom estimates the cost of debt using corporate bond yields. The BBB-rated corporate bond index that Ofcom selects to calculate the cost of debt is comprised of unsecured bonds. We have also checked that the UK MNO corporate bonds Ofcom reviews are unsecured bonds, implying that none of the empirical evidence Ofcom considers includes secured debt instruments. Since the ALF payments are secured assets where the Government is able to recover the market value of the spectrum in the event that an MNO 'defaults', the ALF payments offer a level of security that corporate bonds do not. Therefore, we see a clear difference between the cost of debt associated with the secured ALFs and the unsecured corporate bonds Ofcom uses to estimate the cost of debt.

Ofcom argues that although the ALFs are secured against the market value of spectrum, it considers the WACC is an appropriate upper bound for the discount rate because it reflects the scenario where the ALF changes frequently to reflect real-time changes in value. In this scenario, Ofcom believes the risk facing the Government depends on changes in MNOs' net revenues. Ofcom implicitly assumes that the systematic risk faced by holding spectrum is the same as the systematic risk facing MNOs as a whole. However, there is good reason to believe the systematic risk associated with holding spectrum is lower than the risk facing MNOs as a whole.

All of the UK MNOs are not solely active in the mobile market, and also offer their customers fixed line voice and broadband products, often as part of bundled products. Their WACC is therefore a weighted average of the WACC associated with each type of business activity, and not just their mobile activities. The systematic risk associated with retail fixed line activities is likely to be higher than that of mobile activities because the demand for mobile tends to be less price elastic than the demand for broadband.<sup>38</sup> It follows that the volume risk for a pure-play spectrum operator would be lower than the volume risk for the MNOs, which are increasingly integrated telecoms companies with operations in markets with much higher volume risk. For example, Vodafone has been investing in ultrafast fibre networks with Cityfibre, which is likely to be associated with much greater volume risk than pure-play spectrum activities. Similarly, Telefónica derived 10% of their total FY17 revenues from fixed line activities in Europe, including from superfast broadband networks, which are likely to be more risky than mobile activities.

We therefore disagree with Ofcom that the MNOs' WACC is an appropriate upper bound for calculating the discount rate. In the absence of any pure-play spectrum operator listed on the stock market to calculate a WACC, we do not believe Ofcom should make a subjective assessment of the appropriate WACC. Instead, given the secured loan properties of the ALFs, we believe the discount rate should be based solely on the cost of debt, which in any case Ofcom overstates because it estimates it using unsecured bonds that are more risky than secured ALF payments.

Finally, we note that Ofcom estimates the ALF discount rate as an increment above the cost of debt equal to 25% of the difference in the cost of debt and the WACC. Ofcom notes that if the ALFs were reassessed once around halfway through the 20 year licence period, the Government would bear slightly more than 40% of the risk, higher than its final assessment of 25%, and therefore Ofcom believes it has made a conservative assessment of the degree of risk sharing.

We disagree Ofcom has made a conservative assessment in this regard. Ofcom is speculating as to the likelihood of resetting the ALFs when it could exercise a conservative approach by assuming the ALFs will be fixed for the 20-year duration. Under this conservative assessment, the Government would not bear any of the risk and the discount rate should be based solely on the cost of debt.

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<sup>38</sup> National Infrastructure Commission: "Economic Growth and Demand for Infrastructure Services", March 2017, first bullet point on page 8.



### 3.3.2 Cost of debt

To estimate the cost of debt, Ofcom considers two types of evidence:

- Yields for a BBB-rated sterling denominated corporate bond index; and
- Yields for sterling-denominated corporate bonds issued by UK telecoms operators, specifically, BT, Vodafone and Telefónica.

With regards to the first method, Ofcom previously justified the use of a BBB-rated index on the basis that the UK MNO parent companies have a BBB rating on average. As with calculating the appropriate WACC, Ofcom does not have any available evidence on the credit rating for a pure-play UK spectrum operator. We note for example that in FY17 only 21% of BT's revenues, 9% of Vodafone's revenues and 17% of Telefónica's revenues were derived from UK mobile activities, implying the parent company credit ratings do not reflect the risk associated with UK mobile activities.

We would expect the credit rating for the MNOs' UK mobile activities to be higher than non-UK mobile activities, particularly because some of the operators derive large portions of their revenues from less developed countries, where the risks they face are likely to be much higher than in the UK. For example, Telefónica derives 47% of its revenues from Central and South America and 24% of its revenues from Spain. The sovereign credit rating of these countries is much lower than that of the UK (Spain is currently rated A- by Standard and Poor's compared to AA for the UK) implying that the credit risk rating for an MNO operating in these countries is also likely to be lower than that of an operator in the UK. We therefore believe the credit rating for a pure-play UK spectrum operator to be higher than the average credit rating of the MNO parent companies.

Damodaran (2018) has presented evidence that the spread for an A- rated large company, i.e. one notch higher than Ofcom's BBB assumed credit rating, relative to a BBB rated large company is 14 basis points.<sup>39</sup> This suggests that Ofcom may have overestimated the cost of debt by 14 basis points because it assumes too low a credit rating for a pure-play MNO in the UK.

Ofcom's secondary set of evidence in estimating the cost of debt is the yield on corporate bonds issued by three UK MNO parent companies: BT, Vodafone and Telefónica. All our arguments presented above also apply to the yields on these corporate bonds. None of the bonds Ofcom selects are secured, and the yield would therefore overstate the cost of debt on the secured ALFs. Moreover, as discussed above Telefónica and Vodafone both have extensive business operations outside the UK, particularly in countries where country risk is perceived as much higher than in the UK. This would make the yield on their bonds inappropriate for estimating the cost of debt for a pure-play UK spectrum operator. The additional country risk may partly explain Telefónica's low BBB- credit rating. Credit rating agencies have described this as a key risk factor in arriving at their credit rating determination. For example, Moody's assigns Telefónica with a Baa3 rating (equivalent to Standard and Poor's BBB- rating) and notes "*the rating also reflects the company's exposure to emerging market risks, and to foreign currency volatility*".<sup>40</sup> We therefore do not consider Ofcom's evidence on the yields for debt issued by UK MNO parent companies to be appropriate for setting the cost of debt for a pure-play UK spectrum operator.

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<sup>39</sup> Source: [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ratings.htm](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ratings.htm)

<sup>40</sup> Moody's (7 November 2016): "Moody's downgrades Telefónica S.A.'s rating to Baa3; stable outlook".

Overall, we believe Ofcom has overstated the cost of debt by assuming a BBB rating for a pure-play UK mobile spectrum operator and using the yields on debt issued by the parent companies, which have business operations in more risky countries than the UK. If instead, Ofcom assumes a credit rating one notch higher than the parent companies, to account for the lower risk UK operations, the cost of debt would fall by around 14 basis points. In addition, Ofcom should account for the lower risk of the secured ALFs versus the unsecured corporate bonds selected by Ofcom.

### 3.3.3 WACC

Even if Ofcom is correct in its view that the Government bears some of the risk of the ALFs being reset, we do not believe Ofcom's calculation of the WACC is consistent with its approach on the cost of debt.

Between its 2015 consultation on ALFs and its 2018 consultation, Ofcom's estimate of the post-tax real cost of debt declined from 0.9% to 0.2%, by 70 basis points. The reduction in the cost of debt was driven by a decline in observed yields for corporate bonds. By contrast, Ofcom's estimate of the post-tax real WACC *increased* from 5.2% to 5.5%. We do not believe the change in the WACC is consistent with the reduction in the cost of debt given the observed decline in yields and interest rates.

Ofcom estimates the WACC using its own WACC estimate for the Mobile Call Termination (MCT) review, published in 2018. We note that Ofcom has selected the MCT WACC point estimate of 7% (pre-tax, real) to derive a post-tax WACC of 5.5%. However, Ofcom's range for the WACC in its MCT 2018 decision was 6.1% to 7.7% (pre-tax, real). If Ofcom is to make a conservative decision on ALFs, we see no reason for selecting a point estimate higher than even the mid-point of the MCT 2018 range. Ofcom should select the low end of the range to make a conservative judgment on the ALFs. By doing so, the post-tax real WACC estimate would fall from 5.5% to 4.7%, and the final discount rate used to annualise ALFs would fall from 1.5% to 1.3%, a reduction of 20 basis points. Without selecting the bottom end of the MCT 2018 WACC range, Ofcom cannot claim to have made a conservative judgement on the ALFs and thereby risks MNOs paying too high ALFs.

If we also adjust Ofcom's estimate of the cost of debt down by 14 basis points to reflect a more appropriate credit rating for UK pure-play spectrum operators (see section 3.3.2), then the final discount rate used to annualise ALFs would fall to 1.2%. We believe Ofcom should use a discount rate no higher than 1.2%, and indeed there is strong reason to use an even lower discount rate to reflect the secured loan properties of the ALFs.

## 4 Comments on the fees regulations

Notwithstanding our concerns with the level of the proposed fees, that we have set out in detail above, we believe Ofcom must provide a phase-in period for what would be a very large fee increase.

Ofcom previously in the (now quashed) 2015 regulations provided for a phase-in period for the increased fees such that in the first year 50% of the increase would be payable. This was in recognition of the large step change in fees under the 2015 regulations compared to the then prevailing 2011 regulations.

The 2015 regulations were found to be illegal and were quashed by the Court of Appeal, thereby restoring the 2011 regulations. If Ofcom considered that the step change in fees should be avoided in 2015 it is unclear why the same (and potentially greater) increase should now be deemed suitable when introduced by the 2018 regulations. The reasons that Ofcom mentions for proposing not to phase-in the increase are:

- a) the fact that a significant period of time has passed since the Direction was made in December 2010, and since the conclusion of the 4G auction in March 2013 so that licensees have had a long notice period that their fees would be increased; and
- b) that the proposed fee levels are similar to those that licensees were paying under the now quashed 2015 Regulations.

The first reason is the same consideration that Ofcom made in 2015 (see para 8.33 of the 2015 Statement), albeit we acknowledge that further time has passed. The second reason is not valid if MNOs considered the 2015 fees to be illegal (as was proven to be the case) and expected, and continue to expect, overpaid fees to be refunded and may have had legitimate expectations that the new proposed fees would be lower as a result of Ofcom taking proper account of its full set of statutory duties.

We propose that Ofcom takes an approach on phase-in consistent with that of its prior 2015 regulations, i.e. to phase in the increase with 50% of the increase (relative to the current fees paid under the 2011 regulations) due in the first year following commencement of the new regulations and the full amount starting from in the second year. This will reduce risks of harm from the increase in ALFs, such as on MNOs' ability to invest in networks for capacity growth, expansion of coverage and introduction of 5G. It would also reduce the potential impact on consumers and competition and would have no adverse impact on securing optimal and efficient use of the spectrum, especially given that spectrum trading remains available in the event that a more optimal distribution of spectrum were identified.

## Appendix 1 – Paper on ALFs by economist Brian Williamson<sup>41</sup>



Reappraising + recurring + spectrum + fees

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<sup>41</sup> <http://www.commcham.com/storage/Reappraising%20recurring%20spectrum%20fees%20May%202018%201.pdf> .

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