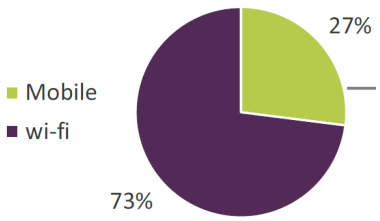
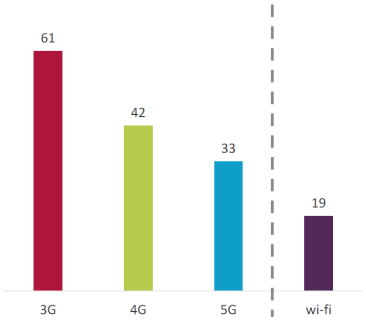
Your response

Question	Your response
Question 1: Do you agree with our proposals to add the 6425-7070 MHz band to the Shared Access framework?	Wi-Fi Alliance commends Ofcom on its ongoing work in the area of spectrum management. This Ofcom Consultation on *Enabling spectrum sharing in the upper 6 GHz band -- Shared licences for local, low-power indoor use of the upper 6 GHz band (6425-7070 MHz)* ("*Consultation*") recognizes essential role Wi-Fi technology plays in delivering wireless connectivity to consumers and enterprises in the UK. In this regard, Wi-Fi Alliance enthusiastically supports the stated aim "to promote sharing as an effective way of maximizing spectrum use" and to bring the benefits of Wi-Fi enabled broadband to the UK (see *Consultation* at ¶ 1.3 and 1.4). Wi-Fi Alliance, however, disagrees with Ofcom's tentative rationale that this spectrum may be used for licensed 5G-mobile deployments in the future (see *Consultation* at ¶ 1.9 (b)). Extensive technical studies conducted in UK, Europe and US (*for example see Consultation starting at ¶ 5.16*) and the subsequent Ofcom decision to authorize license-exempt operations in the lower-6 GHz band (5925-6425 MHz) confirm the regulatory conditions that are necessary for the mobile networks coexistence with 6 GHz incumbents. These conditions are acceptable for license-exempt networks (e.g., Wi-Fi) but are not feasible for commercially viable licensed 5G deployments because, to maintain the necessary quality of service, licensed networks require priority access to spectrum. With priority spectrum access, licensed 5G networks cannot avoid interfering with or tolerate interference from the incumbent operations in the 6425-7125 MHz band. Conversely, Wi-Fi, built on IEEE 802.11 standards, has demonstrated ability to coexist with and protect other spectrum users. These protections are inherent to Wi-Fi technology and are critical to its efficient operations on license-exempt basis worldwide. And Wi-Fi industry is committed to implementing technical, operational, and regulatory solutions that ensure coexistence with other operations in the band. Wi-Fi Alliance respectfully asks Ofcom to take into account that even if the next World Radiocommunication Conference (WRC-23) were to designate 6425-7125 MHz band for IMT in some countries, significant time (i.e., years) and investments (i.e., billions of pounds) will be required to develop, implement, deploy and operate 5G (IMT) networks in the 6 GHz band. It is far from certain that such IMT networks can be economically viable and commercially feasible given limited market scale and harmonization, particularly in light of the fact that other countries

	are firmly opposed to IMT identification in the 6425-7125 MHz band (see United States proposal on WRC-23 Agenda Item 1.2 (6 GHz)). In the meantime, the latest Wi-Fi technology operating in the 5925-7125 MHz band, already on the market, empowering tremendous connectivity and is ready to deliver benefits to consumers and enterprises across UK. This *Consultation* comes at a pivotal time in the development Wi-Fi ecosystem. Last year, Wi-Fi Alliance introduced new Wi-Fi 6E terminology to distinguish the latest generation Wi-Fi 6 devices that are capable of 6 GHz operation. Wi-Fi 6E brings a common industry name for Wi-Fi users to identify devices that offer the features and capabilities of Wi-Fi 6 – including higher performance, lower latency, and faster data rates – extended into the 5925–7125 MHz band. Wi-Fi 6E devices are quickly becoming available, following regulatory approvals in several countries. As the 6 GHz regulatory landscape evolves, Wi-Fi Alliance member companies continue to expand the Wi-Fi 6E ecosystem even further. Initial deployments in the band include Wi-Fi 6E consumer access points and smartphones, followed by enterprise-grade access points. Industrial environments are also expected to see strong adoption of Wi-Fi 6E to deliver applications including machine analytics, remote maintenance, or virtual employee training (see Wi-Fi Alliance 2022 Wi-Fi trends). Wi-Fi 6E will utilize 6 GHz to deliver much anticipated AR/VR use cases for consumer, enterprise, and industrial environments. The list of Wi-Fi 6E certified products is already growing. In 2021, over 300 million Wi-Fi 6E devices entered the market and over 350 million devices are expected in 2022. Regulatory harmonization in the 5925–7125 MHz band will create economies of scope and scale and produce a robust equipment market, benefitting UK businesses, consumers, and the economy. But these benefits cannot be realized in the absence of access to adequate spectrum capacity. Access to less than the entire 5925-7125 MHz band (1200 MHz) for license-exempt use would substantively reduce Wi-Fi 6E performance in terms of latency and data throughput. The 5925-6425 MHz band (500 MHz) does not provide sufficient spectrum to support future Wi--Fi connectivity. And there are no alternative frequency bands that may address expanding Wi-Fi spectrum requirements in the future. In fact, the next generation of Wi-Fi (Wi-Fi 7) will be designed to support VR/AR/XR, Industrial IoT, automotive, telepresence, immersive 3-D and other applications. Wi-Fi Alliance asks Ofcom to note that Wi-Fi 7 is designed to deliver unprecedented quality of service (QoS) benefits at higher data rates and lower latencies. But Wi-Fi 7 optimal performance will depend on access to multiple wider (e.g., 320 MHz) channels – without spectrum access, UK consumers will not realize full benefits of Wi-Fi 6E Wi-Fi 7 and future generations of Wi-Fi technologies. Wi-Fi Alliance asks Ofcom to note that the connections provided by Wi-Fi technology through low-cost, license-exempt

	devices provide billions of pounds in economic value to the UK's economy. Indeed, a recent study by Telecom Advisory Services found that license-exempt Wi-Fi networks delivered over £70 billion pounds of economic benefits per year to the UK's economy. Delaying sufficient spectrum capacity for Wi-Fi undermines these benefits for the UK's consumers and businesses. Lastly, the Shared Access Licence is a relatively new regulatory approach (adopted in 2019) which currently applies to four spectrum bands (1800 MHz band, 2300 MHz band, 3800 to 4200 MHz band; and 24.25-26.5 GHz band) (see here). Wi-Fi Alliance recommends that before extending the Shared Access Licence framework to the upper-6 GHz band, the Ofcom should evaluate the overall efficacy of this approach. For instance, it would be helpful to assess number of licences and implementation challenges in the four existing bands.
Question 2: Do you have any comments on potential uses for this licence?	Shared license approach for local, low-power indoor may support limited commercial or industrial applications but is not suitable for broader market. Importantly, this approach does not address the ever-increasing demand for general Wi-Fi applications. The Ofcom's own projections indicate that Wi-Fi "demand could grow between six and ten times over ten years" (see Ofcom Improving Spectrum Access for Wi-Fi, July 2020, at ¶ 3.24). In this report, Ofcom astutely recognized that Wi-Fi has become increasingly important in connecting people and devices everywhere and that 6 GHz spectrum is critical for futureproofing of Wi-Fi connectivity. And the key findings of Ofcom's 2021 Mobile Matters Report indicate that: • "Seventy-three per cent of data connections were made over wi-fi rather than a cellular network, with no significant differences by rurality or nation.:" and "Nearly three-quarters of data connections were made over wi-fi rather than a mobile network (2G, 3G, 4G or 5G) during the research period."  **Average network share by technology, Jan – March 2021** (See report Ofcom's 2021 Mobile Matters Report, Fig. 1) • Over 2/3 of the time, mobile devices were connected to Wi-Fi rather than to a cellular network." (page 5) • Wi-Fi Response times were half of 4G connections with no significant difference by rurality (page 16) (lower is better)

	 **Average response time by network technology in milliseconds: Jan – March 2021 (lower is better)** (See report Ofcom's 2021 Mobile Matters Report, Fig. 16) Proposed Shared Access Licence approach would do little to address this growing demand. Another concern that would impede deployments under proposed arrangement is persistent regulatory uncertainty of the Shared Access Licence. As noted in the proposal, the Ofcom may revoke the Shared Access Licence if it were to authorize 5G rollout in the band (see *Consultation* at ¶ 3.16). And the risk of potential licence revocation may be more imminent than "some years into the future" (see *Consultation* at ¶ 4.1 (e)). If, next year, the WRC-23 decides to identify the 6425-7125 MHz band for IMT then, consistent with Ofcom's stated objective to increase spectrum access for innovation, there would be no reason to delay revocation of the Shared Access Licences. Since it would not be feasible to recoup network equipment and deployment costs in a few years following the WRC-23, many potential RLAN users may be discouraged to initiate service under the Shared Access Licence arrangement.
Question 3: Do you have any comments on our proposed licence conditions, licence fee or minimum separation distance?	Wi-Fi Alliance questions the feasibility of base station deployments under proposed licensing regime in multistory structures. It is unclear whether the 50 m radius limit would extend in the vertical direction and if so, then how such limit would be determined and enforced. Another needed clarification is the degree of necessary location accuracy for the Shared Access Licence installations and means by which to obtain location information for these installations. With relatively small distances (i.e., 50 m/100 m), these requirements may not be practical for the real-world implementations, particularly indoors where geolocation information may not be readily available. It is also unclear how Ofcom would manage Shared Access Licence installations on private property over prolonged periods where users may inadvertently reposition devices (e.g., room-to-room, floor-to-floor). Lastly, Ofcom may wish to consider that a 100-meter minimum separation distance requirement would significantly curtail deployment densities. Combined with the £320 annual licensing fee, the proposed licence requirement is likely to

	preclude many benefits entailed in the affordable and ubiquitous Wi-Fi connectivity, particularly where it is needed most (e.g., high population density areas, underserved areas).
Question 4: Do you have any comments on our technical analysis?	Wi-Fi Alliance notes with interest Ofcom's rationale that It might be possible for future 5G networks to coexist with proposed licensees on a geographical basis (see *Consultation* at ¶ 4.6(f)(1)). If such coexistence is possible then there is no reason to reserve spectrum access for yet undefined technology while precluding RLAN (e.g., Wi-Fi) deployments in the 6425-7070 MHz band. Again, Wi-Fi 6E is ready to deliver immediate connectivity benefits to the UK consumers and business. Wi-Fi Alliance questions Ofcom's expectation that RLAN deployments under the Shared Access License will implement polite protocols (see *Consultation* at ¶ 3.1). There is no guarantee, and in fact evidence to the contrary, that <u>all</u> RLAN technologies will implement polite protocols. Wi-Fi Alliance agrees with Ofcom that Wi-Fi's contention-based protocols such as carrier sense multiple access with collision avoidance, enable co-existence of multiple unlicensed device types. The IEEE specification for Wi-Fi, for example, requires energy detection at -62 dBm/20 MHz. Wi-Fi Alliance members report that their implementation can sense at an even lower threshold to ensure compliance with the IEEE specification. Coincidently, the same contention-based protocols also will reduce interference potential to incumbent operations in the 6 GHz band. In short, contention-based protocols consistent with the IEEE specification would effectively facilitate coexistence among various license-exempt technologies and augment protection of the licensed incumbents in the 6 GHz band. Wi-Fi Alliance therefore, asks Ofcom to consider requiring contention-based protocol for all license-exempt devices in the 6425-7070 MHz.