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Telecommunications Regulatory Commission (TRC)
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Re: DSA Comments to the Public Consultation on the availability of the 6 GHz band for Wi-Fi technology

Dear Sir/Madam,

The Dynamic Spectrum Alliance ("DSA"[1]) respectfully submits its comments to the Telecommunications Regulatory Commission ("TRC" or "the Commission) in response to the Public Consultation on the availability of the 6 GHz band for Wi-Fi Technology.

The DSA celebrates the Commission's leadership opening this consultation about the future of the 6 GHz band for Wi-Fi 6E adoption in Jordan and believes that the Commission should act to provide greater capacity for data transfer, bridge the digital gap and incentivize modern technologies. The decision of dedicating more spectrum to wireless radio local access systems under license exempt frameworks in the 6 GHz band will benefit Jordan citizens immediately with better Wi-Fi services, and access to affordable license-exempt wireless devices.

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

Respectfully submitted,

Martha SUAREZ
President,
Dynamic Spectrum Alliance

[1] The Dynamic Spectrum Alliance (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. A full list of DSA members is available on the DSA's website.

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DSA COMMENTS TO THE PUBLIC CONSULTATION ON THE AVAILABILITY OF THE 6 GHZ BAND FOR WI-FI TECHNOLOGY

The TRC is proving its regional leadership by running this consultation and considering identifying radioelectric spectrum in the 6 GHz band for the development of Wi-Fi 6 and other innovative use cases in Jordan in favour of its citizens. This step is fundamental to improve Wi-Fi connectivity in homes, companies, government and public institutions.

DSA agrees with the TRC considerations and is convinced that opening up 6 GHz frequency band for Wi-Fi is the right move to ensure that this widely used wireless technology can deliver the necessary performance for future applications and networks.

1. What is the actual need to add new frequency bands for Wi-Fi use according to the current and future needs in Jordan?

This year, it is more obvious than ever that internet access is no longer the luxury item it may have been in years gone by, but a necessity. Throughout 2020 and the Covid-19 pandemic, Wi-Fi access has allowed us to stay connected in a number of previously unimaginable ways. We have been able to continue to work when our offices are closed, educate our children although they can't be in classrooms, and perhaps most importantly stay occupied in numerous virtual conferences and entertained when we've been told to stay at home.

Wireless Access Systems/Local Radio Networks (WAS/RLAN) played a critical role in enabling Jordanians to work and learn from home during the global pandemic, and furthermore, will have an important role to play in the future, offering better performance and enabling innovative use cases.

2. Do the current data transmission capacities need high speed wireless access points?

According to Cisco, more than half of the Internet connections start or end by a Wi-Fi connection. However, Wi-Fi networks congestion at the access point level is becoming an issue because access to license-exempt mid-band spectrum creates an artificial spectrum shortage: since the World Radiocommunication Conference in 2003 no new mid-band spectrum has been made available for Wi-Fi despite the exponential growth in the data traffic.[2] Furthermore, current Wi-Fi spectrum doesn't offer sufficiently wide channels for newer applications and services. Wi-Fi 6 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.[3]

[2] *See* "How to realise the full potential of 6 GHz spectrum". Whitepaper. October 2020 (link)
[3] *See* https://wballiance.com/wp-content/uploads/2019/09/WBA-AnnualIndustry-Report-2020.pdf

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As has been indicated by the Commission in this consultation, 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 what is known as the Internet of Things (IoT).

It is important to mention that license-exempt access to the 6 GHz band could enable three different operating classes:

- Very Low Power (VLP): devices which would be permitted to operate at very low power levels for indoor or outdoor use. They provide low latency and very high throughput over short distances. VLP portable usages are for example mobile AR/VR, UHD video streaming, high speed tethering and in-vehicle entertainment.
- Low Power Indoor (LPI): such as an Access Point or client device, which would be permitted to operate for indoor use only. LPI use cases include residential Multi-AP/mesh networks, multiple dwelling unit (MDU), single-AP networks, high-density enterprise networks, indoor public venues and industrial IoT.
- Standard Power (SP): license-exempt devices operating at 36 dBm EIRP that are only permitted access to spectrum under the control of an Automated Frequency Coordination (AFC) system, which would establish exclusion zones where license-exempt devices could not operate. High throughput capabilities for outdoors and indoors. Relevant for rural connectivity.

Every use case provides benefits in Jordan and the Commission can decide on the specific conditions to enable these different operating classes.

3. What is the effect of assigning new spectrum (frequency bands) for Wi-Fi on launching IoT services and 5G Technology or any other future services?

License-exempt 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.[4]

The Commission should keep in mind the international trend for license exempt devices in this band and the local requirements in Jordan. DSA believes that the highest and best use for this band is for WAS/RLAN. As it has been indicated by the Commission in the consultation document, WLAN/RLAN will carry offload from cellular 5G technologies (total data offload to unlicensed going from 74% to 79% in 2022).[5] This will lower the costs of network deployment

[4] *See* "The crucial decision of enabling better and affordable connectivity through Wi-Fi and spectrum sharing", December 2020 (link)
[5] *See* Cisco Systems, Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017-2022. (link)

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for mobile operators and for edge investment by neutral host and third-party providers. Importantly, it will also lower costs for consumers.

Wi-Fi 6E indoor use cases include residential Multi-AP / mesh networks, multiple dwelling unit (MDU), single-AP networks, high-density enterprise networks, indoor public venues and industrial IoT. VLP portable usages are for example mobile AR/VR, UHD video streaming, high speed tethering and in-vehicle entertainment.

4. What are the suggested technical specifications and regulations for using Wi-Fi 6E?

It is important to note that the 6 GHz band is allocated to a range of services, such as fixed satellite services, fixed services and some mobile applications, including for example electronic news gathering. License-exempt access will not only open the door to innovation by offering extra capacity but protect those that already use the band. There will not be requirements for spectrum clearance processes, that might be complex and expensive. It is really an efficient use of the spectrum. Protecting incumbents and at the same time enabling innovation.

LPI and VLP WAS/RLANs, such as those using Wi-Fi 6E, can coexist well with current incumbent operations and meet the required use cases as demonstrated in the CEPT studies in the 5925-6425 MHz frequency range.[6]

Like in Europe, the FCC in the United States concluded that LPI devices can coexist with incumbent services in the band without further mitigation measures. The studies in the United States were conducted in the complete 6 GHz band (5925-7125 MHz). In addition, the FCC enabled Standard Power devices, using an AFC system in order to manage coexistence with incumbent services in the 5.925-6.425 GHz and 6.525-6.875 GHz sub-bands. This system will coordinate outdoor deployments to ensure no interference will be inflected on the tens of thousands of point-to-point microwave links and other incumbents. Finally, the FCC is currently proposing enabling VLP operations through a further notice of proposed rulemaking.[7]

The FCC claims that "Wi-Fi 6 will be over two-and-a-half times faster than the current standard and will offer better performance for American consumers. Opening the 6 GHz band for unlicensed use will also increase the amount of spectrum available for Wi-Fi by nearly a factor of five and help improve rural connectivity."[8]

In ITU region 1, discussions are taking place about the future of the upper part of the 6 GHz band (6425-7025 MHz) because some countries are considering it for the use of International Mobile Telecommunications (IMT). This consideration is part of the World

[6] *See* Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) in the frequency band 5925-6425 MHz (link) and Harmonised technical parameters for WAS/RLANs operating on a coexistence basis with appropriate mitigation techniques and/or operational compatibility/coexistence conditions, operating on the basis of a general authorisation (link)
[7] *See* https://docs.fcc.gov/public/attachments/FCC-20-51A1.pdf
[8] *See* https://docs.fcc.gov/public/attachments/DOC-363945A1.pdf

Radiocommunication Conference 2023 (WRC-23) agenda, item 1.2. There is no certainty around this possibility yet, but by the time of the conference we will know if it is technically feasible. Studies within the ITU-R are just starting, and administrations should remain open minded when undertaking coexistence and sharing studies based on justifiable technical characteristics and realistic and agreed propagation characteristics.

5. Do you support TRC in providing instructions (regulations) to avail the whole or part of 6 GHz Band (5925-7125)?

The DSA fully supports TRC in providing regulations to enable license-exempt access to the whole 6 GHz band (5925-7125 MHz). Ideally, all countries and all regions should ultimately enable license-exempt access to the entire 1200 MHz in the 6 GHz band. This harmonisation would result in major economies of scale, reducing costs for end-users and allowing people all over the world to benefit from innovative new services that harness the capabilities of Wi-Fi 6E.

Users, both in homes and businesses, increasingly require new applications with high data transmission capacities on the order of Gbps, applications such as virtual reality and augmented reality, interactive content, high-definition video (4k and 8k) and artificial intelligence. These requirements associated with higher video consumption require adapted networks with higher bandwidths and additional spectrum for WAS/RLAN networks. In these cases, having 1200 MHz of unlicensed spectrum in the 6 GHz band, instead of just 500 MHz, will make a big difference for users, since it will be possible to use more than three 160 MHz channels simultaneously. Keep in mind that Wi-Fi access is crucial not only in homes, but also in corporate environments, industrial facilities, factories, companies and in highly crowded places such as airports, stadiums, shopping centers or public hotspots.

The decision to enable unlicensed access to 1200 MHz of spectrum in the 6 GHz band would confirm TRC's long-term vision, laying the groundwork for early adoption of Wi-Fi 7[9] in Jordan. Indeed, the standardization 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.

6. What are the economic benefits resulting from the use of Wi-Fi?

Enhancing digital technology and global proliferation of Wi-Fi access will be very important for the Jordanian economy. The flexibility and benefits Wi-Fi brings to digital economies have proven to provide essential benefits during the COVID-19 pandemic.[10]

[9] Wi-Fi Alliance, "Capacity, efficiency, and performance for advanced connectivity". *See* https://www.wi-fi.org/discover-wi-fi/wi-fi-certified-6

[10] *See* "Covid-19 and the economic value of Wi-Fi. Katz", Jung and Callorda, December 2020.

Spectrum sharing capabilities of Wi-Fi technologies avoid time consuming, complicated and expensive clearance processes that are often required before any commercial usage of a frequency band by exclusive licensed systems.

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.[11] Support for a cellular connection can add as much as US $130 to the retail price of a tablet device.

Given that Wi-Fi service providers do not need to participate in auctions to license the spectrum, the technology is a very cost-effective form of connectivity. 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.

The timing when spectrum is made available is critical in spectrum management and determines the success of 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[12] 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.

7. What is the current status of Wi-Fi 6E? When will the equipment supporting Wi-Fi 6E be ready for use?

Wi-Fi is a great example of how global harmonization benefits economies of scale and final users. Plans for the license-exempt opening of the 6 GHz band are becoming ever-more prevalent, with final regulations adopted by the United Kingdom, the United States,[13] the Republic of Korea,[14] Chile[15] and the United Arab Emirates.[16] And that's not all: Germany is

[11] Source: Eric McLaughlin, General Manager Wireless Solutions Group, Intel during the WBA Congress in Frankfurt in September/October 2019.
[12] *See* http://dynamicspectrumalliance.org/wp-content/uploads/2020/11/1-DSA-Valor-Economico-Uso-Nao-Licenciado-6-GHz-Brasil-1.pdf
[13] *See* https://www.federalregister.gov/documents/2020/05/26/2020-11236/unlicensed-use-of-the-6-ghz-band
[14] *See* https://www.msit.go.kr/web/msipContents/contentsView.do?cateId=_policycom2&artId=3140715
[15] *See* https://legislacion.vlex.cl/vid/diario-oficial-n-42-850686788
[16] *See* https://www.tra.gov.ae/en/media-hub/press-releases/2020/12/28/the-telecommunications-regulatory-authority-tra-adds-additional-500-mhz-of-6-ghz-band-for-the-wi-fi-radio-frequency-spectrum.aspx

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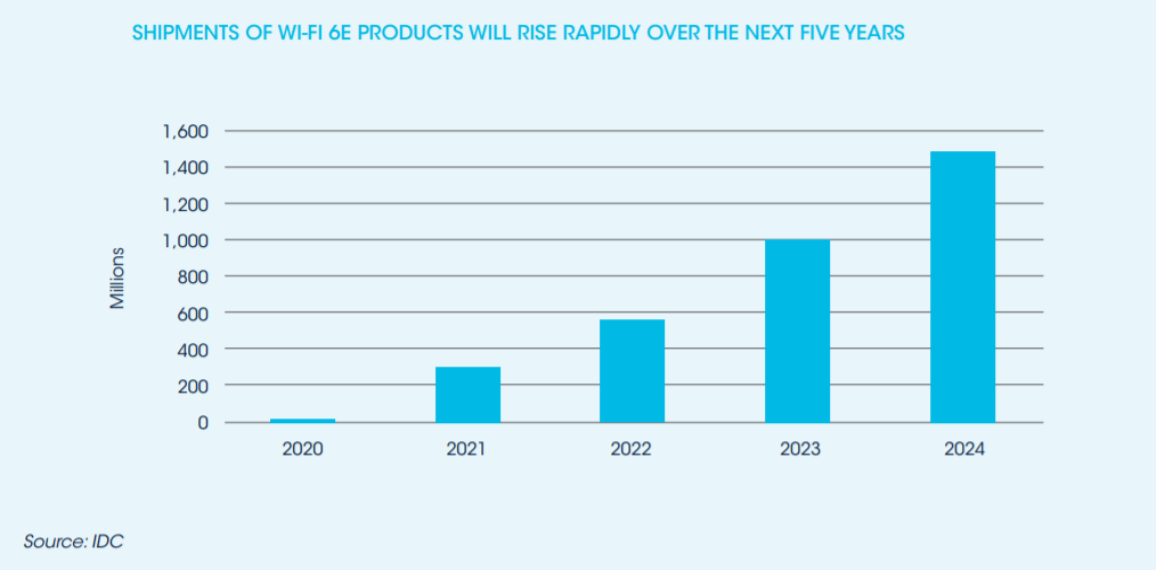
planning to open the band in 2021[17] and the European Commission Decision is likely to mandate by December 2021 Member States shall designate and make available 5945-6425 MHz for the implementation of WAS/RLANs. Wi-Fi 6E consultations have taken or are also taking place in Brazil, Canada, Mexico, Costa Rica, Honduras, Peru, Argentina, Taiwan and Saudi Arabia.

TRC should consider that the ecosystem is ready, Wi-Fi 6 is already standardized by the Wi-Fi Alliance since 2019. Wi-Fi chipsets for Wi-Fi 6E products are available and last year we saw the first Wi-Fi 6 chip[18] and access point[19] certified by the FCC.

The worldwide regulatory momentum accelerates the ecosystem development, that is constantly growing for the different operating classes devices on a license-exempt basis in the 6 GHz band, that include VLP, LPI and SP devices.

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 (see Figure below).[20]



8. Do you support availing Wi-Fi technology for outdoor use (Hot Spot) based on regulated technical and operational specifications and limitations?

As a license-exempt technology offering very low barriers to entry, Wi-Fi serves as a platform for the creation of innovative business models that underpin unique services, while expanding

[17] *See* Startschuss für 6-GHz-WLAN Einführung, Bundesnetzagentur (link)
[18] *See* FCC, Grant of equipment authorization QDS-BRCM1095 (link)
[19] *See* https://fccid.io/MSQ-RTAXJF00
[20] *See* "How to realise the full potential of 6 GHz spectrum". Whitepaper. October 2020 (link)

access to communication services for mobile, fixed, and satellite networks through Wi-Fi hotspots.[21]

The DSA strongly supports availing Wi-Fi technology for outdoor use based on regulated technical and operational specifications and limitations. SP devices might take additional time to be available in the market, because in the United States they require AFC systems that must be authorized by the FCC. However, first deployments are expected this year. The DSA has a great deal of experience on this type of solutions[22] and would be glad to provide any further information to the Commission.

There have been important public programs and initiatives to increase Wi-Fi hotspots like it is the case of the WiFi4EU[23] in Europe, the WiFi4EU initiative aims to provide high-quality Internet access to citizens and visitors across the EU via free of charge Wi-Fi hotspots in public spaces such as parks, squares, administrations, libraries, and health centres. It has revealed a strong and local demand for the expansion of Wi-Fi services in order to foster the local e-commerce economy, support tourism, and increase the availability of local public services to citizens.

But this type of initiative occurs not only in Europe or in urban areas. If we refer to remote areas connectivity, cost-efficiency is best achieved by benefiting from scale inherent in globally adopted Wi-Fi standards, which mean lower cost of coverage for low-population density areas and lower cost of terminals.

The ITU-D Study Group on Broadband development and connectivity solutions for rural and remote areas, in its annual deliverable 2019-2020 has recognized that "Wi-Fi hot spots and local area networks, which can be installed at rural points of community activities, including shopping centres and university campuses, can serve a variety of users. These are also suitable for homes, where all family members can access Wi-Fi connectivity. Wi-Fi technologies are very effective if the backbone landing is not far from the locality and can be used to create a mesh network."[24] According to the report, in India,[25] several rural areas have been connected using Wi-Fi, as a last-mile connectivity solution. In Zimbabwe,[26] the community information centres constructed by the universal services fund of the country use Wi-Fi technology. In Latin America, more than

[21] *See* "How to realise the full potential of 6 GHz spectrum". Whitepaper. October, 2020 (link)
[22] *See* http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf
[23] *See* https://ec.europa.eu/digital-single-market/en/wifi4eu-free-wi-fi-europeans
[24] Annual deliverable: "Broadband development and connectivity solutions for rural and remote areas". Question 5/1 Telecommunications/ICTs for rural and remote areas. ITU-D (link).
[25] Presentation by Mohit Bansal at the workshop on broadband development in rural areas hosted by the Question 5/1 Rapporteur Group,25 September 2019 (link).
[26] Presentation by Batsirayi Mukumba at the workshop on broadband development in rural areas hosted by the Question 5/1 Rapporteur Group, 25 September 2019 (link).

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19 universal service projects in the countries of the Pacific Alliance rely on Wi-Fi to deliver affordable broadband to rural and underserved[27].

In this context, the Commission should consider enabling outdoor usage of Wi-Fi 6 in the 6 GHz band, that would make a more efficient use of the spectrum, while protecting incumbents and increasing affordable connectivity.

9. Will availing this spectrum band technical advantages in terms of reducing the loads of the IMT networks (4G and 5G)?

License exempt access will be a complement for 4G and 5G[28] and from the DSA perspective, it is important that the Commission complements the licensed mobile access with enough spectrum for licensed exempt access.

The 5G strategy goes beyond assigning high-band, mid-band and low-band spectrum for licensed access. The 5G Fast Plan[29] in the United States recognizes that unlicensed spectrum will be important for 5G, and that new opportunities for the next generation of Wi-Fi in the 6 GHz and above 95 GHz band should be created.

As indicated before, Cisco projects that 59% of mobile data traffic will be offloaded to Wi-Fi by 2022. And cellular operators can improve their 5G mobile broadband services by using the 6 GHz band; 3GPP Release 16 will include a 5G New Radio specification for licensed exempt spectrum, called 5G NR-U. That is why from the DSA perspective, cellular and Wi-Fi spectrum are powerful complements, not rivals.

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[27] Sources: IFT-Mexico, MINTIC–Colombia, MTC-Peru and SUBTEL-Chile, universal service projects planned by 2020.
[28] *See* Enterprises building their future with 5G and Wi-Fi 6, Deloitte's Study of Advanced Wireless Adoption (link)
[29] *See* The FCC's 5G FAST Plan (link)