Consultation response form

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Consultation title	Spectrum Roadmap: Delivering Ofcom's Spectrum Management Strategy
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Question	Your response
Do you have any comments on our proposals?	Confidential? – N **A. Introduction** The Dynamic Spectrum Alliance (DSA)[1] respectfully submits these comments in response to Ofcom's discussion document entitled, "Spectrum Roadmap: Delivering Ofcom's Spectrum Management Strategy" (the Spectrum Roadmap).

[1] The DSA is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members

DSA commends Ofcom for its efforts to accelerate innovation by enabling greater spectrum sharing, particularly in light of technology developments that can help spectrum to be managed more effectively.

DSA shares Ofcom's goals of ensuring efficient assignment and use of scarce radio frequencies while making spectrum available for both existing and new wireless services in order to facilitate competition, enhance connectivity, and promote investment.

DSA believes that providing additional spectrum access options through use of new spectrum management tools, such as dynamic shared access systems, will help meet future mobile data traffic demands, benefit competition, create conditions for innovation, and spur more rapid deployments of wireless networks and services. We agree with Ofcom that clearing frequency bands of current users is a lengthy, time-consuming process that involves assessing costs, benefits and risks, along with an evaluation of the ongoing value to the UK of existing uses of the frequencies relative to the potential value of alternative uses.

As an alternative to clearing, DSA encourages Ofcom and other telecommunications regulators to consider spectrum sharing approaches that allow multiple technologies, services, and deployment types to share and maximize efficient use of frequencies. In addition to considering lower power or localized use cases to enable sharing, we recommend that regulators leverage automated dynamic shared access systems to maximize operational flexibility for new services as well as maximizing spectrum efficiency.

DSA further recommends that telecommunications regulators worldwide fully consider licenced, licence-exempt, and lightly licenced options when allocating spectrum to wireless broadband services. Licenced and licence-exempt spectrum bands will both play important and complementary roles in the delivery of advanced wireless services, including mobile data.

B. DSA Comments on Current Priority Projects

1) Preparation for WRC-23

DSA does not support an IMT identification in the 6425-7125 MHz band at the upcoming World Radiocommunication Conference 2023 (WRC-23) under Agenda Item 1.2. Such an identification would likely deny businesses and citizens the benefits of next generation of WAS/RLAN/Wi-Fi technologies. New WAS/RLAN wireless systems, in particular the evolution of Wi-Fi 6E to next generation Wi-Fi known

as Wi-Fi 7, will need access to the full 1200 MHz bandwidth at 6 GHz to support current and emerging innovative use cases. Were the upper part of the band identified for IMT and only the lower 500 MHz made available for WAS/RLANs, WAS/RLANs devices would be limited to smaller channel bandwidths (20 or 40 MHz) when operating in a typical industrial enterprise deployment configuration. With access to the full 1200 MHz, however, there will be sufficient channel diversity that enables enterprises to take full advantage of the larger channel bandwidths of 160 MHz. Additionally, in the near future, 320 MHz wide channels, as supported by Wi-Fi 7, will be available. Enterprise use cases, in particular, will benefit from the additional number of available channels that will enable network capabilities such as service partitioning and prioritization, which will in turn greatly increase quality of service and network efficiency.

Access to wider channel bandwidths is critical for both spectrum efficiency and for the delivery of high-bandwidth applications and services, such as real-time video services and high-bandwidth immersive services, like AR and VR.

DSA encourages Ofcom to consider these perspectives as it prepares WRC-23.

2) Local indoor access in the upper 6 GHz band

As mentioned in our comments on Ofcom's consultation entitled, "Enabling spectrum sharing in the upper 6 GHz band," DSA appreciates Ofcom's efforts to remain flexible in its licensing approach for the upper 6 GHz band. However, we are concerned that, were Ofcom to adopt its current proposal to permit access to the upper 6 GHz band under its Shared Access licence framework, including the possibility of future licence revocation, the resulting market uncertainty could inadvertently discourage market adoption.

We continue to believe imperative for U.K. consumers and enterprises alike to be able to take advantage of the full 1200 MHz of the 6 GHz band for use by a variety of licence-exempt device categories and use cases, while protecting incumbent services from receiving harmful interference. These device categories include low-power indoors, very low power (indoors and outdoors) and standard power (indoors and outdoors).

With respect to Wi-Fi standard power indoor and outdoor devices that could operate both in the lower and upper 6 GHz bands, DSA is confident there is a market for such devices provided that a suitable coordination mechanism is established to avoid interference to incumbent users. Rather than extending the Shared Access licence framework, which will have a number of negative consequences for Wi-Fi standard power adoption as proposed, DSA recommends that Ofcom instead consider implementation of an Automated Frequency Coordination (AFC) system to enable more flexible licence-exempt operations while also ensuring protection of incumbent users.

3) Understanding industry demand for spectrum/spectrum for utilities

DSA applauds Ofcom for its efforts to understand and address the specific spectrum needs of key industries, including utilities and other industrial enterprise users. Increasing spectrum access by a wide range of new users, including vertical sectors, will result in increased and more rapid deployment of new networks and services.

DSA believes that the introduction of new licensing options, supported by automated dynamic spectrum sharing technology, is the best path to support such deployments. Ofcom's current Shared Access licensing framework for the 3.8-4.2 GHz band is an excellent first step in the process. However, DSA encourages Ofcom to take the next step by leveraging commercially available automated shared access technology to further streamline and enhance users' experience with the Shared Access licensing opportunity.

As Ofcom may be aware, after only two years of commercial operation, there are now over 230,000 base stations deployed under the automated shared access framework in the U.S. 3.5 GHz CBRS band. Much of this deployment has been driven by enterprises for private wireless use cases, including utilities, retail, smart agriculture, smart warehousing, smart manufacturing, schools, etc.

From this experience, it is clear to see that the automated opportunistic access available in the CBRS band has revolutionized the ways in which spectrum is improving connectivity across a diverse number of vertical sectors. DSA believes that adopting commercially available automated solutions to the Shared Access licensing model for the 3.8-4.2 GHz band in the U.K. will enable even more enterprise users, including utilities, to access scarce and valuable spectrum resources, leading to lower-costs, lower barriers to entry, and the most effective allocation for innovative businesses. This, in turn, enables and encourages competition and innovation by both existing service providers and new entrants.

4) Database approach to spectrum management

As mentioned above, DSA fully supports Ofcom's efforts to automate its Shared Access licensing framework for the 3.8-4.2 GHz band. We further urge Ofcom to expedite this transition by leveraging the numerous commercially available dynamic shared access systems that are available. Multiple database-enabled automated shared access system vendors stand ready to assist Ofcom in bringing the benefits of this technology to the UK in a speedy and competitive manner.

C. DSA Comments on Key market and technological trends

As mentioned above, and in response to other recent Ofcom consultations, DSA shares Ofcom's observations that wireless connectivity plays a growing and critical role in the digital transformation of industry. We also agree that such connectivity can be delivered by a range of different market players – from traditional mobile network operators using licenced spectrum, to enterprise users deploying licence-exempt technologies, to other private wireless network operators relying on secondary market or other shared access opportunities.

As Ofcom notes, a key market and technology trend that is common across these different approaches is the use of automation, cloud-computing, and machine learning to increase spectrum efficiency and access. Applying cloud-computing capabilities to spectrum management enables more predictable quality of service, better congestion avoidance, and improved coordination.

D. DSA Comments on Proposed future work areas

1) Monitoring and influencing the development of next-generation network technologies

Wi-Fi has moved from an amenity that helps make broadband connectivity more useful to an essential part of broadband delivery that enables businesses and people to get online. There are now more than 16 billion Wi-Fi devices in use, with a further four billion shipped every year. Given this growth and the evolution to next generation Wi-Fi, there is an urgent need to consider making the full 1200 MHz in the 6 GHz band available on a licence-exempt basis.

New WAS/RLAN wireless systems, in particular the evolution of Wi-Fi 6E to next generation Wi-Fi known as Wi-Fi 7, will need access to the full 5925-7125 MHz range to support current and emerging innovative use cases, both now and in the future. As mentioned above, opening only 500 MHz of the 6 GHz band would mean that Wi-Fi networks in dense deployments would have to continue to employ small channel bandwidths (because only one 320 MHz channel would be available). With access to the full 1200 MHz, however, larger channel bandwidths of 160 MHz and especially 320 MHz could be more easily accommodated.

a) Developing a cross-sectoral understanding of evolving spectrum demand at 6GHz

DSA would like to specifically highlight the importance of the full 6 GHz Band (5925-7125 MHz) for state-of-the-art WAS/RLAN systems and their evolution. DSA believes that the highest and best use for this band is for WAS/RLAN devices. Licence-exempt 6 GHz devices will continue to offload traffic from cellular 4G and

5G networks and future 6G networks, which lowers the costs of network deployment for mobile operators and for edge investment by neutral host and third-party providers. Importantly, it will also lower costs for consumers.

Licence-exempt technologies such as WAS/RLANs play a central role in hybrid networks today and will continue to do in the future. Historically, the discussion of broadband speed has focused on the speed to the structure (e.g., residence, office, school, etc.). What matters to individual consumers is the broadband speed to the device. Regardless of whether high-speed broadband access to a residence is provided over optical fibre, coaxial cable, satellite dish, or terrestrial fixed wireless access, the connection from the access point to the residence to the multiple portable and nomadic devices operating within is almost sure to be over a Wi-Fi device utilizing licence-exempt spectrum. As Ofcom considers future very high-speed hybrid networks for consumer use, it needs to ensure that this last leg of data transport, from the residential access point to the multiple devices, does not become a bottleneck. Authorizing the operation of licence exempt devices over the full 1200 MHz of the 6 GHz band will ensure that U.K. consumers will benefit fully from new hybrid networks.

As mentioned above, DSA does not support an IMT identification in the 6425-7125 MHz band at the upcoming World Radiocommunication Conference 2023 (WRC-23) under Agenda Item 1.2. Furthermore, DSA believes that an IMT identification in any part of the 6425-7125 MHz frequency range would deny citizens and businesses the benefits of next generation of WAS/RLAN/Wi-Fi technologies.

b) Review potential for migration from 'dedicated' to 'general purpose' networks

As mentioned above, DSA supports Ofcom's efforts to understand and address the specific spectrum needs of key industries, including utilities and other industrial enterprise users. We also support Ofcom's recognition that this may include migration away from dedicated networks and services and towards more general purpose networks. Leveraging tools, such as automated shared spectrum access systems, may assist Ofcom with its goals of increasing spectrum efficiency, and delivering higher quality services, and promoting competition – particularly with regard to private wireless networks for vertical industries and enterprise users.

2) Accelerating innovation and spectrum sharing with spectrum sandboxes

DSA strongly supports Ofcom's plans to allow industry and academia to experiment with different approaches and

algorithms for sharing spectrum, which should lead to quicker and more innovative approaches toward coexistence and sharing conditions. The examples provided in the Spectrum Roadmap, including demonstration of automated solution to issue Shared Access licences to meet growing demand in the 3.8-4.2 GHz band and demonstration of Wi-Fi 6E together with an AFC to permit higher power and outdoor operations, are excellent places to start.

3) Better data for better spectrum management

a) Using Real-World Data to Improve Propagation and Coexistence Modelling

DSA supports Ofcom's plans to utilise real-world system parameters and performance metrics to develop better spectrum management algorithms. We further agree that an appropriate starting point would be fixed links.

b) Improving Understanding of Real-World Performance of Active Antenna Systems (AAS)

DSA believes that it is important to reduce complexity and uncertainty within coexistence analysis. It is also important to improve how systems are modelled especially in relation to Active Antenna Systems (AAS). We support Ofcom undertaking real-world measurements of AAS emissions to refine theoretical models for further discussion within international environments.

c) Improving Receiver Resilience

DSA agrees that it is important to avoid overly conservative protection requirements and that any assumptions about receiver performance should be truly representative.

d) Using Real-World Data to Improve Efficiency and Effectiveness of Spectrum Assurance Work

DSA supports Ofcom's efforts to improve spectrum efficiency and reduce interference. We agree that voluntarily gathering of technical performance data directly from licensees' radio equipment to help identify / resolve causes of interference could be useful. Use of automated dynamic shared access systems could be leveraged to collect and analyse such data.

e) Measuring Utilisation in Selected Spectrum Bands

DSA appreciates Ofcom's interest in better understanding the use of existing spectrum bands in order to enable innovation and growth via sharing. Automated dynamic shared access technology could greatly facilitate the voluntary gathering of spectrum usage data.