Your response

Question	Your response
Question 1: Do you agree with our proposals to add the 6425-7070 MHz band to the Shared Access framework?	Confidential? – N Meta agrees that there is an ecosystem in the upper 6GHz band (Wi-Fi) and that delaying its use is detrimental to the UK and its citizens. Meta understands that licences could cover an intermediate timeframe to enable the additional use of the band while CEPT is carrying out studies to open the band on a licence-exempt basis. However, Meta emphasises that the licence conditions should enable efficient use of spectrum in the future. These licence conditions should not unnecessarily prevent effective use of the band, in particular the introduction of licence-exempt Wi-Fi. Meta further submits that the proposed licences should respond to a market need and be adequately defined for the ecosystem expected in the band. The band could enable additional benefits by complementing - not duplicating - the Shared Access Licences in 3800-4200 MHz (more details in our response to Question 2). Therefore, Meta recommends OFCOM to ensure that the proposed licences: a) protect the incumbents currently operating in the band, b) complement (not duplicate) the 3800-4200 MHz framework, c) be tailored to the equipment available in the band, d) do not prevent future use of the band, in particular mass market licence-exempt use cases such as Low Power Indoor (LPI) and Very Low Power (VLP) RLANs. This is critical to avoid such licences preventing the efficient use of the band in the near future. More background on the potential use cases is provided in our response to question 2, while suggested modifications of licence conditions are provided in question 3.

Question 2: Do you have any comments on potential uses for this licence?	Confidential? – N OFCOM's Shared Access Framework enables local network deployments, responding to a number of use cases from full campus or stadium networks to extreme Ultra Reliable Low Latency Communications (URLLC) cases in factories. <u>The band should complement the 3800-4200 MHz - not replicate it</u> It should be noted that the range of requirements of local use cases is extremely large. The most extreme URLLC cases may require exclusive spectrum access to ensure e.g. sub-1 ms latency. Licence-exempt spectrum also supports many use cases including some low latency communications such as Augmented Reality/Virtual Reality (AR/VR), but may not support the most advanced URLLC scenarios. However, licence-exempt spectrum supports much larger ecosystems corresponding to affordable and readily available equipment, which is extremely valuable to the majority of local networks use cases. Meta understands that the licences proposed under the Shared Access Network framework can bring benefits in terms of protection of the incumbent services (Fixed Links, Satellite Services, Radio Astronomy) while CEPT has not concluded on the appropriate technical conditions for licence-exempt devices. However, Meta argues that the risk exists that the proposed licences prevent a future licence-exempt use of the band. In such a case, the proposed framework would result in a significant loss of opportunity for the UK. The 3800-4200 MHz is already open under the Shared Access Framework for equipment requiring the highest Quality of Service (QoS), such as the most advanced URLLC use cases. The 3800-4200 MHz is ideal, since such extreme URLLC typically relies on the 3GPP ecosystem which is readily available in 3800-4200 MHz. There is no evidence that 3800-4200 MHz is saturated. Indeed, most extreme URLLC scenarios correspond to factories and other places, where a single operator controls the building/premises. There should be little local competition for 3800-4200 MHz licences based on the ability to share the spectrum geographically.

	Since OFCOM targets early use of the band, it is important to note that there is no product designed for licensed spectrum available in this band. 3GPP TS 38.104 V17.4.0 (2021-12) indicates that "[band n96, i.e. 5925-7125 MHz] *is restricted to operation with shared spectrum channel access"* and that *"This band is applicable in the USA only subject to FCC Report and Order"*. Therefore, there would be no benefit in opening the band for the most advanced URLLC use cases, as no equipment designed for operation under licenced spectrum is available - nor is expected to become readily available in the near future - in this band. There would therefore be no benefit in opening the 6425-7125 MHz for the same use cases envisaged in 3800-4200 MHz. <u>The band could allow new use cases requiring concurrent deployment, especially in dense urban areas</u> The 6425-7125 MHz may bring some early benefits through enabling additional use cases. For example, some users may prefer to rely on the licenced-exempt ecosystem to get access to wider channels and cheaper terminals. Such users may not need the most extreme URLLC capacities and may fulfil their connectivity objectives with mass market and more affordable products based on Wi-Fi 6E (and in the future Wi-Fi 7), which are readily available in the band. SMEs and offices typically invest significantly in their Wi-Fi infrastructure to provide the best connectivity to their employees and customers. The Shared Access Framework proposed would be very attractive for such professional use cases. However, it should be noted that SMEs and offices may be operating in close proximity to each other, e.g. in different floors of high rise buildings, or in offices located less than 50m from each other. It does not seem fair or reasonable to enable some users to preempt very valuable spectrum at a small price and prevent their immediate neighbours from benefiting from the same connectivity solutions. Meta proposes in its response to question 3 some suggestions that would allow this use case to flourish under the proposed Shared Access Framework.

	The Shared Access Framework ultimately prevents true mass market use and therefore does not enable the most efficient use of spectrum It is critical to recognise that the Shared Access Framework, while enabling early use of the band, is not appropriate for true mass market use cases and triggers risks of preventing the efficient use of spectrum in this band. Meta argues that mass market use cases such as Low Power Indoor (LPI) and Very Low Power (VLP) RLANs are not compatible with a licencing or database approach. Advanced and dynamic sharing mechanisms, although very useful to obtain precise spectrum sharing, tend to increase the technical and administrative complexity of corresponding solutions. Citizens and SMEs favour plug and play solutions that do not require complex coexistence or licencing procedures. In particular, localisation can be a challenge for LPI and VLP solutions. Additional complexity and power consumption is particularly problematic for VLP, which is typically leveraged for low power local connectivity. The ASSIA State of Wi-Fi Report demonstrates that current RLAN spectrum (2.4 and 5 GHz) is becoming heavily congested. The additional spectrum currently allocated (5925-6425 MHz in the UK) only supports one 320 MHz channel or three 160 MHz channels. This band is not wide enough to support the mass market adoption of Wi-Fi 7 without drastic congestion. It is important to ensure that the proposed licences do not prevent efficient use of the band, in particular in terms of potential future introduction of LPI and VLP in the band. As detailed in our response to question 3, the introduction of a requirement for a channel sharing mechanism would not limit the immediate use of the band and at the same time maintain full flexibility for future use cases.

Question 3: Do you have any comments on our proposed licence conditions, licence fee or minimum separation distance?	Confidential? – N Meta recommends adopting the following additional conditions: ● requiring equipment to implement a channel access mechanism, e.g. aligned with draft ETSI EN 303 687, ● limiting the licence bandwidth to 320 MHz and removing the minimum separation distance, ● considering the implementation of such licences through an Automated Frequency Coordination (AFC) system. The justification for these suggestions is provided below. <u>Requiring equipment implementing a channel access mechanism</u> The framework proposed by OFCOM will only be successful, if users are convinced that the equipment they acquire will remain operational in the band for the foreseeable future. Requesting equipment to implement a channel access mechanism, such as the channel access mechanism defined in the draft ETSI 303 687 currently going through approval procedure, would not prevent any deployment, as all devices currently available for this band do implement such channel access mechanism. Requiring the implementation of a channel access mechanism would further enable office use cases by naturally enabling sharing between neighbouring networks. This solution is particularly elegant to avoid artificial scarcity (unnecessarily restricting the licence conditions), while also enabling equitable deployment in dense urban areas. Finally, the channel access mechanism would naturally ensure future compatibility with both LPI and VLP use cases, should OFCOM decide to authorise these use cases in the future. Failure to require such straightforward mechanisms would prevent OFCOM in the future from introducing true mass market use cases alongside these use cases under the Shared Access Framework. Ultimately, OFCOM would have to choose between removing these licences or accepting an inefficient use of spectrum in this critical band. OFCOM would be in a position to introduce any further use case in this band by imposing the implementation of channel access mechanism, such as the ones defined in the draft ETSI 303 687. Users that cannot tolerate any channel access mechanism should be directed to the 3800-4200 MHz band, which is more appropriate for such use cases.

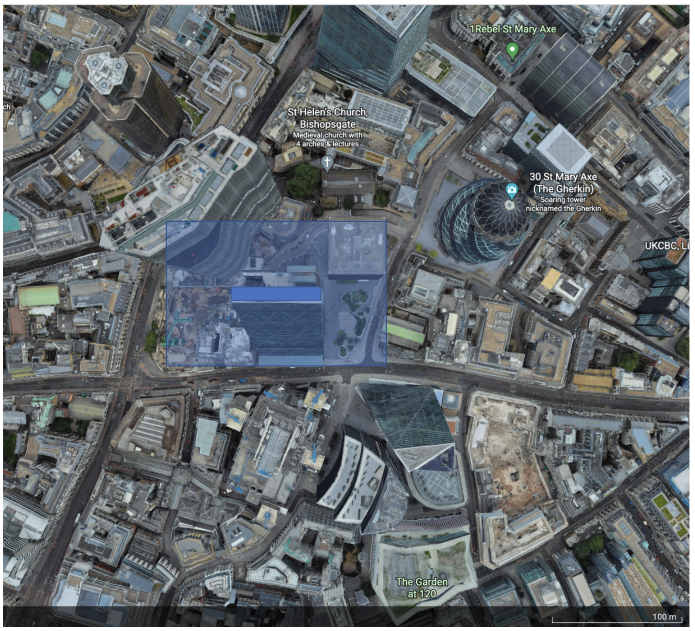
Limiting the licence bandwidth to 320 MHz and removing the 50m radius

The nature of the 6 GHz band - the high building entry loss in this band - implies that interference is likely to be limited to other networks deployed within the same building and/or operating in the immediate vicinity.

For factories, hospitals, shipyards, airports and such large facilities, the building or land owner will naturally control the interference by virtue of controlling which equipment is deployed in its facility.

However, in dense urban areas, the situation would be similar to the 5 GHz band, where networks deployed in adjacent apartments or offices would be visible to the user's network. It seems unreasonable to allow private office owners in a very dense city centre to pre-empt the full 645 MHz band on a 50m radius area, on all floors.

An illustrative example in the centre of London is provided in the Figure below, where a single user could preempt 645 MHz of prime spectrum and prevent other users in the same or neighbouring buildings from getting access to the band. In contrast, removing the 50m exclusivity and requiring a channel access mechanism would enable any company in these buildings to operate on all channels, leading to much improved spectrum efficiency.



Limiting the licence to a maximum 320 MHz and removing the 50m radius exclusivity would enable deployment of the most

	advanced systems currently available while also enabling concurrent access to the band, i.e. enabling offices and SMEs use cases. Considering the implementation of such licences through an Automated Frequency Coordination (AFC) system. As mentioned previously, the success of regulatory frameworks is negatively impacted by their implementation complexity and positively influenced by the existence of an ecosystem and the corresponding economies of scale. If OFCOM decides to go forward with the proposed Shared Access framework, Meta suggests that the implementation could rely on Automated Frequency Coordination (AFC) systems. AFCs simplify the operation for the end user, getting as close as possible to a plug and play situation. They will also benefit from significant economies of scale in this band, with countries like the USA, Brazil and the Kingdom of Saudi Arabia working to introduce them in their national markets. Implementation of AFC should be straightforward as equipment is becoming available. For example, the Telecom Infra Project's Open AFC group is a dedicated open-source community for the design, development, testing and potentially certification of AFC software in the 6 GHz band.
Question 4: Do you have any comments on our technical analysis?	Confidential? – N Meta overall agrees with OFCOM's technical analysis of the sharing in this band presented in Table 4.1. In particular, Meta underlines that operation at low power indoor or very low power outdoor has been identified as a pre-requisite to compatibility in the lower 6GHz band. The situation is very similar in the upper 6 GHz band. Meta stresses that wide area networks operating with high power base stations and 23 dBm outdoor terminals with omnidirectional antennas would undoubtedly interfere with incumbent services or at the very least prevent their future operation in the band. While this consultation is not the right document to fully analyse the risks associated with the introduction of 5G networks in this band, Meta notes that

	OFCOM suggests that outdoor medium power operation is not compatible with incumbent services. Meta requests OFCOM to either confirm this point - or to allow the proposed licences to include outdoor use. Meta disagrees with one specific aspect of OFCOM's analysis, i.e. the argument that limiting the use of the band is reducing the likelihood of interference to Fixed Links and Radio Astronomy. The compatibility of RLANs with Fixed Links in the lower 6 GHz band was ensured through the adoption of Low Power Indoor (LPI), without any requirement for a limit on the density of users. Meta argues that the situation is similar in the upper 6GHz band. Furthermore, interference from RLANs to either Fixed Links or Radio Astronomy would not be the result of aggregate interference, but would most likely be dominated by a single interferer in close proximity. As such, Meta requests OFCOM to clarify that the risk of interference to Fixed Links and Radio Astronomy will be null due to the authorisation process, i.e. the licences. OFCOM will be in a position to refuse any licence that would be in immediate proximity to a Fixed Link or a Radio Astronomy site. Longer term, Meta argues that OFCOM should promote the use of spectrum, not design sharing framework to restrict such use. Efficient use of spectrum is directly related to the number of people receiving services over such spectrum. While Meta fully supports the protection of incumbent services in the band, Meta argues that OFCOM should work towards the implementation that maximises the spectrum use of the band, i.e. towards licence-exempt use. OFCOM's Communications Market Report 2021 indicates that the average fixed broadband data use per month is 429 GB, compared with the average mobile data use per month of 4.5 GB. Most of the fixed broadband data is actually delivered over Wi-Fi on a local basis, suggesting that RLANs deliver traffic 2 orders of magnitude larger than mobile traffic. This clearly demonstrates that RLANs are vastly more spectrum efficient than mobile networks. OFCOM's own data suggests that the most efficient and beneficial use of 6425-7125 MHz is to open it to mass market RLANs, given that the vast majority of internet traffic in the UK is delivered by Wi-Fi. The lower 6 GHz regulatory framework suggests that solutions exist to introduce both LPI and VLP in the upper 6GHz band without restricting the number of users, i.e. without limiting the efficiency of the use of spectrum.

	Meta encourages OFCOM to extend its technical analysis and work towards the introduction of both Low Power Indoor (LPI) and Very Low Power (VLP) in the upper 6GHz band without limitation on the number of users. Such a goal would both secure the long term availability of the band for incumbents and for the new Shared Access framework licensees, and achieve the most efficient use of spectrum.