Dynamic Spectrum Alliance Limited
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RSPG Secretariat
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Re: DSA Comments to RSPG on the Questionnaire on Long-term vision for the upper 6 GHz band

Dear Sir/Madam,

The Dynamic Spectrum Alliance[1] (DSA) appreciates the opportunity to provide comments in response to the RSPG Questionnaire on Long-term vision for the upper 6 GHz band.

I) Explain the demand for MFCN or WAS/RLAN in the upper 6GHz band before and beyond 2030

WAS/RLAN

The DSA report "How do Europeans connect to the Internet - 2022" cites the complementary roles of fixed and mobile networks in the delivery of broadband connectivity, noting that while 4G and 5G networks provide internet access to people on the move, the vast majority of users rely on fixed networks to access the internet at home, at work, in school, and other venues.[2] Although there are exceptions, the EU norm is that over 90 percent of internet data traffic is delivered over fixed networks.[3] Based on measurement data, approximately 92 percent of the European internet traffic on fixed networks is relayed over Wi-Fi.[4] Additionally, Mobile Network Operators (MNOs) typically offload a portion of the data traffic on their mobile networks over Wi-Fi to alleviate congestion on their licensed spectrum. Taken together, a strong case can be made that over 80 percent of European internet data traffic originates and / or terminates over a Wi-Fi connection.

As Wi-Fi is the primary means by which Europeans connect their devices to the Internet, policy makers need to ensure that there is sufficient license-exempt spectrum available for different categories of WAS/RAN devices, including Wi-Fi. The DSA asserts there is a strong need for the entire upper 6 GHz band to be made available for license-exempt spectrum to support near-, mid- and long-term WAS/RAN use and use cases.

While mobile traffic is growing, so is fixed traffic, and it is growing from a much higher base value. Derived from a 2023 Arthur D Little report[5], the absolute growth in fixed data traffic is likely to be almost 5 times the absolute

[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. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members.
[2] Dynamic Spectrum Alliance, "How do Europeans Connect to the Internet – 2022", DSA-WhitePaper-How-do-Europeans-connect-to-the-Internet.pdf (dynamicspectrumalliance.org)
[3] *See* the response of Meta Platforms Ireland Limited to the Call for Evidence - World Radio Communications Conference 2023 – EU Position on pages 7-9. Feedback from: Meta Platforms Ireland Limited (europa.eu).
[4] John M. Cioffi, "State of Wi-Fi Reporting", Adaptive Spectrum and Signal Alignment, Incorporated (ASSIA®), presented at the 2022 DSA Global Summit. ASSIA-DSA-Summit-Presentation-v7.8.pdf (dynamicspectrumalliance.org).
[5] Dr. Nejc Jakopin, Gabriel Mohr, Elisabetta Cafforio, Glen Peres, Matyas Weber, Kamil Burkhanov "The evolution of data growth in Europe", Arthur D. Little, May 2023. The evolution of data growth in Europe | Arthur D. Little (adlittle.com).

growth in mobile data traffic in Europe between 2022 and 2030. The increase in fixed data will be driven by video, much of it originating or terminating on Wi-Fi devices at the edge of a network.

Making available the lower 480 MHz of the 6 GHz band for license-exempt use addresses, in part, the existing deficit in Wi-Fi spectrum. Prior to the EC's 2021 Implementing Decision[6], the last time a significant new designation of license-exempt spectrum for RLAN technology was made was two decades ago[7], following the 2003 World Radio Conference. That national activity that followed opened new spectrum bands in the 5 GHz range, which were at that time optimal for earlier generations of RLAN technology, such as Wi-Fi 4, and later, Wi-Fi 5. In the almost two decades since that time, the equipment used for broadband networking, use cases, and applications, as well as engineering challenges to meet demand, have evolved considerably.

In addition, the number of Wi-Fi devices per user is proliferating. The capability of those devices – in processing power, screen resolution, streaming video support (now at 4k/8k HD), camera performance, and antenna functionality to name a few – has increased exponentially. Devices are deployed in increasingly dense residential or enterprise environments, and the broadband networks they connect to, whether fixed or wireless, are also greatly improving in throughput and latency. But it is not simply the relentless improvements in devices that is increasing demand. New applications, such as consumer gaming or enterprise advanced manufacturing, demand low latency transmissions. Augmented Reality/Virtual Reality/Mixed Reality (AR/VR/MR) technology is starting to impact everything from how we learn to how we work and play. While that capability exists today, connectivity must expand and improve for these services to be placed into routine use by citizens and businesses.[8] Wi-Fi 6E, 7 and future Wi-Fi 8 support natively the full 6 GHz band. The demand for additional Wi-Fi spectrum in Europe is now and this need will only increase over time.

One of the key goals for the Digital Decade Policy Programme 2030 is that all European households have access to internet connections with speeds of at least 1 gigabit per second (Gbps) as measured at the network termination point (NTP), the location where the broadband signal enters the home. Within a residence, a Wi-Fi router is used to distribute the incoming broadband signal to the multitude of devices that now rely on license-exempt spectrum to connect to the Internet. As DSA and others have noted previously, what matters most to residential (and commercial) internet users is the user experience, which in large part is driven by the broadband speed experienced at the device. In residences where there are multiple users, each accessing high-bandwidth / low-latency applications at the same time, gigabit connectivity cannot be distributed through Wi-Fi within premises without utilization of the upper 6 GHz band. Multiple 80/160/320 MHz wide channels are required for Wi-Fi to ensure the delivery of gigabit connectivity within premises.

MFCN

The DSA has long supported EC efforts to make available spectrum immediately above the 3 GHz pioneer 5G band for the local licensing of lower power MFCN systems intended to provide additional localized capacity where needed. We understand that European policy makers are examining possible hybrid sharing arrangements

[6] ECC Decision (20)01 on the harmonised use of the frequency band 5945-6425 MHz for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) – November 2020.
[7] ECC Decision (04)08 on the harmonised use of the 5 GHz frequency bands for Wireless Access Systems including Radio Local Area Networks (WAS/RLAN) – July 2004
[8] Dynamic Spectrum Alliance, "6 GHz License Exempt: Why 1200 MHz and Why Now"(2021) 6GHz-License-Exempt-Band-Why-1200-MHz-and-Why-Now.pdf (dynamicspectrumalliance.org)

in the upper 6 GHz band between WAS/RLAN and MFCN, including one where the WAS/RLAN operates indoors and MFCN operates outdoors. Under this scenario, the upper 6 GHz band would be used to provide extra capacity outdoors where and when it is needed – busy hours in urban cores. Based on technical studies, this scenario is only feasible if MFCN's are authorized to operate at considerably lower powers than that permitted in the 3 GHz band. Unfortunately, the MNOs and their infrastructure providers have made clear their interest to operate high-power wide area mobile networks everywhere. This defeats the idea of sharing the upper 6 GHz band between WAS/RLAN and MCFN. The transmissions from high power mobile networks will simply overwhelm the receivers of indoor Wi-Fi networks access points and client devices.

Policy makers should be highly skeptical for the need of additional spectrum for high-power wide area mobile networks in the upper 6 GHz band. First, high power MFCN operations in the upper 6 GHz band will in no way contribute to meeting the Digital Decade Policy Programme 2030 objective of ensuring that all populated areas in the EU have access to 5G connectivity by 2030. In fact, the 3400-3800 MHz band remains severely underutilized according to the EU 5G Observatory.[9]

Second, it is hard to envision a 5G spectrum 'capacity crunch' through 2030. Although mobile data traffic is still growing, the rate of growth is slowing down according to Analysys-Mason[10] and Ericsson.[11] The DSA questions whether the spectrum needs assessments calling for large increases in new spectrum for 5G accounted for this slowing growth rate. Looking ahead, 6G services are in a formative stage. Unique 6G use cases and corresponding spectrum needs are speculative. Given the pace of the 5G deployment and the magnitude of investment required to deploy a new generation of wireless technology, the DSA doesn't see widespread deployment of 6G in the EU occurring until the middle of the next decade.

Third, regardless of demand, the physics of the upper 6 GHz band is not favourable for indoor/outdoor mobile networks. The average building entry loss in the upper 6 GHz band is over 20 dB, and even higher for energy-efficient green buildings. While MNO's can conceivably operate mobile base stations at much higher power than the levels studied in the ITU Working Parties, and are proposing to do so, there is a practical limit to how much power can be put in handset or other mobile user equipment (UE) for the uplink. The EC set the EIRP limit for license-exempt 6 GHz low power indoor client devices at 23 dBm in order to prevent harmful interference outdoors to licensed services, specifically fixed service links. If the mobile UE for indoor / outdoor mobile network has to operate above 23 dBm, it is highly likely that incumbent fixed service links and other terrestrial incumbents will have to be cleared from the upper 6 GHz band.

Finally, in the past when MNOs had concerns over meeting excess demand due to increasing mobile video traffic, they densified their networks and offloaded traffic over Wi-Fi. By making the upper 6 GHz band available for Wi-Fi there will be more spectrum for all MNOs to offload their non-latency sensitive mobile data traffic than ever before. Indeed, making more license-exempt spectrum available will help to address localized excess demand in urban cores, experienced during so called busy hours.

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[9] *See* 5G Observatory – Tracking 5G developments.
[10] See "Operators and vendors need to plan for more conservative mobile data growth in the near future", Analysis Mason, August 2023. Operators must anticipate conservative mobile data growth (analysysmason.com).
[11] *See* "Mobile network traffic Q1 2024 Mobile network data traffic continues to grow year-on-year", Ericsson Mobility Report June 2024. Mobile network traffic Q1 update – Ericsson Mobility Report (graphic).

II) Provide information about the sustainability of the above explained demand,

Environmental impact assessment

Wi-Fi 6E and Wi-Fi 7 can play a key role in Europe's green transition, providing improved energy efficiency on a per megabit basis, thereby reducing the carbon footprint for this widely deployed technology. A combination of fibre and Wi-Fi 6E/7 is the greenest solution for indoor connectivity, as reported independently by ARCEP[12]and Wi-Fi Alliance.[13] Widespread deployment Wi-Fi 6E and Wi-Fi 7 systems will create positive externalities by enabling the reduction of carbon dioxide emissions in other sectors utilizing the technology. For example, remote work, remote learning and telemedicine over Wi-Fi enabled systems can drastically reduce road traffic and corresponding greenhouse gas emissions.[14]

Social economic impact

License-exempt spectrum facilities permissionless innovation that is only limited by the imagination of innovators. Authorizing all 1200 MHz in the 6 GHz band for license-exempt use will place European innovators in the middle of the action for developing cutting edge high-bandwidth Wi-Fi applications, benefiting European consumers, businesses, and institutions. In the U.S., Canada, Korea, and other countries, the entire 6 GHz band has been available for low-power indoor Wi-Fi devices for a few years. There is an opportunity cost for Europe not making the upper 6 GHz band available for WAS/RAN use.

In contrast, making the upper 6 GHz available for high-power wide-area MFCN in a country will require either very large exclusion zones to protect incumbent fixed service links or fixed service links will have to be relocated to a different spectrum band. Given the size of the exclusion zones required, certain smaller European countries that have multiple borders may face a more complex situation. Either creating large exclusion zones around fixed service links or relocating them to another are likely to create near- and mid-term economic dislocations to the fixed link service provider as well as its customers. Any potential economic benefits from MCFNs would accrue in the long term, sometime after 2030.

III) Provide information about: Use cases, expected deployments and timeframe

Enabling license-exempt use across the entire 6 GHz band allows for near-term use of the latest generation of Wi-Fi and 5G NR-U standards to employ multiple high bandwidth 160 MHz and 320 MHz channels that support the channel diversity needed in dense deployments that exist both indoors and outdoors.

Education

- Each student in a university lecture hall seating hundreds of students can receive a high-definition video feed to her, or his Wi-Fi-enabled device (e.g., laptop, phone). Use of the entire 6 GHz band allows for the necessary bandwidth and channel diversity).

[12] ARCEP, "Achieving Digital Sustainability", December 2020. Achieving Digital Sustainability - Progress report, summary of collaboration platform work and 11 Arcep proposals to combine increasing use of digital technology and reducing its environmental footprint (15 December 2020).
[13] "Sustainability Benefits of 6 GHz Spectrum Policy", Wik Consulting on behalf of the Wi-Fi Alliance, July 2023. SustainabilityBenefitsof6GHzSpectrumPolicy202307.pdf (wi-fi.org).
[14] "Green Wi-Fi", Wik Consulting, March 2021. Green WiFi (wik.org).

- Multiple students accessing materials concurrently on AR/VR/MR devices in a classroom, in the field, or a laboratory setting. Large bandwidth 160 and 320 MHz channels are required for good user experience.

Public Venue

- An indoor arena has deployed 250 Wi-Fi 6E access points to ensure that fans can access the internet from almost anywhere in the facility and with faster access to the team's smartphone app, to allow them to connect better socially and commercially. The network is part of a 'smart venue' that includes a 'digital twin' – a complete 3D digital replica of the arena. The digital twin is augmented by live data from sensors placed throughout the building that track temperature, humidity, sound, and movement, that is fed into a machine learning algorithm, which provides insights into running the venue more efficiently and enabling management to identify potential problems and take preemptive actions.

Manufacturing and Logistics

- Modern factories (and warehouses) are increasingly using Automated Ground Vehicles (AGVs) and Autonomous Mobile Robots (AMRs) to carry and deliver parts, products and materials from a variety of sources and destinations be it inside a building or outside a building. Both AGV and AMR platforms combine multiple video feeds and other sensor data to (know and) report its position accurately (relative to everything else in the facility) so it can receive commands to move. A safety margin must be maintained. The larger the Wi-Fi channel bandwidth, the lower the latency and the faster the AGV or AMR can move. Given that factories usually have multiple AGV and/or AMR operating in proximity, sufficient Wi-Fi bandwidth (and spectrum reuse) is required to have the needed channel diversity and low latency.

Broadband Access

- Once the EC authorizes SP devices under control of an AFC, WISPs (and community networks) can use all 1200 MHz to provide broadband access in less densely populated areas. WISPs will require multiple access points in point-to-point and point-to-multi-point configurations in both the 5 GHz and 6 GHz bands to serve geographically clustered households. With 1,200 MHz available, WISPs will have the option of covering more households with fewer base stations, lowering the cost of providing broadband access or can choose to make available additional broadband capacity to each customer.
- Some local governments in urban, suburban, and rural areas may want to deploy public Wi-Fi networks as a local amenity, that it can either build or contract a third party to build. If the upper 6 GHz is authorized for license-exempt use, public Wi-Fi networks can serve more patrons at each location.

Respectfully submitted,

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