



Vodafone response to Ofcom Consultation: Improving consumer access to mobile services at 3.6 to 3.8 GHz



1 Summary

Vodafone welcomes the opportunity to comment on Ofcom's proposals for facilitating access to mobile services in the 3.6 to 3.8GHz band. Vodafone operates satellite earth stations utilising frequencies in the band, and obviously has an interest in using the band for 5G applications. As such, we have a foot in both camps on the debate of protection for incumbent usage versus innovative new services, and we have endeavoured to propose the most pragmatically workable outcome rather than simply prioritising an outcome which favours one application: we trust Ofcom will consider our input in this light.

The 3.6 to 3.8GHz band should be made available for mobile usage at the earliest possible opportunity, preferably in a timescale that would allow it to be brought into service contemporaneously with the 3.4 to 3.6GHz band.

In an ideal world it would be possible to allow incumbent users to continue to use the band in parallel with mobile users; however it is doubtful whether this will be technically feasible universally. In this response, Vodafone sets out options additional to those identified by Ofcom to mediate between incumbent and mobile usage. In the event that these aren't acceptable, it is with regret that we conclude that incumbent usage should not be protected beyond a transition period.

We set out options for UK Broadband's licence in this band; we accept the licence continuing, but only if an Annual Licence Fee consistent with the economic value of the spectrum is charged, and if Ofcom brings the licence within the scope of the Mobile Trading Regulations.

2 Answers to questions

Question 1: *Do you have any comments on the use of the 3.6 to 3.8 GHz band by existing services?*

Vodafone considers that Ofcom has succinctly summarised the current usage of the band. Much of the usage is legacy, based upon the prevalent state-of-the-art of technology at time of deployment, and users might not choose to use such frequencies in the event that they were deploying today. This doesn't mean a presumption that such usage is inefficient, as the cost of migration to a more suitable band/mechanism may outstrip the benefits, but conversely it does imply that it cannot be presumed that just because something has always been done in a particular way means it should be similarly be allowed to continue to do so.



For fixed links, it could well be that it is possible to readily replace the current deployments with either fibre, or microwave links from other bands. The situation will undoubtedly vary by location, with migration in for example south-east England being more practicable than in the Scottish highlands and islands.

C-band satellite links are used for a series of applications, with the choice of this band generally being driven by weather characteristics at the far-end. Where possible, Vodafone is using higher frequency bands, and where possible within C-band, the top end (3.8-4.2GHz) frequencies are targeted. However, this is not universally possible and fundamentally we are driven by customer requirement and in turn the capabilities of the satellite. Obviously, given the cost of manufacture and deployment, the satellites have very long design lives and it's not practicable to simply replace the transponders on them while in flight! ✂.

Satellite earth stations are deployed in a variety of locations, and it is important that Ofcom takes this into account; it is one thing to arrange protection for an earth station situated in a well-shielded rural area, and quite a different proposition to mandate protection for an earth station with beams pointing across urban areas.

We note UK Broadband's (UKBB's) usage of the band, which seems somewhat shrouded in mystery (in particular the balance of usage between this band and frequencies in the 3.4-3.6GHz band). Whilst it was a sensible opportunistic approach to licence UKBB to use these frequencies, with hindsight if it had been known quite how critical the 3.4-3.8GHz band would become for 5G deployment, licensing a niche application on an open-ended basis might not have been the best idea. However, "we are where we are", and given Vodafone believes that Ofcom should use its spectrum management powers only in the most extreme cases, we consider that economic signals should be used to ensure efficient usage of the band (we elaborate on this in our response to Question Four).



Question 2: *Do you agree with our identification of a trend towards the use of mobile in the 3.6 to 3.8 GHz band?*

Vodafone is in absolute agreement.

We are mindful that it might be argued that at an ITU-R/WRC level, the status is only that mobile has a secondary allocation in Region 1 (including Europe), with the primary services continuing to be fixed/fixed-satellite. However, to use this as a justification that mobile be somehow subservient to the incumbent applications at a national level would be short-sighted¹. There is impetus at a European level to use the 3.6-3.8GHz bands for 5G mobile, with RSPG recommending its usage and other national administrators making similar preparatory moves to Ofcom (for example, Ireland is due to auction the band early in 2017, the Czech authorities are consulting and Romania/Hungary have already issued licences). Subsequent WRC outcomes will undoubtedly reflect the changing landscape. If the UK is not to be left in the slow-lane with respect to 5G deployment, Ofcom must ensure that the band is made available for mobile usage at the earliest possible opportunity.

Question 3: *Do you agree with our high level proposal to make 116 MHz within the 3.6 to 3.8 GHz band available for mobile and 5G services, bearing in mind our statutory duties and the high level trends we have identified?*

Yes, Vodafone absolutely agrees with Ofcom's proposal.

¹ We note that the purpose of this is to ensure protection at an international level, e.g. that UK deployment doesn't affect incumbent usage in the Republic of Ireland, rather than an intervention by the ITU-R in national-specific matters.



Question 4: *Do you agree with our general approach regarding spectrum currently licensed to UK Broadband?*

Per our response to Question One, "you wouldn't start from here". However, Ofcom must deal with the reality of the situation and make policy decisions based upon that.

The three principal possibilities that Ofcom could adopt would seem to be:

1. Withdraw the licence under Ofcom's spectrum management powers and re-issue (with UKBB having the ability, along with anyone else, to bid for that spectrum), or
2. Use spectrum management powers to freeze the licence at today's level of deployment, with UKBB needing to coordinate existing and future deployments, or
3. Vary UKBB's licence to harmonise with future mobile licences.

As outlined in our response to Q1, on balance we consider the first option to be unduly draconian, as it would leave great uncertainty for UKBB² and arguably raise questions about stranded investment where UKBB has already deployed. Although it is the "cleanest" solution, we therefore do not support it.

Option Two would allow Ofcom to issue a sub-national mobile licence, representing the areas where UKBB has not deployed. UKBB could bid for this licence and together with their existing/frozen licence create a harmonised national licence if they so wished. This approach would protect UKBB's existing deployments while still allowing usage of the band for mobile usage in other locations. A cap could be agreed on deployments to be made prior to any subsequent licence-award, with these interim deployments following the existing approach. Beyond this, UKBB could make further deployments by arranging spectrum sharing agreements with the eventual licensee.

However, we cannot comment on whether this is a realistic approach because we don't have information on the level of UKBB's deployment. If UKBB's current usage of the band is minimal, it could be that the licence created by areas without existing UKBB deployments could be essentially national, or conversely it could be that UKBB has significantly deployed therefore a fragmented/limited-value licence would be created. We urge Ofcom to consider whether the proposal would work in light of its greater knowledge of UKBB's deployments.

² And, by extension, any other spectrum licence-holder.



Option Three is in essence Ofcom's proposal. We are supportive if Option Two is considered and rejected, but only if:

- Ofcom issues clear signals that the Annual Licence Fees (ALFs) payable by UKBB will be adjusted to reflect, on an Administered Incentive Pricing (AIP) basis, that UKBB's incumbency is blocking usage by other mobile users. We would expect that this should apply from whenever there is a suitable ecosystem for mobile in the 3.6-3.8GHz band, which may well pre-date when Ofcom is able to auction the remainder of the band for mobile usage (i.e. in this situation UKBB's incumbency would be blocking the 84MHz being auctioned, regardless of other factors setting the timescale for licensing the remainder of the band).

Depending upon the timing, Ofcom could set the ALF according to the outcome of the 3.4-3.6GHz auction (adjusted to reflect any coexistence limitations), or upon the outcome of the award of the remainder of the 3.6-3.8GHz band, or in stages based upon one then the other.

By signalling the setting of an appropriate ALF, this will allow UKBB to make efficient investment decisions based upon their future cost base. ✂. It may well still be economically efficient for UKBB to invest in the band given the appropriate ALF, or they could choose to trade some or all of the licence to a third party (or return to Ofcom) – that would be UKBB's decision.

- Ofcom makes the UKBB licence subject to the Mobile Trading Regulations (MTRs). In the consultation on the auction arrangements for the 3.4-3.6GHz band³, Ofcom has made it clear that for the long term, it has the option to address spectrum asymmetry issues via conditions in subsequent awards such as 700MHz and 3.6-3.8GHz. Therefore, in the event of a trade of spectrum in this band, it is only correct that Ofcom undertakes due diligence of that trade to ensure there are no adverse competitive consequences. Making UKBB's licence subject to the MTRs with immediate effect is absolutely necessary.

³https://www.ofcom.org.uk/data/assets/pdf_file/0026/93545/award-of-the-spectrum-bands-consultation.pdf



Question 5: *Do you agree with our assumptions, methodology, and conclusions with regards to potential coexistence between mobile and existing fixed links and satellite earth stations? Please refer to annex 5 for further details.*

Vodafone agrees. For the avoidance of doubt usage of the mobile spectrum solely for small cell purposes alone would impose a significant restriction on network rollout and is not something which would be acceptable.

Question 6: *Do you have a view on any of the two options we identified?*

Question 7: *Do you have any quantitative evidence on the costs and benefits associated with the options? This include costs for existing users and/or consumers of existing services associated with potential changes, and benefits to UK consumers in gaining access to mobile services in this band.*

Question 8: *Do you have any other suggestions that would allow widespread 5G availability using the 3.6 to 3.8 GHz band across the UK while allowing certainty for Improving consumer access to mobile services at 3.6 to 3.8 GHz at least some existing users to continue to provide the benefits currently provided by use of the 3.6 to 3.8 GHz band?*

Question 9: *Do you have any comments in relation to these proposals?*

In an ideal world, the current rights of spectrum usage for incumbent users would be protected, while allowing usage of the spectrum for 5G mobile services. Regrettably, this is unlikely to be technically feasible and Ofcom must therefore find the optimum balance between incumbent users and the rapidly growing mobile economy.

The two options set out by Ofcom are possibilities, but are blunt instruments; the optimal approach almost certainly lies somewhere in the middle. Protecting all incumbent installations (Option A) would significantly devalue the spectrum for mobile purposes (potentially to the point of it having no value), while providing no long-term protection (Option B) would mean that incumbent installations with no practicable chance of affecting mobile rollout could be unnecessarily decommissioned. Vodafone can foresee two other solutions to bridge this gap, one geography driven and one economic, as set out below.



Option C – geography driven coexistence

In this Option, satellite and terrestrial links in rural areas would be afforded protection, while those in more urban areas would have protection withdrawn after a suitable notice period.

For incumbents classified as rural, exclusion/coordination zones would be put in place around the sites, which new mobile licensees would be required to respect. The mobile licensee could negotiate with the operators of rural links to modify these zones.

It would be open for incumbents classified as urban to negotiate with new mobile licensees for continued access (either temporarily or more permanently), but no regulatory protection would be provided.

We recognise, of course, that this approach would leave a quandary for Ofcom in specifying which sites fall into which category. It could also be portrayed as unfair because the incumbent user in a rural location is allowed to continue, while one in an urban area may need to change frequencies or location; however that is merely reflective that the economic cost of allowing the latter to continue is far higher.

In terms of categorising, in some cases this will be obvious – earthstations in central London and fixed links in South East England are clearly urban, whereas earthstations in Cornwall, Herefordshire or Oxfordshire and fixed links to the Western Isles are clearly rural. For others, it may be necessary to undertake a consultation process whereby Ofcom establishes the nature of the required exclusion/coordination zone and prospective bidders for mobile spectrum indicate whether this would have a low, medium or high impact on their rollout. The work of Ordnance Survey in developing more detailed mapping capabilities could inform this, and Ofcom should work with Ordnance Survey to prioritise locations where this is implemented.

Option D – economic driven coexistence

Under this Option, the default situation would be that incumbent links are afforded no protection, but the licences awarded to new entrant mobile users would require them to negotiate in good faith on request to allow coexistence. The footprints around which incumbent users are permitted to negotiate would form part of the new licences. A fee structure would be agreed by Ofcom, which would essentially reflect the AIP value of the area forgone to mobile by protecting the installation (*), set based upon the auction outcome plus a premium (**).

() This AIP would need to incorporate a gradient reflecting that the value of the spectrum in urban areas will be considerably higher than that in rural areas. We suggest that Ofcom could determine a metric for this with respect to information supplied to it as part of the annual Connected Nations information gathering*



process, which provides the amount of data conveyed over each individual mobile mast and the geographic pixels for which that mast is primary.

*(**) A premium would need to be applied because the proceeds of an auction reflect the value placed upon it by the $N^{th}+1$ bidder (where there were N winners); inherently the winning bidders would have been prepared to pay more for the spectrum, and rationally they would place a higher value on the spectrum than what they would have been prepared to pay via an auction.*

It could be argued that the complexity of determining this fee structure means that this Option shouldn't be followed. However, Ofcom will have to carry out a similar exercise in order to properly determine the AIP for individual sites under Option A⁴, so the difference here is that in effect the mobile licensees will become the entity to whom the incumbent ALF is paid.

Vodafone's preference is for Option C, with Option D as backup if this isn't possible. In the event that neither of these compromise options are acceptable, our strong preference amongst the options set out by Ofcom would be Option B⁵. As Ofcom is aware, Vodafone has a "foot in both camps" in that we operate both satellite earth stations and mobile networks. However, the growth capability is clearly mobile data, and if Ofcom were to adopt Option A there is a risk that UK would be left in a technology slow lane, with limited 5G spectrum being made available. We therefore urge Ofcom to reject calls to protect all incumbent installations regardless of the economic cost of that protection. Further, proposals that result in a default position of universal protection with mobile licensees somehow having to negotiate this away are unacceptable: this will put all power in the hands of incumbents in that delaying agreement will have a greater impact on 5G rollout – it is therefore essential that the default position, at least in urban areas, is for no protection to be afforded.

Vodafone UK

December 2016

⁴ We note that Ofcom's review of fixed links (https://www.ofcom.org.uk/data/assets/pdf_file/0024/82185/fixed_services_fee.pdf) suggested at para 6.30 that AIPs could be set on a 100km² pixel basis; this is clearly inappropriate as the value of mobile deployment blocked within such a pixel would vary dramatically.

⁵ ✂