

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?	<p>Confidential – No</p> <p>Hewlett Packard Enterprise (HPE) appreciates and agrees with Ofcom’s acknowledgment of the sizeable and rapidly growing ecosystem of Wi-Fi equipment in the 6 GHz band – enabled by the growing range of countries that have opened the full 6 GHz band (5925-7125 MHz) for license-exempt use, including leading markets such as the United States, South Korea, Brazil, Canada, and Saudi Arabia. We strongly support Ofcom’s conclusion that there is no need to wait for the WRC-23 deliberations and outcomes in order to move forward with opening the upper 6 GHz band (here defined as the range from 6425-7070 MHz) for technologies that are able to satisfy critical, unmet needs today.</p> <p>HPE is the second largest global provider of managed wireless local area network (“WLAN” or “RLAN”) infrastructure and is a global leader in the Wi-Fi equipment marketplace. HPE’s Aruba business unit ships millions of indoor and outdoor Wi-Fi access points (“APs”) every year, representing approximately 15% of the global market for such devices. We have been a significant provider of WLAN equipment to UK enterprises and service providers for nearly two decades.</p> <p>Given our role as a market making manufacturer, however, we find that the currently proposed technical characteristics and narrow use cases (e.g., low power indoor for industrial and research uses) combined with the additional costs, market size restrictions, operational complexities, license revocation risk, and open liability questions raised by the Shared Access license framework do not justify the significant investment and efforts required to operationalize enterprise Wi-Fi solutions for the band under a Shared Access license framework. It would be extremely difficult for HPE to move forward in this context without meaningful modifications to the proposal that will be enumerated below.</p>
Question 2: Do you have any comments on potential uses for this licence?	<p>Confidential – No</p> <p>HPE recommends broadening the intended range of use cases and beneficiaries of opening the upper 6 GHz band. The narrow range of industrial and research uses, cited as the “more suitable” use cases in the Consultation do not adequately reflect the general societal and economic benefits that Wi-Fi solutions enable – including such important sectors as education, healthcare, hospitality, sports, etc. More to the point in terms of Ofcom’s stated objectives to jump-start enterprise Wi-Fi activity in the upper 6 GHz band, these narrow use cases are not sufficient to make a market. In order for UK businesses and citizens to fully benefit from the opening of the upper 6 GHz band and warrant enthusiastic investment by major manufacturers, additional use cases should be enabled, such as</p>

	<p>localized outdoor Wi-Fi operation.</p> <p>As the Consultation notes, Ofcom has already opened the lower 6 GHz band (5925-6425 MHz) for low-power indoor (LPI) uses on a license-exempt basis. Merely extending the same LPI opportunity into the upper 6 GHz band, but with the additional cost/complexity of the Shared Access licensing framework, will severely limit interest in the band. Given the similar incumbent situations in the lower and upper 6 GHz bands, we believe that LPI could be deployed on a licence-exempt basis in the upper 6 GHz band without affecting incumbents' operations.</p> <p>In our view, the best way to maximise the value of the upper 6 GHz band is to ensure that the regulatory framework appeals to all of the same users who are buying equipment for the lower 6 GHz band, such as schools and universities, hospitals, retailers, and stadium/large venue operators. As a leading manufacturer of networking solutions, we know that our customers expect reliability and consistency, not only from our products but also from the regulatory environment. Should it indeed be Ofcom's intention to limit the number of Shared Access licensees, as indicated in the Consultation, this would effectively contradict the policy objective by so reducing the market as to make it not worth pursuing the limited use cases.</p> <p>HPE has noted with appreciation Ofcom's efforts to address the needs for additional mid-band spectrum for national mobile service (3.4-3.8 GHz), vertical sector cellular solutions (3.8-4.2 GHz), and low power indoor license-exempt technologies (5925-6425 MHz).</p> <p>The most significant unmet need in this comprehensive mid-band strategy is for additional spectrum for outdoor Wi-Fi and 5G NR-U solutions which would benefit the hospitality, education, logistics, and manufacturing sectors, just to name a few. Ofcom could utilize the Shared Access framework to license systems for localized outdoor operations.</p>
<p>Question 3: Do you have any comments on our proposed licence conditions, licence fee or minimum separation distance?</p>	<p>Confidential – No</p> <p>While HPE is absolutely excited about the potential to serve UK customers with upper 6 GHz band capabilities, we are struck by the apparent contradiction between Ofcom's stated intention to encourage Wi-Fi technology and the proposed rules that fail to harness the defining features of Wi-Fi that make pervasive sharing and coexistence possible. Alone among European regulators, Ofcom has an unmatched track record of publishing a wide range of important studies every year about broadband adoption, and it has written at length about the technical features of Wi-Fi that make it uniquely suited for widespread affordable broadband connectivity. The proposed rules for Shared Access licenses in the upper 6 GHz band are incompatible with both the spirit and business of Wi-Fi, as demonstrated by the following examples:</p> <ul style="list-style-type: none"> • Paying for spectrum access: The global record on 6 GHz has been replete with economic impact studies documenting the massive financial benefit accruing to every national economy from Wi-Fi totalling many trillions of US Dollars. For the UK specifically, the Wi-

Fi Alliance has published research¹ demonstrating the economic value of Wi-Fi is USD \$99 billion last year, expected to increase to over USD \$109 billion by 2025. To date, no country on Earth has monetized spectrum access for low-power indoor Wi-Fi uses (in the 2.4 GHz, 5 GHz, or 6 GHz bands) because of this well documented indirect impact. HPE is resolutely opposed to this as a matter of principle given that it is a foundational condition upon which the massive Wi-Fi ecosystem that exists and flourishes today is based. As a practical matter, were we to endorse this approach in one country many others would soon follow. The total funds raised if even 1 million licenses were sold would be dwarfed by this value, while simultaneously creating financial barriers to adoption. As long-time champions of Wi-Fi, Ofcom's proposed policy approach here for Wi-Fi users to pay for spectrum access does not appear consistent with its wider societal objectives to ensure affordable gigabit access and fair competition through the pervasive presence of this technology in the market. Furthermore, given Ofcom's leadership role at a global level and the public statements of other regulators that they are closely monitoring this proceeding, a flawed policy choice here could reverberate worldwide.

- **Sharing in time domain:** The Shared Access framework ignores one of Wi-Fi's single greatest strengths: its ability to fairly share airtime between systems with completely different owners in the time domain. This capability allows very dense overlapping deployments such as at shopping malls, multi-tenant office buildings, and many other scenarios to coexist with minimal mutual interference.
- **Sharing in frequency:** Wi-Fi is synonymous with user flexibility in channel selection because of the coexistence and adaptivity features built into every device. The proposed deployable area of a single license with a 50m radius is 7,853 m², which could support up to 40 APs at a modern density of 200 m² per AP. Some licensees would as a result take advantage of the entire upper 6 GHz band due to the size of areas they need to cover. For these licensees, the full-band concept envisioned by Ofcom certainly makes sense. However, a small coffee shop could equally well take a license for a few or just one AP, denying its neighbours the opportunity to deploy overlapping networks in the frequency domain. In this case, the full band concept would effectively fallow spectrum that could be used by neighbours.
- **Sharing in priority:** Another defining feature of Wi-Fi that is of tremendous societal benefit is the fact that anyone can deploy it at any point in time without seeking permission from anyone else. This flexibility in deployment model and freedom from coordination requirements is one of the inherent characteristics of Wi-Fi that has led to its virtually ubiquitous presence indoors, as well as in many outdoor spaces. However, the Shared Access framework, as proposed, essentially creates priority in time, where whoever happens to apply for a license first obtains access to a given physical

¹ Wi-Fi Alliance: Global Economic Value of Wi-Fi® 2021 – 2025, September 2021

area. This is antithetical to the spirit and business of Wi-Fi. And because the Consultation appears to ignore verticality, a single business in a multi-floor office tower could “lock out” every other tenant (even those many floors away who would be unaffected by the initial licensee’s operations) in the building by obtaining a license first.

HPE reiterates our appreciation for Ofcom’s efforts to open the upper 6 GHz band, but the Shared Access license proposal as written is completely inconsistent with the value proposition that we carry to the market today. Combining these new constraints upon Wi-Fi uses and operations that would result from the proposed Shared Access framework with the other risks Ofcom lays out in the Consultation about the future of the band, HPE is doubtful that a viable Wi-Fi market can be created in the band under these conditions.

Physical License Size and Separation Distance

Considering that Wi-Fi has been designed and optimized to operate on a shared spectrum basis (i.e., without exclusive access to spectrum), we do not see a need for a minimum separation distance of 100 meters as proposed by Ofcom. In our view, Shared Access licenses should not be exclusive in space, time, or frequency. Imposing artificial licensing requirements which would prohibit overlapping deployments would unnecessarily limit the number of Wi-Fi systems that could be deployed in a given area, resulting in a first-come, first-served / winners and losers outcome that is completely avoidable. Exclusive use licenses for LPI Wi-Fi would also result in far less intensive use of this important band.

HPE strongly recommends Ofcom grant upper 6 GHz band licenses on a non-exclusive basis, with a requirement that a contention-based protocol be utilized. Ofcom could also require the use of radio resource management (RRM) or self-optimizing network (SON) mechanisms to assign operating frequencies in order to ensure that overlapping, non-coordinated deployments are optimized. Certain frequencies could be excluded from outdoor Shared Access licenses in order to protect nearby fixed link operations.

Effects on Addressable Market

As noted above, the proposed deployable area of a single license with a 50m radius is 7,853 m². The combined area of the 80 largest UK cities is 9,399 km², meaning that a maximum of 1.2 million licenses could be issued if every square meter of each city was utilized with efficient packing. In practice, the number will be vastly lower than this. Assuming a 25% utilization rate and an average number of APs deployed per license of 10, this works out to a combined addressable market of 3 million APs between residential and consumer applications. Enterprise AP unit volumes are 10% of consumer APs on a global basis. Therefore, the total incremental market opportunity for all enterprise vendors in these 80 cities would be well under 500,000 units. This is not a compelling business case relative to the up-front investment requirements and legal exposures raised by the proposal.

	<p>Operational Costs & Complexity</p> <p>We are of the opinion that Ofcom’s proposed requirement that Shared Access licensees in the upper 6 GHz band “will need to keep a record of their terminals and base stations for inspection by Ofcom” would impose a large administrative burden that has never previously been required for Wi-Fi operations, namely that the operator of the network maintain records of the terminals (i.e., client devices) connecting to the network. It also calls into question whether important Wi-Fi applications would be allowed, such as Wi-Fi public/guest access (i.e., Public Wi-Fi “hotspots” or guest access at corporate locations) or even certain industrial/logistics deployments (e.g., providing connectivity to drivers at logistics hubs such as ports, railyards, and distribution centres).</p> <p>Ofcom should eliminate the requirement for licensees to maintain records on terminals/clients. The requirement to maintain and provide to Ofcom the records related to the base stations (i.e., access points) operated under the license should be sufficient for any administrative or interference investigation issues that arise.</p> <p>Concerning compliance with license terms, Ofcom should make clear that the obligation to comply with the operational constraints of the Shared Access license (e.g., geographic limits, exclusion of frequencies to protect Fixed Link, etc.) are the sole responsibility of the licensee and not the equipment manufacturers. The cost to adapt enterprise Wi-Fi management systems to supervise or even just assist licensees in fulfilling these regulatory obligations could easily run into millions of Pounds for feature development and ongoing operations. Who is to be responsible for ensuring that licenses are renewed on time, and what responsibility do managed systems’ providers have to disable APs that are delinquent in payments? Who is responsible to affect the requirements Ofcom lays out in rules #14 and #15 in the Draft License for modification, restriction, or closedown? Will manufacturers be expected to maintain a liaison office for this purpose, and with what staffing hours?</p> <p>Rule #7 states that licenses are non-transferrable. Yet there is a real secondary market for used enterprise and consumer Wi-Fi equipment. Who bears responsibility to ensure that a secondary buyer of a device obtains a new license, cannot utilize an existing license, and does not conflict with an existing licensee at the new location of the device?</p> <p>On top of this, the liability for improper or misconfigured deployments must rest fully on the licensee. The absence of such a “safe harbour” for original equipment manufacturers (OEMs) would be a significant deterrent to making equipment available for the upper 6 GHz band under a Shared Access license framework.</p>
<p>Question 4: Do you have any comments on our technical analysis?</p>	<p>Confidential – No</p> <p>HPE is not aware of any “technical compatibility work to establish whether and how licensed 5G mobile and licence-exempt Wi-Fi could share the band with each other” that would be undertaken in CEPT, ITU-R, or other regulatory bodies. As a general observation, HPE notes that</p>

there are no examples of licensed cellular (3G/4G/5G) technologies and license-exempt Wi-Fi technologies successfully sharing a frequency band. In our view this is due to the fundamental assumption of exclusive access by licensed cellular technologies while Wi-Fi presupposes opportunistic access to non-exclusive spectrum using a contention-based protocol. The significant efforts undertaken by industry organizations like the MulteFire Alliance and 3GPP to adapt LTE and 5G to operate in license-exempt bands (e.g., 5 GHz and 6 GHz) using new contention-based airlink technologies (LTE-LAA and 5G NR-Unclicensed) are a clear indication of the inability to deploy licensed cellular and Wi-Fi technologies in the same band. HPE believes that the only realistic way to achieve widespread shared access to the upper 6 GHz band in the United Kingdom for both Wi-Fi and 5G is to require contention-based protocols be implemented.