Three's response to Ofcom's consultation on expanding access to the 6 GHz band for commercial mobile and Wi-Fi services

Non-Confidential

Date 08/05/2025

This is a non-confidential version. Confidential redactions are marked with [✂].

Three.co.uk

Executive Summary.

Three UK welcomes the opportunity to respond to Ofcom's consultation on expanding access to the 6 GHz band for commercial mobile and Wi-Fi services.

Our response emphasizes two key points. Firstly, Ofcom should prioritise the Upper 6GHz band (i.e. all 700MHz) for mobile use, with Wi-Fi use only allowed where mobile has not been deployed. As the GSMA has recently highlighted, the release of the Upper 6GHz band provides a critical opportunity for launching 6G. The decisions taken now on the future use of the band will have profound and long-lasting implications for the future of the UK's telecoms sector.

Three is concerned that Ofcom should take for granted that the lower part of the band must continue to be dedicated to Wi-Fi, while the remaining Upper 6GHz is then split between Wi-Fi and mobile.

With three MNOs likely demanding a minimum of 200MHz each, prioritising less than 600MHz for mobile use would create artificial spectrum scarcity in a future auction and potentially compromise the evolution of 6G in the UK. Prioritising the upper 6GHz band for licensed mobile use offers the greatest benefits, avoiding the complexity and risks associated with a hybrid sharing model.

Secondly, if Ofcom still plans to enable shared use of the Upper 6GHz band by both commercial mobile and Wi-Fi, it should at least delay authorization for Wi-Fi until the outcome of the European harmonisation process is clearer. Any decision to authorise Wi-Fi use early on should be based on a cost-benefit assessment, which Ofcom has not undertaken.

Three is not aware of any current or future Wi-Fi spectrum shortfall or Wi-Fi congestion that would justify Ofcom's proposals to authorise Wi-Fi use in 2025, especially given the relative growth rates in mobile and fixed data traffic. On the other hand, there are clear downsides with authorizing Wi-Fi use early, including i) interference that could hinder future mobile use of the band; ii) the costs of interference management solutions imposed on MNOs; and iii) potential fragmentation of the device ecosystem – without EU-wide harmonization, chipset manufacturers may be reluctant to develop dual chipsets, disadvantaging mobile services in the UK.

Contents.

1. Ofcom should prioritise mobile use of the Upper 6GHz band, with Wi-Fi allowed where mobile has not been deployed

The upper 6 GHz band has emerged as a key area of debate within the industry. Stakeholders are divided on how to utilise this spectrum, with some advocating exclusive use by licensed mobile service, while others propose its use for license-exempt such as W-Fi.

Despite this divide, Ofcom has upheld the position outlined in its previous Consultation, favoring a hybrid sharing model that would allow both mobile and Wi-Fi to coexist within the band.

We maintain the position expressed in our response to Ofcom's previous Consultation and continue to believe that the most effective and beneficial use of the upper 6 GHz band is for licensed mobile services to be prioritized, with Wi-Fi allowed only where mobile use has not been deployed.

In this section, we outline our position.

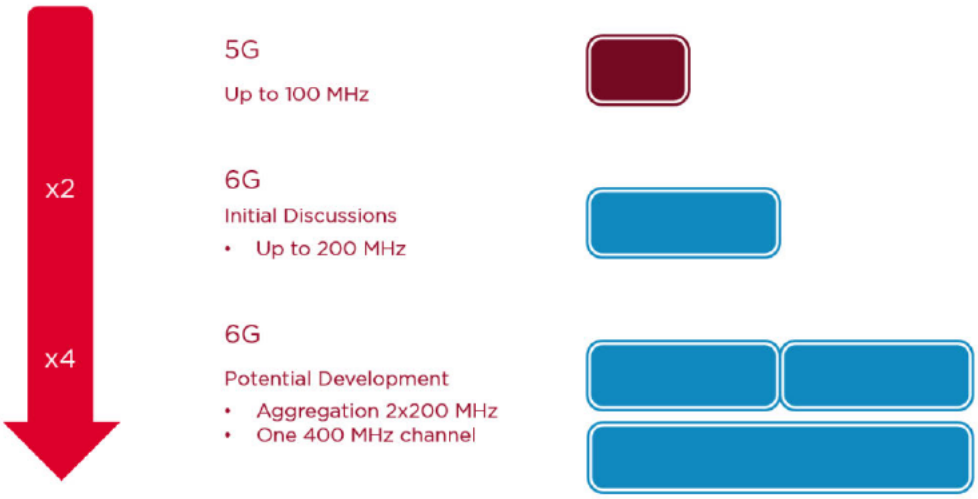
- First, the upper 6GHz band is a critical opportunity for launching 6G services in the UK and should be prioritised for mobile.
- Second, Ofcom has not presented sufficient evidence to justify a need for additional spectrum for Wi-Fi, particularly given the relative rates of growth in mobile and fixed traffic and the correspondingly greater demand for additional spectrum for mobile.
- Third, given Ofcom's objective to maximizing benefits to the UK, prioritizing the band for licensed mobile use offers greatest consumer and economic value. The hybrid sharing model proposed by Ofcom is neither optimal nor practical and risks undermining the potential benefits by limiting mobile network capacity.
- Finally, Ofcom should prioritize the upper 6 GHz band to the highest value use – i.e. mobile.

The upper 6 GHz band is a critical opportunity for launching 6G in the UK

The industry is currently debating which spectrum bands will be used for 6G in the future. As Ofcom is aware, the Upper 6GHz band is a strong candidate band.

Unlike 5G (where the maximum channel bandwidth is 100MHz for sub 6GHz spectrum), technology in the 6GHz band will operate with wider 200-400MHz channels. Following Three's merger with Vodafone, the mobile market will become a three-player market, so the sum of likely demands by MNOs for the Upper 6GHz spectrum will be at least 600MHz. With only 700MHz available in the band, this effectively means prioritising the band for mobile use.

Figure 1: Channel bandwidth requirements for 6G



Source: GSMA, Mobile evolution: spectrum for 6G (Jan 2025)

We are therefore concerned that Ofcom should propose a range of potential splits of the Upper 6GHz band between mobile and Wi-Fi that leaves insufficient bandwidth to MNOs as follows:

- A minimum of 160MHz prioritised for Wi-Fi – leaving up to 540 MHz prioritised for mobile; and
- As much as 320–400MHz prioritised for Wi-Fi – leaving only 300–380MHz prioritised for mobile.
- Ofcom suggests that an appropriate outcome may be 320MHz prioritised for Wi-Fi, with the remaining 380MHz prioritised for mobile.[1]

These proposals would leave a maximum of 540MHz and as little as 300MHz being prioritised for high power mobile deployments, while still allowing Wi-Fi access where there is no mobile deployment.

Prioritising less than 600MHz for mobile use would create artificial spectrum scarcity in a future auction, preventing networks from achieving optimal channels, operating efficiently and potentially compromising the evolution of 6G in the UK.

[1] Consultation, 5.11

Ofcom has not provided sufficient evidence for the need for additional spectrum to support Wi-Fi services

Ofcom has not presented sufficient evidence to justify the need for additional spectrum for Wi-Fi. There is no clear evidence of a spectrum shortfall or congestion in current Wi-Fi networks. In contrast, Ofcom's own Connected Nations report shows that, although data traffic has slowed in recent years, mobile traffic is still growing at a rate of approximately 20% per year, compared to less than 10% growth in fixed network traffic.

Despite slower mobile traffic growth, congestion in mobile networks will increase so there is a need for additional spectrum in the future.

[✂].

Moreover, Wi-Fi performance is fundamentally limited by the capacity of the fixed broadband (FBB) connection feeding it. In most cases, the bottleneck in Wi-Fi user experience lies not in spectrum availability but in the speed and quality of the underlying broadband connection. Therefore, allocating additional spectrum to Wi-Fi will not contribute to an improved customer experience.

Currently, Wi-Fi already benefits from considerable spectrum access. 500MHz in the Lower 6 GHz band has been available for low power indoor Wi-Fi since 2020. Ofcom now proposes to allow standard power Wi-Fi use of that spectrum (in addition to the existing low power indoor Wi-Fi, and VLP outdoors), to be added to the large amounts of previously available spectrum in the 2.4 GHz and 5 GHz bands.

Given this, we believe that allocating the upper 6 GHz band for Wi-Fi as well would represent an imbalanced approach, in light of faster growth in mobile traffic compared to fixed traffic and the limited availability of mid-band spectrum.

Prioritizing the upper 6 GHz band for mobile will result in maximum consumer benefit

Ofcom's primary objective in determining the future use of the upper 6 GHz band is to maximize benefits for the UK. We continue to support the position outlined in our response to the previous Consultation[2]: prioritizing the upper 6 GHz band for licensed high-power mobile use offers greatest consumer and economic benefit.

This position is supported by a recent GSMA cost-benefit analysis[3], which assessed the economic outcomes of three policy scenarios across nine countries globally: (1) licensed use for mobile, (2) unlicensed use, and (3) shared use. The study found that licensed use consistently delivers the highest economic benefit across all countries. The is largely because mobile networks are more likely to

[2] Three UK
[3] GSMA_Mobile-Evolution-in-6-GHz.pdf

face capacity constraints than Wi-Fi, and Wi-Fi capacity can still be improved through better spectral efficiency.

We believe Ofcom's proposed hybrid sharing model is neither optimal nor practical. In its previous consultation[4], Ofcom noted that for Wi-Fi and mobile to coexist, certain technical restrictions might be necessary, such as tighter power limits on licensed mobile.[5]

Imposing stringent power restrictions on mobile base stations would significantly limit the additional capacity they can deliver, reducing the potential economic benefits. As highlighted in the GSMA study, shared use delivers lower economic value than licensed mobile use – especially when technical requirements are overly restrictive or disproportionately burden one technology. In such cases, the value of the sharing framework is fundamentally undermined.

Ofcom should prioritize the upper 6 GHz band to the highest value use – i.e. mobile

The UK has moved away from a traditional 'command-and-control' spectrum management model (where the regulator determined which technologies and services could access specific frequencies) toward a market-based approach. This shift has enabled greater flexibility for spectrum users and is widely recognized as a more effective means of securing optimal use of spectrum, as users are best placed to understand their own needs and constraints.[6]

It is important to note that no spectrum license is entirely exclusive; where licensed spectrum is underutilized in specific areas, Ofcom may issue Local Access Licenses[7] to third parties to ensure efficient use of the spectrum. Even in such cases the policy framework upholds a clear hierarchy; spectrum access should be prioritized for licensed users – those who have made significant investments and are willing to pay market-based fees – while secondary access is permitted only when the spectrum would otherwise remain unused.

The current proposal set out in Ofcom's consultation represents a clear shift away from this established market-based model. By allocating parts of the upper 6 GHz band for license-exempt Wi-Fi use, Ofcom is effectively granting free access to unlicensed users, despite the presence of stakeholders who are both willing to pay and place higher value on the spectrum.

Moreover, Ofcom has not presented any analysis or evidence demonstrating that unlicensed Wi-Fi use of the upper 6 GHz band would generate greater economic value than licensed mobile use. In taking this position, Ofcom appears to be reverting to a 'command-and-control' approach – determining the best use of

[4] Hybrid sharing: enabling both licensed mobile and Wi-Fi users to access the upper 6 GHz band, para 1.14
[5] The current consultation does not provide any detail on the technical conditions for mobile deployment.
[6] Review of Ofcom's market-based approach to mobile spectrum management, para 1.11
[7] A Local Access licence is a mechanism that enables the shared use of spectrum which is already licensed on a national basis to MNOs, in locations where a particular frequency is not being used.

spectrum through regulatory judgement rather than relying on market forces to make that determination.

2. Ofcom should at least delay authorization for Wi-Fi until the outcome of the European harmonisation process is clearer.

Orcom proposes to initially authorise Wi-Fi in the Upper 6GHz band (ideally before end 2025) and to authorise mobile use of the band subsequently, after CEPT concludes its work on a harmonised approach to shared use of Upper 6 GHz by mobile and Wi-Fi (expected in 2027).

In Three's view, Ofcom should wait for European harmonisation to be resolved before authorising Wi-Fi use in the band. Any decision to authorise Wi-Fi use in the upper 6GHz band before 2027 should be based on a comprehensive cost-benefit analysis. This approach is standard in policy-making, as it ensures that Ofcom relies on objective evidence rather than the opinions of stakeholders with vested interests.

The potential benefits of granting Wi-Fi early access to the Upper 6GHz band – potentially by the end of 2025 - must be carefully weighed against the associated costs and risks of such a decision. Such exercise has not been taken forward by Ofcom when designing the proposals included in this consultation.

Fundamentally, Ofcom fails to explain the benefits of early authorization or acknowledge the magnitude of the costs and risks associated with such decision. We have identified at least three major costs and risks associated with Ofcom's proposal with no apparent benefit. In particular:

- Benefits: the rationale for Ofcom's proposal is unclear, as it does not present any data or justification of why Wi-Fi should be authorised in the band before 2027. Ofcom does not present any evidence that Wi-Fi bands will be congested before 2027 or that any technical improvement in Wi-Fi service will derive from early access to the upper 6GHz band.
- Costs: Ofcom ignores, or underestimates, the following costs / risks associated with the proposed approach:
    - The risk of potential sterilization of the band for future mobile use;
    - The costs associated with interference management responsibility that falls only on mobile;
    - The risk of device ecosystem fragmentation.

At Three, we believe that authorizing Wi-Fi across the upper 6GHz band before European harmonization would incur costs that far outweigh any potential benefits. Such a move could have detrimental consequences for the mobile industry, the device ecosystem, and society as a whole. If Ofcom still plans to enable shared use of the Upper 6GHz band by both commercial mobile and Wi-Fi, it should not authorise Wi-Fi until the outcome of the European harmonization process is clearer.

Cost and Benefits analysis of the proposed Ofcom's approach.

Ofcom fails to explain the benefits and rationale for authorizing Wi-Fi in the upper 6GHz band as early as 2025.

Ofcom fails to convincingly identify the benefits for consumers and society as a whole of authorizing Wi-Fi before 2027 and European decision.

The claim that if the UK waits for European harmonisation, the "*UK would not get any benefits from early use of the band by Wi-Fi, and it could remove industry incentives to reach agreement on sharing mechanisms"* fails to describe a) what kind of early benefit Wi-Fi users could get from accessing the band from 2025 and b) why mobile operators will be less incentivised to discuss sharing mechanisms when access to the band for mobile is such of vital importance for the future of the industry.

As Ofcom notes, both the mobile and Wi-Fi industries want access to the band to help them to cope with the future growth in demand. However, Ofcom does not provide any indication that Wi-Fi is currently experiencing congestion in Wi-Fi bands, justifying the urgency of authorizing access points to use the upper 6GHz before 2027.

Allowing early authorization of Wi-Fi throughout the full 6GHz band could effectively sterilize the band for future mobile use.

Ofcom appears to overlook the significant risks that early authorization of indoor Wi-Fi in the upper 6GHz band could pose. The first and most immediate concern with Ofcom's phased proposal is the risk of interference between Wi-Fi and mobile devices once mobile use is authorised in the band (i.e. from 2027 onwards).

Ofcom's proposed solution is to rely on future Wi-Fi access points incorporating "detect-and-avoid" mechanisms, which would cease Wi-Fi transmission upon detecting mobile signals.

Ofcom recognizes that the main risk with this approach is that some "legacy" Wi-Fi access points - deployed before European harmonization is finalized - may lack the features, such as "enhanced sensing," that could help mitigate interference with mobile networks.

Ofcom concludes that this risk can be managed, assuming Wi-Fi equipment is typically refreshed every 5-7 years and that adoption of the upper 6GHz band will be gradual. Ofcom suggests that by the time mobile services are introduced in this band, most Wi-Fi access points will have sensing technology.

We strongly disagree with this assessment, particularly regarding the average lifespan of Wi-Fi access points. A MoneySupermarket report[8] indicates that 16%

[8] https://www.moneysupermarket.com/news/broadband-customers-face-security-risks-with-outdated-routers/

of UK broadband customers use routers that are over five years old. The article notes, "*Wireless routers are the sort of home appliance that most people will set up and forget about*," highlighting that unless there is a technical issue or a change in broadband service, most households do not proactively replace their Wi-Fi equipment.

Moreover, older routers are often sold on the secondary market, where "technology-savvy" users-who upgrade to the latest routers-meet "cost-conscious" users, who are less concerned with technical performance and simply need basic internet access.

It is clear that Ofcom's assessment is based on flawed assumptions. Without standardized sensing capabilities, early Wi-Fi access points will be unable to effectively detect and yield to mobile networks. These devices will remain in use for years, creating persistent interference issues that will undermine the efficient use of the band, even after harmonization.

The only way to remove this risk entirely is to remove the source of interference, delaying any authorization for the use of the band until a European decision on harmonization and standardization of "sense-and-detect" mechanisms is reached.

Absent this, the result will be the de facto sterilization of the upper 6GHz band for mobile use. Once Wi-Fi access points are widely deployed in homes, businesses, and industrial settings across the UK, introducing mobile services in this band later will become technically challenging, if not impossible. Mobile operators deployment plans will be *de facto* affected by the presence of legacy equipment and ongoing risk of interferences, both factors outside MNOs' control.

Ofcom's proposed interference management responsibility falls only on mobile, unfairly imposing additional costs and complexity on mobile operators.

A second cost associated with Ofcom's proposal relates to Ofcom's preferred approach to interference management, as outlined in the Consultation[9], that is to require mobile networks to broadcast a Wi-Fi-like beacon. Ofcom argues that "*it is more practical to implement this solution across thousands of mobile base stations, rather than making significant changes to a much larger number of Wi-Fi access points to enable them to decode mobile control signals".*

At Three, we consider this approach fundamentally unfair. It places the entire responsibility for managing interference on mobile operators, who would face substantial costs, technical challenges, and increased regulatory burdens.

Furthermore, we are particularly surprised that Ofcom has not provided a more detailed assessment of the feasibility of deploying this technical solution across thousands of mobile towers.

[9] Consultation: Expanding access to the 6 GHz band for commercial mobile and Wi-Fi services, para 5.39

In simple terms, no vendors will develop a technical solution incorporating technologies like those foreseen by Ofcom before the band is harmonized at European level, as economies of scale are needed to develop, test and deploy such solutions, and the UK market isn't large enough for a vendor to incur such process.

Even if a vendor would be available to develop such technology before the European decision, this will result in additional R&D costs, testing and manufacturing that will be with no doubt pass over to the mobile operators.

Ofcom is well aware that the mobile industry is currently experiencing low returns, limited growth, and significant financial pressures. Expecting the industry to absorb the costs of this solution is unrealistic and disconnected from the sector's financial reality. It is not something the industry can, and will, accept.

Finally, this approach gives Wi-Fi an unfair advantage, allowing it to benefit from the investments made by mobile operators to support their own services, without sharing the associated costs or responsibilities.

The proposed approach risks fragmenting the device ecosystem

Finally, another significant cost overlooked in Ofcom's consultation is the risk that mobile services will be further disadvantaged compared to Wi-Fi. Without an EU-wide commitment, chipset manufacturers are unlikely to absorb the expense of developing dual mode chipsets that support both technologies.

Ofcom seems to ignore the relevance of economies of scale in device manufacturing. Chipset makers and device manufacturers typically invest in developing new chipsets only when they can serve a large, harmonized market, ensuring economies of scale and a return on investment. If the UK implements a different approach for the upper 6GHz band, manufacturers may be reluctant to design and produce chipsets specifically for the UK market, especially without an EU-wide or global commitment.

This lack of harmonization means that, until at least 2027 or until broader alignment is achieved, mobile devices sold in the UK are unlikely to support the upper 6GHz band.

Indeed, mobile devices sold in the UK will require a huge device ecosystem pull to support upper 6GHz band which – in the best-case scenario - may only be implemented in a small amount of premium devices. This will limit benefits – if any - to a small number of users whilst introducing unnecessary future interference and eco system fragmentation risks.

The indoor / outdoor split rationale isn't reflective of how the two technologies currently work.

With regards to Ofcom's proposed approach of indoor/outdoor spectrum split, we strongly oppose such solution. We believe this approach is fundamentally flawed,

as it assumes that mobile services are only needed outdoors, which does not reflect real-world usage.

Moreover, Ofcom appears to suggest that allocating Wi-Fi for indoor use and mobile for outdoor use would help free up capacity in other mobile bands. However, this overlooks a significant issue: such a split may require limiting mobile power levels to prevent interference, which would severely reduce the usefulness of this spectrum for mobile services.

While we continue to advocate for assigning the entire spectrum to mobile, we believe a more balanced compromise would be to give Wi-Fi priority in the lower portion of the Upper 6 GHz band and mobile priority in the upper portion, with each service allowed to use the other's portion when not in use, so there is no interference. This approach would be far preferable to the proposed indoor/outdoor split.