Vodafone Response to Ofcom's Consultation:

Improving mobile coverage - Proposals for coverage obligations in the award of the 700 MHz spectrum band

(Updated version)

Note: this response to Ofcom's consultation is an updated version of a submission made to Ofcom on 5th May 2018, taking account of more accurate network modelling that Vodafone has subsequently undertaken.

0. Executive Summary

Vodafone welcomes the opportunity to input into Ofcom's consideration of coverage obligations. We recognise the importance of extending coverage. However, the scale of the task necessary to improve coverage in difficult-to-serve areas means that there's a need to move beyond the current dogma of coverage obligations.

We therefore do not support the proposals set out in the consultation. They are unduly onerous to the point of being unachievable. This is reflected in our analysis that far from costing £300M per operator, the cost would be £✂ each. The proposals would lead to a duopoly of rural operators (when Ofcom is firm that having four credible national wholesalers is paramount to maintain competition). They would also effectively lead to some mobile operators subsidising others and, absent from Ofcom's consideration, would lead to urban customers (including the vulnerable and urban poor) subsidising rural customers – this may be a deliberate public policy objective, but Ofcom has not explicitly stated this, nor carried out an impact analysis. Critically, the proposals fail to recognise the relevance of the Emergency Services Network (ESN) contract and associated State aid that has been awarded to BT-EE. As framed, the proposals would likely lead to BT-EE receiving subsidised spectrum as a direct consequence of having already received State aid, as we estimate its costs would be £✂ lower than its competitors.

On this basis, we believe that if Ofcom proceeds with the current proposal, it will be failing in its statutory duties both to further the interests of citizens with respect to communications and to promote competition. Further, the 700MHz auction will be complicated enough, with a likely combined award with higher frequency bands (3.6GHz) and supplementary downlink in the centre-gap: extra complications such as differential lot types within a band will only serve to distort the outcome.

Instead, we believe that there is a need for innovative regulatory solutions, and that the conversation should be moved away from coverage obligations and instead focus on coverage incentives. In this response, we set out an approach that could lead to improved coverage by all operators, hence facilitating competition, rather than being focused upon two operators with the consequent damage to the competitive marketplace.

In this approach, all the lots will have common licence terms, and operators will be rewarded with a scheme of rebates should they exceed coverage targets. The scheme should be extended to Annual Licence Fees to avoid pressure being placed on holders of specific spectrum bands.

The incentives would be accompanied by a safety-net of baseline coverage obligations, so that operators would be obliged to improve coverage; to ensure the spectrum is efficiently deployed across all of the UK; and to act as a consumer protection measure so that citizens could rely on every mobile operator reaching a reference level of coverage.

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1. Introduction

Vodafone welcomes the opportunity to input into Ofcom's consideration of coverage obligations.

We are however extremely disappointed that Ofcom has provided a very limited window to feedback on its proposals, at a time when it has been auctioning spectrum. This has meant that key strategic resources in the mobile operator community have been unavailable as they have been occupied by the pressing demands of the 2.3 and 3.4GHz auctions. Ofcom also fails to recognise the significance of these proposals for the future of the industry. Whilst we recognise that this is the first step in the regulatory process to the auctioning of 700MHz spectrum, it is Vodafone's experience that the fundamental approach to policy is set early on, and once set can be very difficult to influence.

Nonetheless, in this response, alongside our comments on the proposals themselves, we provide alternative approaches to improving coverage using an incentive-based approach.

2. Background

2.1 The context to improving coverage

Ofcom has recently accepted that Vodafone's geographic voice coverage is significantly in excess of the 90% of landmass agreed with Government in 2015[1]. Since 2014, Vodafone has deployed a 4G network that, using Ofcom's preferred metric of -105dBm, serves ✂% of UK geography with mobile broadband service (this amounts to more than 99% of the UK population).

Achieving such coverage comes at a cost, however: Vodafone has invested £2bn on its network over the last few years, at a time of static revenues. It is already the case that barely half of mobile mast sites generate profitable revenue, and additional masts only serve to skew this metric further. This means that the profitable masts, generally in urban areas, are subsidising the unprofitable masts, generally in rural areas.

Nonetheless, Vodafone understands that our customers expect wide spread mobile coverage, regardless of location, and we accept that there is more to be done to improve mobile coverage. We welcome the policy debate of how best to achieve this. It is, however, important to distinguish between providing service where our customers live, work and travel and therefore expect it, versus providing universal geographic coverage including in unpopulated and unfrequented locations. Whilst recognising that coverage could be improved in some rural locations, it would be unfair were our customers to subsidise coverage to large swathes of rural Britain where there would be no meaningful usage. This approach to network expansion would not make economic sense. Even worse, it would harm the UK economy if finite investment resources were directed

[1] Ofcom letters to mobile operators, https://www.ofcom.org.uk/__data/assets/pdf_file/0022/111946/Vodafone_GVCO_compliance_letter_090318.pdf - Vodafone provides voice service to 93.9% of UK landmass as at December 2017.

towards locations where the network will lie largely idle, at the expense of the network performance for the population in locations demanding capacity upgrades.

As we set out below, it is also unreasonable to expect that mobile operators can act alone to improve coverage. In addition to the significant costs there are also considerable barriers to the rollout of masts: technical (finding sites with a realistic prospect of power and backhaul); process (a planning regime which stifles network rollout); and social (a population demanding better mobile service but unwilling to accept more mobile masts). These costs and barriers are particularly high in the locations where it would be necessary to reach in order to deliver the obligations set out in the consultation. Vodafone stands ready to play our part, but to impose a coverage obligation without clear commitments in these associated policy areas is not appropriate, and will not deliver the desired outcome.

We note that Ofcom frequently uses the metric of percentage of UK landmass that is not served by all four operators. Given the oft-repeated mantra of four national wholesalers being the key to effective competition, we can understand why this is cited.

However, Ofcom must recognise that the metric is flawed. Should one operator choose not to invest in widespread geographic coverage, this percentage will be impacted despite the fact that there is coverage available from the other three; there is nothing that the other three operators can do to improve the metric. Ofcom's current proposals will serve to undermine this metric further by incentivising a model of two operators receiving regulatory awards to improve rural coverage.

Whilst there is more that can be done to increase mobile coverage – by both mobile operators and the State – the priority must be to ensure that coverage is targeted where it is really needed. There is little benefit in serving a field occupied solely by sheep with 2Mbps data services[2], other than for applications such as the Internet of Things (IoT) as applied to the farming industry[3]. Increasing coverage comes at a cost, and the implication is that all mobile customers will pay to provide such untargeted and unutilised coverage. What matters is that coverage is provided in locations where people wish to use their mobile phones. Ofcom's proposed premises lot goes some way to acknowledging this, but the blunt instrument proposed in the geographic obligations will necessitate rollout to locations which are both uneconomic and unnecessary. Further, in many cases the coverage will also be unwanted: to meet the obligations suggested will necessitate the placing of masts in Areas of Natural Beauty (AONB) such as Lake District fells, mountains of Snowdonia and Glen Coe. Vodafone believes that there needs to be a wider policy debate about how much the British people are willing to accept mobile phone masts in picturesque areas or at greater heights in exchange for better coverage.

[2] The case for voice is stronger due to health & safety considerations for the farming community. However, as Ofcom is aware, Vodafone's network already provides voice coverage at a far higher level than the consultation proposals.
[3] In any case, for such IoT applications the speed performance requirements are much lower - such applications are already being addressed with technology solutions such as NB-IoT which improves coverage by up to 20dB in comparison to normal cellular coverage.

Finally, Ofcom needs to be sure that measures to improve coverage do not inadvertently harm competition in the mobile market. If subsidised spectrum is provided to operators rolling out additional coverage, care must be taken not to focus the benefit on operators that are in a better starting position due to having already been subsidised by past public policy initiatives.

- BT-EE is uniquely placed to exploit greater coverage requirements. In Section 2.4 we describe the impact of BT-EE being chosen to provide the Government's Emergency Service Network (ESN), but more widely BT-EE has the advantage of possession of a network of ducts and poles (and consequently fibre) which far outstrips what the other mobile operators are able to deploy. This both places BT-EE in a unique position to acquire spectrum with coverage obligations, and uniquely makes them a beneficiary of any other mobile operator taking on such obligations. Any requirement to improve coverage must be accompanied by measures to level the playing field on backhaul, preferably by the provision of regulated dark-fibre but at the very least by amending the rules on Duct and Pole Access (DPA) to classify mobile backhaul as being associated with the provision of broadband (which it is: the metrics that Ofcom proposes for coverage obligation…support of a given Mbps throughput…are absolutely those of a broadband provider).
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2.2 Assessing the business case for improved coverage

Ofcom has failed to carry out any impact analysis around the extent to which improved mobile coverage carries a net benefit for UK citizens. The consultation starts from a position that coverage must be improved, regardless of whether this actually delivers a net benefit or cost to society as a whole. A metric of 92% geography has been proposed, but nowhere in the consultation does Ofcom address the question of whether the societal benefits of this justify the cost (both quantitative and wider in terms of changing landscape vistas).

There is some evidence to support policy intervention in this area. Figure 1 shows that from an economic standpoint, the equilibrium coverage will be achieved where the societal benefit intersects with the cost of rollout, i.e. point E_1. However, there are inevitable economic externalities as mobile operators are not able to monetise the whole of the benefit. For example, willingness-to-pay will vary substantially between customers, with those in rural locations presumably valuing improved coverage considerably more than customers in cities who would only make occasional (if any) usage: yet pricing policies for a mobile service inherently must be national, so it's not possible for mobile operators to access this additional benefit. Therefore, the practicable equilibrium point actually moves to E_2, at a lower level. Given that mobile networks have a high fixed cost base yet revenues will vary according to the volume of customers, the equilibrium point E_2 will also vary on a per-operator basis: any policy initiative which affects the cost base of some operators but not others will similarly mean a different equilibrium point per operator.

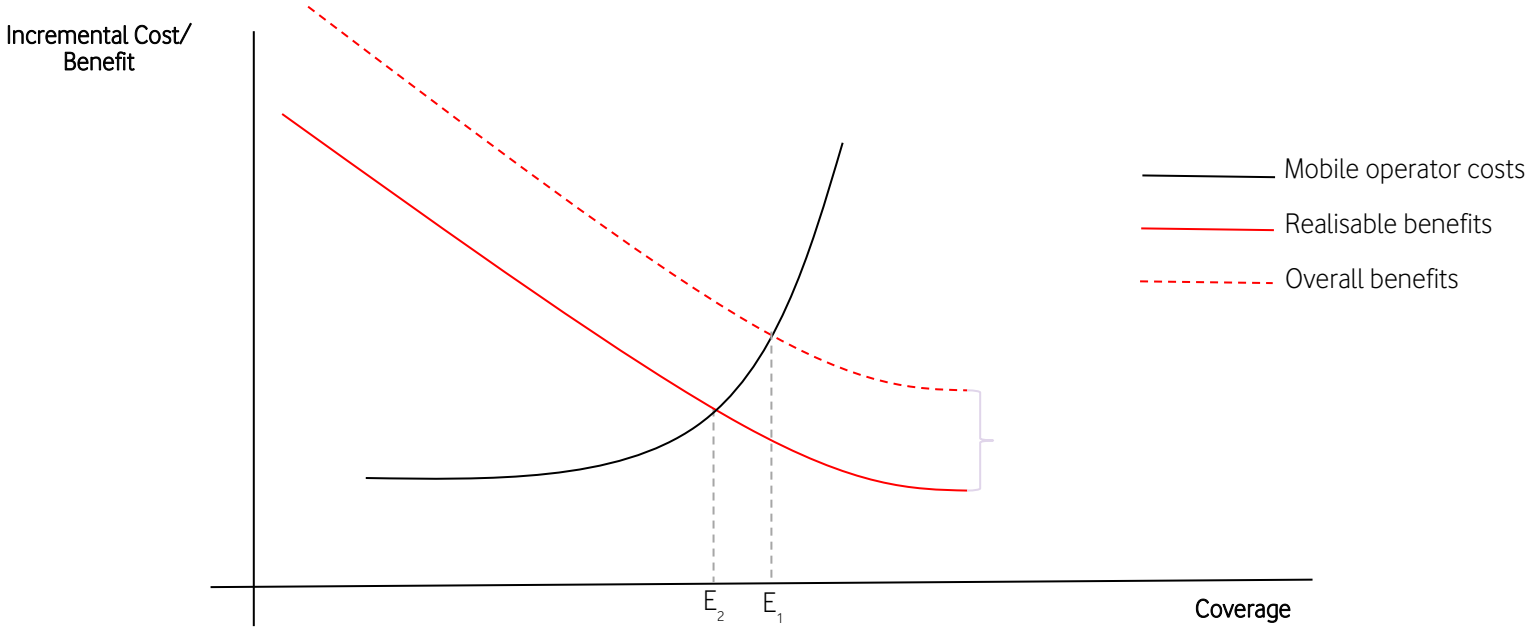

Figure 1: Equilibrium coverage

Insofar that E_2 is lower than E_1, there is a need to at least consider policy intervention. Measures that we set out in Section 4.1.1 such as improving planning law and allowing higher masts would serve to move the cost-base curve and hence restore the equilibrium towards E_1. Reduced spectrum fees under a scheme as we set out in Section 4.3 will similarly do so. However, the proposed coverage obligations set out in the consultation do not – at least not on an industry-wide basis. As we will set out, the impact isn't to reduce costs to the industry as a whole, but merely to change who pays what. By introducing an effective subsidy from those winning unencumbered spectrum lots to those winning lots with coverage obligations, the result is to move the cost curve down for some operators, but up for others.

In the consultation, Ofcom has not sought to contrast the cost of rollout with societal benefit. Rather, it has chosen an arbitrary point on Figure 1 (92% coverage), and sought (wrongly) to justify this on the basis that mobile operators' costs to achieve this would be lower than the discount that they might get in a spectrum auction. It may be that Ofcom intended to use auction receipts as a proxy for societal willingness to pay. However, this would take a huge leap of faith, because the dynamics of a multi-band auction, complicated by heterogeneous lots and potentially caps, means that auction bidding is a poor proxy for consumer benefits. What seems more probable is that Ofcom has not carried out an adequate impact analysis of its proposals.

2.3 Inter-relationship between coverage and Emergency Services Network (ESN) contract

As Ofcom is aware, the Government has awarded the contract for the ESN to BT-EE. Construction of the ESN means that BT-EE will add some 500 mast sites to its network, of which we understand ✂ will directly benefit from up to £500M of State aid. In addition, the Home Office is directly building 292 additional sites known as Extended Area Services (EAS) sites.

At para 3.35 of the consultation, Ofcom states that the EAS sites will be built in a way that will allow operators to use these sites in the future. However, Vodafone must highlight that Ofcom is mistaken in its confidence. ✂[4]. If sites are designed for sole occupancy, it will be necessary to retrofit the capability to share – which may lead to significant costs and delays – and in some cases this may simply not be possible. It is therefore far from certain that other operators will have economically-viable access to the EAS sites, and Ofcom is wrong to consider its coverage obligations based upon that assumption.

Moreover, it is not the case that other operators will necessarily be able to access the other ESN sites being built by BT-EE with State aid funding, notwithstanding the fact that such access is a condition of the EU State aid approval. ✂

The advantages to BT-EE of serving the ESN go further than just the immediate State aid subsidy. Carriage of ESN traffic on the remainder of the 500 mast sites serves to improve the economic viability of those sites. The common costs of providing power and backhaul to the masts can be apportioned between the ESN contract and commercial retail services. This puts BT-EE in a far better position to compete for the proposed coverage lots than the other mobile operators, who must seek to recover (at least some of) the costs solely from our retail customers.

Even in the situation that BT-EE was willing to provide access to their masts on appropriate terms, it may not be within their gift to do so. Many are in sensitive areas where planning constraints preclude sharing. For example, the Head of Development Management for the Yorkshire Dales National Park Authority has recently stated their preference for single-occupancy monopoles in order to minimise the impact on the landscape, meaning that sharing will not be possible[5].

Ofcom therefore needs to consider the implications of ESN further when considering coverage. It is abundantly clear that BT-EE will have a significant increase in coverage footprint as a result of providing the ESN. It is already seeking to extract commercial advantage from this, for example by publicising that it is seeking to cover 95% of landmass with a 4G signal by 2020[6]. Given the coverage footprint that is essential in order to fulfil its ESN contractual obligations, from which it has benefited from up to £500M of State aid, it is obvious that BT-EE will be in a far better position to meet any coverage obligations imposed by Ofcom than will its competitors. For example, had Ofcom chosen to place a coverage obligation on a single 700MHz

[4] Letter from Stephen Webb to Nick Parbutt of Vodafone dated 30th January 2018.
[5] Richmondshire Today, "Vodafone, O2 and Three customers unlikely to see improved mobile coverage in Dales due to new masts says chief planner", April 26th 2018, http://www.richmondshiretoday.co.uk/vodafone-o2-three-customers-unlikely-see-improved-mobile-coverage-dales-due-new-masts-says-chief-planner/
[6] See for example http://ee.co.uk/why-ee/4g-coverage

licence, it is inconceivable that BT-EE would not be the winner of that licence because its net valuation of the spectrum would be higher (given its costs to achieve the obligation would be lower than competing bidders). As we will set out in Section Three, BT-EE will benefit from any scheme where a discount on spectrum fees is given in exchange for a coverage obligation, and where this discount is given on only part of the spectrum it means that at least some of BT-EE's competitors will be excluded from getting that same benefit.

Ofcom must take the benefits of the ESN contract into account when considering coverage obligations, otherwise BT-EE will be rewarded not just by the provision of State aid, but then once again by being given cut-price spectrum as a consequence of that Aid. However, Ofcom has failed to address this issue. For example, in setting the level of the obligation Ofcom has examined the costs to a *typical operator*, rather than considering that the starting positions of BT-EE and other operators are quite different. Every operator will have a different starting position and it would be wrong for Ofcom to reward historic poor coverage performance on the part of an individual operator by setting less onerous coverage obligations for them, but in the specific case of BT-EE their privileged starting position is wholly because of the benefit of State aid. Coming on top of previous regulatory decisions that were beneficial to BT-EE (for example the merger decision to form EE that allowed 4G rollout ahead of its competitors), this cannot be ignored in Ofcom's policy consideration.

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2.4 Funding improved coverage

As we will set out in Section Three, Ofcom's proposals continue the approach of imposing coverage obligations on mobile operators in exchange for being given access to spectrum that is essential to provide services. Some would argue that whilst the mobile industry is seen as a key-enabler to post-Brexit Britain[7], there is also a risk of it being regarded used as a vehicle to bolster public finances via spectrum fees.

Annex B to this response provides ✂. As can be seen, the UK mobile industry is an extremely challenging one. Costs are higher than international benchmarks due to structural issues in building mobile networks (not least planning constraints, the high cost of backhaul and power, and high site rental costs), but intense competition means that pricing is lower. Industry analysts[8] confirm that UK mobile prices are failing to keep pace with inflation, and competitive pressure on pricing is greater in the UK than other European comparators, including key saturated markets such as Germany and Sweden. Ofcom itself calculates that the price of a typical mobile bundle fell by a third between 2012 and 2016[9]. But every tranche of spectrum

[7] See for example HM Government Industrial Strategy, which foresees the building of a 5G infrastructure as key to the UK's industries - https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

[8] Bloomberg, "Mobile rivalry is keeping down prices in the UK", April 2018, https://www.bloomberg.com/news/articles/2018-04-02/mobile-rivalry-has-u-k-carriers-eating-brexit-linked-inflation

[9] Pricing trends for communications services in the UK, https://www.ofcom.org.uk/__data/assets/pdf_file/0028/98605/Pricing-report-2017.pdf Figure 1.6

released represents more costs to the UK industry, whether via direct regulatory fees[10] or the cost of meeting associated coverage obligations. This leads to the UK being a less attractive place for investment than our international counterparts. ✂.

The stark reality is that with mobile profitability already challenged, there is little scope to absorb additional costs – ✂. Fewer than 10%[11] of mobile users express dissatisfaction with their mobile signal, but as set out in Section 2.2 Ofcom starts from the premise that there must be better mobile coverage, rather than whether there is willingness-to-pay on the part of mobile consumers to fund the £600M cost that it calculates will be incurred in carrying out this improvement (which, for the avoidance of doubt, we consider to be a gross-underestimate). There is a clear public policy need, in addition to Ofcom's regulatory duties in this area, to conduct a full a regulatory impact analysis to assess whether the benefits justify the associated costs. This has not been undertaken.

There is also the question of whether mobile operators' existing customers, who are predominately urban-based (including substantial numbers of vulnerable customers) and are predominately satisfied with coverage should subsidise the cost of providing mobile coverage to largely unpopulated rural areas. The answer may well be yes, but the question has not been considered by Ofcom in its analysis: a public policy conversation has been ignored because the premise is that mobile operators will find some way to fund all of this. Mobile operators cannot fund the cost of rollout. As with any industry, if costs go up, then customers will ultimately end up paying.

2.5 Focusing solely on the 700MHz auction may be wrong

We note that Ofcom has linked a desire to improve coverage to the forthcoming 700MHz auction, albeit the requirement to achieve coverage could be met by any spectrum bands. 700MHz is likely to be an attractive band, representing the main internationally-harmonised coverage band for 5G mobile technology. However, Ofcom should not assume that purchase of 700MHz spectrum is effectively compulsory for mobile operators, hence giving it an opportunity to impose onerous obligations because with no alternatives the operators will dig deep to get access.

All things being equal, all operators will want some 700MHz spectrum. ✂[12]. This being the case, Ofcom should be extremely cautious of imposing obligations which are too onerous or lead to some lots being priced abnormally highly, because there is a real possibility of 700MHz spectrum going unsold. If this occurs, Ofcom will have failed both in its duty to manage spectrum efficiently, and in its duty to further the interests of consumers. As set out in Section Four, Vodafone's alternative model is not restricted to leveraging the

[10] For example, the recent auction of 2.3/3.4GHz resulted in £1.4Bn being paid to the Exchequer - £1.4Bn which now cannot be invested in mobile network rollout.
[11] Ofcom customer satisfaction tracker, M4, "how satisfied are you overall with the reception or signal strength that you get on your mobile phone service?", dissatisfied, 9%
https://www.ofcom.org.uk/__data/assets/pdf_file/0021/112287/Customer-service-tracker-2018-data-tables.pdf
[12] ✂

sale of 700MHz spectrum and builds upon the mobile industry's need for spectrum more generally, thereby mitigating this risk.

In Annex C, Charles River Associates set out that bundling coverage obligations to spectrum auction terms could result in an inefficient outcome, and that the two regulatory topics are best kept separate (as Vodafone's alternative model seeks to achieve).

3. Ofcom's coverage proposals

We are disappointed that Ofcom has failed to take a more innovative and creative approach to driving improved coverage when compared to its fellow regulators. Whilst Vodafone would not endorse the entire approach taken by the French regulator of providing extended spectrum licences in exchange for more masts[13], ARCEP has at least adopted an innovative strategy in collaboration with French mobile operators. Also, the Swedish regulator is prioritising areas where coverage is really needed, and appears to be advocating spectrum fee deductions in exchange for building new masts[14].

In this section we set out the problems that we foresee with Ofcom's approach to improving coverage, i.e. blunt force coverage obligations. For the avoidance of doubt we believe that the proposals as set out would be highly damaging to competition in the UK market, and ✂. However, in the spirit of contributing constructively to the process, in Section Four we set out an alternative approach that would achieve both Government and Ofcom's policy goals, while maintaining a competitive marketplace.

3.1 Coverage obligations on a subset of licences will always distort competition

Ofcom's approach is to impose coverage obligations on a subset of the 700MHz lots to be auctioned. However, such an approach would distort the auction and consequently competition. It might be argued that the proposals represent a discount to the price paid for spectrum in exchange for accepting a coverage obligation, but this is not the case. In Annex C, Charles River Associates demonstrate that compared to the counterfactual of an unconstrained auction (or indeed one where coverage obligations were equal across all the lots), the effect of Ofcom's proposals would be to drive up the price of the remaining lots with no coverage obligations. We believe this particularly to be the case in the 700MHz auction because:

- There is 2x30MHz of spectrum available, with four operators, all of whom would ideally desire ✂MHz – so demand already significantly exceeds supply.
- ✂

[13] "Signature of an historic agreement between the Government, Arcep and mobile operators to accelerate mobile coverage in the regions" January 2018, https://www.arcep.fr/index.php?id=8571&no_cache=0&no_cache=0&tx_gsactualite_pi1%5buid%5d=2117&tx_gsactualite_pi1%5bannee%5d=&tx_gsactualite_pi1%5btheme%5d=&tx_gsactualite_pi1%5bmotscle%5d=&tx_gsactualite_pi1%5bbackID%5d=26&cHash=82451327e6b1567021b2784b7ff30a96&L=1

[14] https://www.pts.se/contentassets/58f801887d6e46f590ef2b846447bc9b/consultation-700mhz-feb2018.pdf, see in particular pages 7-9.

- ✂
- This means that the remaining ✂ operators will be left to compete for the remaining ✂MHz, hence driving up the price of it in both absolute and relative terms. Even if we are wrong ✂, this still leaves ✂ operators chasing ✂MHz of spectrum, hence driving up the cost.

It therefore follows that rather than the winners of the coverage lots receiving a *discount* in exchange for accepting coverage obligations, a more accurate description would be that those operators taking the unburdened lots would be subsidising the necessary cost for the coverage lot winners to meet the obligation.

This subsidy would serve to create a two player market in those areas where the coverage lot winners rollout to meet their obligation. This will not deliver on Ofcom's concern about the amount of the UK that is not served by all four mobile operators. The effect of a coverage obligation applicable to a subset of lots is to create a two-player system on rural coverage, as the remaining two operators will have no more incentive to rollout than they do today, and will be lacking funds, having had to pay more for spectrum/subsidise the coverage lot winners.

Competition could be damaged further, however. Coverage claims are used for marketing purposes and have an impact on all geographic areas of the market, with at least a minority of consumers who may never visit a deep rural coverage area being swayed by nationally quoted coverage stats when making their purchasing decision of which mobile operator to take service from. ✂. However, it could be that consumers consider the wider network reach of those operators with coverage lot spectrum to be something that makes them more attractive than other operators even if the reality is that they'd never use that capability. A comparison could be struck with the range of an electric car…it could be that many buyers can manage just fine with the lower range than a petrol car, but would be fearful of buying one "just in case". In this situation, the "non-coverage" operators would be unfairly penalised, having provided an effective subsidy to the "coverage" operators, they would not receive any assistance in rolling out their own coverage, and hence be unable to do so and as a result be seen as offering an inferior option. In this situation, Ofcom's preferred "four national wholesalers" model of competition would be threatened across the board, not just in those locations where the coverage obligation is relevant.

An obvious alternative to Ofcom's current proposal would be to have an obligation on a single spectrum lot. This would fail to address the issues we raise above, however: while the increase in competition for unburdened lots would be less profound (hence the increased price would be less), the benefit of any excess returns would accrue to a single operator, hence further damaging competition. Further, that operator would, with subsidised spectrum, become a monopoly provider of service in those areas where the coverage obligation bites.

3.2 Failure to address past and current subsidies

As we set out in Section 2.3, BT-EE has been the beneficiary of State aid for the ESN contract, and will indirectly benefit by being able to share the costs of extended coverage between retail consumer services

and the ESN. It is vital that any coverage obligation put together by Ofcom does not further reward BT-EE for already having been awarded State aid.

The proposals as set out by Ofcom do precisely this.

Given BT-EE's post-ESN footprint, it is clear that their costs to achieve the coverage desired by Ofcom will be lower than the costs of other operators. In Annex D, which we expand upon in Section 3.5, we demonstrate that BT-EE's costs will be some £✂ lower than those of Vodafone[15]. Unless there is some extraordinary outcome of the auction, then, it is apparent that BT-EE would be awarded subsidised coverage lots. BT-EE will be receiving spectrum at a lower price than its competitors entirely because it has been the recipient of a previous Government contract with associated State aid. Annex E provides legal analysis which sets out that if Ofcom's proposals are adopted, it will have failed in its statutory duties:

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- ✂,
- ✂,
- ✂, and
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✂

3.3 Coverage obligations set at auction will always lead to jam tomorrow

As we will set out subsequently, Vodafone has profound doubts as to the feasibility of achieving the coverage set out by Ofcom in the three years that are proposed. Notwithstanding this, the whole approach of a coverage obligation tied to a specific future date inevitably leads to a "jam tomorrow" situation, where Ofcom is accepting assurances of coverage in the future in exchange for discounted spectrum now. This is particularly amplified in the case of the 700MHz auction, where in spring 2018 Ofcom is proposing obligations that would apply to an auction in late 2019, with fulfilment only by end 2022. Ofcom will be left in the position of promising the rural population that things will get better, but the only incentive on any licence-holder with that obligation will be to provide coverage years down the line. There is a better way, as we set out in Section Four.

3.4 The choice of signal threshold and impact on coverage

We note the choice of -105dBm as a signal threshold, and Ofcom has confirmed that this is Reference Signal Received Power (RSRP). There is a need for clarity on the intended measurement of this metric: Vodafone uses a metric of ✂dBm, but this is as received by a mobile terminal, and building in antenna loss this is

[15] ✂

consistent with Ofcom's choice of -105dBm[16] predicted signal strength. We note that this is a more aggressive target than previously used by Ofcom because of a perceived degradation in mobile terminal performance, however Vodafone has *de facto* been using this signal level as a benchmark since the launch of 4G services.

There appears, however, to be a tacit assumption in Ofcom's numbers that increasing coverage requirements by a given percentage, will increase the volume of masts needed to achieve this linearly by the same percentage. This is not the case. Figure 3 shows a real-world example of perceived coverage gaps – all of the area has data service, but the pixels coloured red will experience a lower download speed (1Mbps). The cost of filling in these areas will be immense, as it implies finding infill sites in very constrained locations. So while Ofcom's logic might be correct in a greenfield scenario, that is not the situation we face: operators have built a radio grid based on being measured against a given signal strength requirement, and moving the goal posts part way through renders the design ineffective.

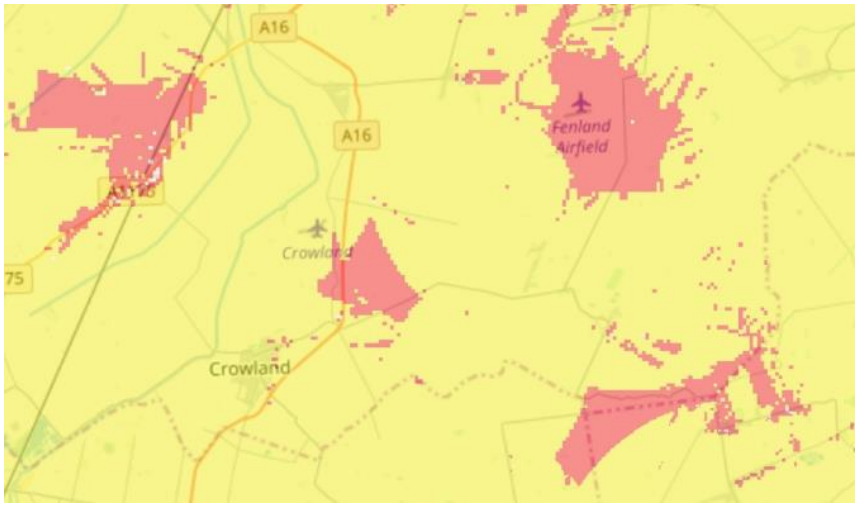

Figure 3: Example of effect of increasing the required signal threshold (red pixels would require filling)

Ofcom has failed to address this issue in its analysis. Far from the 5-700 additional masts per operator envisaged by Ofcom, Vodafone's analysis in Annex D suggest that we would need approximately ✂ new masts, and additionally need to seek to share more than ✂masts with other operators to augment our network in order to achieve the proposed coverage obligation[17].

We believe that Ofcom should play a greater role in improving customer understanding of the issue of handset performance. Ofcom has highlighted deteriorating performance of smart phones, but this cannot be a universal/uniform phenomenon: some handsets will perform better than others in marginal coverage

[16] This lack of clarity in the measurement point for RSRP has led to Vodafone historically under-reporting coverage of 4G services to Ofcom, which is now being rectified.
[17] Note: Vodafone's original analysis assumed an approach that would lead to the mast height being raised at an additional ✂ locations. We have now concluded that given planning constraints and the need to maintain a live network, such an approach would not be realistic.

areas. In its role of furthering the interests of UK citizens with respect to coverage, Ofcom should be explaining and publicising this. It should be highlighting specific handsets that perform well and poorly, in order that consumers can make informed decisions between performance and other features (such as user-interface, battery life and form factor). ✂ Ofcom is far better placed to take this role than individual mobile operators.

3.5 The costs have been underestimated

Vodafone does not recognise the costs estimated by Ofcom. As we set out in detail in Annex D, Vodafone's preliminary assessment is that the cost of fulfilling the obligation would be almost £✂ of capital expenditure, followed by an approximate increase in operational cost of £✂/yr: a 20-year cost (in NPV terms) of some ✂, in contrast to the £300M suggested by Ofcom[18].

We have profound concerns about this cost. Firstly, where is Ofcom's analysis that such an expenditure can be justified to increase coverage? For example, in terms of serving the 120,000 premises that Ofcom desires, that implies over £✂,000 per property. Working on the basis of average 2.3 people per property[19], the implication is over £✂,000 cost per person against an average annual revenue of £160[20].

The implication is that these costs will be met by the generality of mobile consumers via increased pricing. Even so, with a finite investment pool, operators with a given income stream will face decisions of whether to spend money on improving capacity where there are greater numbers of customers, or providing coverage where there are limited volumes of customers. If operators choose the latter option, this means that urban customers will be subsidising unprofitable network rollout to serve a small volume of customers, and that expenditure will be at the expense of improving networks in urban areas. Where is the public policy consideration of whether this is a desirable outcome?

Once again, Vodafone has significant doubts about whether mobile operators could accept this level of expenditure being diverted away from the competitive urban market, hence whether the coverage lots may well go unsold if Ofcom proceeds with its proposals.

3.6 The timeline is unachievable

Ofcom's proposals foresee a three-year period to achieve the coverage obligations. As waiting for the 700MHz spectrum to be available for deployment would imply a delay to rollout of approximately nine months after the auction[21], the implication is that any coverage obligation would be broadly achieved using existing spectrum rather than 700MHz itself.

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[18] ✂.
[19] 27M UK homes, 65M population
[20] Pricing trends for communications services in the UK https://www.ofcom.org.uk/__data/assets/pdf_file/0028/98605/Pricing-report-2017.pdf page 12, £16/month inclusive of VAT
[21] Auction envisaged for autumn 2019, 700MHz will not be usable until May/June 2020.

Based upon Vodafone's analysis described in Section 3.5, the implication is ✂ masts to be upgraded or installed per year, or an average of ✂per day: ✂masts in rural locations which will probably lack suitable power supply or backhaul, every day, consistently, for three years. Common sense must dictate that this is not achievable, and it is for this reason that our analysis in Annex D is based upon a ✂ rollout period.

Rolling out a mobile network in the UK is difficult: far more difficult than we experience in the other countries where Vodafone operates. The record of the Mobile Improvement Programme (MIP) provides independent evidence of the absence of magic wands when it comes to providing rural coverage, with just 16 masts being delivered in two years[22]. Public calls to improve mobile coverage do not translate into a belief that mobile masts are a good thing. In Annex F, we provide just a small selection of press cuttings associated with residents seeking to block the building of additional masts to improve coverage. Whilst we can understand that few people would choose to have a mobile mast at the foot of their garden, new masts are essential if coverage is to be improved. Unfortunately, the proposed coverage obligations do not recognise the importance of this being accepted if coverage is to be extended, and offer no suggestion as to how this will be done, with the onus on selling the benefits of mobile masts seemingly placed solely in the hands of the mobile operators, with threats of punitive penalties should we fail (the Digital Economy Bill gave Ofcom the power to fine mobile operators up to 10% of turnover). Further, the mast locations required to achieve Ofcom's desired coverage will in many cases be in picturesque places, including National Parks and Areas of Natural Beauty, the building of which we know from the outset will prove highly unpopular. Mobile operators cannot change the culture of demanding coverage without understanding the need for associated masts alone, and it is not appropriate to place this burden on us. There needs to be a wider public policy debate – again, missing from this consultation - about whether UK citizens' preference is for greater coverage or unadulterated landscapes.

Access to Government sites could also be improved. Despite an initiative launched in 2014 by Government to improve access to public sector sites we have had very slow progress in this area. We need a better process to enable this initiative to work.

Annex G sets out the difficulties that mobile operators face when wishing to deploy a new mast. As can be seen, the process typically takes ✂months, with challenges faced at every step. It is unreasonable for Ofcom to set an obligation that requires over ✂000 masts to be deployed or updated, when planning approval, mast heights, business rates, access to power and access to backhaul are not in the gift of the mobile operators and without a commitment from others for action in these areas. It is also the case that a hyper-aggressive rollout obligation, as suggested by Ofcom, will leave mobile operators with very little negotiating scope when it comes to discussions with infrastructure providers and land owners who will know full well that we would face substantial fines were there to be any delay to the programme. It is also worth noting that the UK has a shortage of engineers and the roll out will fall squarely into the period of time when

[22] "MIP project was a failure admits Vaizey", https://www.computerweekly.com/news/4500277419/Mobile-Infrastructure-Project-was-a-failure-admits-Vaizey

Brexit will further complicate operators' abilities to hire staff capable of implementing this improved coverage. ✂.

3.7 Conclusions on Ofcom's proposals

In summary, it is our firm belief that Ofcom's proposed approach will serve to damage competition by forcing one part of the mobile industry to subsidise another. The cost analysis in the consultation is fundamentally flawed, the impact assessment absent, and the required rollout not possible in the timescale dictated, if at all.

4 A better way of incentivising improved coverage

It will be clear from Section Three that Vodafone does not support a policy to improve coverage in the manner that Ofcom proposes. We believe that there is a better balance of carrot and stick than the current proposals set out. In this section we identify some key enablers which need to be addressed if coverage is to be improved without damaging competition. We then go on to describe a better way of incentivising improved coverage than blunt obligations: we describe a potential scheme, but it is just one of many possible alternatives that would better achieve increased coverage that Ofcom could and should consider.

4.1 The foundations of improving coverage

4.1.1 We cannot improve coverage on our own

If we are to build for the future and increase coverage as well as capacity in urban areas, there is a need to fundamentally rebalance the regulatory and policy framework, which currently risks holding back the investment and innovation that the market is capable of delivering and that the UK needs.

Gigabit capable networks, driven by full fibre and 5G, will be crucial in underpinning the UK's ability to grow our economy and compete on the global stage.

There has been some positive policy reform to date, including welcome but limited planning reform, and changes to the Electronic Communications Code to make it easier and cheaper to access land on which to place infrastructure. However, we need much faster and more radical change, especially to deliver coverage in rural areas that are economically challenging for mobile operators. There is a need for policymakers and operators to work together to understand how to improve the economics and provide adequate incentives for investors. For example, greater coverage could be facilitated via:

- Removal of the need for full planning permission: Our masts are 10m shorter on average than several of our European competitors. Taller masts result in better coverage. A 25m mast could provide, depending on terrain, up to 150% more coverage than a 15m mast. We believe we should move towards all mobile infrastructure in the UK being classed as Permitted Development, with Prior Approval in certain more sensitive areas.
- Reform of property costs: We need quicker, cheaper access to land. The reform of the Electronic Communications Code (ECC) is a step in the right direction but more needs to be done. A level playing field on costs and access with other utilities is needed.
- Infill programmes: The UK Government could follow the Scottish Government and explore a mast infill programme to improve coverage in harder to reach rural areas. The Government could also consider funding for fibre hubs to help with backhaul for sites in rural locations: we return to this aspect in Section Five.

- Business rates: The Scottish Government is piloting an exemption from business rates for new mobile masts in more remote areas: Ofcom should lobby the UK Government to do the same.
- Access to public sector sites: We need a better process to make access to public sector sites easier and more efficient. There has only been limited progress on this to date.
- Fibre backhaul: Mobile sites need to link back to the fixed network and underinvestment in fixed fibre by Openreach therefore has consequences for mobile connectivity as well. Access to dark fibre will be key, especially for 5G transmission. We need to ensure timely and efficient access to these assets. Ofcom must deliver on unrestricted access to dark fibre, and the rules around Duct and Pole Access (DPA) should be revised to recognise that mobile represents a form of broadband access so backhaul from mast locations should have a right to use to the facility.
- Electricity: All sites require power to be connected and the costs associated are significant. Mobile operators cannot expect to be sheltered from the effects of market forces in the energy sector, but as a key facilitator for UK industry we query whether it may be possible to exempt equipment consumption from green taxes. We are also concerned that Ofcom could increase the burden in this area by an insistence that all sites have battery backup too.

If Ofcom wishes mobile operators to improve coverage, it has an important advocacy role to play in ensuring structural changes are made to facilitate improvement in all of the above areas.

4.1.2 ESN must not be allowed to distort competition

Whichever approach to improving coverage is adopted by Ofcom, it cannot be assumed that operators will have access to EAS sites, and BT-EE cannot be allowed to gain an unfair advantage solely as a result of the State aid it is receiving for ESN. It is absolutely Ofcom's duty to foster an approach which does not distort competition, and to intervene where competition in the communications market could be damaged.

Vodafone believes that the charges levied by BT-EE for access to ESN mast sites should be restricted to the incremental capex cost of accommodating subsequent operators, these being assessed on the basis that the mast had been originally built to accommodate multi-tenancy (i.e. if BT-EE made the decision to build a mast suitable only for their own equipment, it should be for BT-EE to remedy this). Ongoing wholesale access pricing should be discounted to take account of the State aid that BT-EE has received. Alternatively, we would be prepared to accept paying a fair share of the fully-allocated costs of the mast, so long as this is accompanied by BT-EE passing through the same proportion of the State aid that they've received for that mast.

If BT-EE is unable or unwilling to meet these conditions, when Ofcom assesses compliance with coverage obligations, it should either discount any coverage provided by that mast when calculating BT-EE's figures, or alternatively treat the "blocked" operator as having deployed at that mast, i.e. include the theoretical coverage in their calculation.

Vodafone considers that these measures should be embedded into the conditions of any licence awarded to BT-EE to utilise 700MHz spectrum, to be clear that BT-EE's access to spectrum is dependent upon compliance with State aid rules.

Only by taking this approach can Ofcom ensure that BT-EE is not further rewarded for coverage secured at the cost of the British taxpayer.

4.2 Why wait for jam tomorrow?

As we have already set out, it is an inherent feature of coverage obligations that they only provide a promise of coverage at a future date. There is little commercial incentive to prioritise coverage because the sites will be unprofitable for the operator, and the regulatory incentive applies only at the assessment date. This effect is further amplified where coverage obligations are imposed as a condition of auctioned spectrum, because for example in this case Ofcom is proposing an assessment date three years after an auction which in itself is 18 months away (barring any delays due to legal action). There is a better way.

Firstly, if improved coverage is linked to rewards rather than avoiding punishment, then operators are incentivised to achieve that coverage at the earliest opportunity. Secondly, if the treatment of coverage is linked to spectrum fees generically rather than specifically to an auction event, we have no need to await that auction. The proposals we set out in Section 4.3 achieve both of these goals.

4.3 How Ofcom can ensure improved coverage while maintaining the benefits of competition

Rather than focusing on the "stick" approach of imposing onerous coverage obligations, Vodafone proposes that Ofcom adopts a more balanced "carrot & stick" approach of coverage incentives, accompanied by baseline coverage obligations.

A baseline coverage obligation will provide some certainty to policy makers that coverage will improve, to ensure that spectrum is efficiently deployed, and will act as a consumer protection measure insofar that customers will be assured that their choice of mobile operator will provide a given degree of coverage, hence protecting Ofcom's four credible national wholesaler model. As such, this baseline obligation would apply to **all** operators, not holders of specific lots in the auction. In Table 2 below we set out what a stretch baseline coverage obligation could look like. We consider that maintaining the deadline of autumn 2022 to achieve this would be reasonable.

Table 2: Example baseline obligation (% geography at -105dBm)

Location	Baseline obligation	*Comparison – current Vodafone coverage*	*Comparison – Ofcom proposal*
England	92%	✂	*92%*
Northern Ireland	92%	✂	*92%*
Scotland	65%	✂	*76%*
Wales	72%	✂	*83%*
(Net impact: UK overall)	82%	✂	*92%*

In addition to this coverage obligation, there would then be incentives to exceed the obligation. To provide incentives, coverage would be assessed annually:

- For the 700MHz licence holders, if coverage exceeded the baseline, then they would receive a return of some of the fee paid for the spectrum.
- For spectrum already liable to Annual Licence Fees (ALFs), part of the ALF would be rebated according to whether coverage had outstripped the obligation.
- Other spectrum would be subject to the rebating scheme once it became subject to ALFs (we suggest that the rebate be restricted to bands suitable for providing coverage, i.e. 2100MHz and below).

Annex H to this response sets out how this approach could work in detail, including codifying the level of penalties that could apply to operators failing to achieve the baseline coverage obligation.

This approach has a series of benefits over that proposed by Ofcom:

1 It means customers of all mobile operators will benefit from at least a baseline coverage, rather than restricting benefits to a subset of mobile operators. This means that there is far less scope for distortion in the competitive mobile market.

2 As mobile operators would see returns once they have achieved coverage rather than at some future arbitrary date, it incentivises early rollout.

3 Conversely, further rollout is incentivised on an ongoing basis rather than getting to 2022 and Ofcom having to re-address the subject.

4 Mobile operators can make rational decisions between spend on coverage rollout and spend on regulatory fees. The decision is transparent, based upon solid inputs, rather than being based on

forecasting the vagaries of differential auction outcomes of spectrum lots having or not having associated coverage obligations.

5 It avoids the spectre of a subset of mobile operators' coverage rollout being subsidised by their competitors.

6 The auction design would be considerably simplified, and the auction itself would not be distorted by subsets of mobile operators pursuing coverage or unburdened lots. Analysis by Charles Rivers Associates presented in Annex C demonstrates that the likelihood of an efficient auction is increased.

7 The parallel debate on the future of ALFs could be detoxified if operators had a means of limiting their exposure in return for a positive public policy outcome.

8 Whilst a "good" outcome (from a coverage standpoint) would result in reduced future receipts to the Treasury, it does not require public funding to the mobile operators.

There are alternatives ways in which Ofcom could implement an incentive scheme. For example, it could be possible for winning bidders in the 700MHz auction to receive an immediate rebate of some of the fee paid in exchange for signing up to a 2022 coverage commitment determined by the winning bidder themselves, the rebate either being assessed using the pixel mechanism set out in Annex H or alternatively as a function of how closely they match Ofcom's 92% proposal[23]. This would have the advantage of Ofcom not having to pass funds to Treasury only to subsequently have to request them back in 2022 in order to provide the rebate, but ultimately could lead to a lower coverage outcome as operators would inevitably moderate their forward commitment to allow for deployment risk. A further hybrid scheme could be that winning bidders make a commitment and receive an immediate rebate, but this is then combined with the annual scheme set out in Annex H to provide an ongoing incentive to improve coverage.

Vodafone recognises that making a scheme such as that we've described is not solely within Ofcom's gift. There will need to be discussions and agreement with Government (both DCMS and Treasury). **However, there is a unique opportunity to provide a once-and-for-all innovative solution to the issue of coverage, and we hope that Ofcom seizes this.**

[23] For example, a maximum rebate could be agreed to be payable should an operator commit (at the end of the auction) to achieve Ofcom's proposed 92% obligation. If the baseline coverage obligation for Wales was 72% per Table 2, then an operator committing (at the end of the auction) to provide 77.5% coverage could be said to have committed to provide half of the "stretch coverage" of 83%, hence receive half of the maximum rebate.

5. A better way of incentivising mast sharing

5.1 Ofcom proposals to mandate notification before planning consent is sought

On the face of it, Ofcom's proposals at paras 3.59 – 3.62 to incentivise the sharing of masts are to be welcomed. However, Vodafone is extremely frustrated at the timing of these ideas.

What we have here is not a case of slamming the stable door after the horse has bolted, but instead slamming that door, providing the best hay for the escaped horse while allowing them to roam loose, and going to give those horses that had stayed put in the stable a good whipping.

We have set out in Section 2.4 how BT-EE has sought to prevent access to ESN sites by being tardy in providing information, then designing sites and getting planning permission in such a way as to discourage multi-operator usage. Our appeals for help have fallen on deaf ears. If Ofcom implements the mast sharing arrangements as part of the 700MHz coverage policy, the result will be that BT-EE's masts will already be past the point when Ofcom's proposals would bite (they may not have been built, but planning consent will certainly have been sought). Therefore, Vodafone, Telefonica and Three would see no benefit from the proposal. In contrast, we would then be faced with rolling out additional masts to meet coverage obligations – whether the Ofcom proposals or our superior incentive approach – and given the mast-sharing proposal BT-EE would reap the benefit of being able to obtain access to our new masts at the design phase.

This is simply unacceptable.

Ofcom must take action immediately. There is no reason to await the 700MHz auction before implementing the publication proposals; the sooner this is done the fewer ESN sites will be implemented before that date. As we set out in Section 4.1.2, where Ofcom is too late for ESN sites, it should be for BT-EE to remedy the situation to make them capable of multi-operator usage.

5.2 Changing the paradigm of who provides coverage

Ofcom's proposals in general make the assumption that coverage should always be provided by the big four mobile operators. Vodafone agrees that mobile operators are generally best placed to build new masts, however, there is no reason to stick to the dogma of this being the preserve of the four national wholesalers. Where it proves more cost-effective, Vodafone is open to the concept of a neutral host using our licensed spectrum[24] to provide a radio access network combined with backhaul, that's presented to us as a managed solution. In this context, the neutral host could be a commercial enterprise, or it could be a community initiative, or indeed it could be a state initiative.

[24] Usage of spectrum licensed to mobile operators is preferable because having a neutral host bidding to acquire their own spectrum simply serves to drive up auction prices.

To facilitate this, however, Ofcom needs to resolve the licensing issues. As we are all aware, there are restrictions in that mobile operators are not able to sub-let our spectrum to third parties, and even if we could, the wording of past ALF regulations has led to the recipient being liable for a full ALF, whether they're using spectrum on a single mast or a grid of 18,000 masts. Neutral hosts using mobile operator spectrum is not possible.

To resolve this, Ofcom could either take a liberal view of the words "establish and use" in Section 8 of the Wireless Telegraphy Act[25] to clarify that they would allow a third party to use the spectrum with the consent of the licensee, or alternatively could update its approach to spectrum sharing to allow the sub-letting of mobile spectrum with Ofcom's consent.

If these issues are addressed, we see no reason that neutral hosts can't play a positive role, so long as a mobile operator subcontracting in this way can count the coverage achieved towards their coverage obligations/incentives.

6. Making Ofcom's proposals workable

Vodafone is clear that we consider there is a better approach to improving mobile coverage than blunt-force obligations as proposed by Ofcom. We hope that Ofcom will consider our alternative proposals in the positive light that they're intended. If, however, Ofcom proceeds with the current proposals, the following represents the minimum conditions that could make them achievable:

- We would require full access to ESN sites (both BT-EE-built and EAS), on the basis set out in Section 4.1.2.
- The deadline for meeting the obligation would need to be six years after the grant of spectrum at the very earliest. We would not oppose an approach of staged obligations in the interim.
- We would need to see actual implementation of the public policy reforms set out in Section 4.1.1. - we note that even after a protracted process to change legislation, it then took the Government a further two years to implement the ECC changes it agreed as part of the voluntary agreement to extend geographic coverage with mobile operators, whilst the date for operators to improve coverage remained static.
- The situation of public opinion being against additional masts needs to be addressed. In the event that our Permitted Development ideas in Section 4.1.1 aren't adopted, then if planning consent is applied for and rejected, then for the purposes of assessing coverage, the mast in question should

[25] http://www.legislation.gov.uk/ukpga/2006/36/pdfs/ukpga_20060036_en.pdf - "It is unlawful to establish or use a wireless telegraphy station…except under and in accordance with a licence…granted under this section by Ofcom"

be considered as deployed[26]. This would allow local communities to make the decision between accepting mobile network masts, or accepting lesser coverage. We also consider this solution should be adopted if Ofcom accepts our alternative incentive approach to coverage.

- The coverage obligations should operate on a two tier basis. Rural communities having connectivity at a lower speed is by far preferable to having no coverage because no operator can reasonably take on the commitment. One of the following approaches would be acceptable:
    - Pixels being designated as rural and urban. The threshold in rural pixels being set such that at least 1Mbps will be supported, with 2Mbps in urban pixels[27].
    - The obligation being set such that 2Mbps has to be achieved in a given proportion of the overall obligation, 1Mbps in the remainder.

Even with these changes, if Ofcom does wish to proceed with a strict coverage approach, binding on only two operators, then combining it into the auction as "spectrum with coverage obligation" lots is wrong. It unnecessarily complicates and distorts the auction. A preferable way of achieving Ofcom's approach would be to have a spectrum auction with no coverage limitations, followed by the award of a contract to provide coverage in the form of a reverse auction. If there were no bidders for the coverage obligation contract, then that would be a clear indication that the obligation was too onerous, thus requiring it to be re-run with weaker obligations. To be clear, however, this is plainly inferior to providing incentives for all four mobile operators to provide coverage hence maintaining a competitive marketplace.

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[26] We recognise that this could be open to gaming by mobile operators. However, it should be reasonably simple to implement a scheme whereby a) the operator has to provide evidence of a failed application, and b) there is a feedback loop in which the local authority could offer an alternative site that the operator would have to demonstrate is unsuitable.

[27] We acknowledge that this could be depicted as there being a two-tier system with rural communities receiving poorer service. Ofcom will understand that this is not the case: the performance experienced by users is governed by the volume of users in a given mast sector, and performance at the cell edge. By limiting the requirement to 1Mbps, Ofcom is reducing the required signal strength at the cell edge. However, away from that edge, rural mast sectors will have far fewer users so the perceived performance will be as good if not better than in many urban locations.

Annex A – Inability to access ESN sites

✂

Annex B – ✂

Annex C – Impact of proposals on auction

✂

Annex D – Relative costs of fulfilling Ofcom's proposals

Ofcom has provided very little time for respondents to the consultation to model the costs of implementing the coverage proposals. Nevertheless, we have attempted to model the cost of implementing the proposed geographic coverage obligation, both for Vodafone and other mobile operators. We are confident that this model is more refined than that adopted by Ofcom, because it builds upon a baseline of known coverage (and sites used to provide that coverage) and operator planning assumptions. We note that Ofcom has now requested site information, and believe that once this is used in the impact analysis, Ofcom will confirm the conclusions in this annex.

Due to time constraints, Vodafone's analysis has taken an "all of UK" approach, rather than focusing on the individual nations. The effect of this will be to suppress the predicted cost of implementation.

Our starting point is that according to our predictive models, Vodafone's coverage would by 2019 be at ✂% of UK landmass, using Ofcom's preferred metric of -105dBm: this represents ✂% of the UK population.

In order to meet the obligation, Vodafone's focus would be to first on securing access to existing masts:

- We would ✂;
- We would ✂; and
- We would ✂[28].

Obviously, it is far from clear that all of the above would be possible (for example whether planning consent would be achievable), but for the purposes of this analysis we must assume that it is. As we know the precise location of many of the above sites and are able to make an educated guess on the remainder, we are able to assess the coverage uplift provided, as shown in Table D.1 below.

[28] ✂

Table D.1: Uplift without building new sites

Initiative	Number of sites	Geographic uplift @-105dBm (km^2)	Geographic uplift @-105dBm (%)	Population uplift (absolute)	Population uplift (%)
✂	✂	✂	✂%	✂	✂%
✂	✂	✂	✂%	✂	✂
✂	✂	✂	✂%	✂	✂%
Total	✂	✂	✂%	✂	✂%

In terms of costs of these initiatives:

- ✂.
- ✂.
- ✂.

Our cost assumptions are summarised in Table D.2.

Table D.2: Costs for existing sites

Initiative	Capex cost/site	Opex cost/site	Total capex	Total opex
✂	£✂	£✂	£✂M	£✂
✂	£✂	£✂	£✂M	£✂
✂	£✂	£✂	£✂M	£✂
Total			£✂M	£✂M

Before proceeding, it is worthwhile noting that on the basis that Vodafone expanding coverage would benefit half of the local population (two coverage lots), this implies an incremental capex cost of £✂/head followed by an annual operational overhead of £✂/head.

The above initiatives would leave Vodafone with a ✂% geography gap between our coverage and the 92% coverage obligation, which would need to be filled using new mast sites.

Vodafone has a "cookie cutter" model which is able to examine the gaps in coverage after the upgrades in Table D.1, and identify optimal mast sites to address them. We were able to run this model to assess that an additional ✂ sites would deliver ✂km^2 of coverage, filling the remaining gap: details of the prospective sites and coverage provided by each can be supplied on request to Ofcom, but it must be recognised that the

model merely identifies sites suitable to plug gaps and does not assess the feasibility of each location to bear a mast structure or whether there would be local opposition.

Figure D.1 shows the coverage achieved by each mast in the cookie cutter exercise[29]: as can be seen the first 180 or so are able to achieve the full potential according to radio link budget[30], but beyond this the coverage per mast diminishes.

✂

Figure D.1: coverage per mast

When expressed from the other angle, Figure D.2 shows how coverage expands as the sites are added.

✂

Figure D.2: increasing coverage

We now turn to the cost of providing these masts. Vodafone considers that a reasonable estimate could be £✂k to build a mast, ✂. This said, it is likely that the cost of sites will escalate as build progresses to more marginal areas, so in carrying out the cost analysis below we have used a core case of the capital expenditure being £✂k, with a high scenario using the ✂. In our modelling we envisage these costs to reduce at ✂% per anum. For operational expenditure, Vodafone has assumed £✂k per anum per site, again ✂. For this cost, we envisage an increase of ✂% per anum.

The total capex on new sites is therefore £✂M, followed by £✂M per year opex. Added to the upgrades, this brings a grand total of £✂M capex, £✂M/yr opex.

In order to assess a NPV of the exercise, however, it is necessary to consider when these costs would occur. Notwithstanding the proposed obligation applying after three years, Vodafone considers it impossible to upgrade ✂ masts and deploy nearly ✂ in three years. We have therefore capped the numbers at ✂ upgrades and ✂ new deployments per year – the best that has ever been achieved. This implies a five year programme of upgrades, six year programme of new deployments. Table D.3 therefore shows the modelled costs.

[29] This is ranked by diminishing coverage/mast, rather than being on any kind of scale of value wrt population served, or cost to implement.
[30] ✂. We would be happy to share our link budget calculation with Ofcom should this be helpful.

Table D.3 – Vodafone cost to meet obligation

Year	1	2	3	4	5	6	7	…	20
Number of upgrades	✂	✂	✂	✂	✂	✂	✂	…	✂
Number of new sites	✂	✂	✂	✂	✂	✂	✂	…	✂
Approx of improved coverage	✂%	✂%	✂%	✂%	✂%	✂%	✂%	…	✂%
Capex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Opex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Total Cost [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂

In calculating the NPV, we have used a discount factor set at the Weighted Average Cost of Capital (WACC). For this analysis Vodafone has used an industry WACC of 9.1%, as Ofcom informs us that this is the figure it has adopted in other policy formulation[31]. We consider it reasonable to assess the cost of the obligation across twenty years (given this is the period over which the associated 700MHz spectrum will be depreciated).

Using these figures yields a 20 year NPV of -£✂, some ✂x that which Ofcom concluded[32].

The capping of site upgrades and deployment serves to reduce the magnitude of the negative NPV: were it possible to achieve the obligation in three years then the capital expenditure would be incurred sooner and operational expenditure apply in more years. If we remove the cap, the effect is that the 20 year NPV becomes -£✂.

The effect of using a capital cost of £✂k for each new mast is that the 20 year NPV becomes -£✂.

Vodafone has carried out two further sensitivity analyses on its modelling:

- The core model is based upon a cell radius of ✂km, which equates to an intersite distance of ✂km. Figure D.3 shows the spread of intersite distances in Vodafone's network, demonstrating that the core case is entirely consistent with current network build. Ofcom's proposed obligation is silent on the topic of upload speeds, but Vodafone considers this extremely important – an obligation that mandates users be able to receive but not share media would result in a highly dissatisfying user experience. Nevertheless, we have also modelled using a ✂km cell radius, resulting in an intersite distance of ✂km – the effect of which would be to throttle upload speeds. This results in a requirement for ✂ additional masts, with a consequent 20 year NPV of £✂.

[31] Email from ✂ to Paul Rosbotham, 17/4/2018.
[32] For reference, the 10yr NPV is -£✂, 15 year NPV -£✂

✂

Figure D.3: Vodafone network intersite distances

- ✂

Vodafone has been able to further carry out analysis of the cost to other operators.

In the case of BT-EE, we estimate that post-implementation of the ESN, its coverage will stand at ✂% of geography at -105dBm, leaving a coverage shortfall of ✂% to the obligation. Similar to Vodafone, we estimate that it would first seek to ✂. Based upon the benefits that our own network accrues from these actions, our estimate is that this will leave ✂ uncovered, which based upon the above analysis would require around ✂additional masts. We can therefore assess BT-EEs costs as shown in Table D.4.

Table D.4 – BT-EE cost to meet obligation

Year	1	2	3	4	5	6	7	…	20
Number of upgrades	✂	✂	✂	✂	✂	✂	✂	…	✂
Number of new sites	✂	✂	✂	✂	✂	✂	✂	…	✂
Approx of improved coverage	✂%	✂%	✂%	✂%	✂%	✂%	✂%	…	✂%
Capex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Opex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Total Cost [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂

The 20 year NPV for BT-EE is therefore -£✂.

Finally, we have assessed the costs on the same basis for Telefonica. Our logic for Telefonica is identical to that of Vodafone (which is unsurprising given the mast share arrangements), other than ✂. The incremental costs will therefore be as depicted in Table D.5.

Table D.5 – Telefonica cost to meet obligation

Year	1	2	3	4	5	6	7	…	20
Number of upgrades	✂	✂	✂	✂	✂	✂	✂	…	✂
Number of new sites	✂	✂	✂	✂	✂	✂	✂	…	✂
Approx of improved coverage	✂%	✂%	✂%	✂%	✂%	✂%	✂%	…	✂%
Capex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Opex [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂
Total Cost [k£]	£✂	£✂	£✂	£✂	£✂	£✂	£✂	…	£✂

The 20 year NPV for Telefonica is therefore -£✂.

✂

Annex E – Legal analysis of Ofcom's statutory duties

Executive summary

Ofcom's coverage proposals are legally flawed. In particular:

a) Ofcom is failing in its duties by ignoring BT-EE's non-compliance with ESN State aid notification clearance;

b) Ignoring BT-EE's non-compliance with ESN State aid notification clearance has the result that the coverage proposals are likely to represent further (illegal) State aid to BT-EE;

c) It would not be realistic to comply with the coverage obligation without using other spectrum (i.e. outside the auction) because of the timing of release and the date for compliance with the obligation. This represents a de facto exclusion of non-incumbent MNOs. This will breach various legal obligations, including State aid (see below);

d) Ofcom has mis-stated its statutory duties and/or ignored relevant law;

e) Ofcom has failed to carry out a proper competition assessment, in breach of its primary duty under the 2003 Act;

f) Ofcom has failed to consider whether the proposals represent the least intrusive means of achieving the desired result, thereby breaching the principle of proportionality;

g) The proposals make it likely that some spectrum will remain unsold, which by Ofcom's own account is likely to mean a breach of Ofcom's duties to ensure efficient use of spectrum; and

h) Ofcom has failed properly to justify the valuation which sits behind its reserve prices, including taking into account an irrelevant factor (namely, Ofcom's own unlawful ALF decision).

1. Impact of BT-EE's failure to comply with ESN State aid requirements / proposals amounting to further (illegal) State aid

1.1. As set out at Section 2.3 of the main response Ofcom has developed the 700MHz coverage proposals based on the assumption that BT-EE has complied with the Emergency Service Network ('ESN') State aid EU notification clearance requirements[33] (the 'notification clearance'). That is that:

1.1.1. BT-EE complied with the requirements when BT-EE designed and constructed the physical masts so that they could be made available on equal and non-discriminatory access terms to other operators; and

1.1.2. Other operators will develop business cases for bidding for lots in the 700MHz auction on the basis that they consider they have equal and non-discriminatory access to the ESN sites, including pricing that addresses any competitive distortion from the State aid.

1.2. As a matter of fact, these positions are wrong. Given the interdependency between the ESN and the economic incentives Ofcom has assumed in designing the coverage obligations, the coverage obligation proposals are legally flawed. This error has been caused by Ofcom failing to respond to the world *as it actually is* but rather how it considers it *should be*, (i.e. as if BT-EE were fully compliant with the legal rules governing the ESN State aid; and as if there were a smoothly functioning process for access to ESN sites).

1.3. As detailed in correspondence from Vodafone's UK General Counsel to Ofcom's CEO of 22 February 2018[34], BT-EE is failing to fulfil the legal obligations of the State aid notification clearance to provide equal and non-discriminatory terms of access to the entirety of the subsidised network. Ofcom's decision on 700 MHz necessarily involves Ofcom taking a stance on whether it accepts that truth, or not.

1.4. As a consequence of BT-EE's non-compliance with the State aid notification clearance, the coverage obligation proposals themselves are likely to constitute further State aid by the UK government (via Ofcom) to BT-EE in respect of its position in the 700MHz Auction, which is illegal. That State aid will be granted by virtue of the fact that, on the facts as they stand today, any geographically encumbered coverage blocks offered in the 700MHz auction become *de facto* 'earmarked' for BT-EE. As a result of funding it has received for building the ESN masts, it will cost BT-EE less to fulfil the geographic coverage obligations, coupled with the benefits the greater coverage heralds to its commercial operations, BT-EE will be willing to pay more for the spectrum than any other operator.

1.5. Ofcom may say that this advantage could be addressed by ensuring compliance with the existing State aid conditions. Unfortunately, many of the advantages enjoyed by BT-EE are (literally) structural and it is unlikely they can be resolved in sufficient time. Failing resolution of that in a timely way, Ofcom must take the advantage BT-EE has received from the State aid into account in the design of the Auction conditions (e.g., until it is assessed to be in compliance). By failing to do either of these things, in

[33] State aid SA.38863 (2015/N) – United Kingdom Emergency Services Mobile Communications Programme http://ec.europa.eu/competition/state_aid/cases/258318/258318_1718437_89_2.pdf

[34] See Appendix One to Annex A of this response

combination with the approach Ofcom proposes to take with the 700MHz auction, Ofcom will confer a *further* advantage on BT – that is, further State aid. This further State aid does not fall within the scope of the existing clearance for ESN and would fall to be assessed by the Commission.

1.6. This would result in Ofcom failing to discharge its statutory duties (in particular the proposals would distort competition and fail to achieve the optimal use of spectrum) and may be in breach of Article 107, Treaty on the Functioning of the European Union ('TFEU') State aid provisions.

1.7. The root cause of this problem is Ofcom failing to tackle, or even take into account of, the 'facts on the ground' of BT-EE's non-compliance in relation to the ESN conditions. In practice, BT-EE has secured an outcome where no other operator can obtain fair and reasonable access to those ESN subsidised sites. No operator, properly advised, could rely on that access as an input to its operations to meet the new coverage obligation.

1.8. The preferable solution to this problem (and a step that would materially support Ofcom's objectives for the 700 MHz spectrum) would be action to secure full compliance with BT-EE's obligations in relation to the ESN. ✂

1.9. ✂

1.10. If Ofcom does nothing, and simply carries on with its proposals in their current form, then the relevant enforcement activity becomes a matter for the European Commission. It is also likely that any legal challenge to Ofcom's decision to establish a 700 MHz auction in the terms set out above would raise a question of European law, necessitating a reference from a UK court to the European Court for resolution. Neither of these prospects is in the interests of consumers or compatible with the swift bringing into use of the 700 MHz spectrum. Ofcom can and should take a more active role in ensuring BT-EE's compliance with the State aid notification clearance and the EU Guidance[35] in order to prevent these outcomes.

Ofcom's failure to ensure BT-EE complies with State aid notification clearance

1.11. The UK notified the State aid measure to the Commission pursuant to Article 108(3) of the TFEU on 27 April 2015.

1.12. On 2 December 2015 the European Commission published its determination that the part of the ESN measure which constituted State aid is considered compatible with the TFEU in accordance with Article 107(3)(c) on the basis that the aid is to:

> *'to facilitate the development of certain economic activities or of certain economic areas, where such aid does not adversely affect trading conditions to an extent contrary to the common interest'*[36]

[35] 2013/C 25/01, EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013XC0126%2801%29
[36] Article 107(3)(c)

1.13. The Commission's notification clearance decision was subject to compliance with certain requirements which included in particular that BT-EE:

> *'provide effective wholesale access to the entirety of the subsidised network, including the areas concerned [...], on equal and non-discriminatory terms for an unlimited period of time*[37]

And,

> *'in the absence of an established wholesale market for areas of mobile coverage in the UK, wholesale access prices on the subsidised network will be either set through agreements between MNOs or, in the absence of the latter, established on the advice of the National Regulatory Authority, Ofcom.'*[38]

1.14. The notification clearance decision is required by the Commission[39] to be read against Article 107(3)(c) and the '*EU Guidelines for the application of State aid rules in relation to the rapid deployment of broadband networks'* ('EU State aid Guidelines'). The EU State aid Guidelines set out that NRA's must play a proactive role in managing State aid measures:

> *'(42) The role of NRAs in designing a pro-competitive State aid measure in support of broadband is particularly important. The NRAs have gained technical knowledge and expertise due to the crucial role assigned to them by sectoral regulation. They are best placed to support public authorities with regard to the State aid schemes and should be consulted when target areas are being identified. NRAs should also be consulted with regard to determining the wholesale access prices and conditions and solving disputes between access seekers and the subsidised infrastructure operator.'*

1.15. The EU State aid Guidelines state as follows:

> *'3.4. Design of the measure and the need to limit distortions of competition*
>
> *(78) Every State measure in support of broadband deployment should fulfil all compatibility principles described above in Section 2.5, including the common interest objective, the existence of market failure, the appropriateness and the incentive effect of the measure. As regards limiting the distortions of competition... the following necessary conditions must be fulfilled to demonstrate the proportionality of the measure. Failure to meet **any** of these conditions would most likely require an in-depth assessment which could result in a conclusion that the aid is incompatible with the internal market.*
>
> *(g) Wholesale access: Third parties' effective wholesale access to a subsidised broadband infrastructure is an indispensable component of any State measure supporting broadband. In particular, wholesale access enables third-party operators to compete with the selected bidder (when the latter is also present at the retail level), thereby strengthening choice and competition in the areas concerned by the measure while at the same time avoiding the creation of regional service monopolies. Applying only to State aid beneficiaries, this condition is not contingent on any prior market analysis within the meaning of Article 7 of*

[37] Paragraph 41, Notification clearance
[38] Paragraph 42, Notification clearance
[39] Paragraph 26, Notification clearance

the Framework Directive. The type of wholesale access obligations imposed on a subsidised network should be aligned with the portfolio of access obligations laid down under the sectoral regulation. In principle, subsidised companies should provide a wider range of wholesale access products than those mandated by NRAs under sectoral regulation to the operators who have significant market power since the aid beneficiary is using not just its own resources but taxpayers' money to deploy its own infrastructure. Such wholesale access should be granted as early as possible before starting the network operation.'

1.16. The EU State aid Guidelines provide further detail on the approach that the NRA i.e. Ofcom must take to pricing access to State aid funded projects:

'(h) Wholesale access pricing: Benchmarking is an important tool for ensuring that the aid granted will serve to replicate market conditions like those prevailing in other competitive broadband markets. Wholesale access price, should be based on the pricing principles set by the NRA and on benchmarks and should take into account the aid received by the network operator. For the benchmark, the average published wholesale prices that prevail in other comparable, more competitive areas of the country or the Union shall be taken or, in the absence of such published prices, prices already set or approved by the NRA for the markets and services concerned. If there are no published or regulated prices available for certain wholesale access products to benchmark against, the pricing should follow the principles of cost orientation pursuant to the methodology established in accordance with the sectorial regulatory framework.'

1.17. BT-EE has been awarded access to up to £500M in State aid to add some 500 mast sites to its network for construction of the Emergency Service Network. In addition, the Home Office is directly building 292 additional sites known as Extended Area Services (EAS) sites for use in the provision of ESN.

1.18. To date, BT-EE has failed to consult with other mobile operators prior to designing the ESN sites and instead simply designed them to suit its own sole use (more detail is in Section 2.3 of the main response). As a consequence, there is a real risk that a large number of the ESN masts will not have the capacity for sharing access with other operators. To make matters worse Government have yet to confirm that all the EAS sites it builds will be constructed in a way that is suitable for multi-operator third party access (both as regards the structure of the site and the availability of sufficient radio and transmission, backhaul and Bitstream to support multi-occupancy).

1.19. If sites are not designed and built for multi-occupancy, they may need to be altered or retrofitted so they are suitable for sharing access with other operators. Where retrofitted sharing is possible, in many cases significant structural changes are likely to be required. BT-EE has offered this at a commercial rate at the sharing operator's expense, despite BT-EE having received State aid to build these sites. Some of these masts cannot simply be altered or retrofitted however and would need to be pulled down and rebuilt for the purpose of sharing.

1.20. Given fair and non-discriminatory access to the masts, as required by the notification clearance[40] and the EU State aid Guidelines, cannot be achieved without significant (costly) structural changes to the existing and planned masts, BT-EE is currently in serious non-compliance with these requirements.

[40] Paragraph 41, Notification clearance

1.21. Vodafone has engaged with BT-EE to seek commercial terms that are fair and reasonable in view of the requirements of the notification clearance and the EU State aid Guidelines. BT-EE has refused Vodafone's request on these terms. As a consequence, the parties are unable to reach agreement on a wholesale access price.

1.22. Vodafone's General Counsel wrote to Ofcom's CEO on 22 February 2018[41] identifying the compliance issues referred to above and that Vodafone has tried and failed to reach agreement with BT-EE on pricing. Vodafone therefore requested that Ofcom intervened directly. Ofcom's Group Director responded on 6 March, taking the position that:[42]

1.22.1. State aid is a matter for Government;

1.22.2. Because Government has not yet sought Ofcom's advice on this matter, Ofcom does not have a role.

1.23. Vodafone considers Ofcom's response seriously misunderstands its role and duties. Ofcom's letter is also inconsistent with what Ofcom said it will do in the consultation.[43]

1.24. Ofcom's principal duty, to further the interests of citizens and promote competition, does not require some external trigger or formal request from Government before they are engaged. The EU State aid Guidelines and the notification clearance specifically envisages Ofcom having an active role in solving disputes and managing compliance with the State aid requirements[44] and calls on Ofcom to exercise its competence to set wholesale access prices for the subsidised network.[45]

1.25. In this particular case, where Ofcom is given specific evidence of non-compliance with an EU requirement (and was asked to provide an opinion in accordance with the role envisaged for it in the State aid decision), for Ofcom to argue it is not required to take action because Government or some other party has not 'notified' Ofcom would amount to willful blindness to a serious competitive harm to the UK. The subsisting impact of BT-EE's non-compliance is that the objectives of the notification measures are not fulfilled, so competition is distorted by the State aid, which renders the State aid incompatible with the internal market[46].

1.26. BT-EE's failure to comply with the notification clearance and the EU State aid Guidelines is squarely within Ofcom's jurisdiction and mandate to remedy. A failure to do so amounts to a serious derogation of Ofcom's primary functions and places the UK in breach of requirements of EU law.

[41] ✂
[42] ✂
[43] At footnote 29 of the consultation Ofcom states 'We will keep the availability of these sites under review'.
[44] Recital 42, EU State aid Guidelines
[45] Paragraph 78, EU State aid Guidelines
[46] ibid

Further State aid 1: Ignoring BT-EE's non-compliance with ESN means Ofcom's coverage obligation proposals have the effect of indirect (illegal) further State aid

1.27. The definition of State aid in Article 107 TFEU is drafted broadly:

> *'Save as otherwise provided in the Treaties, any aid granted by a Member State or through State resources in any form whatsoever which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall, in so far as it affects trade between Member States, be incompatible with the internal market.'*

1.28. The case law sets out that as '*regulatory charges are by their nature included in the budgets of undertakings, they are normally caught by the State aid rules.'*

1.29. In *Cassa di Risparmio di Firenze*[47] the ECJ stated:

> *'The definition of aid is more general than that of a subsidy because it includes not only positive benefits, such as subsidies themselves, but also measures which, in various forms, mitigate the charges which are normally included in the budget of an undertaking and which thus, without being subsidies in the strict sense of the word, are similar in character and have the same effect'.* [our emphasis]

1.30. The Commission notice on the notion of State aid[48] sets out further that State aid need not be overt and can take various forms and in particular can be the result of an administrative practice which selectively excludes or favours undertakings if it is based on meeting some selective criteria:

> *'121 De facto selectivity can be established in cases where, although the formal criteria for the application of the measure are formulated in general and objective terms, the structure of the measure is such that its effects significantly favour a particular group of undertakings (as in the examples in the preceding sentence).*
>
> *122 De facto selectivity may be the result of conditions or barriers imposed by Member States preventing certain undertakings from benefiting from the measure.*
>
> *123. General measures which prima facie apply to all undertakings but are limited by the discretionary power of the public administration are selective. (193) This is the case where meeting the given criteria does not automatically result in an entitlement to the measure.'*

[47] Judgment of 10 January 2006, Cassa di Risparmio di Firenze, C-222/04, ECLI:EU:C:2006:8, para. 131
[48] *Commission Notice on the notion of State aid as referred to in Article 107(1) of the Treaty on the Functioning of the European Union*

1.31. It is common ground between Vodafone and Ofcom that:

1.31.1. It is uneconomic for operators to meet the coverage obligation proposals absent State aid (which is why State aid was necessary for the ESN in the first place) and/or effective access to the ESN masts.

1.31.2. Access to the masts that benefitted from State aid must be on equal and non-discriminatory terms to be effective and compliant with the notification clearance requirements. (Vodafone's considers that 'effective access' under the notification clearance and the EU State aid Guidelines is:

1.31.2.1. the design and construction of the subsidised network must be that it is suitable to carry capacity of other operators;

1.31.2.2. that pricing should take into account the State aid received by BT-EE.

1.32. The objective of the ESN notification clearance to '*minimise potential distortion of competition*' caused by the State aid is consistent with Ofcom's duties.[49] However, BT-EE has failed to comply with the requirements of the State aid notification as set out above.

1.33. As a consequence of BT-EE's non-compliance with the State aid notification clearance, the coverage obligation condition proposals themselves are likely to constitute a *further* additional State aid by the UK government (via Ofcom) to BT-EE.

1.34. This is because, on the facts as they stand today, BT-EE is failing to comply/is in serious breach of the State aid notification clearance by freely exercising its ability and incentive to not provide wholesale access to mobile operators to the ESN masts on fair and non-discriminatory terms. The advantages bestowed on BT-EE from the State aid are therefore being enjoyed by it unchecked by any counter-balance to prevent competition being distorted by the State aid.

1.35. So when it comes to assessing the benefits of purchasing the spectrum with geographic coverage obligation against:

1.35.1. BT-EE's costs of meeting the coverage obligation as a result of the State aid; and

1.35.2. the costs BT-EE's competitors will face / the lack of competition it will face from other operators trying to achieve a similar footprint;

BT-EE will realise vastly superior benefits than its competitors and have a significantly higher willingness-to-pay for that spectrum than other operators. [See Annex D]

1.36. As a consequence of the exercise of Ofcom's *discretionary power* to design a geographically encumbered licence condition, those blocks offered in the 700MHz auction are 'earmarked' for BT-EE by *the structure of the [condition]…such that its effects significantly favour* BT-EE.

1.37. Our initial view is therefore that by being willfully blind to the ESN notification clearance compliance failure (when it is made aware) and the consequent competitive distortion caused by it, the coverage

[49] Paragraph 42, European Commission, State aid notification clearance letter

proposals themselves may constitute additional State aid. We understand Ofcom has not notified the Commission of its plans for the coverage obligation, it has not been cleared and it is therefore illegal under EU law.

Further State aid 2 – Unrelated to ESN: The design of the condition discriminators in favour of certain operators

1.38. Implicit in Ofcom's coverage obligation proposals is that the winning bidders of the 700MHz coverage encumbered spectrum will 'fill the gap' Ofcom is seeking to bridge using either the 700MHz spectrum won in the Auction or any other spectrum at their disposal and would require any new entrant relying on 700MHz alone to build and deploy (or reach a sharing agreement for) around 21000 masts in any event.

1.39. Further, given that spectrum is finite and other spectrum is already fully allocated by licence (to Vodafone, H3G, BT-EE, and Telefonica) and there is no more spectrum available for purchase, neither would it be viable to meet the coverage obligation through purchase of 'other' spectrum.

1.40. This places potential new entrants at a practical unassailable economic disadvantage to incumbent operators in the proposed Auction; to have any realistic possibility of fulfilling the coverage obligations, bidders would need to already own sufficient *other* spectrum and/or infrastructure to start work to meet the obligation immediately following the Auction, pre-requisites not possible for new entrants to meet. It follows that operators who do not currently own other spectrum and/or access to masts and infrastructure are effectively precluded from bidding in the Auction for the encumbered spectrum because they have no realistic means of fulfilling the obligation should they win encumbered spectrum in the Auction. The coverage encumbered spectrum is therefore effectively *reserved* for operators that already hold sufficient spectrum to meet the obligation.

1.41. By attaching coverage obligations to the 700 MHz Auction, Ofcom is therefore also likely to fall foul of Article 107 TFEU by *using state resources to favour certain operators* that already own licences for other relevant spectrum in the domestic market. This almost certainly *has the effect of distorting competition* for 700MHz spectrum. As a consequence, Vodafone's current view is that, absent EU clearance, attaching coverage obligations to the Auction *prima facie* amounts to the provision of illegal State aid, in breach of Article 107 TFEU.

1.42. We have not seen any proper analysis of the competitive impacts that such favouritism for Auction participants will likely have on the market structure and competitive conditions for spectrum and mobile services. If this has not been undertaken, Ofcom must have no real sense of whether encumbering Auction lots with coverage obligations is legally justifiable or proportionate. As a consequence, we consider the proposals to attach coverage obligations to the Auction are also likely to be in breach of Ofcom's duties under domestic and EU law requiring it be non-discriminatory and proportionate.

1.43. Vodafone fears this is yet another symptom of Ofcom failing to undertake a proper impact assessment – see section 3 below – and strongly urges Ofcom to go back and do a proper impact assessment and legal analysis of its ambitions and proposals against the State aid provisions.

Conclusion

1.44. Unless Ofcom addresses how the ESN arrangements are actually operating in reality and takes active steps to remedy the issues:

1.44.1. Competition distortions resulting directly from the ESN State aid will continue unabated; and

1.44.2. Ofcom's coverage obligation proposals will confer an unfair competitive advantage on BT-EE that may be characterised as further State aid.

1.45. Ofcom is best placed to address BT-EE's compliance with the requirements of the ESN notification clearance and so should do so as a matter of urgency.

1.46. Vodafone also considers that attaching coverage obligations to the Auction is *prima facie* likely to be in breach of EU law on State aid, absent clearance and EU CRF duties and domestic law.

1.47. Unresolved, this issue is likely to result in a number of legal battles, on a number of fronts, that could delay the 700MHz auction at best or at worst seriously harm competition in the UK.

2. Ofcom's approach to its duties

2.1 Ofcom appears to studiously set out the legal framework it considers is relevant for:

> '*setting coverage obligations in the licences for 700 MHz spectrum to be awarded by auction*'.[50]

2.2 This includes UK and EU law. Under EU law Ofcom specifically identifies the Framework and Authorisation Directive and under domestic law the Communications Act 2003 (CA3) and Wireless Telegraphy Act 2006 (WTA).

2.3 Ofcom's approach to the legal framework requires it to balance, weigh up and prioritise a number of duties and objectives that can compete or conflict with each other, consider them against its policy objective and develop a range of proposals which are consistent to determine the most suitable action for it to meet them. In this case it is critical because the proper approach of that framework will ultimately determine whether Ofcom's design of the auction conditions will operate in the interests of industry stakeholders and the mobile consumers they serve.

2.4 Vodafone considers that as things stand in the current consultation Ofcom has failed to appropriately grapple with and apply the regulatory framework it is bound by. Any decision that emerges directly from the analysis in the consultation would therefore be incompatible with Ofcom's duties and legally flawed. We explain this below.

2.5 As a preliminary observation we consider Ofcom started off down the wrong path, both simply by incorrectly reciting a duty and then proceeding to incorrectly apply the appropriate weight to it. Unfortunately, Ofcom builds the approach it takes for the entire consultation on this foundation continues down this wrong path and develops its proposals based on it.

[50] Annex 5

2.6 The first reference to this wrong foundation is found in the introduction and at paragraph 1.2 where Ofcom states:

> '*We have a statutory duty to ensure the widespread availability of mobile voice and data services throughout the UK*'

2.7 Throughout the consultation Ofcom goes on to repeatedly state:

> *'we have put particular weight on our duty to ensure the widespread availability of mobile services throughout the UK'*

2.8 However, on inspection it can be seen no such duty exists in CA03, the WTA or CRF. Presumably Ofcom has arrived at this by extrapolating from its duty to:

> *'Secure…the availability throughout the United Kingdom of a wide range of electronic communications services';*[51]

But this is clearly not the same thing as what Ofcom is claiming as its duty and Ofcom has no jurisdiction to create new ones. Ofcom has no duty to promote mobile services or ensure that they are widespread; rather it is under a (competing) requirement to take the utmost account of being non-discriminatory and technologically neutral in pursuing its objectives.[52] Ofcom therefore appears to have read 'mobile services' and in that context 'widespread' into its duties where it should not have.

2.9 This is not just a question of semantics. Ofcom places particular weight on this reading of its duties; it has coloured Ofcom's entire analysis and approach to the consultation and consequently its coverage proposals. We are seriously concerned that Ofcom's proposals are therefore built on a false legal platform, without the legal *vires* to sustain them, has taken into account irrelevant considerations. This is all seems to be because Ofcom started off in the wrong direction.

2.10 Vodafone is therefore also concerned that Ofcom has failed to pay due regard to the duties which are in fact primary. These include in particular to secure the optimal use of spectrum and to further the interests of consumers and citizens by promoting competition where appropriate.

2.11 It is questionable therefore whether Ofcom has sufficiently developed a sustainable legal vires for developing the coverage obligation proposals as part of the 700MHz auction process and may be currently acting unlawfully in making these proposals.

Demand for spectrum

2.12 Ofcom's principal duties under the WTA06 require Ofcom to have particular regard to current and future demand for mobile spectrum.[53] Ofcom has presented no evidence to support its geographic coverage proposals which require the provision of mobile services, and the mobile masts that this implies, over large swathes of the UK which is mostly uninhabited. Ofcom has presented no balancing exercise of the

[51] Section 3(2)(b)
[52] Section 4(6) CA03; Article 8 FD.
[53] WTA Section 3(1)

demand that does exist against its duty to ensure the optimal and efficient use of spectrum and the economic benefits that are likely to arise.[54]

2.13 Absent this analysis Ofcom cannot claim that it has acted appropriately in the interests of all consumers or in a targeted and proportionate way with respect to its proposals and balanced the competing interests that it is required to.

3. Ofcom has failed to carry out a proper impact assessment

3.1 Ofcom's approach to the 'impact assessment' it states it has undertaken in the consultation is deficient and flawed in fundamental respects by reference to what stakeholders have come to expect. This expectation emerges from Ofcom's statutory duties and the requirement for it to only act transparently, based on robust evidence, only where it is absolutely necessary and proportionately. This is also reflected in Ofcom's own guidelines and those of government on what is required when undertaking an impact assessment.

3.2 Most specifically Ofcom has:

3.2.1 Failed to develop and consider a range of options for achieving its policy objective and then assess the impacts of each of those options to arrive at a balanced and proportionate solution.

3.2.2 Failed to undertake a competition assessment at the time it is consulting on a proposal to meet its policy objective.

3.3 These failures in approach are insufficient to discharge Ofcom's duties and the statutory purpose of an impact assessment provided for by section 7 of CA3. What's worse is that it appears these errors appear to have caused Ofcom to avoid stepping through the administrative process required of it to ensure robust decision making and leap to an erroneous proposal to achieve its policy objective. We consider Ofcom could fall into serious error of law if these errors are not rectified.

3.4 Ofcom has a duty to carry out a proper impact assessment where it proposes to do anything for '*the purpose of or in connection with its functions*'. An impact assessment is a statement setting out how, in Ofcom's opinion, the performance of their general duties (those duties set by section 3 CA3) is secured or furthered by or in relation to what they propose to do.

3.5 This rationale for following this process is far from an abstract mechanistic tick box exercise. The role of a regulatory impact assessment in decision-making is widely-recognised as critical to the proper exercise of authority and to assist it to avoid regulatory error and should be given due respect.

[54] WTA Section 3(2)

3.6 To 'carry out' an impact assessment has a legal meaning. To begin with the form of the impact assessment must comply with Ofcom's statutory duties and published guidelines (both from Ofcom and from government).

'Producing an Impact Assessment will normally involve six stages:

- *defining the issue we need to consider and identifying the citizen or consumer interest (stage 1);*
- *defining the policy objective (stage 2);*
- *identifying the options (stage 3);*
- *identifying the impacts on different types of stakeholders (stage 4);*
- *identifying any impacts on competition (stage 5);*
- *assessing the impacts and choosing the best option (stage 6).'*[55]

3.7 This reflects the process set out in governments *Better Regulation Framework Manual* summarised visually in the diagram extracted from the Manual below.

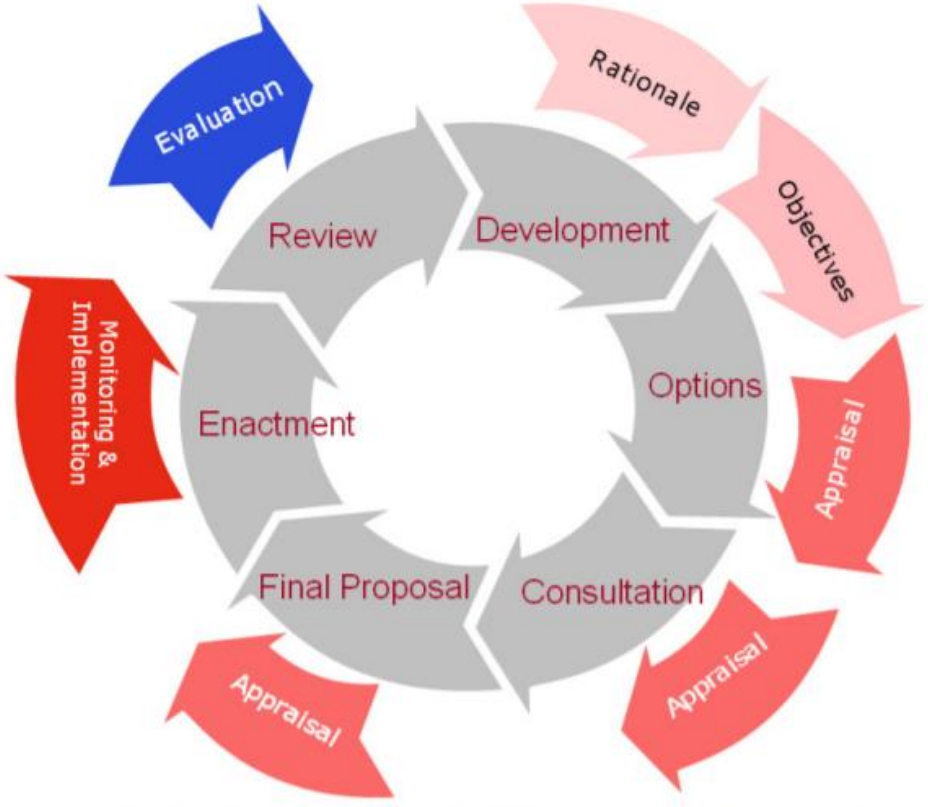

Figure 2.1.A: The stages in the impact assessment process [56]

[55] Paragraph 5.4, *Better Policy Making, Ofcom's approach to Impact Assessment, 21 July 2005*
[56] *Better Regulation Framework Manual*, page 5.

Impact Assessment failure 1: Failure to consult on options

3.8 As Ofcom set out in its Guidelines:

> *'By encouraging policy makers to identify and analyse a wide range of policy options, Impact Assessments form an important part of the decision-making process.*[57]

3.9 However, the impact assessment that Ofcom has purported to undertake in the 700MHz consultation fails to provide options for achieving its objective and so is seriously deficient in this critical respect of government and Ofcom's own guidelines. As a consequence, Ofcom has 'put the cart before the horse' by *completely* failing to consult on a range of options to meet its policy proposal and then appraise those options through the consultation process. This error appears to be as a consequence of Ofcom failing to follow the process Ofcom and government have set down, that is required and expected of in responsible administrative decision making.

3.10 Ofcom's error is as follows - Ofcom has defined the policy objective as to:

> '*deliver improvements for those rural communities that are least likely to benefit from commercial rollout. We also want to ensure that the benefits of the obligations are fairly distributed between the UK's Nations*.'

3.11 However, Ofcom then makes the leap to consulting on a single proposal; what form should the coverage obligations be that are attached to the winning bidder(s) licence(s). Ofcom does not appear to haven even considered whether it is *necessary* to attach coverage obligations to the auction conditions to achieve its objective. By failing to develop a set of options to weigh up the extent to which any would best achieve the policy objective and simply decide on the blunt instrument of attaching coverage obligations to the 700MHz spectrum licences, Ofcom fails to discharge its obligations to conduct a proper impact assessment and reaches a conclusion that we consider is not proportionate.

3.12 As set out at Section 4 of Vodafone's response we consider there are a number of potentially more appropriate and less intrusive options available that would better meet Ofcom's duties and objectives. Had Ofcom properly turned its mind to the process required it no doubt would also have identified some of these less intrusive, more efficient and proportionate measures for achieving the coverage obligations.

3.13 Ofcom is well versed in developing a clearly identifiable impact assessment by reference to its published guidelines and statutory duties because it has taken this approach to most of its spectrum consultations in the past.

3.14 This included a range of options and an assessment of impacts on competition.

3.15 Vodafone strongly urges Ofcom to step back from its objective, follow the process that is expected of it and consult on range of options achieving its coverage objectives.

3.16 Should Vodafone decide not to challenge Ofcom's impact assessment in this consultation but do so after the publication of the final statement, we expect that Ofcom would not take a timing point against

[57] *Better Policy Making, Ofcom's approach to Impact Assessment.*

Vodafone for not appealing the consultation now, given this is unlikely to be an efficient use of resources. Please let us know by 31st May if this is not the case though.

Impact Assessment failure 2: Failure to undertake a competition assessment

3.17 The flaws in Ofcom's purported impact assessment, and in particular the failure to consult on options, highlights that Ofcom has also failed to conduct a competition assessment against its coverage obligation proposal.

3.18 The requirement to undertake a competition assessment when Ofcom is consulting on a proposal is another fundamental legal requirement of a proper impact assessment. The rationale behind this is as Ofcom sets out in its Impact Assessment Guidelines:

> *'5.22 Given Ofcom's commitment to promoting open and competitive markets, it will normally be appropriate to identify any impacts which each of the options would have on competition. Where the policy objective involves promoting competition in a particular market, this analysis will be an integral part of the policy-making process and it may be appropriate for the Impact Assessment to refer to other sections of the consultation document or statement.*
>
> *5.23 Where promoting competition is not the main focus of the policy, it may still be important to assess the risk of options having a detrimental effect on the operation of markets and to factor this into the decision-making process. By doing so, it may be possible to lessen or remove significant adverse effects by modifying the proposed options or finding alternatives.'*[58] [Our emphasis]

3.19 However, instead in the consultation Ofcom says it will:

> *'publish a second consultation in the second half of 2018 setting out…our draft competition assessment for the 700 MHz auction.'*[59]

3.20 Decoupling the competition assessment from the proposal in 'the second consultation' is inappropriate and wrong in law. This is because it is necessary that Ofcom assesses the impact that the proposals it is consulting on will have on competition and the structure of the market. How else can Ofcom properly:

> *'select the option most closely aligned with Ofcom's principal duty, which is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition. By encouraging policy makers to identify and analyse a wide range of policy options, Impact Assessments form an important part of the decision-making process.'*[60]

3.21 Unless Ofcom's approach includes being seriously open to abandoning the coverage obligation proposal if, when it undertakes a competition assessment, it finds that the negative impacts of the

[58] Better Policy Making, Ofcom's approach to Impact Assessment.
[59] Consultation, paragraph 5.3(c).
[60] Better Policy Making, Ofcom's approach to Impact Assessment.

proposal are too great – which we have no expectation Ofcom's approach does – then undertaking a competition assessment out of sequence and after consulting on its coverage proposal comes far too late.

3.22 Undertaking a competition assessment in a 'second consultation' is therefore out of sequence, puts the cart before the horse again (for the reasons set out in section 3 above) and results in Ofcom making a serious administrative error of process.

3.23 It is particularly important for Ofcom to understand the impact that its proposals could have on competition given the interdependency between the coverage obligations and the ESN State aid to BT-EE. It is clearly foreseeable that the coverage obligation proposals could have an impact on the outcome of the Auction which could in turn determine the structure of the mobile market in the UK i.e., the level of competition.

3.24 A competition assessment against the proposal for coverage obligations is also particularly important in view of the design and outcomes in the recent 2.3 and 3.4GHz auction. The auction rules/competition measures in place in the 2.3 and 3.4GHz auction were designed on the basis that 700MHz spectrum would become useable in a 'similar time frame' to 2.3 and 3.4GHz spectrum. As a consequence, the 700MHz spectrum was included in the denominator used to calculate the cap on spectrum that BT-EE could purchase in that auction. A number of issues arise directly from this which make a competition assessment of Ofcom's coverage proposals crucial:

- The issues in the 2.3 and 3.4GHz auction (in particular that of the 5G race) made it abundantly clear that the structure of competition in the mobile sector is in a state of flux due to the fast pace of emerging technologies and exponential demand for data. An issue that played particular importance (and the subject of H3G's appeal) was the delicate point at which one player, BT-EE, already having the largest amount of useable spectrum by far, could achieve an unmatchable competitive advantage from acquiring more spectrum. To address this problem Ofcom put competition measures in place. Ofcom stated that it will be necessary to review the adequacy of these measures (i.e., conduct a further competition assessment) as more spectrum becomes available and useable[61]. In view of the impact that the coverage obligations are likely to have on the outcomes of the Auction it is therefore critical that Ofcom undertakes a competition assessment now to review the position before it develops and concludes on proposals that could undermine the objectives for market structure it set down in the 2.3 and 3.4GHz auction.
- As set out above the reality of the ESN State aid is far removed from the requirements of the ESN State aid clearance notification from the EU. There is therefore a clear foreseeable risk that if Ofcom does not assess the reality of the impact of the ESN State aid and take the impact into account in the design of the coverage obligations Ofcom could be unwittingly fixing the Auction so BT-EE will have an unfair advantage in the Auction. In that event Ofcom will have

[61] Paragraphs 7.50 – 7.51, Ofcom statement, *Award of the 2.3 and 3.4GHz spectrum bands*, 11 July 2017.

created the conditions under which BT-EE's share of spectrum goes very dangerously close to exceeding the level under which competition concerns arise.

- The timing with respect to the release and 'usability' of new spectrum is of critical importance to the shaping of the current market. Failing to undertake a competition assessment on 700MHz at this point is likely to make any decision more vulnerable to appeal and delay the Auction and availability of the spectrum – and thereby realising the concerns about including the 700MHz in the denominator in the 5G Auction appeal.

3.25 In the absence of a robust competition assessment against a range of options for achieving Ofcom's policy objective it is not clear at all how Ofcom is in a position to assess the extent to which Ofcom will meet its objective or of any benefits or harm to competition and consequently consumers. There is no reasonable basis for Ofcom ignoring the likely impact of its policy on future market conditions faced by existing licensees and consumers.

3.26 Vodafone considers by refusing to undertake a competition assessment of the impact of its proposals alongside its proposals Ofcom is likely to fail to discharge its statutory duties and general public law requirements.

4. Legal errors resulting from Ofcom's flawed costing analysis

Error 1 – factual errors

4.1 Ofcom agrees that it will fail to meet is principal duty of promoting the interests of citizens and consumers if any of the 700MHz spectrum goes unsold as a result of the Auction design because:

> '*it would delay the point at which operators deploy services in the spectrum*'.

4.2 It follows that if Ofcom's proposals and/or Ofcom's decision confirming the proposals in the consultation create a reasonable risk that the proposals will result in spectrum going unsold, it must be common ground between us that Ofcom's proposals are in conflict with its duties and therefore *per se* unlawful.

4.3 Ofcom considers an operator will purchase spectrum if its:

> '*valuation of the spectrum, less the price it has to pay for the spectrum, is greater than the net cost of meeting the coverage obligation*'.

Of course, the converse is true therefore that spectrum will go unsold if an operators value of spectrum is less than the auction price plus the cost of coverage obligations.

4.4 Ofcom has determined that it would be optimal for consumers if there were two operators meeting the geographic coverage obligations.[62]

4.5 ✂

4.6 As set out in Annex D Vodafone's analysis of its own costs and likely costs of other operators meeting the coverage obligations is that Ofcom's analysis of the cost of meeting the obligations is significantly

[62] Consultation paragraph 1.7

flawed. Vodafone considers it will likely cost it around ✂ which is about ✂times Ofcom's prediction of £300m per operator, for Telefonica ✂ and for BT-EE Vodafone estimates that cost to be ✂.

4.7 ✂

4.8 Vodafone has identified a number of other factual flaws in Ofcom's analysis including that the timeline for implementing the obligations is unachievable.

4.9 In view of the above, Vodafone considers Ofcom's current coverage obligation proposals:

4.9.1 create a very real risk that at least one of the geographic coverage encumbered spectrum pairs will go unsold and

4.9.2 fail to recognise and take into account the material asymmetry in the cost function of the other operators compared to BT-EE as a result of the ESN State aid.

4.10 As a consequence, Ofcom's proposals include a real risk that if it were to proceed with the current proposals it not meet its objective and fail to discharge its statutory duties.

4.11 For completeness, we do not accept Ofcom's suggestion [at paragraph 4.19] that it can responsibly or lawfully include an option for it to simply change the structure of the entire auction at the last minute if it appears that some of the spectrum will go unsold.

Error 2

4.12 Despite the value of the 700MHz spectrum to be auctioned being critical as to whether Ofcom's coverage obligation proposals are viable, Ofcom has provided negligible information on the overall value that it considers operators will place on 700MHz spectrum that comes encumbered with coverage obligations. As set out above Ofcom calculates the cost to each operator of meeting the obligation proposals to be around £300m per operator (compared with Vodafone estimate of ✂).

4.13 Ofcom has merely stated:

> *'Given these inherent uncertainties as to the value of spectrum in advance of the auction, we are not able to reach a definitive view on the likely value of the spectrum. However, in order to be able to take a view of whether our proposals might give rise to a risk of some of the 700 MHz spectrum going unsold, we have undertaken a high-level analysis of the results of recent auctions in other countries, to inform our assessment of whether our coverage obligation proposals are appropriate. As a result, and on a conservative basis, we consider that if the cost of meeting any one of the obligations were materially higher than 300m then there would be a risk of spectrum going unsold.[26] This could mean the wider benefit of 700 MHz spectrum to improve capacity and coverage for consumers across the UK would not be realised in a timely way. We have therefore developed our initial proposals for the number of obligations and the scale of each coverage obligation with an investment of this order of magnitude in mind.'*
>
> [26] In coming to this high level view, we have taken account of outcomes from a number of auctions, including awards of lower frequency spectrum in France, Germany and Finland since 2015 (both relative and absolute UK equivalent values calculated in a similar way as in our statement on annual licence fees for 900 MHz and 1800 MHz spectrum, 24 September 2015) as well as to our assessment of the full market value of low frequency spectrum in that statement.'

4.14 This explanation for Ofcom's approach to valuing the 700MHz, which is critical to its proposals, is severely lacking and inadequate for discharging Ofcom's duties to be transparent, provide proper reasons for its proposals and only act based on robust evidence. As it stands Ofcom's approach to and reasons underpinning the coverage proposals appear likely to be vulnerable to challenge on public law grounds based on some obvious procedural and methodological errors. Vodafone would welcome an immediate explanation of the following:

4.1.1 If Ofcom has undertaken a high-level analysis of the results of auctions in other countries to inform its valuation, please explain why Ofcom has not provided that analysis as part of this consultation so consultees have an opportunity to consider it and respond. We would also be grateful if Ofcom could please publish that analysis immediately.

4.1.2 Ofcom states that has calculated a high-level analysis the value based on '*our assessment of the full market value of low frequency spectrum…in the 900 and 1800MHz statement of 24 September 2015'* (ALF decision). We expect Ofcom is not surprised that Vodafone considers any use of the ALF decision by Ofcom to assess value of spectrum is fundamentally flawed and unlawful given the ALF decision was quashed by the Court of Appeal, with the decision being rendered *void ab initio.* This is particularly concerning given the issue of Ofcom's assessment of 'full market value' that it refers to in the ALF decision was central to the Court of Appeal's reasoning for considering that Ofcom's approach was fundamentally flawed and in all respects wrong in law.

4.15 Our current view is that Ofcom is acting unlawfully by failing to provide full and frank disclosure of its analysis and by relying on the flawed ALF methodology.

4.16 Vodafone invites Ofcom to provide immediate clarification of this matter and in particular why Ofcom considers it is legally entitled to take into account the approach taken in the ALF decision that has been rendered void.

5. Proportionality

5.1 It is widely accepted that mobile spectrum, and in this case the allocation of 700 MHz, is of significant national importance. In view of this Ofcom must develop a proposal which carefully balances its objectives and provide a compelling proposal that is proportionate and objectively justifiable to meets its objectives. This burden is arguably even greater in this kind of prospective analysis:

"[B]ecause the likelihood of error is greater in a prospective analysis, the prospective analysis must be proportionately more rigorous to account for this possibility".[63]

5.2 That proposition has also been described in other cases relevant to any regulator assessing a matter with significant consequences for industry stakeholders:

[63] Decision No: 02/05 of the Electronic Communications Appeals Panel in respect of appeal No: ECAP 2004/01, as adopted by the CAT Hutchison 3G (UK) Limited v Ofcom [2005] CAT 39 at 33

'the more important a particular factor seems likely to be in the overall proportionality assessment, or the more intrusive, uncertain in its effect, or wide-reaching a proposed remedy is likely to prove, the more detailed or deeper the investigation of the factor in question may need to be...'[64]

'...within a wide margin of appreciation, the depth and sophistication of analysis called for in relation to any particular relevant aspect of the inquiry needs to be tailored to the importance or gravity of the issue within the general context of the Commission's task.'[65]

5.3 However, to date Ofcom's proportionality analysis appears to be significantly lacking and confined to a single boilerplate statement:

'3.63(c) Our provisional assessment is that the coverage obligations and our proposals concerning information about new cell sites are...proportionate to what they are intended to achieve as our provisional view is that none of the proposed obligations would introduce any disproportionate regulatory burden on industry.'

5.4 Applying European and domestic case law to auction design, which is purely prospective, reinforces the requirements to act rigorously, establish a range of options and assess the risks to competition and consumer harm in order to develop a proportionate response. However, that obligation is all the more compelling in this case where there can be little doubt about the significance or gravity of the 700MHz spectrum for the future development of the mobile industry.

5.5 At present Ofcom appears to have completely failed to explore other options for achieving its coverage objective that could be more consistent with its duties in favour of the blunt instrument of the geographic coverage obligation, which comes shackled with the problems of the interdependency with the ESN State aid regime notification clearance; which is currently seriously flawed.

5.6 The importance of proportionality in setting spectrum fees is reinforced by the Recitals to the Authorisation Directive, which serve as important aid to understanding the thinking of the Community legislature. Recital 11 of the Authorisation Directive provides that:

'The granting of specific rights may continue to be necessary for the use of radio frequencies... Those rights of use should not be restricted except where this is unavoidable in view of the scarcity of radio frequencies and the need to ensure the efficient use thereof.' [emphasis added]

5.7 This makes it clear that spectrum licence rights should only be encumbered where this is unavoidable – in other words, where there is a clear necessity to do so driven by the scarcity of frequencies and the need to ensure spectrum efficiency and there is no better option. This emphasises the distinction between, for example, the setting of conditions following a finding of significant market power where Ofcom has a relatively wider zone of discretion to adopt rules in certain circumstances, and the relatively more limited scope that exists to do in relation to (in this context) spectrum rights. However, Ofcom has failed to inform itself of whether a better option exists.

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[64] *Tesco v Competition Commission* (2009), CAT 6 paragraph 139
[65] *PPI* (2009) CAT 27, paragraph 21

5.8 This same point is reiterated in Recital 15:

The conditions, which may be attached to the general authorisation and to the specific rights of use, should be ***limited to what is strictly necessary*** *to ensure compliance with requirements and obligations under Community law and national law in accordance with Community law.*

5.9 The judgment of the Court of Appeal in the Annual Licence Fees case should have left Ofcom in no doubt about the balancing act that is required of Ofcom with regard to its duties and the primacy of Article 8. Section 4(2) of CA 2003 expressly provides that in respect of their function relating to the management of the radio spectrum:

'It shall be the duty of OFCOM, in carrying out any of those functions, to act in accordance with the six Community requirements (which give effect, amongst other things, to the

requirements of ***Article 8 of the Framework Directive*** *and 'are to be read accordingly).'*

5.10 However, Ofcom appears to have singled out a particular objective that it wants to achieve to '*ensure widespread improvements in mobile coverage across the UK*', (which, as established above is not actually a duty) and determined to disregard and/or attributed less weight to its other duties without so much as a proper impact assessment or competition analysis. Ofcom appears to have made the leap to designing a mechanism to achieve that single objective and attempting to retrofit its actual duties to that objective.

5.11 As Vodafone shows in section 6 Ofcom has completely failed to explore what other legal powers and regulatory tools and levers could be invoked to achieve the outcome it is seeking or engaged in the appropriate balancing exercise against the costs and benefits that will be spread across UK citizens more broadly (see section 2.2). For example, Ofcom recognises that government (finally) considers that '*broadband and mobile must be treaty as the fourth utility*' and that a new Universal Service Obligation for broadband is likely to be on the horizon. Yet Ofcom fails to engage in any discussion about whether it is in fact appropriate for it to be aiming to achieve a *de facto* universal service for broadband (at the cost of other duties).

5.12 As a consequence, the legal *vires* that Ofcom has referred to for imposing the onerous coverage obligation is seriously deficient for relying and the coverage proposals disproportionate. Ofcom is likely to be acting unlawfully by failing to develop a regulatory condition which is not in any respect proportionate to the outcomes it is required to achieve.

Annex F – Public attitude to mobile masts

This Annex provides a series of press cuttings demonstrating public opposition to the rollout of mobile masts.

Chard and Ilminster News, 25th January 2017, "*Controversial phone mast for Combe St Nicholas football club divides residents*"

Okehamton Times, 1st February 2017, "*South Zeal phone mast plans opposed by parish council*"

The Huddersfield Daily Examiner, 20th April 2017, "*50ft phone mast set to go up in heart of rural village*"

Express & Star, 22nd April 2017, "*Furious residents say 'no' to 50ft phone mast plans in Tettenhall*"

Somerset Live, 19th May 2017, "*Wells residents 'horrified' at plan for 17.5 metre mobile phone mast just feet away from their homes*"

News Shopper, 23rd May 2017, "*Head teacher at Woolwich primary furious after council miss deadline to prevent phone mast being built outside school*"

Northwich Guardian, 10th June 2017, "*Vodafone plan to build radio base station next to Sandiway church*"

Wharfedale Observer, 22nd June 2017, "*Pool and Leathley councilors fighting 'eyesore' mobile mast plan*"

Ross-shire Journal, 28th June 2017, "*Evanton 52ft mobile phone mast approved on appeal despite gripes*"

Uckfield News, 12th July 2017, "*Good news for High Hurstwood villagers battling mobile phone mast plan*"

Bucks Free Press, 12th July 2017, "*Piddington village outrage over mobile phone mast plans*"

Wiltshire Times, 25th August 2017, "*Phone mast protestors hand in petition*"

North Somerset Times, 13th October 2017, "*Residents criticise Vodafone plan to install mobile tech at Clevedon Church*"

Formby Bubble, 9th November 2017, "*Celebrations all round for Hightown residents as phone company's mast appeal is rejected*"

Somerset Live, 20th December 2017, "*Vodafone's plans for 15 metre monopole in Frome could still go ahead*"

Southern Daily Echo, 29th March 2018 , "*Health concerns over plans for mobile mast*"

Daily Telegraph, 15th April 2018 , "*Dame Judi's phone mast objection gets mixed reception from the locals*"

Annex G – Building a mobile mast

Whilst it is widely recognised that public opposition to the deployment of radio base stations has declined over the last twenty years, there still is significant opposition to the development of new infrastructure in areas where there is currently none. This raises the dichomty of improving coverage in areas where there is no coverage, against opposition and resistance from local communities, landlords, Parish and Town Councils or Planning Authorities. For example, the Mobile Infrastructure Project delivered very few sites, even after a year's extension. Whilst it was not the major reason for under-delivery, resistance from landlords and local planning authorities contributed.

The majority of Vodafone's deployment in the last five years has been focused on consolidating and upgrading the existing infrastructure of both Vodafone and Telefonica to create a single grid of radio base stations. When the project is complete, it will deliver well over 14000 base stations providing 4G coverage outside of London. In 2015, Vodafone and Telefonica decided to extend our coverage into new areas, not covered through the consolidation of sites, effectively adding ✂ sites into the grid, all in locations where neither Vodafone or Telefonica had infrastructure. This is sometimes referred to as "Grow the Grid". The following comments relate to this subset of ✂ sites as this group would most represent the challenges that might be faced in an extensive deployment of new infrastructure. The data below represents the complete dataset, from both East and West, representing the performance of Cornerstone Telecommunications Infrastructure Limited (CTIL), for both Vodafone and Telefonica.

As of April 2018, the target number of sites has reduced to ✂ sites, as a number of sites have had to be removed from the programme due to either failure of being able to find a suitable location, or a willing landlord, or to obtain planning consent, or that the build or connection to back haul and/or electricity represented unacceptable costs. It is unclear as yet as to the impact of the new Electronic Communications Code. It is possible that it will take several years for the new Code to embed and there may be need for Code Operators to establish positions through the Courts before the market accepts the new Code.

Of the ✂ sites that are left, ✂ sites are still in pre-planning application submission after 3 years of searching. The remaining ✂ either have a planning application running, either directly with Local Planning Authority or an appeal with the Planning Inspectorate, or have a planning permission granted. When planning a build of a new site, it is expected that a consent is granted in 8 weeks (56 days). A summary of the length of time for decisions is provided in Table G.1. and G.2 below

Table G.1: Undecided applications

Total	Average	< 2 months	< 4 months	< 6 months	< 12 months	> 12 months
✂	152 Days	✂	✂	✂	✂	✂

Table G.2: Decided applications

Total	Average	< 1 month	< 2 months	< 4 months	< 6 months	< 12 months	> 12 months
✂	70 Days	✂	✂	✂	✂	✂	✂

Analysing the data suggests that all of the "applications" above that were decided within 1 month are likely to be licence notifications, or applications submitted under Regulation 5, where existing infrastructure will have been utilised.

Examining sites that have either been in planning for over 4 months, or took over 4 months for a planning decision or removed from the programme, it can be seen that over ✂sites (✂%) have taken considerably longer than was planned for. If this was replicated in another programme, this would have a significant impact on the ability to be able to deploy sites in areas where there is no infrastructure.

Whilst there has been a significant number of sites that go through the planning process unchallenged, there are still a significant number that face public opposition, for example, ✂. The first application, within ✂, was for a 17.5m pole at the car park of the local football club which was refused by ✂ planning team and then turned down on appeal to the Planning Inspectorate. The reason for the refusal was unacceptable impact on the National Park. A review of the area resulted in a smaller, 12.5m mock telegraph pole, closer to the centre of town. The intention of the local authority was to refuse this application as well, along with significant objection from the local Parish Council, but permission has been granted by default through a deemed consent. However, this demonstrates the difficulty in getting new infrastructure within National Parks, the areas of the country that would need to be covered if further geographic targets are imposed.

We are also seeing an increase in the number of locations where local communities are expecting multiple base stations to cover small villages rather than the taller optimal site at the centre of, or close to, the village. This significantly increases both capital and operating costs. An example of this is in ✂ in Wales. We currently have an application running for a new site to be located at the ✂ in the town. Local residents have significant opposition to the site and have suggested a number of alternatives but the local planning authority want to consider upgrading one structure and potentially sharing a new site. Whilst sharing existing infrastructure can be an ideal solution for a base station, often, significant redevelopment costs are incurred. This is highly likely where the heavier, greater cross-sectional antennas, will need a strengthened tower.

New sites in remote locations can present a number of challenges for build. The sites may need long access tracks where is it difficult to get the heavy machinery required to build the site. Last winter, a significant number of builds had to be aborted or delayed due to access tracks or routes being unusable, indeed some landlords, typically farmers, simply barred the build teams onto sites for the whole winter as the ground would not accommodate the equipment. There are also other considerations that need to be taken into account, for example, the connections required for power and transmission. Often, these involve long and expensive build outs of cable runs, with multiple wayleaves that need to be cleared.

During the build out of the targeted ✂ Grow the Grid sites, Vodafone based our forecast build around an ✂-month delivery cycle. A comparison has been undertaken of those sites that are currently live in this subset in the West, i.e. those in build control of Vodafone, looking at the performance against key milestones in the process and their associated lead times for bringing the site live. The associated data is presented in Table G.3.

Whilst we have presented the key milestones below, there is approximately 2 – 6 months' pre-work required in the cycle to allow the search and identification of potential options to meet the coverage demand. We have presented data below that demonstrates the % target against the milestones for those sites that are now live and taking traffic, starting from the Multi Skilled Visit (MSV).

Table G.3: Performance of key milestones within the Grow the Grid Project against target dates (Vodafone only controlled (West))

	Target lead time from Site Live	Average in GTG dataset	% within target lead-time
Multi Skilled Visit Complete	✂	✂ days	✂%
Site Accessed (planning and landlord agreement complete)	✂	✂ days	✂%
Passive Built & Powered	✂	✂ days	✂%
TX solution in place TIC	✂	✂ days	✂%
Site live	Live		

Table G.3 demonstrates that the majority of the delays occur in the front ended milestones where there is site selection, design, planning consent, legal agreement with landlord, transmission and power design and ultimately, site access. Looking at all sites that are accessed, not just live, it can be seen that the average gap between MSV and Site Accessed is ✂days (compared to a target of ✂days). This can be due to a number of reasons; delays in the planning process will be contributing towards the increased gap between target and actual, but a major contributing factor is the time taken to manage the power and transmission delivery, that often need first and third party wayleaves, or excessive build costs due to the complex nature of rural builds.

An example of this was seen at ✂ in Wales, where a site was built to provide 4G to the surrounding area but the connection of the site to main electricity was delayed because ✂ delayed the completion of the third party wayleave for the power company. Ultimately, the site was brought live using a generator. This was repeated at six different sites across England and Wales during December as delivery of power was delayed due to 3rd party wayleaves, obtained Regional Electricity Companies (REC), or excessive electrical costs due to length of cable run.

Further examples of failed delivery due to wayleaves have occurred where one party is adamant not to allow the cable across their land. In some cases, the third party is from the same family as the landlord for the base station (first party), and operators are reliant on either the REC or the fibre provider to take the landlord to court to force the issue. ✂.

Table G.3 demonstrates that once the site has been passively built, i.e. pole and cabinets installed, delivery of site live against the target timescales significantly improves. This is not to be unexpected as often new sites are not passively built until all dependencies have been designed out. ✂. Several sites were delayed in the period running up to Christmas due to unexpected issues. For example, a site in ✂ was delayed due to inability to deliver fibre transmission to the site. Transmission could only be delivered via an overhead route and yet the Council refused access to the lampposts to install the fibre due to the presence of Christmas lights. Whilst our target was to bring this site live by the end of 2017, the delay in delivery of transmission has resulted in a six-month delay.

As stated above, the weather can have a significant delay in our ability to build. Whilst in the main, it can be several days, the weather can cause months of delays. A site in ✂ was delayed as the landlord refused access to his land to start the build on the basis that the ground was too wet for the dig to commence. Ultimately, the planned December 17 live date was delayed by six months.

Annex H – Incentivising mobile coverage

This annex describes a mechanism by which the scheme proposed in Section 4.3 could be implemented.

Coverage conversations with Ofcom revolve around the mobile signal strength that sophisticated models predict for 100m^2 pixels, given the operator mast locations, transmit powers and environmental clutter that affects radio propagation. These results are calibrated via drive-tests.

Table H.1 translates the suggested benchmarks set out in Section 4.3 into pixel terms.

Table H.1: Coverage obligation in pixel terms[66]

Location	Area (km^2)	Hence total pixels	Baseline %	Baseline pixels	Pixels not covered by baseline
England	130,395	13,039,500	92%	11,996,340	1,043,160
Northern Ireland	14,160	1,416,000	92%	1,302,720	113,280
Scotland	78,772	7,877,200	65%	5,120,180	2,757,020
Wales	20,779	2,077,900	70%	1,496,088	581,812
UK					4,495,272

Operators' coverage performance compared to the benchmarks in Table H.1 would be assessed annually from an agreed date (notionally this year). If an operator fails to achieve coverage to the volume of pixels set out in Table H.1 by the 2022 assessment date, then they would be subject to penalties (the level of which we will return to).

Where an operator exceeds the volume of pixels for any of the nations, then they would be rewarded by an auction rebate and an ALF discount.

Auction rebate

The auction rebate would be assessed with respect to the incremental volume of pixels covered in excess of the baseline, relative to the previous assessment year. So for example if in 2021 an operator provided coverage to 1.36M pixels in Northern Ireland and the equivalent figure in 2020 had been 1.31M, the auction rebate would be assessed on the basis of 50k pixels.

[66] We note that there are a series of references for the areas of the UK nations. The figures above are for illustration only and we would propose any scheme implemented be based upon definitive figures from the Ofcom mapping files, but not including areas such as MoD exclusion zones.

As a starting point, each excess pixel would be worth 0.000022%[67] of the auction fee – so if an operator had paid £500M for their 700MHz licence, each pixel covered in excess of the baseline would result in the return of £111.23. In our example above, this would imply that in 2021 the operator would receive a rebate of £5.56M. So in the extreme/improbable case of an operator managing to achieve coverage to every single pixel, they would see the rebate of the entirety of their auction fee.

We would propose, however, a more sophisticated model:

- Focusing coverage where it matters. Rather than having a blunt single rebate figure for all pixels, it would be possible to rank pixels. So for example, a pixel containing a house, office, A/B road or railway could be given a rebate that is double the starting point, i.e. 0.000044%, or £222.45 in our example. The remaining pixels would then be assigned a lower rebate value – it is impossible to know what this would be absent knowing the relative number of "priority" pixels, but if e.g. 10% were assigned priority, this would imply that the remainder would have a rebate value of 0.0000198%, or £98.87 in our example. By taking this approach, the premises obligation suggested by Ofcom would be redundant, as operators would be incentivised to target homes in this way.
- Recognising that life is tougher as networks expand to the extremes. The first pixels beyond the baseline obligation could be considered relatively simple to serve, whereas addressing the very last parts of geography necessary to achieve 100% coverage is extremely costly. To acknowledge this, the starting point numbers could be modified such that the first 450,000 pixels beyond the baseline pay out only half the figure, and the final 450,000 pixels pay out 1.5x the figure.

ALF discount

The ALF discount would operate in a similar manner. However, rather than being based on the incremental coverage above the baseline *that has been achieved in that specific year*, the discount would instead be assessed based upon the coverage in excess of the baseline in general. So, if we take our Northern Ireland example, if the operator in 2021 their pixel coverage was 1.36M, that would imply that they had beaten the target by 57,280 pixels. If their ALF was £50M/yr, that would mean that their starting point discount would be £11.12/pixel/yr[68], so their ALF in 2021 would be discounted by £637k. Once again, the implication is that if the operator was to achieve 100% coverage across the UK, then no ALF would be payable.

As with the auction rebate, we suggest that the pixel discounts could be weighted according to whether the excess pixels addressed are priority ones, and whether they're at the easy or difficult end of the implementation spectrum.

Penalties for non-compliance

We believe this scheme could be further expanded to include penalties for non-compliance with the baseline coverage obligation. Ofcom now has the power to fine operators that do not achieve their coverage

[67] Calculated as 1/7149594 of the auction fee
[68] Calculated as 1/7149594 of the £50M ALF

obligations, but there is considerable discretion, in that the legislation only sets a maximum level of penalty. Vodafone believes that there would be benefits to providing greater regulatory certainty in this area. Ofcom could set the level of penalties according to a fixed component (to punish non-compliance), followed by a variable component (to address the level of non-compliance). The variable component could be set with reference to the volume of pixels that the recalcitrant operator was short when compared to the benchmark. So for example if an operator was 100k pixels short of meeting their obligation in Scotland, the penalty would be a fixed amount plus £11.2M (this being 100k pixels at £111.22/pixel).