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February 28, 2021

Communications and Information Technology Commission
Al-Nakheel District
Prince Turki Bin Abdul Aziz I Street intersection with Imam Saud Bin Abdul Aziz Road
PO Box 75606, Riyadh 11588
Saudi Arabia

Spectrum.Strategy@citc.gov.sa

Re: DSA Comments to the Public Consultation on "Spectrum Outlook for Commercial and Innovative Use 2021 - 2023".

Dear Sir/Madam,

The Dynamic Spectrum Alliance (DSA[1]) respectfully submits its comments in response to the Public Consultation on ""Spectrum Outlook for Commercial and Innovative Use 2021 - 2023".

The DSA welcomes the Communications and Information Technology Commission's efforts to pursue its mission to protect consumers, promote investment and safeguard competition in order to ensure reliable communications services and innovative digital technologies. CITC has a holistic vision that outlines the potential of radio spectrum to transform Saudi Arabia into a digital society by enabling different industries.

DSA members would like to express our unanimous and enthusiastic support for the CITC's proposal to authorize the use of the 5925-7125 MHz band (the '6 GHz band') by license-exempt Wireless Local Area Networks (WLAN) from 2021 onwards. The DSA agrees with CITC's aim to increase the total portion of unlicensed spectrum to enable the wireless Internet of Things and to promote emerging radio technologies.

Furthermore, DSA agrees with CITC on the fact that spectrum sharing enhances the efficiency of use, and as databases, artificial intelligence and other tools become more capable, new and more effective forms of sharing will open up over the coming years.

[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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Once again, the DSA believes that the CITC is moving on the right direction and that it is really important to target ambitious goals like in this case. Spectrum access for different technologies will foster innovation and provide last-generation connectivity and digital empowerment in the Kingdom.

DSA welcomes the CITC's plan to publish new separate consultations for specific subjects and a new Spectrum Outlook every 3-4 years. We will be pleased to provide our comments and suggestions in those future consultations in the hope that those will help define the Kingdom's spectrum policy in the most positive way.

The DSA is available to discuss these comments and any additional requirement the Commission might have.

Respectfully submitted,

Martha SUAREZ
President
Dynamic Spectrum Alliance

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DSA COMMENTS

Release Plan for License-Exempt Spectrum

5925 – 7125 MHz

The Dynamic Spectrum Alliance appreciates the summary of the current situation presented in the "Spectrum for IMT-2020 and Beyond: Fostering Commercial and Innovative Use of Radio Spectrum - CITC response to the public consultation" and "Spectrum Outlook for Commercial and Innovative Use 2021- 2023" documents.

DSA agrees on the fact that the 5925 – 7125 MHz (6 GHz) band offers higher capacity than low-band spectrum while also affording greater coverage than mmWave bands. The 6 GHz band is being considered for Wi-Fi, as a sway of alleviating capacity constraints in the congested 2.4 GHz and 5 GHz bands. Current Wi-Fi spectrum doesn't offer sufficiently wide channels for newer applications and services that are a complement for the 5G ecosystem. Wi-Fi 6E will enable new use cases for industrial IoT, smart homes and support for high-density deployments, to name a few, but access to wider channels is needed to support these new use cases.[2] Currently available spectrum in the 2.4 GHz and 5 GHz bands will not be able to absorb the amount of data expected to be provided through 5G networks and beyond in addition to the huge growth in the number of devices connected to the Internet through the Internet of Things (IoT).

The effect of enabling additional spectrum for Wi-Fi will be relevant on launching IoT services and 5G Technology. Unlicensed access to the 6 GHz band is required to meet the unprecedented demand and enable innovative use cases. With it, comes the opportunity for more effective spectrum use allowing support for new applications and laying the foundations for innovation.[3]

By the time of the CITC consultation the US, South Korea and Chile had released the entire range from 5925 to 7125 MHz. In just these few months Brazil and Guatemala have also released the entire range for unlicensed access and other countries have conducted public consultations about the future of this band (Taiwan, Jordan, Canada, Costa Rica, Honduras, Colombia, Mexico, Peru, Argentina) and are expected to follow this lead soon.

The DSA strongly supports CITC intention to follow the US and make the entire 5925 – 7125 MHz band license-exempt and agrees on the three exposed reasons:

1- **Importance of WLAN use in the Kingdom and substantial amount of Wi-Fi carried traffic, which was exemplified during the COVID-19 lockdowns, and the emergence of a promising device ecosystem that can be taken advantage of starting from 2021.**

   The importance of WLAN use and substantial amount of Wi-Fi carried traffic has been exemplified during the COVID-19 lockdowns not only in the Kingdom but worldwide. The flexibility and benefits Wi-Fi brings to digital economies have proven to provide essential benefits during the COVID-19 pandemic.[4]

   Regarding the device ecosystem, the DSA would like to provide some updates. In our previous comments to the consultation, the Dynamic Spectrum Alliance stated that the Wi-Fi ecosystem was ready and that

[2] *See* https://wballiance.com/wp-content/uploads/2019/09/WBA-AnnualIndustry-Report-2020.pdf
[3] *See* "The crucial decision of enabling better and affordable connectivity through Wi-Fi and spectrum sharing", December 2020 (link)
[4] *See* "Covid-19 and the economic value of Wi-Fi. Katz", Jung and Callorda, December 2020.

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devices compatible with the 6 GHz band will be released by the end of 2020. That was effectively the case, last year the FCC certified the first Wi-Fi 6E chipset[5] and its first 6 GHz Wi-Fi device.[6] FCC has currently certified multiple Access Points that operate in the 1200 MHz of the 6 GHz band[7]. In early January of 2021, the Wi-Fi Alliance began certifying Wi-Fi 6E devices, paving the way for new gadgets that can transmit across the entire 6 GHz band.[8] Currently there are 14 Wi-Fi 6E certified devices[9] and many Wi-Fi 6E products have being announced at this year's (virtual) Consumer Electronics Show.[10] On January 14th, Samsung announced a new mobile phone that incorporated a Wi-Fi 6E client.[11] In light of this momentum, the research firm IDC has forecast that more than 316 million Wi-Fi 6E devices will enter the market in 2021 and shipments will rise rapidly over the next three years.[12] So clearly the Wi-Fi 6E ecosystem is ready and will continue to grow at an accelerated pace in the coming months. Making the entire 5925-7125 MHz band license-exempt will provide benefits for end users in the Kingdom immediately. CITC can be certain that equipment will quickly be presented for certification shortly after release of its ruling.

The timing when spectrum is made available is critical in spectrum management and determines the success of many public policies in the telecommunications sector. The DSA carried out a study on the economic value of the unlicensed use of spectrum in the 6 GHz band in Brazil[13] and found that accumulated economic value between 2021 and 2030 associated with allowing unlicensed access to 1200 MHz in the 6 GHz band amounts to 112.14 billion U.S. dollars in contribution to the GDP, 30.03 billion U.S. dollars in producer surplus (a benefit for Brazilian companies) and 21.19 billion U.S. dollars in consumer surplus (a benefit for Brazilian population). The most interesting aspect is not only this result, which is clearly very specific to the Brazilian case, but the fact that this study shows that not taking actions to open the band in the short term, but for example waiting to do so until 2024, in the case of Brazil, would lead to the loss of this economic contribution and would have an opportunity cost of 16.94 billion dollars. This is a material difference when considering the 6 GHz band for Wi-Fi or other possible uncertain usages in the future.

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[5] *See* FCC, "Grant of equipment authorization QDS-BRCM1095 (link)".

[6] *See* "Chairman Pai Statement on FCC Authorization of First 6 GHz Wi-Fi Device" (December 7, 2020). DOC-368593A1.pdf (fcc.gov)

[7] *See* https://fccid.io/MSQ-RTAXJF00

[8] *See* "Wi-Fi Alliance® delivers Wi-Fi 6E certification program" (January 7, 2021). Wi-Fi Alliance® delivers Wi-Fi 6E certification program | Wi-Fi Alliance (wi-fi.org)

[9] *See* https://www.wi-fi.org/product-finder-results?sort_by=default&sort_order=desc&certifications=1275

[10] *See* "Linksys Introduces Fastest and Most Powerful Wi-Fi 6E Mesh System and Enhanced Motion Detection" (January 11, 2021). https://www.prnewswire.com/news-releases/linksys-introduces-fastest-and-most-powerful-wi-fi-6e-mesh-system-and-enhanced-motion-detection-301205475.html; See "Nighthawk® Tri-Band WiFi 6E Router (up to 10.8Gbps) with new 6GHz band, NETGEAR Armor™" (January 11,2021). AXE11000 WiFi Router (netgear.com); *See* "TP-Link Unveils New Networking Offerings, Bringing a Blazing-Fast, Ultra-Secure Broadband Experience to Consumers and Businesses" (January 11, 2021). https://www.tp-link.com/us/press/news/19331/.

[11] Samsung Press Release, "Samsung Galaxy S21 Ultra: The Ultimate Smartphone Experience, Designed To Be Epic In Every Way". https://news.samsung.com/global/samsung-galaxy-s21-ultra-the-ultimate-smartphone-experience-designed-to-be-epic-in-every-way

[12] *See* https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-delivers-more-value-from-wi-fi-in-6-ghz

[13] *See* http://dynamicspectrumalliance.org/wp-content/uploads/2020/11/1-DSA-Valor-Economico-Uso-Nao-Licenciado-6-GHz-Brasil-1.pdf

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Wi-Fi is a highly cost-effective wireless access technology due to ease of installation and user control over the network. According to Intel, the cost of licensing the necessary intellectual property for cellular 5G alone is 3x that of a Wi-Fi chipset, and the entire 5G cellular modem cost is 50x the cost of a Wi-Fi chipset.[14] Support for a cellular connection can add as much as US $130 to the retail price of a tablet device. Thanks in part to spectrum harmonisation, the global Wi-Fi ecosystem benefits from enormous economies of scale, enabling manufacturers to produce very cost-effective products.

A new report released by the Wi-Fi Alliance in February 2021 projects the total global economic value of Wi-Fi in 2025 will be nearly US$5 trillion.[15] That measure of economic value reflects that more than half of all Internet traffic globally begins or ends on Wi-Fi, more than 70% of global data traffic on smartphones is offloaded to Wi-Fi[16] and that the number of devices per capita, and the throughput capacity of those devices, continues to grow.

2- **The substantial amount of licensed TDD mid band spectrum already being made available for IMT and 5G. With the release of the 3800 – 4000 MHz band, a total of 890 MHz will be available in large contiguous channels for exclusive IMT use across 2300 MHz, 2600 MHz and 3400 – 4000 MHz. CITC believes that this bandwidth will be sufficient to cover the mid-band spectrum needs of IMT for the foreseeable future. We note that the situation is different in the EU where less exclusive mid-band spectrum (in particular in the TDD configuration) is available for IMT. On the other hand, countries with substantial exclusive mid-band spectrum for IMT (such as South Korea) have decided to release the entire 6 GHz band for license-exempt use**.

The DSA completely agrees on this. From the DSA perspective, 5G and Wi-Fi spectrum are powerful complements, not rivals. Licence-exempt RLAN technologies (e.g., Wi-Fi, 5G NR-U) are a critical component for enabling 5G services. Regulators must ensure that there is sufficient licence-exempt spectrum to complement 5G licenced networks. License-exempt access will be a complement for 5G[17] and from the DSA perspective, it is important that CITC complements the 5G licensed networks with sufficient license-exempt spectrum. The concept of "balance" must encompass the whole of spectrum allocations and designations.

Saudi Arabia is one of the lead countries among the G20 countries in terms of the amount of radio spectrum awarded to operators in IMT frequency bands.[18] Initial benchmark analysis conducted by CITC shows that mobile operators in Saudi Arabia have access to larger contiguous bandwidth in most bands compared with operators in most of the advanced countries. Additionally, with the release of 3800 – 4000 MHz band, a total of 890 MHz will be available in large contiguous channels for exclusive IMT use across 2300 MHz, 2600 MHz and 3400 – 4000 MHz. It seems to the DSA, that in Saudi Arabia, the issue is not necessarily identifying new spectrum for IMT in the 6 GHz band, because the appropriate spectrum

[14] Source: Eric McLaughlin, General Manager Wireless Solutions Group, Intel during the WBA Congress in Frankfurt in September/October 2019.
[15] The Wi-Fi Alliance, What Is the Value of Wi-Fi?, available at https://www.wi-fi.org/news-events/newsroom/wi-fi-global-economic-value-to-reach-5-trillion-in-2025
[16] Beyond offloading, there is a growing body of literature on the issue of 5G and Wi-Fi Convergence, where the two networks technologies can essentially be operated seamlessly from a consumer's perspective. *See*, e.g.,WBA and NGMN Alliance, RAN Convergence Paper, Jan. 2019, https://wballiance.com/wp-content/uploads/2019/01/RAN-Convergence-Paper-2019.pdf
[17] *See* Enterprises building their future with 5G and Wi-Fi 6, Deloitte's Study of Advanced Wireless Adoption (link)
[18] *See* How Saudi Arabia is deploying ICTs against COVID-19 – and beyond, ITU News, July 24, 2020

planning actions has been undertaken in the past years and there is an aggressive plan to continue releasing spectrum for 5G in other frequency bands.

3- **The existing mid-bands for exclusive IMT use have robust ecosystems already as well as superior propagation characteristics. If mobile operators want to access the 6 GHz band, they can do so on a license-exempt basis using NR-U (which 3GPP has defined as band n96)**.

Changing use cases are compelling the industry to evolve its technology to meet rising demand and new use cases in licence-exempt spectrum. That technology, including Wi-Fi 6E and 5G NR-U, requires broad channels and contiguous spectrum, and is driving the need to open the whole of the 6 GHz band to licence-exempt use.

Regulations adopted for the 6 GHz band should be technology neutral to allow other free use technologies to be deployed. For example, the 3GPP community is developing a technology known as "New Radio-Licence exempt." [19] 3GPP-based 5G NR-Unlicensed ("5G NR-U") technology will be deployed in licence-exempt bands, such as the 6 GHz band, to supplement licenced 5G deployments.[20] Like Wi-Fi 6 and the upcoming Wi-Fi 7, when used in combination with licensed or shared spectrum, anchored 5G NR-U helps mobile operators deliver 5G with better, faster mobile broadband for consumers. Standalone NR-U deployments extend the benefits of 5G to private networks without requiring any licenced spectrum. Whether standalone NR-U, or supplemental to licenced 5G, 5G NR-U is envisioned to support greatly improved Industrial IoT applications with ultra-reliable, low latency needs.

It should be noted that, at this point in time, n96 is applicable in the USA only subject to FCC Report and Order [FCC 20-51] as stated in Note 14 in Table 5.2-1 of 3GPP specification 38.101-1 V16.5.0 (2020-09). We anticipate that the n96 band class will be extended to other countries that also designate the entire 6 GHz band for licence-exempt use.

From a spectrum policy perspective, multiple technology organizations see the benefit of licence-exempt spectrum and are seeking to deploy in the 6 GHz range with wholly new, stateof-the-art equipment. Licence-exempt Wi-Fi 6E routers and client devices are already certified for use in the U.S. and will be imminently available for purchase.[21] CITC is acting in the best interest of the Kingdom end users, with the decision of opening the band to licence-exempt use as promptly as possible they will enjoy the benefits of Wi-Fi 6E and 5G NR-U.

Being the first country in the EMEA region to open the entire 6 GHz band for license-exempt use will not only bolster the Kingdom's position as innovation driver but also accelerate global harmonization of this band for license-exempt use and thus create economies of scale effects to the benefit of users in the Kingdom and globally.

The decision to enable unlicensed access to 1200 MHz of spectrum in the 6 GHz band would confirm CITC's long-term vision, laying the groundwork for early adoption of Wi-Fi 7 in the Kingdom. Indeed, the standardization

[19] See 3GPP Technical Specification Group Radio Access Network; NR; User Equipment (UE) radio transmission and reception; Part 1: Range 1 Standalone (Release 16), 3GPP TS 38.101-1 V16.5.0 (2020-09), (NR operating bands in Table 5.2-1 lists NR band class n96 covering the entire 6 GHz band – 5925 to 7125 MHz).

[20] Xiaoxia Zhang, Qualcomm OnQ Blog, How does support for licence exempt spectrum with NR-U transform what 5G can do for you?, June 11, 2020, https://www.qualcomm.com/news/onq/2020/06/11/how-does-support-unlicensed-spectrum-nr-utransform-what-5g-can-do-you.

[21] See, e.g., Stephen Silver, Wi-Fi 6E: What Is It and When Can You Buy It?, The National Interest, Jan. 9, 2021 (link).

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process of the next generation of the IEEE 802.11 family standard, 802.11be, also known as Wi-Fi 7, is ongoing. The initial draft (0.1) is expected to be defined in the first half of 2021, with the launch of certification processes at the end of 2023, including channels of up to 320 MHz of bandwidth for Wi-Fi connections and other functionalities.

As pointed out by the CITC, to date, multiple technical studies have been carried out to assess interference risk from license-exempt operations in the 5925 - 7125 MHz band. These studies indicate that operating license-exempt Wi-Fi devices either indoor (at eirp<250mW) or outdoor at very low-power (at eirp<25mW) will result in minimal interference risk to the existing point-to-point or other operations in the band. Moreover, CITC perfectly summarized the behavior of the automated frequency control system (AFC)[22] under the U.S. regulations.

Where authorized, outdoor Wi-Fi systems are already today playing an increasingly important role in providing connectivity on company and university campuses, on large industrial sites, in public areas and at major outdoor events but also for fixed wireless access (FWA). With Wi-Fi 6E, the level of performance and the quality of service available to outdoor users can be enhanced dramatically.

The DSA respectfully invites CITC to consider the implementation of the three referred operating classes in the entire range of the 6 GHz band (Low-Power indoor, Standard-Power indoor and outdoor and Very Low Power mobile equipment). Regarding LPI devices, the DSA considers that indoor Access Points and indoor Subordinate Access Points should only operate indoors. In this way the Access Point transmissions can experience building entry loss and indoor clutter, which further reduces the risk of harmful interference to outdoor fixed service links.

As pointed out by the CITC, WLAN low-power indoor and very low power systems can share spectrum with incumbent users on a license-exempt basis while higher power systems (indoor and outdoor) can potentially operate under a light licensing regime.

Given the fact that the 6 GHz band is currently used by medium/high capacity, long-distance fixed terrestrial links as well as FSS earth stations in the Kingdom, as it is the case in the United States of America, Standard Power outdoor operations could be considered and easily implemented following similar rules to those adopted by the FCC and taking benefits of economies of scale. CITC indicates in their conclusions that they plan to continue monitoring developments in the US and may consult on standard power use in the band subject to a similar access regime if it proves successful in the US. The DSA encourages CITC to consider authorizing the deployment of standard power license-exempt systems in the 5925-7125 MHz band, using AFC, on a light licensing basis, indoor and outdoor.

We appreciate that the CITC will consult further on licensed-exempt spectrum and look forward to providing our comments and suggestions on the “Unlicensed consultation (5925 – 7125 MHz and 66 – 71 GHz)”.

[22] The FCC is looking to go further and allow higher power outdoor use subject to some restrictions. To reduce potential harmful interference to incumbent licensed users, the FCC is requiring the use of an automated frequency control system (AFC) for standard power operations. The access point (or a central control point) will send geolocation information, FCC ID and device serial number to an AFC operator. The AFC operator will do a lookup in the FCC Universal Licensing System (ULS) and calculate the ratio of interference to noise power (I/N) using one of several attenuation models based on the distance from the licensed antenna. The AFC returns a list of allowable frequencies and output powers that the AP can choose.

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66 – 71 GHz

Under the WRC-19 decision, the 66-71 GHz band is technology neutral and will support mobile applications such as multi gigabit wireless systems and IMT. DSA appreciates and fully supports the intended opening of the 66-71 GHz band for license-exempt usage in 2021. Due to the propagation characteristics of the 66-71 GHz band, the overwhelming trend globally is to allow technology neutral and license-exempt operation. Making the 66-71 GHz band available for license-exempt operation of Multiple Gigabit Wireless Systems (MGWS) such as WiGig will enable a large variety of applications, allowing end consumers and businesses in the Kingdom to benefit from the unique capabilities of commercially available multigigabit wireless systems. The DSA is confident that the decision by the CITC to open this band will spur innovation and set a positive example for other administrations in the Middle East and beyond.

Release Plan for Lightly-Licensed Spectrum

DSA celebrates CITC's vision about Light licensing approaches. We agree that this regime should increasingly make use of databases as these provide more flexibility, deliver greater control of the band and provide important insight into usage. Payment for usage will generally be set at a low level that is sufficiently high to discourage speculative or vexatious applications and to cover administrative costs, but sufficiently low to allow for innovation.

DSA fully supports CITC in its plans over the next five years to adopt a light licensing regime using a database solution in all or parts of the 4000 – 4200 MHz band, in a manner that does not impact existing or new satellite users.

The DSA clearly supports the implementation of databases to enable this release plan, seeking flexible databases that can automate processes as far as possible. As pointed out by CITC such implementations are typically developed and managed by commercial companies that have valuable international experience on this matter. The DSA would be happy to participate later this year on the consultation on "the use of databases for lightly licensed bands as well as its application in the 4 GHz, 10 GHz, 28 GHz and 71 – 76 / 81 – 86 GHz bands" and on the consultation on "Regulations and Policy Document for Lightly Licensed Bands".

Regarding the 4.0 – 4.2 GHz band, DSA is glad to see that CITC recognizes the demand for spectrum by verticals and the possibility of sharing the band with satellite subject to protection of continued FSS use in this band. According to the reference document, CITC intends to make spectrum between 4000 MHz and 4200 MHz available for low-power innovative uses and the spectrum would be available on a shared basis using a geolocation database with exclusion zones to protect FSS earth stations. The DSA believes that the adoption of a geolocation database in this band could even estimate the allowed power limits that would correctly protect incumbents. We agree with CITC that this automated approach is an important step in making a more efficient use of the spectrum and promoting innovative uses.

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