

December 2, 2021

Department for Digital, Culture, Media & Sport  
100 Parliament Street  
London  
SW1A 2BQ  
United Kingdom

**Re: Wireless Infrastructure Strategy: call for evidence**

Dear Sir/Madam,

The Dynamic Spectrum Alliance (DSA)<sup>1</sup> respectfully submits these comments in response to the Department for Digital, Culture, Media & Sport (DCMS) “Wireless Infrastructure Strategy: call for evidence” (the Consultation). DSA welcomes DCMS’s interest in ensuring efficient assignment and use of scarce frequencies and in making spectrum available for new wireless services that will facilitate competition, enhance connectivity, and promote investment. DSA believes that providing new spectrum access options through use of new spectrum management tools will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G (and beyond) networks and services.

DSA appreciates the opportunity to participate in the Consultation and to present our views and comments. We are available to discuss these comments and provide any additional information.

Respectfully submitted,



Martha SUAREZ  
President  
Dynamic Spectrum Alliance

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<sup>1</sup> 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](http://www.dynamicspectrumalliance.org/members)

## DSA COMMENTS

### A. Introduction

DSA recommends that telecommunications regulators worldwide take a balanced approach between licensed, unlicensed, and lightly licensed when allocating spectrum to wireless broadband services. An unbalanced approach may have the unintended consequence of creating an artificial scarcity, which could, in turn, increase the cost of broadband access. Licensed and unlicensed spectrum bands will both play important and complementary roles in the delivery of advanced 5G services and that coordinated shared spectrum should be considered in spectrum planning. As part of spectrum planning, DSA also supports spectrum sharing that will lead to the more efficient utilization of spectrum and foster innovation and affordable connectivity for all. The opportunities made possible by spectrum sharing go beyond the economy, facilitating the evolution of the ecosystem as the potential for new use cases expands and large-scale applications are realized.

In the whitepaper entitled “Automated Frequency Coordination - An established tool for modern spectrum management,”<sup>2</sup> DSA makes the case that the use of databases to coordinate spectrum assignments has evolved significantly since its first introduction, but at its heart, it is nothing new. The basic steps are the same as in a manual coordination process or where a regulator assesses the opportunities for local licensing on a case-by-case basis. However, what is new includes:

- (1) Surging consumer demand for wireless connectivity and hence the need to intensively share underutilized frequency bands;
- (2) Significant improvements in the computation power to efficiently and rapidly run advanced propagation analysis and coordinate devices and users in near real-time; and

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<sup>2</sup> [http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA\\_DB-Report\\_Final\\_03122019.pdf](http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf)

- (3) More agile wireless equipment that can interact directly with dynamic frequency coordination databases.

There is no question that today we have the technical ability to automate frequency coordination and thereby lower transaction costs, use spectrum more efficiently, speed time-to-market for new services, protect incumbents from interference with greater certainty, and generally expand the supply of wireless connectivity that is fast becoming, like electricity, a critical input for most other industries and economic activity. 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. The introduction of new licensing options supported by automated dynamic spectrum sharing technology is the best path to support such deployments.

## **B. Background on Spectrum Sharing in the 3.55-3.70 GHz Band in the United States**

DSA would like to highlight some real applications that have been developed in the United States as a result of the commercial deployment of the 3.5 GHz Citizens Broadband Radio Service (CBRS) authorized by the Federal Communications Commission (FCC) in January 2020 – a major milestone for automated spectrum sharing.

Under the CBRS regulatory framework, the spectrum access system (SAS) coordinates CBRS frequency use and manages coexistence among the three tiers of access: 1) incumbent (e.g., navy radar and commercial fixed satellite services), 2) priority access licensed (PAL), and 3) general authorized access (GAA). The environmental sensing capability (ESC) network detects incumbent naval radar use of the band and alerts the SAS to move new terrestrial commercial operations to non-interfering channels. The SAS also interfaces with the FCC's Universal Licensing System (ULS) to obtain information about Fixed Satellite Service (FSS) incumbents and grandfathered fixed wireless systems. Using this information, the SAS is able to calculate aggregate interference from new commercial users to incumbents and enforce protection of these systems. In the twenty three months of commercial operational experience, no incumbents have reported interference from new CBRS users, demonstrating the effectiveness of SAS management of the band.

New commercial users in the CBRS band have multiple options for accessing this 150 MHz of spectrum:

- a) Acquisition of a PAL in the FCC’s 2020 CBRS auction where use-or-share rights for county-based licenses were offered;
- b) Use of the GAA tier, which does not require an individual license to operate, but does require use of certified equipment and connectivity to a SAS to receive a spectrum grant for operations with a particular transmit power and antenna orientation at a specific location and height; or
- c) Leased rights from a PAL license holder.

Based on the type of device (fixed or personal/ portable) and its coordinates, information about the transmitter’s location and operating parameters, and the technical rules the regulator puts in place to protect incumbents and/or adjacent users from harmful interference, the SAS calculation engine determines the list of available channels at the PAL’s and/or GAA’s device location and its maximum permissible radiated power. As described above, the SAS not only coordinates protection of incumbent users from new commercial operations, but also manages the assignment of frequencies to PAL and GAA users, protection of PAL operations, and co-existence among GAA users to maximize spectrum efficiency and provide deterministic access for all users. The automated SAS process provides near real-time management of the CBRS band, speeding time-to-market while minimizing uncertainty and administrative burdens.

Through this automation of shared spectrum, a whole host of private wireless network opportunities, from smart energy to smart city, have emerged. From business to leisure, hundreds of smart office, airport and stadium private networks have been deployed using CBRS as the result of having access to spectrum without the need for an individual license. In fact, only a year and a half after receiving authorization for commercial operations, over 187,000 CBRS cell sites have been deployed across the United States with the vast majority of them using the GAA tier. Examples of such deployments include:

## **1) Retail**

The American Dream Entertainment and Retail Complex in New Jersey has implemented CBRS to cover the entire 3 million square foot venue, servicing over 40 million annual visitors and more than 450 stores. Beyond the mall itself, CBRS has also been used for traffic and parking management, assessing approximately 33,000 parking spaces. Equipping security cameras, digital signage and other systems for both internal and external mall operations, CBRS has proved essential for supporting and enabling interesting such new use cases. This type of infrastructure deployment has proven to be faster and more economic than traditional fixed infrastructure, offering reliable and simple, yet effective means of connectivity.

## **2) Airport**

In Dallas, CBRS has transformed airport communication systems, bringing airport staff and management connections onto the CBRS spectrum. Such deterministic spectrum access is critical in emergency scenarios to cater to higher power requirements and improve coverage. This network supports critical airport communications and coexists with a robust Wi-Fi network.

## **3) Sport stadium**

Angel Stadium in Anaheim, California has adopted CBRS capabilities to support its internal communications, lightening the load on the Wi-Fi system, similar to what Dallas airport has achieved. Since the full commercial deployment of CBRS, they have also been working as a neutral host provider, offering Mobile Network Operators (MNOs) support in managing signal traffic for customers attending events. By not only supporting internal connectivity for both staff and customers but extending this service for the reinforcement of existing MNOs, CBRS has presented the opportunity to eliminate barriers and limitations, providing full, flexible coverage whenever it is needed – even when roaming.

#### 4) Rural connectivity

Fixed Wireless Access providers, also known as Wireless Internet Service Providers (WISPs), are able to harness the newly available CBRS spectrum, tripling the amount of spectrum previously available to them. WISPs, which typically operate in rural areas and have been using this part of the CBRS band for the past 12-15 years, are transitioning older WiMAX and proprietary systems to the new CBRS rules and LTE equipment to expand their reach and improve their service offerings.

As we reflect on the use cases developing across the United States, it is clear that CBRS has revolutionized the ways in which spectrum is utilized to improve connectivity across a diverse number of vertical sectors.<sup>3</sup> DSA believes that adopting a similar spectrum sharing model in the UK will enable more users, including verticals, to access scarce and valuable spectrum resources, leading to lower-costs, lower barriers to entry, and most effective allocation for innovative businesses. This, in turn, enables and encourages competition and innovation by existing service providers as well as new entrants.

#### C. Unlicensed Sharing in the 6 GHz Band

Another important example of innovative spectrum sharing is the 6 GHz Band, where regulators worldwide are enabling license-exempt Wireless Access Systems/Radio Local Area Networks (WAS/RLAN) use on a shared basis with incumbent services. In the United States, the entire 1200 MHz (5925-7125 MHz) of the 6 GHz Band has been made available for license-exempt use on a shared basis with incumbent services. Two categories of license-exempt devices have been

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<sup>3</sup> Other examples of CBRS deployments can be found here: >[https://www.lightreading.com/5g/charter-to-start-first-cbrs-market-buildout-in-2021/d/d-id/769456?itc=lrnewsletter\\_cabledaily](https://www.lightreading.com/5g/charter-to-start-first-cbrs-market-buildout-in-2021/d/d-id/769456?itc=lrnewsletter_cabledaily)<; ><https://www.telecompetitor.com/wisps-get-cbrs-range-as-great-as-six-miles-at-100-mbps-speeds/><; ><https://ongoalliance.org/news/watch-communications-and-bec-technologies-partner-to-expand-rural-internet-access/><; >[https://www.fiercewireless.com/wireless/wispa-cbrs-a-good-guide-for-3-45-3-55-ghz](https://www.fiercewireless.com/wireless/wispa-cbrs-a-good-guide-for-3-45-3-55-ghz/)<; [https://enterpriseiotinsights.com/20210714/channels/news/las-vegas-deploys-largest-private-municipal-lte-network-in-45-days?utm\\_campaign=RCR%20Newsletter&utm\\_medium=email&hsmi=140455124&hsenc=p2ANqtz-8\\_naAz8kuWAD4MfCsNIO\\_UI-BHN\\_Tmp\\_iZplCd7CyiiErXRYqqzuw2clkX7aZjVjvO\\_rXC6x2qLT514s778wtgZli-kkEvx9mmlXvfu-4lsAQOaUM&utm\\_content=140455124&utm\\_source=hs\\_email](https://enterpriseiotinsights.com/20210714/channels/news/las-vegas-deploys-largest-private-municipal-lte-network-in-45-days?utm_campaign=RCR%20Newsletter&utm_medium=email&hsmi=140455124&hsenc=p2ANqtz-8_naAz8kuWAD4MfCsNIO_UI-BHN_Tmp_iZplCd7CyiiErXRYqqzuw2clkX7aZjVjvO_rXC6x2qLT514s778wtgZli-kkEvx9mmlXvfu-4lsAQOaUM&utm_content=140455124&utm_source=hs_email).

authorized to date: 1) Low Power Indoor (LPI) devices, and 2) Standard Power (SP) devices that can operate both outdoors and indoors under the coordination of an automated database system, known as the Automated Frequency Coordinator (AFC). A third category of Very Low Power (VLP) portable devices is also under consideration.

Under the new rules, WAS/RLAN operations in the band are able to commence while also ensuring that existing incumbent services, including fixed satellite services, fixed services and mobile service with some applications, such as electronic news gathering, can continue to thrive. The introduction of license-exempt devices did not necessitate a spectrum clearance process, which would have been complex and expensive.

In addition to the United States, many other countries, including the Republic of Korea, Saudi Arabia, Brazil, Canada, Chile, Peru, Costa Rica, Honduras, and Guatemala have already permitted license-exempt use across the entire 6 GHz Band. Mexico and Colombia are engaged in consultations that proposed to make the entire 1200 MHz available for license-exempt use.

## **D. DSA Recommendations**

### **a. 3800–4200 MHz**

As DCMS considers options for how the regulatory and policy framework can best support investment, competition, innovation, the adoption of wireless infrastructure, as well as the development and deployment of future wireless networks, DSA encourages the U.K. Government to leverage commercially available automated sharing technology, which will enable new systems to begin operations in bands identified for IMT, including 3800-4200 MHz, while also protecting incumbent FSS users. As described above, automated sharing systems have proven to be successful in protecting incumbent users while also enabling hundreds of additional users to leverage shared spectrum, maximize spectrum efficiency where it may be possible to authorize multiple users to operate on an overlapping and shared basis, and create more operational flexibility for new users to access spectrum for both indoor and outdoor use cases.

In addition to implementing automated shared access technology, DSA recommends that the U.K. Government consider tiered licensing approaches where incumbents, such as FSS operators, are in the top tier, while new entrants are in one or more lower tiers and may operate so long as they protect the top tier. Such a tiered approach could be adopted as follows:

Tier 1 – Incumbent users. Users operating in the band that have the highest priority in accessing spectrum. Their access must be guaranteed at all times during their operation so their radio equipment does not need to be aware of other operations sharing the band.

Tier 2 – Licensed new users. New entrant users that require a degree of certainty in accessing spectrum. In order to ensure that the band can be shared with this tier of new users, it is fundamental that the operation of incumbent services is well understood (for example, they operate only in certain areas) and is predictable (for example, they operate at certain times or there is a way to know when spectrum needs to be vacated). If such information is not accurate enough or it is not available, then access to the band for Tier 2 users might be greatly reduced or not possible at all.

Tier 3 – Opportunistic users. New entrant users that can access spectrum on an unlicensed or licensed by rule basis. These users may not need access to spectrum over a larger geographic area and/or are operating indoors or on a campus or may be operating in more remote areas where spectrum usage will not be as competitive. In many cases, such networks are deployed in very remote areas where spectrum is largely unused and the risk of interference to higher tier users is negligible. There might be other cases where there is sufficient spectrum available and the envisioned applications allow QoS flexibility, for example because the band would mainly be used to provide additional capacity to networks using other anchor frequencies. In such cases, it is conceivable to have a third tier of users with minimal regulatory barriers and no need for interference protection from other Tier 3 users.



It is also possible to combine a tiered licensing approach with streamlined secondary market rights. For example, the new license conditions might include the right for the license holder to lease the spectrum to other users – whether on a geographic basis (partitioning) or by sub-dividing the spectrum (disaggregating). Such a secondary market can drive innovation, allow new technology to be deployed by leased spectrum users, and support various sectors, such as enterprise networks and industrial uses.

Additionally, DSA recommends the implementation of a “use-it-or-share-it” policy for licensed spectrum. Conceptually, use-it-or-share-it rules authorize opportunistic access to licensed spectrum that is locally unused or underutilized. Until the spectrum is actually put to use in a local area, it should be available for non-interfering use by networks and devices. Licensees lose no rights whatsoever. In 2016 the FCC authorized opportunistic access by GAA users to unused PAL spectrum in the CBRS band. Opportunistic use of unused PAL spectrum is controlled by the SAS, which requires that GAA users must periodically check with the database to renew permission to continue operating. This is one of the key reasons for the success of CBRS.

A general use-it-or-share-it authorization has a number of affirmative benefits. First, opportunistic access reduces spectrum warehousing in areas where the economics are least attractive for large service providers. It might increase access for operators that are interested in deploying, but who lack needed spectrum access in that local area. Second, opportunistic access further encourages secondary market transactions by facilitating price discovery on both the supply and demand side. For licensees, it will both identify users interested in a potential lease or partition and provide information on the potential value (i.e., how much is my spectrum worth?). For users, opportunistic use is an opportunity to test the local market and to determine the value of a more secure, longer-term lease or partition agreement (i.e., how much am I willing to pay for spectrum?). Third, opportunistic access will lower barriers to entry for innovative new use cases by parties that at least initially either cannot afford or do not believe they need to pay for exclusive use and interference protection. The option to deploy, at least initially, without committing to the cost of a long-term lease or license could be particularly useful for small providers and industries.

**b. 5925-7125 MHz**

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.<sup>4</sup> DSA believes that the highest and best use for this band is for WAS/RLAN devices. Unlicensed 6 GHz devices will offload traffic from cellular 5G networks (total data offload to unlicensed going from 74% to 79% in 2022),<sup>5</sup> which will lower 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.

While we acknowledge the significant progress made in the U.K. and elsewhere in Europe to develop regulations enabling licence-exempt access to the lower 6 GHz (5945-6425 MHz), DSA is of the opinion that licence-exempt access to the upper 6 GHz (6425-7125 MHz) is also imperative. The entire 1200 MHz of spectrum in the 6 GHz Band is required to meet the projected demand for mid-band WAS/RLANs and other uses. It would also support future Wi-Fi 7 devices feature 320 MHz wide channels. If only the lower 500 MHz is made available, only one 320 MHz channel is possible. On the other hand, three non-overlapping 320 MHz channels will be supported if the entire 1200 MHz of the 6 GHz Band is made available for WAS/RLAN.

While we respect the World Radiocommunication Conference 2019 decision to study coexistence between IMT with other incumbent services, DSA does not believe that these studies should delay opening 5925-7125 MHz frequency range should Administrations wish to do so. Furthermore, DSA does not believe an IMT identification is needed in any part of the 5925-7125 MHz frequency range as this would deny citizens and businesses the benefits of next generation of WAS/RLAN/Wi-Fi technologies.

DSA is aware that work has only recently started within CEPT on IMT coexistence studies under World Radiocommunication Conference 2023 (WRC-23) Agenda Item 1.2 and currently no

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<sup>4</sup> DSA notes that in a recent revision to a previously published Wi-Fi Alliance (WFA) economic assessment study on the value of Wi-Fi to economies the new value to the global economy is anticipated to be \$4.9 trillion by 2025.

<sup>5</sup> See Cisco Systems, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022.

decision has yet been made within CEPT. We believe it is important that all the facts are available prior to CEPT Administrations taking a position on the future use of the 6425-7125 MHz band.

Finally, DSA recommends that the U.K. permit Standard Power operations operating under an automated frequency coordination system, such as an AFC. There are unique high power indoor and outdoor RLAN operations that can benefit from this category of device. DSA believes that Standard Power access points (and client devices) could operate throughout the band under AFC control while fully protecting incumbent services.

## **E. Conclusion**

DSA appreciates the opportunity to provide input on the DCMS Consultation. We believe that the use of spectrum sharing and automated sharing technology can help the U.K. Government to reach its policy goals of facilitating spectrum access by a variety of entities and use cases, fostering investment, and encouraging innovation, while also reducing administrative burdens on both government and industry players.