COMMENTS OF THE DYNAMIC SPECTRUM ALLIANCE

Enabling opportunities for innovation:
Shared access to spectrum supporting mobile technology

The Dynamic Spectrum Alliance (DSA)[1] submits these comments in response to Ofcom's consultation, "Enabling Opportunities for Innovation: Shared access to spectrum supporting mobile technology."

The DSA is a global organization advocating for laws and regulations that will lead to more efficient and effective spectrum utilization. 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.

We believe that spectrum sharing is fundamental to a modern spectrum policy framework and applaud Ofcom for its recognition of the vital importance of spectrum sharing and for its long-term ambition to adopt a dynamic access approach.

The DSA welcomes Ofcom's recognition that sharing mobile spectrum bands can deliver a wide range of new use cases, a wider range of investment, and open up new channels for innovation. As Ofcom considers its options for new opportunities for commercialization of spectrum bands DSA urges Ofcom to:

1. Continually examine opportunities to unlock new bands through modern and tested spectrum sharing techniques;
2. Consider the costs and benefits of sharing a spectrum band versus clearing it and licencing it; and;
3. Implement dynamic spectrum sharing technologies in the bands that it has identified to enable both licenced and unlicenced/opportunistic access to critical 5G spectrum.

Building these strategies into a comprehensive framework will improve broadband access across the United Kingdom for consumers and businesses and will stimulate a robust technology and service ecosystem, which will serve as the engine for 5G leadership. Crucially, this will also support Ofcom's and the Future Telecoms Infrastructure Review's wider ambitions to help close the digital divide between many communities.

Sharing technologies exist today that can dramatically increase spectrum utilization

Electromagnetic spectrum is naturally a shared resource. Licensed spectrum has always been shared in the geography and frequency domains, and unlicensed spectrum has always been shared in geography, time, frequency, and even power domains. As wireless technologies have evolved, the intensity of sharing has increased, although not at the same rate. Technological advancements and diverse wireless use cases have outpaced the rate at which spectrum is shared in practice. This divergence between the capability of wireless

[1] The Dynamic Spectrum Alliance is a global, cross-industry alliance focused on increasing dynamic access to unused radio frequencies. The membership spans multinational companies, small- and medium-sized enterprises, academic, research, and other organizations from around the world, all working to create innovative solutions that will increase the utilization of available spectrum to the benefit of consumers and businesses alike. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members/.

and computing technologies to intensify spectrum sharing – and the level of sharing in practice – is a function of an outdated regulatory and policy paradigm that is far too static for modern spectral needs. When coupled with ever-increasing consumer demand for bandwidth, these ingredients create the so-called "spectrum crunch," which can only be addressed through regulatory reforms that take advantage of proven spectrum sharing technology.

We believe the time is right for Ofcom to move away from the binary lens through which regulators have historically viewed spectrum policy, where the only access choices are between licenced and unlicenced. Instead, Ofcom should continually leverage all available spectrum access schemes and technologies and consider the benefits of combining these access approaches in the same band to meet diverse needs. DSA applauds Ofcom's initial steps toward this worthy goal, but we encourage Ofcom to be less incremental in its approach in adopting dynamic spectrum access.

Indeed, technologies exist today to increase dramatically spectrum utilization through sharing tools. Dynamic databases, device-based sensing, simple electronic coordination, and smart radios are all available and deployed across the wireless ecosystem. There is no question that the technical ability exists to automate frequency coordination and thereby lower transaction costs, use spectrum more efficiently, speed time to market, protect incumbents from interference, and generally expand wireless connectivity that is fast becoming, like electricity, a critical input for industries and economic activity.

While Ofcom's proposals for an administrative sharing may provide an initial step, it is vital that Ofcom commits to progressing rapidly to full dynamic spectrum access with a clear roadmap to do so.

Automated frequency coordination databases facilitate spectrum sharing by carrying out core functions including:

- Protecting incumbent licencees or other users from interference caused by entrants with lower priority (and, in some cases, coordinate among users with the same priority);
- Providing authoritative and, in some bands, virtually real-time decisions on requests to transmit or assign usage rights;
- Enforcing the use of authorised devices; and
- Monitoring spectrum assignments and, in some cases, actual usage.

For instance, for years WiFi has leveraged "listen-before-talk" protocols that rely on device-level sensing to coordinate effective access. Broadcast spectrum white spaces can now be leveraged through relatively simply lookup databases that help authorise additional unlicenced access in unused broadcast spectrum. More recently, the U.S. Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA), in partnership with the U.S. Department of Defense and the Navy, and with the support of diverse industry participants, have leveraged automated, dynamic databases (the Spectrum Access System or SAS) and sensing technology to unlock 150

megahertz of previously unusable spectrum in the U.S. Citizens Broadband Radio Service (CBRS), which is poised for commercial launch in the coming months.[2]

The SAS in CBRS will coordinate commercial use by licensees and lower-tiered lightly-licensed users in real time, while protecting incumbent U.S. Navy radar systems from interference. Because the location of Navy vessels and their use of radar is unpredictable, the SAS employs a coastal sensing system to move conflicting commercial operations to non-interfering channels.[3] This form of dynamic spectrum management requires a high degree of complexity due to unpredictability of military operations. However, successes in CBRS should provide regulators confidence in quickly moving forward with simpler forms of dynamic sharing.

DSA members have extensive experience in defining CBRS and other industry frameworks for dynamic sharing. These frameworks and industry standards can be adapted rapidly to suit the U.K. situation, and DSA stands ready to assist Ofcom to accelerate this process. Indeed, in the United Kingdom, the 3.6-3.8 GHz band is relatively under-utilised by current licensees, offers 200 MHz of contiguous bandwidth, and 5G network equipment and end user devices can be made available quickly due to international development in adjacent bands designated for 5G. This band therefore provides a singular opportunity for Ofcom to employ dynamic sharing technology for the varied IoT, private LTE, fixed broadband, and wide-area mobile use cases that will make up 5G.[4]

Ofcom's policy goals can best be achieved through implementation of dynamic sharing

Models and technologies are available to authorise automated spectrum access systems to advance Ofcom's policy goals. These technologies will vary depending on the nature of the incumbent service, the propagation characteristics and size of the band, the nature of the shared-access use, and other factors. Spectrum coordination solutions are also a force multiplier for regulators: by automating assignments and monitoring usage, databases enhance efficient allocation of national spectrum resources while strengthening enforcement and ensuring the protection of incumbent users with a higher licensing priority. The availability, flexibility, and reliability of spectrum coordination systems make them a critical tool for regulators to meet the growing and diverse spectrum needs of industry, government, national security, and individual users.

These techniques and others must be leveraged as part of a spectrum strategy that continually unlocks spectrum that was previously unavailable, or intensifies spectrum use, for a variety of entities and use cases. Critically, spectrum sharing techniques can also help facilitate competitive access to spectrum resources. Shared spectrum also reduces the financial barrier to spectrum access, which allows competitive providers and new entrants to invest more significantly in network deployment instead of spectrum acquisition. Smaller or new competitors will be able to commence or continue operations, promoting a more robust technology ecosystem in the United Kingdom, characterized by diverse device and

---

[2] *See Promoting Investment in the 3550-3700 MHz Band*, GN Docket 17-258, Report and Order, FCC 18-149 (rel. Oct. 24, 2018) (CBRS 2018 R&O).

[3] *See generally* 47 U.S.C. Part 96, available at https://www.ecfr.gov/cgi-bin/retrieveECFR?mc=true&r=PART&n=pt47.5.96.

[4] DSA notes that mobile spectrum bands which Ofcom has selected for sharing are useful but are variously too narrow or insufficiently supported by the LTE and 5G device suppliers to gain early benefits. We would urge Ofcom to ensure that the 3.6 - 3.8 GHz band is included in the sharing framework from the outset.

technology offerings. In particular, shared access could cultivate better broadband access options for consumers.

The DSA strongly agrees with Ofcom that dynamic spectrum sharing could "provide users more flexible access to spectrum as devices would automatically connect to a central database and be assigned spectrum based on availability at that time and location" and that this would ensure efficient spectrum usage. However, dynamic spectrum sharing solutions are available today and could be rapidly adapted for and deployed in the United Kingdom to assist Ofcom in achieving its goals of facilitating access to spectrum for new users and encouraging innovation.

The DSA is encouraged by Ofcom's reconsideration of a traditional licensing approach to move towards adoption of dynamic sharing technology. We encourage Ofcom to leverage technology that is currently available to effectuate its policy goals of facilitating spectrum access by a variety of entities and use cases, fostering investment, and encouraging innovation. In turn, Ofcom should reject proposals that would authorise a single licencee per each geographic area in each of the proposed shared bands, which would, in effect, create a form of exclusive licencing, rather than an implementation of dynamic spectrum sharing.

Sincerely,

Kalpak Gude,
Dynamic Spectrum Alliance