Dynamic Spectrum Alliance Limited
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July 21, 2022

Communications Regulatory Authority
State of Qatar

Re: Consultation on 5G private mobile networks

The Dynamic Spectrum Alliance (DSA)[1] respectfully submits these comments in response to the Communications Regulatory Authority (CRA) Consultation on 5G private mobile networks (the Consultation), which seeks input on the ways in which CRA might satisfy the needs of enterprises, such as manufacturing, energy, automotive, healthcare, etc., for wireless connectivity at a particular building, industrial complex, hospital, or campus university, etc.

DSA welcomes CRA's interest in making spectrum available for new 5G private mobile networks, local use cases, and applications. We encourage CRA to provide a variety of spectrum access options, including licensed, unlicensed and lightly licensed, to enable enterprises either to contract with an existing mobile network operator, deploy and manage their own private networks, or contract with a third party to deploy and manage a network on their behalf. Having all three of these options available to enterprises will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G 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,

/s/ Martha SUAREZ
President
Dynamic Spectrum Alliance

[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

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REPONSE TO QUESTIONS

Respondent: Dynamic Spectrum Alliance, Martha Suarez, President

Clause or Question Reference	Responses and Comments
1. What benefits do you perceive and what concerns do you have regarding each of the three possible options discussed in Section 3 of this document?	DSA appreciates CRA's efforts to identify spectrum access options for new 5G private networks. DSA recommends that telecommunications regulators worldwide implement licensed, unlicensed, as well as lightly licensed approaches when allocating spectrum to wireless broadband services. Focus on only one spectrum access option may have the unintended consequence of creating an artificial scarcity, which could, in turn, increase the cost of broadband access. With regard to the spectrum access needs of enterprises, DSA recommends that CBA provide a variety of spectrum access options to enable enterprises either to contract with an existing mobile network operator, deploy and manage their own private networks, or contract with a third party to deploy and manage a network on their behalf. Having all three of these options available to enterprises will benefit competition, create conditions for innovation, and spur more rapid deployments of 5G networks and services. DSA believes that 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. 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

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	becoming, like electricity, a critical input for most other industries and economic activity. Increasing spectrum access by a wide range of new users, including enterprises, 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. In keeping with this philosophy, DSA encourages CRA to pursue all three approaches identified in the Consultation. Specifically, DSA recommends CRA provide licensed, unlicensed, and lightly licensed options for enterprises to be able to access spectrum for self-deployment of 5G fixed and mobile networks, through an existing mobile network operator, as well as through a third-party managed service provider. The spectrum access model that exists in the 3.5 GHz band in the United States, which we will describe in greater detail below, may be instructive.
2. Which of the three options discussed in this document do you prefer and why?	As mentioned above, DSA believes that telecommunications regulators should provide multiple options for accessing spectrum to maximize innovation, flexibility, and competition. No one size fits all. Rather, a combination of licensed, unlicensed, and lightly licensed approaches will spur more rapid deployments of 5G networks and services. To that end, we also recommend that CRA consider automated shared access frameworks to maximize efficient use of spectrum while simultaneously providing a variety of access options for enterprises. In the whitepaper entitled "Automated Frequency Coordination - An established tool for modern spectrum management," 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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	(3) More agile wireless equipment that can interact directly with dynamic frequency coordination databases.
3. Would you consider using the services of a new licensee dedicated to the provision of 5G private mobile networks and services (i.e., option 3 above) if such a licensee was available in Qatar? What benefits would you foresee arising from such a licensee compared to the current 5G public mobile operators (option 1)?	As mentioned above, DSA recommends that telecommunications regulators provide a variety of options for accessing spectrum to promote innovation, competition, and rapid deployment of new networks and services. Having only a single option creates artificial scarcity and limits competition, both of which may have a negative impact on cost and speed to market. Below, DSA will describe the impressive rollout of private wireless network deployments in the 3.5 GHz band in the United States that has resulted from having access to a variety of spectrum access options.
4. Would you prefer an alternative deployment option to those mentioned in this document (i.e., an approach that is not mentioned in this document)? Please describe your preferred alternative.	As an alternative to selecting only one of the three approaches described in the Consultation, DSA would like to highlight the success of a regulatory approach that is currently supporting the deployment of hundreds of new private wireless networks. In the United States, the 3.5 GHz Citizens Broadband Radio Service (CBRS), authorized by the Federal Communications Commission (FCC) in January 2020, has been a shining example of the myriad benefits of automated spectrum sharing. Under the CBRS regulatory framework, the spectrum access system (SAS) coordinates CBRS frequency use (3550-3700 MHz) 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 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 thirty months of commercial operational experience, no incumbents have reported interference from new CBRS users, demonstrating the effectiveness of SAS management of the band. Commercial users in the CBRS band have multiple options for accessing this 150 MHz of spectrum:

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	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 two and a half years after receiving authorization for commercial operations, over 230,000 CBRS cell sites have been deployed across the United States with the vast majority of them using the GAA tier. Examples of such private wireless network deployments using the GAA tier include: **Energy management:** https://www.fiercewireless.com/private-wireless/schneider-electric-adds-private-wireless-smart-factories

	Retail: https://www.druidsoftware.com/2019/11/15/cbrs-ongo-at-american-dream-entertainment-retail-complex-nj-usa/ **Military logistics:** https://www.fiercewireless.com/private-wireless/federated-demo-dod-highlights-benefits-shared-spectrum **Municipal government:** https://www.fiercewireless.com/private-wireless/motorola-and-harris-county-build-private-lte-network https://www.fiercewireless.com/private-wireless/cox-launches-cbrs-pilot-city-las-vegas **Transportation:** https://www.fiercewireless.com/wireless/boingo-deploys-trial-cbrs-network-at-dallas-love-field-airport **Education:** https://www.csrwire.com/press_releases/747561-private-wireless-helps-schools-close-digital-divide https://www.fiercewireless.com/private-wireless/fort-worth-isd-builds-sustainable-cbrs-network https://www.fiercewireless.com/private-wireless/samsung-amdocs-deploy-private-cbrs-network-howard-university **Entertainment:** https://inbuildingtech.com/venues/connectivity-wireless-jma-stadium-cbrs/ **Hospitality:** https://www.thefastmode.com/technology-solutions/24585-airspan-networks-deploys-5g-cbrs-private-network-for-hospitality-industry **Manufacturing warehouse/supply chain:** https://www.fiercewireless.com/private-wireless/calchip-connect-emerges-key-player-private-wireless https://www.fiercewireless.com/private-wireless/mxd-adds-second-private-wireless-network

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	Agriculture: https://www.fiercewireless.com/private-wireless/three-day-deployment-makes-tractors-autonomous https://enterpriseiotinsights.com/20220607/smart-farm/how-robot-tractors-and-a-private-network-came-together-at-a-smart-vineyard
6. If you wish to self-provide a 5G private mobile network, which radio spectrum bands do you consider to be most useful for your intended application and what bandwidth would you require?	In addition to the private networks being deployed in the 3.5 GHz band, another important example of innovative spectrum sharing that can support enterprise private networks is the 6 GHz Band, where the FCC and many other regulators worldwide are enabling license-exempt WLAN/RLAN use on a shared basis with incumbent services. DSA recommends that regulators pursue the following approach to the 6 GHz Band, which will also be important for meeting the connectivity needs of verticals: (1) Dedicate the entire 1200 MHz (5925-7125 MHz) of the 6 GHz Band for license-exempt use, taking advantage of the full potential of this band; and 2) Authorize the three categories of license-exempt devices: (i) Very Low Power (VLP) devices (ii) Low Power Indoor (LPI) devices, and (iii) 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). As CRA considers ways in which it can support the deployment of private wireless networks and the connectivity requirements of enterprises, making available the entire 6 GHz Band (5925-7125 GHz) for WLAN/RLAN devices, while also permitting VLP, LPI and Standard Power operations, it has the opportunity to get front of this issue, support new applications, and lay the foundations for innovation.
7. Do you have any views on how spectrum for 5G private mobile networks should be licensed to Enterprises?	DSA applauds CRA's interest in increasing opportunities for spectrum access by a variety of enterprises and other new users. As part of that effort, we encourage CRA to consider a tiered licensing approach to provide multiple spectrum access options. A three-tier or two-tier framework could be adopted depending on the frequency band and its incumbent situation.

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	In bands where incumbents are operating, those operations could continue in the top tier on a protected basis, while new entrants in one or more lower tiers may operate so long as they protect the top tier. A three-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. In theory, a tiered spectrum sharing model can be applied to any band. In addition, 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 that CRA consider implementing a "use-it-or-share-it" policy for bands that are licensed to mobile network operators. 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.