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VIA ELECTRONIC FILING
CNECT-RSPG@ec.europa.eu

Re: RSPG Questionnaire on Long-Term Vision for the Upper 6 GHz Band, 8 July 2024

Dear Radio Spectrum Policy Group,

Wi-Fi Alliance commends the Radio Spectrum Policy Group ("RSPG") on its ongoing work in the area of European spectrum planning. The Questionnaire on Long-Term Vision for the Upper 6 GHz Band **("***Questionnaire*") is an effective mechanism for soliciting stakeholders' feedback that will inform the RSPG's policy recommendations on the upper-6 GHz band (i.e., 6.425-7.125 GHz).

Wi-Fi Alliance is a global, non-profit industry association of over 900 leading companies devoted to connecting everyone and everything everywhere. For over 25 years, Wi-Fi Alliance has advanced worldwide adoption of Wi-Fi technology by enabling interoperability, security and performance. Wi-Fi Alliance appreciates the opportunity to provide the RSPG with Wi-Fi industry (i.e., "*WAS/RLAN stakeholders*") perspective on spectrum policy priorities for the upper-6 GHz frequency band.

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

Response: Wi-Fi Alliance enthusiastically supports the RSPG's intention to leverage the upper 6 GHz spectrum policy towards achieving the Digital Decade Policy Programme 2030 (DDPP) gigabit connectivity targets.[1/] In this regard, Wi-Fi Alliance respectfully asks the RSPG to consider that Wi-Fi has become indispensable to broadband connectivity in Europe because most users connect to the broadband networks via Wi-Fi. In fact, most devices are not even equipped to plug into the fixed network termination point, relying on wireless Wi-Fi connection instead. Already, over 90% of data traffic in Europe is transferred over fibre to end-user premises (FTTP) networks and more than 90% of that data traffic is delivered to end-users by Wi-Fi.[2/] Wi-Fi devices are now the primary means by which Europeans connect to the Internet. As Europe advances towards the universal gigabit connectivity goal with extensive FTTP deployments, the Wi-Fi's central role continues to grow.

But, as with any wireless technology, Wi-Fi functionality and performance depend on access to sufficient spectrum capacity (i.e., bandwidth). In the case of Wi-Fi, ever-increasing data traffic

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1/ *See* RSPG Questionnaire on Long-Term Vision for the Upper 6 GHz Band, 8 July 2024, Section A on page 2

2/ *See* The Evolution of Data Growth in Europe, Evaluating the trends fueling data consumption in European markets, Arthur D. Little, available at https://www.adlittle.com/en/insights/report/evolution-data-growth-europe?_ga=2.144516406.2086959423.1718125980-1400302830.1716388958

volumes combined with expanding performance (e.g., latency) requirements and ever-growing number of active devices strain available Wi-Fi spectrum capacity and, thereby, constrain end-to-end gigabit connectivity capabilities.

A recently completed study on Wi-Fi Spectrum Requirements analyzed the impact of spectrum availability on Wi-Fi's ability to support gigabit connectivity.[3] The simulation modeled Wi-Fi deployments in a typical European residential apartment building with gigabit fiber to every apartment. The model was set to ensure that Wi-Fi spectrum congestion does not constrain (i.e., bottleneck) the gigabit connectivity delivered by the FTTP infrastructure. The results of this study confirm that five 160 MHz channels (two 160 MHz channels in 5 GHz and three 160 MHz channels in the 5.945-6.425 GHz (i.e., lower-6 GHz) frequency band can only support gigabit coverage to approximately 50-60% of residential building areas. To ensure whole-building coverage, a minimum of ten 160 MHz channels are necessary.

Wi-Fi Alliance respectfully asks the RSPG to note that optimal Wi-Fi performance and functionality depend on access to multiple wider (e.g., 160 MHz and 320 MHz) channels in the 6 GHz band. Access to less than the entire 6 GHz band (i.e., 5.945-6.425 GHz and 6.425-7.125 GHz bands) substantively reduces Wi-Fi performance in terms of latency and data throughput. Importantly, reduced Wi-Fi performance caused by spectrum congestion degrades the expected gigabit connectivity benefits and jeopardizes the DDPP's objectives.

Question II: Provide information about the sustainability of the above explained demand, especially the:

1) ***Environmental impact assessment***

Response***:*** The ongoing digital transition offers a unique opportunity to advance the DDPP sustainability targets and the Green Deal objectives. In this regard, Wi-Fi Alliance calls on the RSPG to recognize inherent environmental advantages of low power Wi-Fi over MFCN (e.g., cellular) networks. The recent *Sustainability Benefits of 6 GHz Spectrum Policy* study offers a methodical analysis of this aspect for the upper-6 GHz band. [4/] The study provides clear evidence that empowering Wi-Fi with access to the upper-6 GHz band spectrum capacity results in a sizeable reduction in energy consumption and corresponding reduction in the CO_2 emissions. In this study, WIK-Consult analyzed two distinct connectivity scenarios. The first scenario assessed the impact of making the upper-6 GHz band available for Wi-Fi access in Europe. Under this scenario, fiber-to-the-home capacity was not constrained by a lack of spectrum for Wi-Fi, which in turn allowed for sufficient bandwidth to meet advanced indoor connectivity needs. In the second scenario, WIK-Consult modeled assigning the upper-6 GHz to MFCN networks, which restricted the amount of

[3] *See* Wi-Fi Spectrum Requirements, Plum Consulting, March 2024 available at Wi-Fi Spectrum requirements - Plum Consulting

[4/] *See* Sustainability Benefits of 6 GHz Spectrum Policy, by WIK-CONSULT, 31 July 2023 available at SustainabilityBenefitsof6GHzSpectrumPolicy202307.pdf (wi-fi.org)

spectrum available to Wi-Fi. The analysis confirmed that lack of spectrum access reduced Wi-Fi performance and increased data traffic congestion, which in turn, drove frustrated consumers from the fiber/Wi-Fi onto cellular networks. The forced transfer in the second scenario resulted in a 15% increased shift in data traffic from fiber/Wi-Fi to MFCN (cellular), resulting in an estimated 16% higher energy consumption. The cellular networks' higher energy consumption resulted in an additional 3.2 megatons of CO_2 emissions per year in Europe alone. **Wi-Fi Alliance calls on the RSPG to consider that the end-to-end connectivity landscape and the ensuing sustainability benefits are highly dependent on Wi-Fi performance which, in turn, depends on spectrum access.**

2) ***Social economic impact***

Response: Wi-Fi is one of the most successful connectivity technologies and is used ubiquitously in European homes, businesses, institutions, and countless other locations. The Wi-Fi functionality and evolution are essential to the connected society, which, in turn, depends on more data traffic, more devices, more services, and more applications. Wi-Fi technology continues to support and drive this growth but, **without Wi-Fi access to the upper-6 GHz band, European consumers and enterprises cannot realize the full potential of the latest and future generations of Wi-Fi technology.** Opening the upper-6 GHz band to Wi-Fi will enable a wide range of new technologies and use cases, which aligns with growing broadband (e.g., FTTP) deployments in the EU. Wi-Fi connectivity is versatile, extremely affordable, and compatible with existing networks, sharing security, management, and authentication implementations. This makes Wi-Fi an ideal "force multiplier" for the European socioeconomic development. Importantly, connectivity provided by Wi-Fi delivers billions of euros in value to the EU's economy. Indeed, a study on the Economic Value of Wi-Fi found that Wi-Fi technology generated over €400 billion in value to the European economy in 2021, a number expected to grow to nearly €600 billion by 2025.[5/]

Question III: Provide information about:

1) ***the possible role of the upper 6GHz for MFCN or WAS/RLAN***

Response: The 6 GHz Wi-Fi is here and now, enabling advanced and affordable communications for business and consumers. It is implemented in many products (e.g., flagship smartphones, laptops, access points, etc.), but in Europe these capabilities are impaired because Wi-Fi access to the upper-6 GHz band is precluded. European consumers pay a premium for the latest 6 GHz Wi-Fi enabled products with expectations that they will experience optimal Wi-Fi performance, but with the upper-6 GHz frequency band disabled, Wi-Fi cannot support higher data rates, ultra-low and deterministic latencies, better mobility, improved battery power consumption, high densities of users/devices and other features.

[5/] *See* The Economic Value of Wi-Fi: A Global View (2021-2025), Telecom Advisory Services, February 2021, available at: https://www.teleadvs.com/wp-content/uploads/The-Economic-Value-of-Wi-Fi-A-Global-View_2021-2025.pdf

In contrast, there are no 6 GHz MFCN and their requirements for the upper-6 GHz spectrum are questionable at best. This fact is clearly evidenced by the recent European Commission report on 2024 State of the Digital Decade, in which the Commission observed that the "stand-alone" 5G networks are "still not deployed on any meaningful scale, except in very few cases of private networks." [6] In this report, the Commission further observed that 5G network deployments in the 3.4-3.8 GHz band, considered the primary pioneer band for 5G in the EU with superior propagation characteristics, stood at only 51% in 2023. With the EU 5G Action Plan spectrum roadmap fulfilled,[7] it is difficult to rationalize reserving even more spectrum with less favorable propagation characteristics (i.e., upper-6 GHz vs. 3.5 GHz) for MFCN (5G) deployments. Moreover, with the 2027 World Radiocommunication Conference (WRC-27) agenda item 1.7, the IMT proponents already moved on to other "mid-band spectrum priorities" in the 4.4-4.8 GHz, 7.250-8.4 GHz and 14.8-15.35 GHz frequency bands. Given that purported MFCN spectrum needs can be accommodated in a variety of other frequency bands, while Wi-Fi technology is specifically engineered for the 6 GHz band, Wi-Fi Alliance respectfully asks the RSPG to consider that the upper-6GHz is the only mid-band spectrum that can accommodate rapidly growing need for Wi-Fi connectivity in Europe. **Without access to the upper-6 GHz band, Wi-Fi capabilities in Europe will be permanently impaired, undermining the overall connectivity goals and objectives**.

2) use cases, expected deployments (e.g. number of BS for MFCN) and timeframe

Response***:*** Wi-Fi Alliance supports the overriding policy objective of optimizing the efficiency and utility of the upper 6 GHz for public benefit. In this regard, Wi-Fi Alliance respectfully asks the RSPG to consider that extensive technical studies along with real-world RLAN deployments in the lower-6 GHz band provide the RSPG with ample evidence of regulatory conditions that are necessary for coexistence with important incumbent operations in the upper- 6 GHz band. These conditions are acceptable for RLAN networks (e.g., Wi-Fi) that can operate under constraints that do not cause unacceptable interference to incumbent operations. But these conditions are not feasible for *commercially viable* MFCN deployments because, to maintain the necessary quality of service, the MFCNs require priority spectrum access. With priority spectrum access, the MFCNs cannot avoid interfering with and/or tolerate interference from the incumbent operations in the upper-6 GHz band. That is why, in several European countries, the MFCN implementation in the upper-6 GHz will trigger a protracted and complex incumbent relocation process. In addition to the costly, multi-year 6 GHz incumbent relocation, more time (i.e., years) and investments (i.e., billions of euros) will be required to develop, implement, deploy and operate the MFCNs in the upper-6 GHz band. It is

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[6] *See* 2024 State of the Digital Decade report, July 2024 at pg. 3, fn 5

[7] *See* Communication – 5G for Europe: An Action Plan and accompanying Staff Working Document | Shaping Europe's digital future (europa.eu), 14 September 2016, low-band and mid-band spectrum for 5G harmonized at the EU level: Decisions (EU) 2016/687 [694-790 MHz], 2010/267/EU [790-862 MHz], (EU) 2022/173 [880-915/925-960 MHz and 1710-1785/1805-1880 MHz], (EU) 2015/750 [1427-1517 MHz], 2012/688/EU [1920-1980 MHz and 2110-2170 MHz], 2008/477/EC [2.5-2.69 GHz], and 2008/411/EC [3.4-3.8 GHz]

unlikely that such 6 GHz MFCNs would be economically viable given questionable ROI, limited market scale and harmonization. In the meantime, the latest Wi-Fi technology, operating in the 6.425-7.125 GHz band, is already on the market, empowering tremendous connectivity benefits in other countries (e.g., South Korea, US). Allowing RLAN operations in the upper 6 GHz band will preserve continuity of the 6 GHz incumbent operations while expanding spectrum utilization by RLANs, resulting in a spectrum policy win-win.

Question IV: Provide information about standardization and technology impact

Response*:* The *Questionnaire* comes at a pivotal time in the development of Wi-Fi ecosystem. Earlier this year, Wi-Fi Alliance introduced the latest generation of Wi-Fi technology, ***Wi-Fi 7***. Wi-Fi 7 devices are now available to support applications that require higher levels of interactivity and reliability. Wi-Fi 7 implements powerful new features, summarized below, that boost performance and improve connectivity across consumer and commercial market segments with cutting-edge capabilities that deliver high throughput, deterministic latency, and greater reliability.

- 320 MHz channels: Doubles today's widest channel size to facilitate multi-gigabit device speeds and high throughput.
- Multi-Link Operation (MLO): Allows devices to transmit and receive data over multiple links for increased throughput and improved reliability.
- 4K QAM: Achieves 20% higher transmission rates than 1024 QAM.
- 512 Compressed Block Ack: Improves efficiency and reduces overhead.
- Multiple RUs to a single STA: Improves flexibility for spectrum resource scheduling to enhance.
spectrum efficiency.
- Triggered Uplink Access: Optimizes Wi-Fi 6 defined triggered uplink access to accommodate latency sensitive streams and satisfy QoS requirements.
- Emergency Preparedness Communication Services (EPCS): Provides a seamless National Security & Emergency Preparedness (NSEP) service experience to users while maintaining the priority and quality of service in Wi-Fi access networks.

With these features, Wi-Fi 7 provides an unprecedent performance which is necessary for enablement of the innovative use cases including multi-user AR/VR/XR, immersive 3-D training, cloud computing, hybrid work, AI, industrial automation, and many others. In 2024, over 269 million Wi-Fi 7 devices will be introduced into the global market. And by 2028, the annual shipments of the 6 GHz enabled Wi-Fi devices are projected to exceed 2.5 billion. In short, regulatory harmonization in the 6 GHz band will create economies of scope and scale and produce a robust equipment market, benefiting European businesses, consumers, and the economy. But Wi-Fi 7 optimal performance depends on access to the upper-6 GHz spectrum band. **Wi-Fi 7 and future generations of Wi-Fi need access to the upper-6 GHz to deliver optimal connectivity performance – *there is no alternative spectrum.***

Wi-Fi Alliance appreciates the opportunity to contribute to the RSPG efforts.

Respectfully submitted,
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