Virgin Media O2 response to Ofcom consultation:

Expanding access to the 6 GHz band for mobile and Wi-Fi services

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Our approach to future mobile use in high density areas and incumbent users in this band

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INTRODUCTION

Virgin Media O2 (VMO2) welcomes the opportunity to respond to Ofcom's consultation on Expanding access to the 6 GHz band for mobile and Wi-Fi services: Our approach to future mobile use in high density areas and incumbent users in this band[1].

We appreciate Ofcom's ongoing work on this critically important spectrum band, which has the potential to deliver significant and widespread benefits for the UK, by enabling the delivery of high-quality mobile connectivity into the next decade. Establishing a clear roadmap for unhindered mobile priority use is crucial, as it will create the certainty needed for operators to plan and invest in the band.

VMO2 supports a long-term, harmonised, future-proofed framework for the band, which maximises consumer benefits, whilst remaining aligned with European and 6G developments, to ensure UK mobile networks perform on a par with those of international peer countries.

EXECUTIVE SUMMARY

The UK has an objective to increase growth and prosperity. This can be achieved by ensuring an investment friendly environment which provides certainty and minimises regulatory burden, whilst integrating a broader industrial policy outlook.

The Upper 6 GHz band is of key strategic importance to the UK. It can enable the evolution of high-quality 5G connectivity and support the launch of 6G, driving economic growth and widespread societal benefits.

The definition of high density areas and the overall licensing framework for the band will have profound implications for investment incentives and consumer outcomes.

Whilst Ofcom's current proposals for high density areas provide a useful starting point, they require further assessment and significant expansion to maximise consumer outcomes. VMO2 is concerned that the proposed high density areas are based on operators current deployment footprints, which are not fully developed. Operators continue to invest heavily in 3.4-3.8 GHz spectrum ("3 GHz spectrum"), and future mid-band deployment footprints will be substantially larger than the current snapshot suggests.

[✂]. These plans are underpinned by the recently enhanced Beacon agreement we have with VodafoneThree. [✂]

[1] Expanding access to the 6 GHz band for mobile and Wi-Fi services_approach to future use

Consequently, Ofcom should adopt a forward-looking approach when defining the geographic scope of the Upper 6 GHz spectrum to be awarded for mobile use, as it is expected to be used as an overlay onto existing 3 GHz macro sites, to meet future demand.

In light of Ofcom's view that mobile performance currently falls short of where it should be, not just in urban areas, but across the UK, we encourage Ofcom to support operators investment plans to improve mobile connectivity by ensuring that the geographical scope of 6 GHz licences for award enable operators to deploy the spectrum widely, and unhindered.

Ofcom's continued push to increase spectrum sharing should not prioritise sharing over the economic benefit and wider public good that mobile can deliver. We urge Ofcom to ensure that it does not take decisions on the Upper 6 GHz band that could inadvertently undermine the UK's ambition for world-class mobile connectivity and leave consumers, businesses, and public services, with inferior capabilities.

VMO2 also seeks clarity on the licensing model for mobile use outside high density areas. Without this understanding it is difficult to assess Ofcom's proposals in the round.

VMO2 supports the clearance of incumbent fixed links in areas where operators expect to deploy 6 GHz spectrum, and pragmatic coexistence arrangements for PMSE, MoD and Radio Astronomy Services. Any possible future sharing arrangements in the band should seek to preserve investment incentives and not constrain mobile deployment opportunities.

VMO2 therefore strongly urges Ofcom to:

- Ensure its analysis and decision making process fully takes into account the strategic importance of the Upper 6 GHz band to the future of 5G and 6G mobile connectivity in the UK, and aligns with the shared ambition for improved, widespread high-quality mobile connectivity.

- Reassess its proposals for the geographical scope of high density areas to ensure that the final design used for award licences for Upper 6 GHz mobile priority use incentivises investment and appropriately reflects operators long term mid-band deployment plans to deliver high-quality connectivity across the widest areas that is economically feasible.

MAIN RESPONSE

THE IMPORTANCE OF THE UPPER 6 GHZ BAND

Mobile connectivity is a critically important national infrastructure that drives economic growth, enables productivity, innovation, social inclusion, and underpins many public services. The continued increase in demand for mobile data and the digitalisation of businesses, public services, transport systems, and manufacturing, means demand for high-quality mobile connectivity will continue to increase substantially into the next decade.

As we have highlighted previously to Ofcom, the Upper 6 GHz band has the potential to deliver significant economic and societal benefits. It can support the UK's ambitions for long-term economic growth and high-quality mobile services in all populated areas. By enabling the further improvement of mobile quality across the UK, it can help to deliver the essential requirement of world-class connectivity.

The band is also uniquely important for the UK's 6G launch, and future success. It is the only remaining mid-band spectrum capable of supporting 200 MHz channels per operator—an emerging requirement in 6G development, and a necessity for delivering the high-capacity, wide-area performance required to achieve world-class mobile connectivity.

Recent developments at the European level represent an important milestone towards harmonisation of the band. Whilst full clarity is expected following the outcome of WRC-27, the final European level decision will result in either 665 MHz or 700 MHz of spectrum in the 6425 to 7250 MHz range secured for mobile networks within the EU.

European harmonisation remains critically important. VMO2 continues to believe that alignment with the European ecosystem offers the greatest opportunity to maximise economies of scale, encourage investment, reduce equipment costs, and accelerate deployment. Harmonisation creates certainty for network operators, equipment manufacturers, and infrastructure providers, and will support the development of a broad and competitive ecosystem.

As Ofcom has consistently recognised, mobile networks require future access to additional spectrum to support continued growth in mobile data traffic and deliver high-quality user experiences, widely, as existing mobile bands, including 3 GHz, will become absorbed by demand.

The Upper 6 GHz band is uniquely positioned to fulfil this requirement. It represents the last remaining viable mid-band spectrum that can be used for full power mobile deployment over wide areas. Unlike mmWave spectrum, it offers the combination of capacity and coverage characteristics necessary to provide high-quality mobile services over wide areas, whilst supporting substantial increases in network capacity.

The ability to uniquely provide 200 MHz channels of clean mid-band spectrum, per operator, in the UK's three player market, will be essential for delivering capacity, and to launch 6G and realise its full benefits, whilst also enabling new applications that are expected to place significantly greater demands on mobile infrastructure, noting that 3GPP aims for up to 400 MHz 6G carrier bandwidth.

Upper 6 GHz spectrum can also support higher spectral efficiency, and lower deployment costs, improving network economics and incentivising widespread investment in the band, and enable operators to evolve their networks using the latest technologies and realise efficiency gains to improve user experience.

Realising the ambition to deliver world-class mobile connectivity will depend upon operators having access to the spectrum resources necessary to continue meeting rapidly increasing demand and expectations. Mobile users want a good quality, consistent service, that provides speed, low latency, and a robust service across not just urban centres, but suburban and smaller communities, transport corridors and public venues. Delivering these outcomes will require significant network evolution and additional harmonised mid-band spectrum.

Ofcom has repeatedly stated that it is committed to a thriving telecoms sector. It therefore has a role as a market facilitator, in addition to its duties in relation to spectrum management. Through its spectrum policy decisions on the Upper 6 GHz band, Ofcom can enable growth and widespread improvement in mobile quality, support the UK's 6G priorities, and secure the widest benefits for consumers.

Given the clear strategic importance of the Upper 6 GHz band for the future of mobile quality in the UK, decisions taken now will have an impact on investment, connectivity, competitiveness, and digital inclusion, for many years to come.

THE 6 GHZ ECOSYSTEM

The importance of investment certainty cannot be overstated, both for vendors and operators. Operators require confidence that they can deploy Upper 6 GHz spectrum on a widescale basis, without unnecessary constraints before making the substantial investments required to support large-scale deployment. Vendors require certainty to develop and build equipment and benefit from economies of scale.

The ecosystem for the Upper 6 GHz band is developing quickly in preparation for operators expected deployment of the spectrum in Europe, and internationally. Decisions taken at WRC-27, and at the European level on harmonisation, will provide certainty for investment, deliver economies of scale, reduce equipment cost, and accelerate deployment.

Whilst harmonised technical conditions will provide the clarity to develop equipment on a widescale basis, RAN vendors are already trialing 6 GHz with prototype AAS units. These trials have demonstrated that downlink coverage throughput is comparable to 3 GHz spectrum. There are also further enhancements expected to beamforming operation, and vendors are working to develop Giga/extreme massive MIMO units, which includes up to 256/512 TRX and up to 512/1024 Antenna elements.

Whilst single-band radio units are being developed initially, vendors are also evaluating the design of multi-band AAS units for 3 GHz and 6 GHz. There are clear opportunities for equipment supporting combined 3 GHz and 6 GHz operation, including integrated radio solutions that would support efficient site upgrades, lower weight load, and exploit the benefits of rapidly evolving M-MIMO technology. Given the scale of anticipated demand across Europe, there are strong incentives for vendors to develop harmonised solutions that support widespread deployment and are attractive to operators seeking to deliver high quality mobile performance efficiently across wide areas.

As we have highlighted, the propagation characteristics of 6 GHz spectrum, along with new radio units, antenna arrays and techniques, combined with the continued growth in mobile data traffic, means that operators expect to deploy 6 GHz spectrum as an overlay to their 3 GHz spectrum, i.e. widely across their macro site grids, and it is likely to become the operators primary next-generation capacity layer.

Ofcom should ensure that its decisions on the licensing and high density areas for Upper 6 GHz spectrum for mobile use align with European harmonisation of the band, to enable the UK to benefit from economies of scale and to encourage investment and support growth and innovation, consistent with its wider statutory duties and objectives.

OFCOM'S MOBILE CONNECTIVITY AMBITION

VMO2 welcomes Ofcom's recently published discussion paper – Connectivity you can count on[2]. It shines a light on key issues, and highlights the need for better mobile connectivity, which is critical to supporting productivity and economic growth.

If Ofcom's ambition for more widespread, good mobile connectivity across the UK is to be realised and long-lasting, the support and actions of key stakeholders, including Ofcom, and Government, is critical. While operators have invested many billions of pounds in network infrastructure, future improvements in mobile quality will depend upon a combination of spectrum availability, clear investment incentives, and supportive regulatory frameworks.

In its discussion paper, Ofcom states that it has limited powers, and its role will be to highlight issues, provide better data, and support others to deliver better outcomes for consumers.

[2] Connectivity you can count on

VMO2 strongly believes that spectrum policy is one of the most important levers available to Ofcom, and it can play a key role in improving mobile connectivity, and delivering better outcomes for consumers.

Decisions on the Upper 6 GHz band should therefore be viewed not simply through the lens of spectrum management, but as part of a broader strategic framework to improve network quality, support investment, and drive further growth and productivity across the UK.

Ofcom's current proposals for high density areas for mobile use of the band do not seem to fully align with its stated ambition for better mobile connectivity across the UK. Ofcom's assertion that mobile quality is not good enough and that more needs to be done, whilst proposing a restrictive set of areas for mobile priority use of Upper 6 GHz spectrum, appear to be at odds.

VMO2 believes there is a need for clearer alignment between Ofcom's mobile strategy work - including its ambition for better mobile connectivity, and that of its spectrum policy work and associated decision making. Policies and decisions that support unhindered deployment of 6 GHz spectrum for mobile use, will create long-term investment certainty, and maximise the footprint of high-quality 5G and future 6G networks, securing optimal benefit for the UK. We encourage Ofcom to ensure it remains consistent with these wider objectives and avoids approaches which could dampen investment incentives and unnecessarily constrain deployment opportunities.

We urge Ofcom to reassess its current proposals for high density areas in light of the considerations that we have outlined, and the information and deployment plans that we provide later in this response.

Is it essential that the UK does not miss the opportunity to fully utilise this critical spectrum band to deliver widespread improvements. Ofcom should ensure that its analysis and decisions on the Upper 6 GHz band appropriately aligns with its mobile strategy work to support investment and improve mobile performance widely if it is to realise the ambition for the UK's mobile connectivity to perform on a par with peer OECD countries.

SUB-NATIONAL LICENSING

Ofcom has acknowledged that 6 GHz spectrum has different propagation characteristics to that of mmWave spectrum. It is therefore correct to expect that it will be deployed in a different way.

Based on trials to date, the deployment of 6 GHz spectrum on macro sites with full power next generation MMIMO AAS radio units will provide coverage which closely aligns with 3 GHz spectrum. As a result, whilst the deployment of mmWave spectrum in the UK is likely to be targeted at key hotspots in specific areas, operators expect to deploy Upper 6 GHz in a similar way to 3 GHz spectrum, as an overlay on the same macro grid, and it thus reflect a similar future end state of deployment.

With expected deployment across substantially wider areas than mmWave spectrum, approaches used and conclusions drawn from Ofcom's sub-national licensing of mmWave spectrum, should not automatically be applied to the Upper 6 GHz band.

Proceeding with sub-national licensing 6 GHz spectrum would represent a significant departure from the licensing approach that Ofcom has consistently adopted for similar mid-band mobile spectrum it has awarded previously.

Any geographic restrictions on the 6 GHz mobile licenses for award need to be much more relaxed than those applied to the mmWave licences, to ensure that the business case for 6 GHz deployment is preserved and the widest benefits realised.

In light of the shared objective for good, reliable mobile connectivity across the UK, along with the fact that mobile has consistently been the highest value use for harmonised mid-band spectrum, we believe that a strong case remains for the spectrum to be awarded for priority mobile use on a nationwide basis, consistent with the 3.4-3.8 GHz band. Doing so would incentivise investment and support operators rollout plans and ambitions to improve mobile quality nationwide.

Ofcom has an established process for enabling other users to access licensed mobile spectrum in specific localised areas where mobile operators do not plan to use it. This Local Access Licensing approach is suitable for enabling discrete deployments which are able to coexist with wider licensed mobile use. Whilst this regime is not suitable for use by mobile operators seeking to deploy spectrum extensively across the UK, including into medium and smaller towns, it is suitable for other users seeking to deploy in rural areas to gain access to spectrum.

However, VMO2 recognises that Ofcom has taken the decision to proceed with a sub-national licensing approach for the Upper 6 GHz spectrum to be awarded for mobile priority use. Should Ofcom choose to remain committed to this decision, for reasons including to enable fixed links to operate in the band across some areas of the UK, we believe that with careful reassessment and planning, Ofcom can significantly expand its proposed high density areas under a sub-national licensing approach, whilst still leaving room for fixed links to operate in some rural areas. We explore this later on in this response.

Whilst it has not been made explicitly clear by Ofcom in its current consultation (e.g. through detailed analysis and explanation), we are concerned that Ofcom's decision for sub-national licensing is partly driven by a desire to enable Wi-Fi to co-exist in the mobile priority spectrum. If this consideration is indeed part of the reason for Ofcom's decision to adopt a sub-national licensing approach, it does not appear to align with Ofcom's views on the potential for future sharing of the band between the two services. The following comment by Ofcom illustrates this:

> *"We anticipate that in due course spectrum sharing can be further improved as other sharing mechanisms (e.g., enhanced sensing) that can allow sharing between Wi-Fi and mobile are fully developed as part of the European harmonisation process. We may then consider allowing a wider range of devices into the mobile priority portion of the band."*[3]

If Ofcom anticipates that other sharing mechanisms can allow both mobile and Wi-Fi use within the mobile priority spectrum, it therefore follows that a restrictive sub-national licensing approach is not required to achieve future co-existence between the two services in the band.

HIGH DENSITY AREAS FOR MOBILE PRIORITY USE OF 6 GHZ

The definition and geographical scope of the high density areas is one of the most consequential decisions within Ofcom's work to enable the Upper 6 GHz band for future mobile use. In practical terms, the boundaries that Ofcom ultimately decides to adopt, are likely to significantly shape the future extent of 6 GHz deployment by operators, and therefore the extent of the benefits that consumers and businesses will ultimately receive from the band.

If Ofcom defines high density areas too narrowly, there is a significant risk that operators investment incentives will be dampened, future deployment opportunities constrained, and users outside the predefined boundaries denied the benefits of high-quality 5G mobile performance, and future 6G capabilities.

As we have highlighted to Ofcom, operators expect to deploy 6 GHz spectrum in a broadly similar way to 3 GHz spectrum, and thus reflect a similar future end state of deployment. The areas currently proposed by Ofcom do not reflect the likely evolution of mobile networks over the coming decade, and beyond. Demand for high-quality mobile connectivity continues to spread beyond dense city centres into suburban communities, commuter areas, smaller towns and other populated locations.

We note that Ofcom expects mobile deployments outside high density areas to be relatively limited, and not extensive, so possible to manage on a case-by-case basis with some form of localised licensing framework. VMO2 strongly disagrees with this assumption, which does not appear to be supported by robust evidence.

VMO2 has a serious concern that Ofcom's proposed high density areas are too heavily influenced by current deployment assumptions, and present-day traffic distributions. While current deployments and traffic profiles provide a starting point, they do not reflect operators

[3] Footnote 3, Expanding access to the 6 GHz band for mobile and Wi-Fi services approach to future use

forward-looking mid-band deployment plans and ambitions for widespread high-quality connectivity, nor do they account for the expected continued growth in mobile data traffic.

As Ofcom has identified in its recent discussion paper, there are several existing barriers to improving mobile connectivity. We believe that it is therefore incumbent on Ofcom to ensure that it does not inadvertently add a further barrier which could undermine the shared ambition for better mobile connectivity across the UK.

We encourage Ofcom to carefully consider the potential impact of geographical restrictions in the Upper 6 GHz licences for award, on mobile operators rollout ambitions, as well as the burden that would be created if deployment outside high density areas involves a manual authorisation process.

VMO2 believes that Ofcom can significantly expand its proposed high density areas, while still preserving some incumbent fixed links located outside those areas. There are fixed links outside the currently proposed high density areas that are unaffected by the proposed clearance. This suggests that there is considerable scope to expand the geographical footprint of high density areas, whilst still retaining and allowing fixed-links in some rural areas. This approach would better align with operators long-term deployment plans, support investment, and maximise the benefits of Upper 6 GHz spectrum.

Ofcom has previously acknowledged that it would take into account operators concerns about avoiding artificial limits to the extent of mobile rollout, and the likely footprint of mobile deployments when considering the geographical extent for Upper 6 GHz award licences. We urge Ofcom to fully take into account operators plans and ambitions for the deployment of mid-band spectrum and to re-define its proposed high density areas accordingly, to ensure that the final licensing framework provides sufficient flexibility to incentivise long-term investment and operators deployment plans, and does not artificially constrain future rollout opportunities.

VMO2 wishes to re-iterate to Ofcom that we have plans and ambitions to deploy the highest quality services over the widest areas, where it is economically feasible for us to do so. We provide an outline of these plans later in this response.

MOBILE ACCESS OUTSIDE HIGH DENSITY AREAS

VMO2 note Ofcom's intention to consult separately on licensing mechanisms and the process for mobile use outside the high density areas that it ultimately decides upon. However, the current absence of detailed proposals for this, such as the level of prioritisation that mobile access will be given in these areas, the licensing process, licence duration, and any associated costs, make it difficult for us to assess the overall framework in the round.

Notwithstanding, we urge Ofcom to carefully consider the potential impact of the burden that would be created if mobile rollout of 6 GHz spectrum outside high density areas involves a manual authorisation process. Such hinderances create frictions through necessitating additional time, resource, and cost to plan and validate each site to enable deployment, compared to the right to deploy unhindered which would see wider, faster, more efficient rollout of the spectrum. Maximising the geographic reach of the award licences will mitigate these risks, and preserve mobile operators investment incentives and rollout ambitions.

3 GHZ DEPLOYMENT PLANS

For mobile networks, there is a strong relationship between channel size, network equipment costs, and performance. Large contiguous channels of spectrum mean improved performance, better spectral efficiency and reduced cost of deployment, supporting viable investment decisions for operators.

The future deployment of Upper 6 GHz spectrum should be viewed in the context of operators broader network evolution strategies and plans. Deployment of 3 GHz spectrum is not fully developed and plans for significant further expansion remain ongoing. As demand for mobile data continues to increase year-on-year, operators are actively expanding 3 GHz utilisation to support growth and address congestion.

Upper 6 GHz spectrum is expected to function as a natural overlay to 3 GHz deployments. Rather than representing a standalone deployment layer, Upper 6 GHz spectrum will in many cases be deployed on sites which have 3 GHz spectrum deployed, and where additional capacity will be required in the future. Accordingly, Upper 6 GHz licensing should facilitate efficient overlay deployment and avoid creating artificial barriers that limit future network evolution.

[✂]. Our network transformation over the coming decade will involve maximising the value of existing infrastructure assets while introducing new spectrum layers to meet demand. We explore this further, below.

VodafoneThree Merger / Updated Beacon Agreement

The Vodafone-Three merger was one of the most significant developments in the UK mobile market for many years. For VMO2, it enabled our purchase of 78.8 MHz of spectrum from Vodafone, which included 20 MHz in the 3.4-3.8 GHz band. It also saw our long-standing network sharing agreement with Vodafone (Beacon) significantly updated to support widespread long-term upgrades of shared macro infrastructure to enhance both parties networks across the UK, committing investment in upgrades, at existing, and new sites.

The updated agreement provides a clear pathway for intensive deployment of mid-band assets into the next decade. As a result, VMO2 will continue expanding its deployment of 3 GHz spectrum significantly. Over time, as those assets become increasingly utilised by the continued growth in demand for mobile data, Upper 6 GHz spectrum is expected to be deployed on many of the same sites to ensure the longer term delivery of high-quality mobile performance. This demonstrates why licence areas for mobile use in the Upper 6 GHz band should also reflect planned, not just current deployment footprints.

VMO2's long-term Mobile Transformation Plan aims to further improve the capacity and coverage of our network, leveraging the updated Beacon agreement to deliver major upgrades to ensure we continue to deliver strongly in a highly-competitive market.

[✂]

CWP (Consolidated Works Programme) - The long term agreement with VodafoneThree will deliver an upgrade [✂].

Table 1: VMO2 Planned 3 GHz deployment on macro sites (CWP)*

[✂]

[✂]

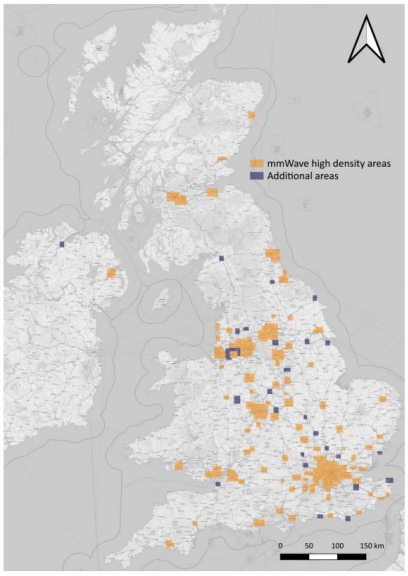
[✂]

[✂]

Figure 1: [✂]

[✂]

Ofcom's proposed high density areas for 6 GHz



[✂]

[✂]

Ofcom, Figure 3.1, Expanding access to the 6 GHz band for mobile and Wi-Fi services_approach to future use

[✂]

In Annex A1 of this response, we provide larger, individual maps of our current, and planned, 3 GHz spectrum deployments.

Population density

We now examine the population of the areas where we plan to further deploy 3 GHz spectrum.

[✂]

Table 2: VMO2 3 GHz Planned deployments (CWP), by population of area*

[✂]

[✂]

[✂]

[✂]

[✂]

[✂]

[✂]

[✂]

We note Ofcom's approach for defining the mmWave high density areas included a population metric based on the Office of National Statistics (ONS) Major Towns and Cities dataset, with Ofcom identifying towns and cities with a population of 75,000 or greater. [✂]

Table 4, below, shows the population range for each Built Up Area (BUA) classification, along with the settlement type. This shows that both medium and small towns fall below the 75,000 threshold that Ofcom used in its approach to define with mmWave high density areas.

Table 4: Built-up area (BUA) size classification

Population range (Usual resident population)	BUA size classification	Approximate settlement type
0-4,999	minor	hamlet or village
5,000-19,999	small	larger village / small town
20,000-74,999	medium	medium towns
75,000-199,999	large	large towns / smaller cities
200,000+	major	cities

Source: Office for National Statistics, Towns and cities, characteristics of built-up areas, England and Wales - Office for National Statistics

[✂]

This analysis supports our view that the application of the approach used to define mmWave high density areas is not appropriate for the Upper 6 GHz band. We hope the information that we have provided is useful to Ofcom and can aid further analysis.

We urge Ofcom to continue to take into account our concerns about avoiding artificial limits to the extent of mobile rollout in the band, and the likely footprint of mobile deployments, when considering the geographical extent of the Upper 6 GHz award licences.

RESPONSE TO SPECIFIC QUESTIONS

Question 1: Do you agree with our proposed set of 88 high density areas for 6 GHz authorisation? If you disagree, please provide your reasoning and evidence.

VMO2 does not agree with the proposed set of 88 high density areas to authorise 6 GHz spectrum for mobile priority use.

The appropriate starting point for setting Upper 6 GHz high density areas should be to include all areas where operators have already deployed 3 GHz spectrum, and areas where operators have plans and ambitions to deploy 3 GHz spectrum.

Ofcom should reassess its proposals for the high density areas and redefine them appropriately to ensure they incentivise investment, reflect operators long term mid-band deployment plans and align with the shared ambition for improved, widespread high-quality mobile connectivity.

Please refer to our main response for our full reasoning and evidence.

Question 2: Do you agree with our proposal to clear fixed links from the Upper 6 GHz band in and around high density areas, and to leave the band open to new fixed link licence applications outside of high density areas, subject to coordination?

VMO2 recognises the importance of existing fixed-link users and the services they support. However, Ofcom has correctly identified that many of these services can be supported through migration to other spectrum bands, or the deployment of alternative technologies.

Spectrum management inevitably requires difficult decisions regarding the most efficient use of scarce spectrum resources. However, there is substantial precedent for clearing incumbent users in key spectrum bands where significant wider public benefits can be achieved through alternative use of the spectrum.

VMO2 therefore supports the principle of clearing fixed links to facilitate future mobile deployment in populated areas.

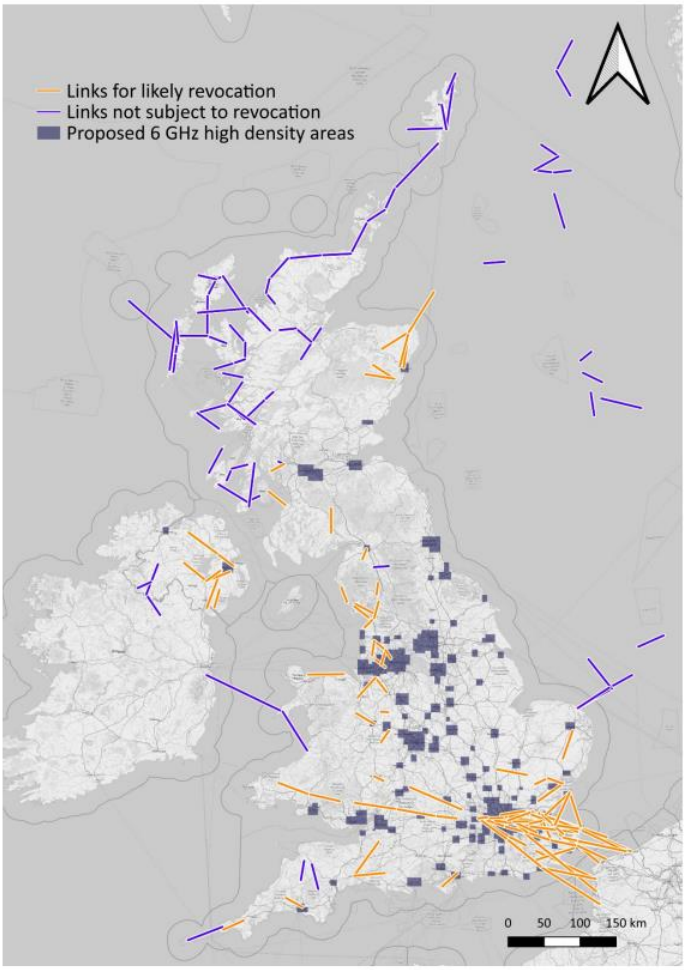
We believe that with reassessment and planning, Ofcom can significantly expand its proposed high density areas, whilst still leaving room for fixed links to operate in some rural areas.

Ofcom should use operators forward-looking plans for 3 GHz spectrum deployment and associated footprints, as a proxy for likely future Upper 6 GHz deployment locations. Aligning

fixed-link clearance more closely with the areas in which operators expect to deploy mid-band provides a more appropriate balance and will maximise the benefits that mobile can deliver.

VMO2 believe that Ofcom can significantly expand its proposed high density areas, while still preserving some fixed link use in the band. As illustrated in Ofcom's map below (Figure 5) there are fixed links outside the currently proposed high density areas that are unaffected by the proposed clearance. This suggests that there is considerable scope to expand the geographical footprint of high density areas, whilst still retaining and allowing fixed-links in some rural areas.

Figure 5: Fixed Links in the Upper 6 GHz band, and Proposed High Density Areas



Source: Ofcom, Figure 4.1, Expanding access to the 6 GHz band for mobile and Wi-Fi services approach to future use

Question 3: Do you agree with the approach we have set out to identify the links which will be affected by the proposed revocation?

Broadly, yes, but please refer to our response to question 2 in relation to expanding the high density areas, whilst potentially enabling fixed links to operate in the band in some rural areas.

Question 4: Do you agree with our proposal to remove access to the frequencies 7110– 7125 MHz for PMSE use, but to retain the option of allowing users to "borrow" spectrum from the Upper 6 GHz band for occasional major events?

VMO2 recognises the importance of PMSE spectrum use, and the services and events they support.

However, we encourage Ofcom to carefully consider mobile operators future spectrum needs for occasional major events, alongside other users such as PMSE who may seek to borrow spectrum from the Upper 6 GHz band.

Major events that draw large numbers of people also generate localised high traffic demand for mobile services, meaning mobile operators will want to use all available spectrum at these locations to provide good mobile connectivity and minimise congestion.

Whilst future deployment of mmWave spectrum could play a role in helping meet intense mobile demand at occasional major events, the equipment ecosystem is still uncertain, both in terms of vendor kit and handset availability, with some of the latest premium handsets not including mmWave chipsets. This contrasts with the fast growing mobile ecosystem for the Upper 6 GHz band.

VMO2 wishes to highlight that in partnership with Boldyn Networks, we recently significantly enhanced 5G connectivity at Silverstone in time for the 2026 British Grand Prix[4]. The event hosted over half a million fans, and saw very high demand for mobile connectivity throughout the weekend. The solution uses DAS across 570 acres of the site, including the race circuit. As demand for mobile data at major occasional events continues to grow and investments are made in infrastructure to enhance connectivity, spectrum in the Upper 6 GHz band will be key to future-proofing good mobile connectivity.

We therefore recommend that Ofcom carry out detailed analysis into the possible co-existence between mobile and PMSE at such events, to assess feasibility, quantify expected impacts, and establish net benefits.

Question 5: Do you agree with our proposal to require mobile base stations to protect RAS usage of the band at the levels specified?

We note that Ofcom highlights Radio Astronomy (RAS) has no primary or secondary allocation in the band, nor is it included under the radio astronomy grant of Recognised Spectrum Access (RSA) or the pricing arrangements for public sector spectrum use.

Given Ofcom's acknowledgement that its proposed coordination requirements could affect deployment opportunities within parts of several key high density areas including Manchester, Liverpool and Cambridge, where mobile demand is expected to continue to be particularly high, we urge Ofcom to carry our further detailed assessment of this potential impact and ensure that any RAS protection measures are proportionate and minimise

[4] Lights out and away we go: O2 switches on enhanced 5G connectivity at Silverstone as fans gear up for the British Grand Prix - Virgin Media O2

restrictions on mobile deployment, preserving the wider public benefits associated with the delivery of high-quality mobile connectivity.

Question 6: Do you have any comments on how we should manage coexistence between mobile and any other users in the Upper 6 GHz band (i.e., RAS, EESS, SRDs, FSS and MOD use)?

VMO2 recognise the importance of MoD use of spectrum. Coordination between mobile operators and defence users is already an established and well-understood process. Where specific sites or deployments require additional coordination, this can generally be managed effectively through existing lines of communication and agreed procedures.

Question 7: Do you have any comments on our assessment of the impacts of our proposals (to the extent not covered by previous questions)?

In its impact assessments, at A2.40, Ofcom states the following:

> *"Our proposals will give additional spectrum access to Wi-Fi and mobile services, which will likely increase capacity and speed of both, bringing benefits to UK consumers and industry. We consider the use of Upper 6 GHz by these applications will predominantly be in high density areas, such as town and cities, or where there is high demand for these applications. We have not identified any adverse impacts on specific groups of persons that are likely to be affected in a different way to the general population."*

VMO2 believes that Ofcom should conduct a further assessment to identify adverse impacts on the people and communities that fall outside high-density areas. Ofcom's current proposals for restrictive high density areas is not underpinned with a robust assessment that establishes if there are net benefits of implementing such as approach.

Question 8: Do you have any comments on our Equality impact assessment?

Please see our comments in response to question 7.

Question 9: Do you have any comments on our Welsh Language impact assessment?

No.

ANNEX A1: Large maps of VMO2 current and planned 3 GHz deployments.

[✂]

[✂]

[✂]

[✂]

[✂]

[✂]

[✂]

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