Virgin Media O2 response to Ofcom's Consultation on setting Annual Licence Fees for 2100 MHz spectrum [Non-Confidential version]

Introduction

We welcome the opportunity to respond to Ofcom's Consultation. Annual Licence Fees (ALFs) play a major role in providing spectrum holders with incentives to efficiently use spectrum and to invest in its deployment. The ALFs that Ofcom will set for paired and unpaired 2100 MHz spectrum are no exception to this. The paired spectrum in this band is important: MNOs have or are refarming this spectrum and use it to deploy 4G and in the future 5G services.

Our response is structured in two parts. First, we explain why Ofcom's approach to setting paired 2100 MHz ALFs is not truly conservative and that a more appropriately conservative approach is both justified and would imply lower ALFs overall. Secondly, we set out our serious concerns with Ofcom's proposals for setting ALFs for unpaired 2100 MHz spectrum. The proposals for the unpaired spectrum would give rise to ALFs that are excessive compared to the current and future mobile value of this spectrum. If implemented, the plausible effect of such ALFs is to foreclose this spectrum from mobile use.

Ofcom's proposals for paired 2100 MHz ALFs

The methodology that Ofcom followed to set proposed ALFs consists of three stages.

1. Determining lump-sum value of spectrum based on UK auction outcomes and international benchmarks.
2. Converting lump-sum values into annual rates by application of an annualisation rate.
3. Assessing whether setting ALFs based on the first two stages is in line with Ofcom's regulatory duties.

We support Ofcom's proposals for stages 2 and 3 (subject to the lump-sum value in stage 1 being determined on a truly conservative basis).

Our response focuses on stage 1. We agree with Ofcom's proposals to determine the market value of paired 2100 MHz spectrum by using benchmarks from both sides of the band (i.e. below 1 GHz and higher bandwidth spectrum), and in doing so to apply the 'distance method' developed to set ALFs for 1800 MHz spectrum.

At the time of setting 1800 MHz ALFs, UK auction outcomes that Ofcom could use to determine this spectrum's market value were limited to 800 MHz and 2.6 GHz. The range of relevant UK auction outcomes has expanded since: there are two auction outcomes for below 1 GHz spectrum (700 and 800 MHz), and four for higher bandwidth spectrum (2.3, 2.6, 3.4 and 3.6 GHz). The challenge is how to decide which combinations of below 1 GHz and higher bandwidth spectrum benchmarks to rely on and which weights to put on the estimates of 2100 MHz market value that differing combinations support.

Ofcom proposes to use the full set of combinations (for which international Tier 1 benchmarks can be determined) and to put, in principle, equal weight on the estimates supported by differing combinations. It then adopts what it argues to be a conservative interpretation of the range of estimates supported by these combinations to provisionally determine market value of paired 2100 MHz spectrum at £10.5m.[1]

Ofcom explains its considerations in adopting a conservative approach in footnote 26:

> *We take a conservative approach to interpreting the evidence to reflect the asymmetry of risk as between the effects on spectrum efficiency from inadvertently setting ALFs either above or below market value, given the uncertainty about the correct estimates for market value.*[2]

We agree with Ofcom that asymmetry of risk (with adverse impact being greater when setting ALFs above market value) justifies taking a conservative approach. Yet we are concerned that the approach Ofcom followed in reaching its provisional view on market value – and thus the value it used to set proposed ALFs – is not truly conservative.

We have identified four areas where Ofcom could have exercised more conservative judgement.

[1] Paragraphs 4.43 to 4.53 of Ofcom's Consultation.
[2] Page 16 of Ofcom's Consultation.

1. Ofcom included all three Slovenian benchmarks in the set of estimates it has regard to even though it acknowledged that these benchmarks carry a risk of overstating the distance method benchmarks (and by extension the estimates of 2100 MHz market value). This risk originates from Slovenian 700 MHz spectrum auctions being susceptible to understate market value because of the additional coverage obligations that applied to this spectrum.
2. Ofcom included Slovenian and German benchmarks based on the 700 and 2100 MHz combinations in its set of estimates. These auctions had the unintuitive outcome of higher bandwidth spectrum being valued more than 700 MHz spectrum. Such valuation is consistent neither with the common understanding of below 1 GHz spectrum being more valued per MHz than higher bandwidth spectrum (as recognised by Ofcom in the Consultation) nor with the more intuitive auction outcomes that other estimates in Ofcom's benchmark range are based on. In our view, Ofcom should have excluded these benchmarks from its analysis.
3. Ofcom decided to not rely on estimates based on the Dutch benchmarks for which it used proxy values for higher bandwidth spectrum to estimate the market value of 2100 MHz spectrum. It did use these low estimates (average of £9.1m and maximum of £10.1m) to argue that a value towards the lower end of its set of estimates is appropriate. The exclusion of Dutch proxy benchmarks seems inconsistent with Ofcom's inclusion of Ireland (2012) and Sweden (2011) benchmarks (both based on proxies for 2.6 GHz spectrum) as Tier 1 benchmarks in setting 1800 MHz ALFs.
4. Ofcom put equal weight on estimates determined based on combinations involving 3.6 vs 3.4 GHz spectrum. The former spectrum was auctioned more recently and thus is likely much more informative about current UK value of spectrum in the wider 3.4-3.6 GHz band. It would have been reasonable to put greater weight on estimates based on the more informative UK auction outcome (ie, 3.6 GHz).

We recognise that Ofcom has regard to a wide range of evidence and must apply difficult judgements in setting ALFs. Given the importance to mitigate the impact of potentially too high ALFs and the need to reflect on the areas we identified above, we believe that Ofcom must apply a truly conservative approach. This would involve Ofcom changing its judgement on (some of) the above areas and using the revised set of estimates to decide on market value. This would give rise to a considerably lower market value, likely around the £9.5m lower threshold that Ofcom identified.

The methodology that Ofcom applied in determining proposed 2100 MHz ALFs was developed and used to set ALFs for 900 and 1800 MHz spectrum. We acknowledge that it supported setting ALFs that reflect reasonable market values. This said, we consider that it falls short in offering an intuitive understanding of how ALFs vary in UK auction outcomes and international benchmarks. We do not suggest that Ofcom revisits the methodology as part of this Consultation. But we do think that Ofcom and industry should evaluate the methodology (including its merits in comparison to alternatives) outside the context of setting ALFs for an individual spectrum band.

Ofcom's proposals for unpaired 2100 MHz ALFs

Having decided on mobile as highest value use case (which we agree with), Ofcom proposes to determine the market value of this spectrum based on the UK auction outcome for unpaired 2.3 GHz spectrum. We are greatly concerned with this proposal. It would result in ALFs that are excessive compared to the current and future mobile use value of this spectrum. The adverse impact of too high ALFs would be significant. They would distort competition and incentives for this spectrum to be used efficiently, plausibly foreclosing this spectrum from mobile use.

Before proceeding, we note that there is no *current* mobile use case, and that there is great uncertainty around the potential and timing of a *future* mobile use case and what its value could be. Combined, these facts mean that the expected value of this spectrum is small and uncertain. It will be very low over the next years, and even thereafter it will be uncertain and unlikely substantial. In such circumstances, ALFs should not be set based on an unreasonably optimistic prospect of use case and market value.

The great uncertainty around use cases makes it challenging to use option value as a basis for setting ALFs. We asked ourselves the following questions in developing our view on use case and potential value of this spectrum over the years ahead. What is the current use case? What could a future use case be (if existing barriers to use case are addressed)? What are existing barriers? What is needed to address them, and by when can this be achieved?

No current mobile use case

Ofcom recognises in paragraph 3.6 of its Consultation that "*the unpaired 2100 MHz spectrum is currently unused for high power mobile services (and has not been used since its award in 2000)*". This is correct. MNOs do not currently use this spectrum to deploy high power mobile services. In fact, the MNOs that hold spectrum in this band are not permitted to deploy such services under terms of their current licence. Moreover (as discussed below), MNOs would only be able to deploy this spectrum for providing high power mobile services if and once barriers to such use are addressed.

The prospect for a future mobile use case is limited

We have considered options for a potential mobile use case if existing barriers are addressed or mitigated. Before setting out our views on these options, we explain that the amount of spectrum available to individual MNOs has a major bearing on the operational and commercial merits of any use case. We presume that spectrum can be used to deploy high power services though this requires several barriers (including availability of radio equipment and interference management) to be addressed.

The band comprises of 20 MHz in total, allocated across three MNOs, and with questions around the potential for the full 20 MHz to be used without causing interference. We consider that MNOs can only make the commercial case if they are able to deploy a minimum of 10 MHz of unpaired spectrum or preferably more. Deploying more spectrum allows to deliver greater network benefits and it is more cost effective (because the costs of installing radio equipment depends more on the decision to deploy and much less on the amount of spectrum that is used). When having less than 10 MHz available, the commercial case for mobile deployment will not be there as MNOs cannot effectively use the spectrum for a wide area macro deployment, scalability would be questionable, and the trade-off between deliverable benefits and deployment costs would be unfavourable.

The combination of 20 MHz in total and a minimum requirement of 10 MHz unpaired spectrum would mean that the band can support at most two MNOs to deploy high power services and this requires effective interference management. It seems prudent that Ofcom takes a step back and determines the minimum requirements for MNOs to deploy mobile services using this spectrum, and to then reflect on the number of MNOs that can use spectrum in this band.

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] But we identified several barriers, which individually and jointly, mean that MNOs will not be able to deploy spectrum they hold in this band until barriers are addressed. This includes the equipment ecosystem, interference management, and insufficient spectrum available to individual MNOs.

(1) No supportive equipment ecosystem

MNOs require access to an available equipment ecosystem – both radio equipment to deploy and devices that support using this spectrum. Absent such ecosystem and a realistic prospect for it to develop, MNOs will not be able or find it very costly to deploy this spectrum.

Ofcom understates this reality by noting in paragraph 3.10b that "*the equipment ecosystem already exists for mobile terminals and the band is deployed for mobile in China*".[3] This seemingly brings Ofcom to consider that the required ecosystem exists and is available to UK MNOs. Reality is different and more challenging. We next explain that the required ecosystem does not currently exist (or that UK MNOs do not have access to it), and that the prospect for such system to develop (or for access to emerge) is unfavourable.

No (available) supply of radio equipment that supports deployment

MNOs will need to install radio equipment on sites in areas where they want to deploy this spectrum. We checked with equipment suppliers that we are permitted to purchase from (ie, Nokia and Ericsson). They do not produce radio equipment that supports deploying this spectrum and that is compatible with UK/EU requirements (ie, band 33).

[3] Paragraph 3.10b of Ofcom's Consultation.

Ofcom observes that this spectrum is deployed for mobile in China. It is unclear to us why Ofcom has not considered the impact of wider government policy, soon to enshrined in law, on the relevance of the Chinese market to useability of spectrum in the UK. The Telecommunications Security Bill does not allow UK communication providers to use equipment supplied by High Risk Vendors (which will include Chinese suppliers such as Huawei) in building its mobile networks.

If non-Chinese suppliers (Nokia, Ericsson, possibly others) neither produce nor have plans to develop such equipment, options for UK MNOs will be very limited. Even if some of these suppliers were to develop equipment that is compatible with UK/EU requirements, it will take years for such equipment to come to the market, available suppliers and their offering will be limited, and prices will be very high because of lack of scale and a weak negotiation position.

Suppliers do not produce devices that support band 33

The commercial case for deploying this spectrum will also depend on the number of devices (and thus users of our network) that are able to use this spectrum. We validated based on our internal device database that devices available in UK/Europe do not currently support band 33.

Whilst devices supporting band 39 are produced for the Chinese market, these do not comply with the UK/EU requirements. Suppliers would have to adjust their devices to achieve compliance. Whilst technically feasible, the commercial case to do so will not be attractive when mobile use of this band is limited to the UK and with only one or two UK MNOs deploying this spectrum. Device suppliers will not want to invest in adjusting their devices when there is no realistic prospect for mobile deployment of band 33 (in UK or elsewhere). Even if, it will take years for such devices to hit the market and even longer for a substantial proportion of users on our network to have devices that support using this spectrum.

2) Transmission considerations

The provisioning of phase synch in transmission connections between cell sites and core network is required for deployment of 2100 MHz unpaired spectrum. Phase sync is available on sites where we deploy unpaired 2.3 GHz and will be available on sites where

we deploy 5G. For other sites, phase sync will have to provisioned to support deployment of unpaired 2100 MHz spectrum as it is not currently present. This will either limit viability or increase our costs of deploying this spectrum.

3) Interference with adjacent bands

Using this spectrum for deploying high power mobile services requires effective management of interference with adjacent spectrum bands. This concerns an area that Ofcom, in our view, has had only limited regard to.

It is not clear to us whether the 5 MHz of unpaired spectrum that borders 1920 MHz can be deployed without interfering with the paired spectrum 1920 MHz and above spectrum. We note that Ofcom decided on the inclusion of a guard band between paired and unpaired spectrum in the 2.6 GHz band. The absence of such guard band in the 2100 MHz band introduces a challenge which can only be overcome through coordination between MNOs and effective management. In a similar vain, Ofcom has not extensively considered potential interference with spectrum just below 1900 MHz in the event that lower bandwidth unpaired spectrum (ie, 1900 to 1915 MHz) were used to deploy high power mobile services.

4) *Spectrum available to individual MNOs constrains or inhibits mobile use case*

The unpaired spectrum band consists of 20 MHz, distributed across three MNOs. BT/EE holds 10 MHz, Three and VMO2 only ~5 MHz. The small amount of spectrum held by individual MNOs constrains their potential mobile use case, in economics of deployment and in benefits that can be delivered. This limits the potential for a mobile use case and reduces the associated value compared to where one single operator holds substantially more spectrum (as is the case in China, where China Mobile holds 20 MHz[4]). As explained above, we anticipate that a mobile use case requires a minimum of 10 MHz but preferably more.

[4] https://halberdbastion.com/intelligence/mobile-networks/china-mobile

Using the 2.3 GHz auction outcome greatly overstates the market value of unpaired 2100 MHz spectrum

Unpaired 2.3 GHz spectrum was sold as part of Ofcom's 2018 combined 2.3 and 3.4 GHz auction. The outcome of this auction was that we (Telefónica UK) purchased all four 10 MHz lots in this band. We switched this spectrum on within six minutes (from confirmation of licence grant) on 42 sites in London with proactive testing and performance analysis, and expanding to 1,000 sites by the end of 2018.[5] Completely the opposite set of circumstances to unpaired 2100 MHz where deployment is uncertain and years away.

Ofcom proposes to use this auction outcome, in £m per MHz, to determine the market value of unpaired 2100 MHz spectrum. We recognise there are similarities between unpaired 2.3 GHz and unpaired 2100 MHz spectrum in terms of the balance of propagation and capacity they support, and that this, at least in theory, can be informative about the relative value of spectrum in both bands.

We have identified several reasons why this relation breaks down in practice, and which lead us to conclude that using the 2.3 GHz auction outcome will greatly overstate the market value of unpaired 2100 MHz spectrum.

1. The potential use case for unpaired 2100 MHz spectrum is much more challenging than it was for unpaired 2.3 GHz spectrum. As discussed extensively above, it remains unclear if, how and when MNOs could deploy this spectrum. Moreover, even if barriers are addressed we anticipate that the use case will be less commercially promising.
2. Ofcom has no regard to the amount of spectrum that UK MNOs would be able to deploy and what this means for the spectrum's value. VMO2 and H3G each only hold 5 MHz in this band. Ofcom presumes that the value per MHz would be the same for 40 MHz (the amount of 2.3 GHz that we purchased in 2018) and 5 MHz (the unpaired 2100 MHz holding of both Three and VMO2). This ignores that 5 MHz does not allow MNOs to viably deploy spectrum in this band.
3. The outcome of the 2.3 GHz auction reflects the value associated with the winning bidder acquiring the full 40 MHz available. The value of individual 10 MHz lots of 2.3 GHz spectrum (or of 5 MHz lots had these been available) would have been substantially lower as MNOs participating in that auction were able to adapt their

[5] https://news.o2.co.uk/press-release/o2-to-connect-1000-locations-to-latest-4g-spectrum-in-rapid-rollout/

bidding as a function of the number of lots they bid for. This thesis is supported by both the auction outcome (one bidder gaining the full 40 MHz) and by actual bidding behaviour (other bidders withdrawing from submitting bids for single lots).

4. As illustrated above, we deployed this spectrum at scale only days after we got access to it. Completely the opposite set of circumstances to unpaired 2100 MHz spectrum where deployment will take many years (in particular, because deployment of this spectrum will be way down in our priorities).

Implications of setting excessively high ALFs

If Ofcom proceeds with its proposals, the MNOs that hold spectrum in this band face an unenviable choice. They would not be able to sell their spectrum as ALFs would exceed the value of any (non-) mobile use case. Absent the opportunity to sell, MNOs could either pay excessively high ALFs and hope that the potential use case turns out more favourable than they predict or surrender their spectrum. Whilst the latter would be the economic decision for MNOs when facing such high ALFs, it would mean that this spectrum would be lost for mobile use. In particular because should Ofcom bring that spectrum back to the market, MNOs, especially those MNOs still paying ALFs, would have a legitimate expectation that ALFs would reflect the reserve price for such spectrum.

Setting lower ALFs (or no ALFs until there is more certainty on mobile use case) would give MNOs, independent of whether they currently hold some of this spectrum or not, more appropriate incentives to trade spectrum. It would be wise to create conditions for spectrum trading as it would allow for the market to decide on the efficient allocation of spectrum in this band. Excessively high ALFs, as Ofcom proposed, would instead prevent MNOs to pursue efficient trades as MNOs that hold spectrum would be triggered to sell to avoid being liable to paying ALFs.

Available options that would allow Ofcom to set more reasonable ALFs

The reality is that there is no current use case for unpaired 2100 MHz spectrum, and that the (uncertain) potential of a future use case will be limited compared to unpaired 2.3 GHz spectrum. Ofcom must set ALFs that acknowledge this reality, in terms of both expected value and uncertainty.

Starting from this reality, we request Ofcom to consider the subsequent options.

1. Set ALFs that reflect option value and consult on a methodology.
2. Set ALFs at zero level and revisit when a mobile use case develops.
3. Phase in ALFs over time, eg, as a function of time and/or of the removal of barriers to the development of a mobile use case.

We believe these options allow setting ALFs in a manner that is more appropriate to the limited and uncertainty use case and values of this spectrum. Independent of the option that Ofcom decides on (we prefer the second option as it would be most straightforward), we are confident that once Ofcom accounts for the points we made above, it will acknowledge that ALFs should be set at a much lower level (possibly at zero level initially) to provide efficient conditions for mobile use.