Virgin Media O2 response to Ofcom Consultation:

Award of 1492-1517 MHz spectrum for mobile services

(Questions 16 – 19)

July 2025

Non-Confidential Version

INTRODUCTION

Virgin Media O2 ("VMO2") welcomes the opportunity to respond to Ofcom's consultation on the Award of 1492-1517 MHz spectrum for mobile services.[1] We submitted our response to questions 1-15 ("Part 1 Response") in April 2025. Herein, we respond to the remaining questions 16-19 ("Part 2 Response").

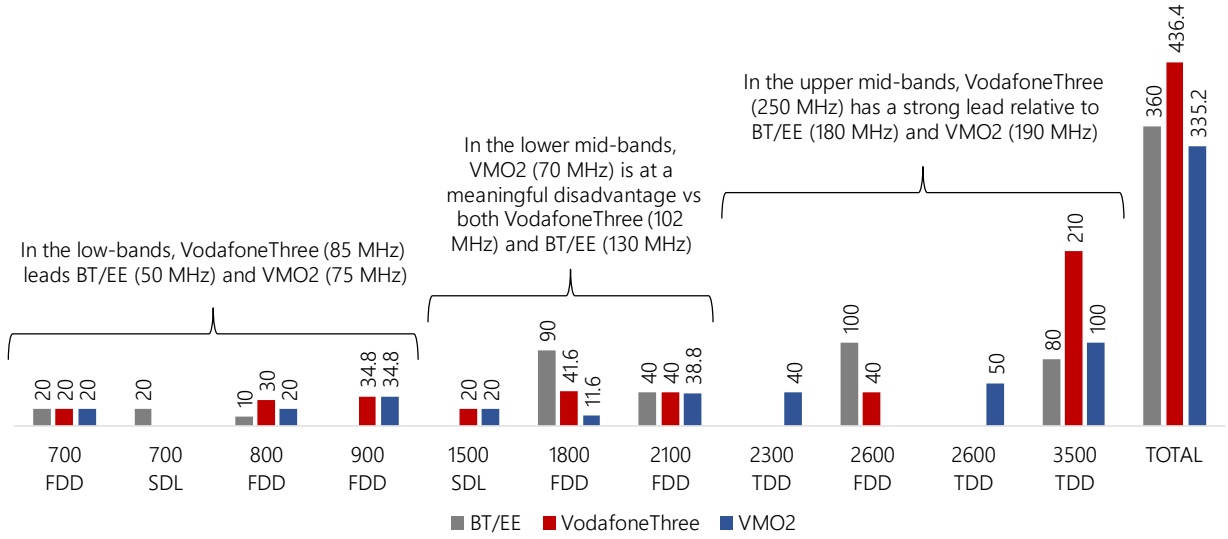
GENERAL COMMENTS

On 30 June 2025, VMO2 announced its acquisition of 78.8 MHz of usable mobile spectrum from the newly merged MNO, Vodafone-Three. The sale of this spectrum to VMO2 was a voluntary undertaking that contributed to the Competition and Market Authority's decision to approve the merger of Vodafone and Three. The deal ensures that "the UK has three scaled mobile network operators with a greater balance in terms of spectrum holdings."[2] "The transfer of spectrum reduces the previous imbalances in spectrum between mobile network operators in the UK, enhancing competition and allowing Virgin Media O2 to provide increased capacity, speeds and greater coverage for its customers."[3]

Following this transaction, significant asymmetry in spectrum holdings still remain between the three UK operators. Notably, VMO2's share of usable allocated mobile spectrum below 4 GHz is only 335 MHz (29.6% of the total), behind BT/EE with 360 MHz (31.8%) and Vodafone-Three with a market leading 436 MHz (38.6%). This is illustrated in Figure 1. The award of 1492-1517 MHz has the potential to either reduce or increase this asymmetry, depending on which MNO (if any) wins this spectrum. Notably, the auction may deepen VMO2's deficit in the lower mid-bands (spanning 1500 MHz to 2100 MHz) where it currently only holds 70 MHz (23.3%) versus BT/EE's 130 MHz (40.3%) and Vodafone-Three's 102 MHz (30.6%). We believe that it is vitally important that design of the award allows all MNOs to properly express their valuations, rather than incorporate a structure that favours the adjacent licensee.

[1] Consultation Award of 1492-1517 MHz spectrum for mobile services.
[2] https://news.virginmediao2.co.uk/virgin-media-o2-to-boost-its-mobile-network-through-spectrum-acquisition-deal/.
[3] Ibid.

Figure 1: Sub-4 GHz IMT Spectrum Holdings by MNO

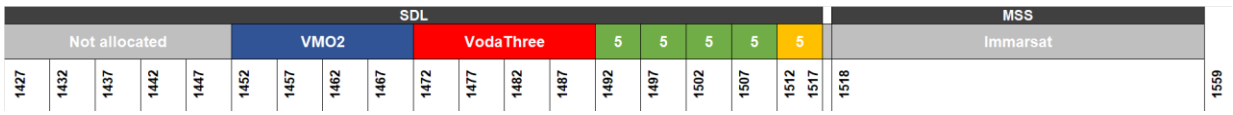


The spectrum for sale in this award has an underdeveloped ecosystem but is in due course expected to become part of a core European mobile band at 1500 MHz, which will provide supplementary downlink with excellent propagation. Accordingly, we do not expect the allocation of this spectrum to have any short-term impact on the competitiveness of an MNO that acquires the frequencies, but it will be become increasingly relevant to competitiveness over the medium-to-long term. Over this timeframe, we anticipate that other larger frequency bands, such as 600 MHz and 6 GHz, may become available for mobile use. Therefore, it is our opinion that no spectrum caps are required for this award.

Notwithstanding this view, VMO2 is concerned that spectrum imbalances could again become an issue for competition in the future, and Ofcom must consider this risk for future awards. One may reasonably suppose that Vodafone-Three divested only the minimum quantity of spectrum necessary to secure regulatory approval for the merger, and therefore it is now at or close to a maximum level of spectrum holdings, above which there may be concerns for downstream competition. In the new context of a three-MNO market, we would welcome a renewed commitment from Ofcom to consider total holdings across all mobile bands when formulating competition measures for spectrum awards.

Ofcom should also consider the impact of existing frequency assignments on operator demand for this spectrum. As part of the divestment, VMO2 has acquired 20 MHz of spectrum in the 1500 MHz band, as illustrated in Figure 2. However, Ofcom will note that Vodafone-Three opted to divest the lower 20 MHz, while retaining the upper 20 MHz that is adjacent to the spectrum available in this award. This gives Vodafone a significant valuation advantage versus other bidders. Specifically, if it acquires spectrum immediately adjacent to its existing holdings, it will in the future be able to deploy the combined spectrum using a single radio. In contrast, if VMO2 acquires spectrum, we would either need to deploy a second radio (which is non-standard and would involve significant additional expense) or seek a spectrum swap with Vodafone-Three to defragment the band.

Figure 2: Updated UK L-band frequency plan



VMO2 is a strong supporter of spectrum trading. In recent years, we have significantly expanded our spectrum portfolio through secondary market transactions with other mobile operators. However, the market lacks liquidity and it can be hard to negotiate with direct competitors who may be concerned that a sale will make a rival more competitive. [✂]. Accordingly, to enable all bidders to freely express their full value for this spectrum in an auction, Ofcom should consider regulatory action to support future defragmentation. We put forward some options for such action in our response to Question 19.

Finally, as we set out in both our October 2023[4] and April 2025 responses, the restrictions proposed to be applied to the top 5 MHz at 1512-1517 MHz mean that mobile operators are unlikely to consider it usable spectrum. The conclusion that that there is only 20 MHz of usable spectrum has implications for spectrum packaging and auction design. As we discuss below, we are sceptical that there is sufficient spectrum available in this award to support more than one additional operator in the band, given the poor economies of scale from deploying a new radio in this band with less than 15 MHz of capacity.

The remainder of this response focusses on Ofcom's specific questions 16-19.

RESPONSE TO SPECIFIC QUESTIONS (16-19)

Question 16: Do you have any comments on the proposed format for the auction?

VMO2 has a strong general preference for multi-round auctions. For many awards, this is reflected in a preference for clock auctions with categories of generic lots that can be aggregated to form larger continuous carriers. However, for this award, our preferences are complicated by our acquisition of related spectrum at 1452-1472 MHz. For the technical reasons discussed above, our value for additional spectrum is greater if there is a path to making it contiguous with our existing holdings in the band. To achieve this, we would ultimately be willing to explore relocating in the wider band.

[✂]. In our opinion, Ofcom must act on defragmentation if it is to deliver on its mandate of promoting value-based bidding and maximising the likelihood of an efficient, pro-competitive allocation. Without action, competition in the auction will be constrained and a sub-optimal outcome is likely.

[4] Call for inputs on Ofcom's coexistence analysis

Our risk profile impacts our preference for auction formats:

- With action to support future defragmentation, we support Ofcom's Option A, a clock auction with generic lots. This may be augmented by only offering the lower four 5 MHz lots in the main auction and adopting a spectrum floor to protect bidders against winning an unwanted subset of their demand.

- Without action to support future defragmentation, we propose that Ofcom adopt an alternative Option E of a clock auction with a single 25 MHz lot. In this scenario, we see no benefit in allowing bidders to bid for smaller quantities, as they are too hard to value and there is material risk of bidder error and an inefficient allocation. If Ofcom insists on more flexible bid options, then Option C (sealed bid with package bidding) is the least-worst remaining option.

In the following, we elaborate on our preferences, addressing in turn: the implication of 1512-1517 MHz not being usable; our views on spectrum packaging; our assessment of Ofcom's three auction options; and our views on two alternative auction format options.

Assignment of 1512-1517 MHz

For the reasons set out in our Part 1 Response, we do not regard the upmost 5 MHz block from 1512-1517 as usable spectrum, owing to the restrictions proposed to protect adjacent uses. In effect, this is a guard block. If this spectrum block has a reserve price, obliging bidders for adjacent spectrum to bid for it potentially devalues associated frequency packages within the sub-band. This could distort bidding in an auction. This spectrum should instead be awarded directly at zero cost to the winner of the adjacent spectrum from 1512 MHz downwards. This approach will enable that winner to manage adjacent band interference issues.

Practically, our proposal could be achieved in two ways depending on the auction format:

- If specific frequency blocks are allocated in the main stage of an auction, this block should be included at zero incremental cost in any package bid options that include the adjacent 1507-1512 MHz spectrum; and

- If generic frequency blocks are allocated in the main stage of an auction, then the block should be assigned directly to the winner of adjacent spectrum at zero cost as part of the assignment process.

Spectrum packaging

In response to the October 2023 Call for inputs, we advocated for the spectrum to be awarded as a single 25 MHz block. BT also supported this approach. Vodafone, which at that time owned the 1452-1472 MHz spectrum, was interested in options to buy smaller quantities of

spectrum but noted that a defragmentation process may be appropriate. Three, which at that time owned the 1472-1492 MHz spectrum, was also interested in options to buy smaller quantities and argued that it should be guaranteed contiguity with its existing spectrum.

These differences in opinion reveal a clear split between incumbents and non-incumbents within the wider L-band. Incumbents favour the option to incrementally add spectrum to their existing L-band holdings, but only if this is contiguous (and thus can be serviced using a single common radio). Non-incumbents want to acquire a larger block, ideally the full 25 MHz (i.e. 20 MHz usable + 5 MHz guard block), so that they have sufficient capacity to justify investing in a new frequency band.

VMO2's position has evolved owing to our recent transition from non-incumbent to incumbent, following our acquisition of 1452-1472 MHz. Whereas previously we were interested in buying the entire spectrum or nothing, we now have value to acquire smaller quantities of the available spectrum. However, such additional spectrum will likely only offer value if the band can be replanned so that any new spectrum we acquire is contiguous to our existing spectrum, so that the entire bandwidth can be deployed on a single radio.

As the MNO with the smallest total spectrum holdings, it is plausible that VMO2 has the highest value amongst the three MNOs for incremental mobile spectrum. In contrast, as Vodafone-Three has by far the largest spectrum holdings, it is plausible that it has the lowest value. However, Ofcom's proposed auction designs all favour Vodafone-Three because they are the only bidder that can secure contiguity with existing holdings. This is a perverse situation, and one that – absent appropriate intervention in the award design – may lead to an outcome that is inefficient and will tend to weaken future downstream competition.

Our preferred solution is for Ofcom to build a process for defragmenting the wider 1452-1517 MHz band into this award process, so that we are ultimately guaranteed contiguity between any new spectrum we buy and our existing holdings. We recognize that this may require us to move position in the band, and that a transition period will be appropriate given that the new frequencies are still being integrated into the band's ecosystem. We discuss mechanisms that could achieve this in our response to Question 19. If defragmentation and contiguity is mandated, then we favour an award design with four 5 MHz generic lots.

A second-best solution is to award the spectrum as a single 25 MHz lot (including the guard block at 1512-1517). [✂]. BT has said it also prefers to bid for all of the available spectrum. If there are no non-MNO bidders, then having smaller lots offers no benefit, as Vodafone bidding and winning less than 25 MHz would result in unsold spectrum. For avoidance of doubt, our value for spectrum in this scenario would still be impaired owing to lack of contiguity. [✂].

Assessment of Ofcom candidate auction formats

Ofcom proposes three auction formats at consultation, all of which involve breaking up the available spectrum into multiple lots:

- Option A: Clock auction with four 5 MHz abstract lots (and the upper 5 MHz in the band awarded as a guard block to the winner of the top lot in the assignment round).[5]
- Option B: Clock auction with two fixed frequency lots of 10 MHz (lower) and 15 MHz (upper).
- Option C: Combinatorial sealed bid with package bids and second price rule.

If Ofcom can provide us with reasonable certainty that the full 1452-1517 MHz band will be defragmented after the auction, so that we will in due course have contiguous holdings, then we support Option A. Ofcom's proposal anticipates bidding for up to five lots of 5 MHz but this would need to be reduced to four lots, as the upmost 5 MHz block has no value. [✂].

We anticipate that BT/EE will not favour this option, given its expected preference to bid for the entire spectrum. BT/EE might argue that this format unduly exposes it to winning an unwanted subset of its demand. To address this complaint, we would be open to Ofcom allowing bidders to nominate a spectrum floor of 1, 2, 3 or 4 lots. In a clock auction, a bidder would be precluded from bidding for and would not be retained on demand below its floor. In a competitive auction, it is possible that the exit of a bidder with a floor leads to excess supply; this supply could potentially be reallocated to other bidders that had previous expressed incremental demand for the spectrum at lower prices.

If Ofcom is unwilling or unable to address defragmentation, then we strongly oppose Option A. [✂]. In short, such a design will not enable to us to bid to value and cannot be relied on to deliver an efficient allocation.

Under all circumstances, we oppose Option B as it is insufficiently flexible. In the best case where there is a defragmentation, the option to bid for only 5 MHz is unnecessarily precluded. In a case with no defragmentation, we face new challenges. [✂]. Again, we would not be able to bid to value under an auction design that exposes us to such risks.

Without defragmentation, Option C is the least-worst option from a risk management perspective. [✂]. In short, we prefer the format only because we have more control over our risk; we still would not be able to express our full incremental value for more spectrum.

[5] Here, we have amended Ofcom's original option with five lots to take account of our position that the upmost block should be identified as a guard block and be awarded directly to the winner if adjacent spectrum.

A more general problem with Option C is that the format is a sealed bid. We strongly prefer that Ofcom adopt multi-round auction formats for awards of core mobile spectrum. Bidding over multiple rounds facilitates price discovery and makes governance decisions over bid values and limits easier. This process promotes value-based bidding and efficient outcomes. Accordingly, our general preference is that Ofcom limit the use of sealed bids to low value processes, such as certain assignment rounds. However, for this award, absent defragmentation, we will not be able to follow a value-based bid strategy, so our desire to manage risk trumps our preference for price discovery. Ideally, we should not be exposed to such an unpalatable choice.

Other candidate auction formats

Given that we have concerns with all three auction formats proposed by Ofcom, we have also considered two other format options:

- Option D: Combinatorial clock auction (CCA) with package bid options like Option C.
- Option E: Clock auction with a single 25 MHz lot.

Option D would be the multi-round equivalent of Option C. Unlike a sealed bid, an advantage of this approach is that it would allow some degree of price discovery. We also note that given this is a single band award with only four lots, a CCA would be simpler than previous awards run using this format in the UK. However, we have deep reservations regarding the use of the CCA in general and specifically for this award. The uncertainty over price outcomes is undesirable from a governance perspective. And we are concerned that the format might be vulnerable to gaming, primarily price driving, given bidder's predictable preferences for certain packages. Accordingly, we do not support this format.

We think that Option E is the best approach if Ofcom cannot provide some certainty regarding defragmentation. In this case, Vodafone-Three would likely be the only bidder with firm demand for smaller packages, so bid option flexibility is not needed. Put simply, what is the point in allowing Vodafone-Three to bid for smaller quantities if there is no natural candidate to buy the rest of the spectrum? A single unit auction run with clock style bidding would be simple for Ofcom and for bidders and would help us to manage risk. Notably, this approach eliminates the possibility of bad outcomes in which a bidder wins an unwanted subset of their demand [✂].

Question 17: Do you have any comments on the proposed bidding options for the auction? Do you believe we have excluded any bidding options which would be worth identifying?

We agree that all bid options should be in units of 5 MHz.

We understand that this question primarily relates to Ofcom's Option C auction design which allows for package bidding. A general problem with Ofcom's proposal is that it treats 1512-

1517 MHz as if it was a usable spectrum lot. In fact, we attribute negligible value to this lot owing to the restrictions on its use and we think it should have a zero reserve price. However, we do support it being included in discretionary bid options. On this basis, we agree that Ofcom has identified a sufficiently exhaustive set of bid options and theoretical allocation outcomes in the context of this auction format. As discussed above, this is not our preferred auction format.

Question 18: Do you have any comments on our proposed information policy or reserve price?

We support the disclosure of the the total number of qualified bidders and their identity before bidding starts. In our preferred option of a generic lot clock auction with a defragmentation plan, this approach will facilitate price discovery and promote valuation-based bidding. In a scenario where this no certainty regarding defragmentation, this information may be helpful to bidders attempting to manage their exposure to undesirable frequency assignment outcomes.

If a clock auction format is adopted (instead of a sealed bid), then Ofcom will also need to consider information policy during the auction. The best approach may depend on the auction format:

- If there is a defragmentation plan, then bidders do not need to know who they are bidding against, so Ofcom's standard policy of revealing aggregate demand each round but not the identify of bidders is appropriate.

- The same approach would also apply to a single unit auction, as bidders have certainty over positioning in the band and do not need to know who they are bidding against.

- If there were multiple blocks and no defragmentation plan, the situation is complex. [✂]. This is another reason to avoid such an approach.

In the interests of transparency, VMO2 normally supports the publication of all winning and non-winning bids following the auction. If a clock auction format is adopted, such information should be published. If the auction produces a non-fragmented band plan or if there is a defragmentation plan, then we see no reason to withhold such information. [✂].

VMO2 supports Ofcom's proposal to set a reserve price of £1m per MHz lot. This reserve price should only be applied to the four usable lots. The upmost lot is not usable for high power mobile and should be awarded at zero incremental cost to the winning of spectrum immediately below 1512 MHz.

Question 19: Do you have any other comments on the proposals or analysis set out in this consultation document?

Modern mobile technology utilizes larger contiguous blocks of spectrum to provide the highest capacity and speeds to customers. Operators prioritize deploying larger blocks using single radios, as this is cost effective. Small blocks of spectrum tend to be under-utilized because it is hard to justify the investment in an additional radio. Fragmented assignments within bands are undesirable because it may not be possible to deploy equipment that can aggregate the non-contiguous spectrum, meaning that the smaller block may go unused.

With respect to L-band spectrum, it would obviously be efficient if all winning bidders end up with contiguous spectrum, combining both existing and new holdings. Such an outcome is likely to lead to maximum utilization of the spectrum. Unfortunately, the existing configuration of the band is a barrier to such an outcome. Only Vodafone-Three is positioned to secure contiguous spectrum, and this requires that it wins spectrum at the bottom of the extension band. If VMO2 wins any new spectrum, it would need to execute spectrum swaps to secure contiguity.

Ofcom's consultation process appears to anticipate relying on the market to engineer a defragmentation after the auction. In our opinion, such a non-interventionist approach would be a mistake. Defragmentation is obviously efficient but there is a material risk that this will not happen at all or sufficiently quickly, owing to the entrenched interests of individual operators and/or disagreement over the terms of a trade. Ofcom has the regulatory power to set the rules for the award in ways that make defragmentation much more certain. It can and should execute this power in line with its mandate to promote the efficient use of spectrum.

A key reason why Ofcom must take action is that it is impossible for VMO2 to express its full value for incremental spectrum if we do not have reasonable certainty that there will be a defragmentation. In order to ensure optimal use of spectrum, in accordance with its Statutory Duties, we believe that Ofcom must design an award that enables all MNOs, especially the one with the smallest holdings, to bid to value. This is only possible if Ofcom sets out a path to defragmentation as part of the award.

We recognise that Ofcom has hitherto been reluctant to require bidders to move frequencies within bands. In part, this was owing to legacy concerns that MNOs with existing holdings might have to replace equipment and incur costs if they moved within a band. However, modern radio equipment is generally tuneable across a full band, and this can be done remotely at minimal cost with no site visit. We also appreciate that Ofcom is reluctant to interfere with existing licence terms, notwithstanding its extensive spectrum management powers. However, this reluctance should be weighed against Ofcom's mandate to do what is best for the country as a whole, not specific MNOs who may be see value from blocking rivals or extracting rents from them.

It is relevant to consider that Ofcom has previously taken a non-interventionist approach to the 3410-3800 MHz spectrum, and this has not gone particularly well. Four years after the

completion of the 3600 MHz auction, the spectrum remains fragmented. Notably, this has prevented BT from deploying a contiguous 5G carrier, which is clearly inefficient. [✂].

It is relevant that all stakeholders have, in their consultation responses, highlighted the importance of receiving contiguous spectrum in this band. We note that:

- In the consultation, Ofcom states that "*an efficient allocation of this band is likely to entail all licensees holding contiguous blocks of spectrum*".[6]
- Three highlighted the importance for Ofcom to "*minimise fragmentation in the band and guarantee contiguity*" to existing holdings.[7]
- Vodafone identified the possibility of a defragmentation process in its response to question 10 of the 2023 call for inputs.[8]
- Both VMO2 and BT supported the allocation of new spectrum on a contiguous basis.

We also note that, in an analogous situation, Vodafone called for "*an exercise to defragment the* [wider 3.4-3.8 GHz] *band*" in the run up to the 3.6 GHz auction.[i]

In summary, all the principal parties likely to bid in this award are on record as strong advocates for defragmentation of spectrum bands, so as to promote cost-effective deployments that can deliver the highest quality of service to consumers. Accordingly, we believe there should be little or no resistance to securing a defragmentation of the L-band through the award process itself. It is very much in the national interest to avoid a repeat of the issues that have impeded efficient deployments in the C-band. [✂].

We also request that Ofcom consider the following measures to facilitate defragmentation:

- As a condition of participation in the auction, requiring bidders with existing holdings to agree to move frequencies within the band if necessary to ensure that all licensees have contiguous spectrum. A suitable notice period (e.g. 12 months) may be allowed.

[6] Ofcom, 2025, Award of 1492-1517 MHz spectrum for mobile services, Consultation, available at: https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/269383-call-for-input-making-more-spectrum-in-the-1.4-ghz-band-available-for-mobile-services/associated-documents/consultation-award-of-1492-1517-mhz-spectrum-for-mobile-services.pdf?v=390906

[7] Three, 2024, Three's response to Ofcom's Call for Inputs on making more spectrum in the 1.4GHz band available for mobile services, available at: https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/269383-call-for-input-making-more-spectrum-in-the-1.4-ghz-band-available-for-mobile-services/responses/three-uk?v=293073

[8] Vodafone, 2024, Vodafone Response to Ofcom call for inputs: Making more spectrum in the 1.4GHz band available for mobile services, available at: https://www.ofcom.org.uk/siteassets/resources/documents/consultations/category-1-10-weeks/269383-call-for-input-making-more-spectrum-in-the-1.4-ghz-band-available-for-mobile-services/responses/vodafone?v=293076

- If a generic lot approach is adopted, any winners of spectrum that are not existing incumbents (i.e. not Vodafone-Three or VMO2) should be placed at the top of the band, so that any spectrum swaps to achieve defragmentation only need to involve two parties.

- We propose that bidders be allowed to negotiate on plans to defragment the band and make a proposal to Ofcom. If the proposal was not acceptable or bidders cannot reach agreement, then Ofcom should be allowed to determine the revised band plan.

- In case that there is an incumbent licensee that decides not to bid in the auction, Ofcom should provide 5-years notice of its intention to vary said licensee's licence by altering their frequency allocation, if contiguity is not achieved before this date. By creating a backstop date for negotiations, it is more likely that agreement will be reached sooner.

VMO2 is in principle willing to move to a contiguous block in the wider band to facilitate this process.

[i] Vodafone Response to Ofcom's Consultation: Variation of UK Broadband's Spectrum Access Licence for 3.6 GHz spectrum, p.7.