

# Draft RSPG Opinion on The development of 6G and possible implications for spectrum needs and guidance on the rollout of future wireless broadband networks

Nokia's response to the Public Consultation

August 2023

Nokia welcomes the opportunity to comment the draft RSPG Opinion on “The development of 6G and the possible implications for spectrum needs and guidance on the rollout of future wireless broadband networks”. This response is complementary to the contributions provided via the industry association of which Nokia is member and observer, namely GSA and ETNO, respectively. We welcome and encourage RSPG to continue its engagement with all stakeholders for developing a robust 6G strategy for facilitating the timely launch of 6G services across the EU.

Nokia sees the draft RSPG Opinion as a first step towards the definition of European Union vision on 6G<sup>1</sup>. We therefore encourage the RSPG to take into consideration our comments to the Opinion when defining its spectrum roadmap for 6G. We further encourage RSPG to start its 6G spectrum roadmap as of 2023, with a goal to define it in 2024.

However, we are of view that – while providing a comprehensive collection and analysis of spectrum related material from the EU Member States on 5G deployments, state of play of the 5G pioneer bands, spectrum for local area networks, as well as views on future developments, including 6G and spectrum needs – the Opinion misses to include/ address some key elements such as the financing aspect of the 6G deployment and the ability of the operators to secure the massive investments required before the end of the decade and further in the 2030s, as well as providing guidance on RSPG’s vision of 6G and initial considerations on a related radio spectrum strategy. We equally found that the draft Opinion fails to provide a clear vision and strategy towards 6G, with initial recommendations and guidelines, and conclusions on the next steps to identifying pioneer spectrum bands for 6G.

We recommend RSPG, building on the success of its 5G Action Plan, to actively engage in considering and identifying adequate harmonised spectrum bands for the early deployment and take-up of 6G across Europe. The European Union and its member states should have a proactive position, in line with their ambitious Digital Decade and beyond goals, combining the 6G related R&D activities on technology with efforts to identify suitable spectrum allowing the technology to be deployed as soon as 2030.

Moreover, considering that identification and harmonization of spectrum for the initial 6G deployments can be a long-tail process, such spectrum-related aspects need to be addressed by Europe from an early stage of the 6G development. The successful European mass-market roll-out of 6G will not be possible without timely identification and access to adequate harmonised spectrum that allows for sustainable deployment of networks. Europe will need to be an active part of the important decisions that will be taken already in the WRC-2023 and which will be fundamental in setting the pillars of its future 6G spectrum strategy. European Union and its member states should have a

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<sup>1</sup> More detailed 6G vision from Nokia at <https://www.bell-labs.com/research-innovation/network-fundamentals/what-is-6g/>

proactive position in securing additional spectrum for mobile, in line with its ambitious Digital Decade and beyond goals.

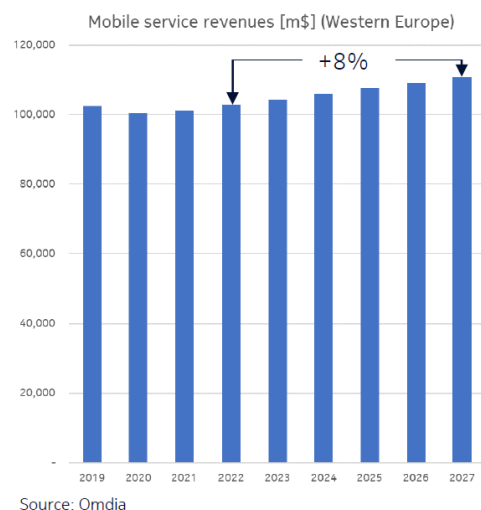
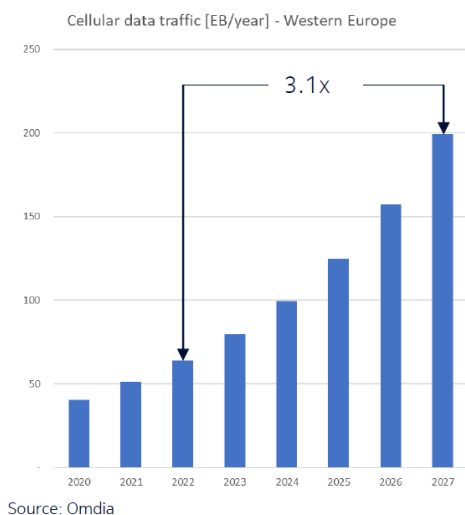
In addition to our views expressed via the GSA and ETNO contributions, Nokia would like to share some additional views on spectrum related aspects that need to be considered by RSPG in relation with 6G.

To enable Europe to take a leading position in 6G clear strategic objectives and concrete implementation steps are needed. We clearly support RSPG's recommendation for Europe to develop a 6G strategy and encourage the RSPG to define early concrete steps essential for it, including on the spectrum resources, for the 6G to be able to reach its full potential. The 6G strategy of the RSPG and EU should contain concrete goals and the adequate steps and actions to ensure that the set goals are achieved.

Although research is still ongoing the mobile industry performed preliminary analysis of spectrum needs for 6G considering two main aspects:

- Mobile traffic growth in the 2023-2030 period and what is required for the mobile networks to accommodate this traffic;
- Initial calculation of spectrum needs of some 6G use cases and their overall impact on the spectrum required per mobile network.

Europe mobile data traffic will continue its growth over the 2022-2027 period: a three-times mobile data consumption growth for a mere 8% of growth of the associated revenues. For the connectivity to remain affordable for the European consumers and businesses, mobile networks should be able to deliver the requested additional capacity at reasonable costs. Noting the already large investment gap in Europe, policy and regulatory support are necessary to meet the demand of digital growth.



Our analysis indicates that even before the arrival of 6G, to cope with traffic growth in an economic manner, densification and spectrum refarming all together with the technology enhancement will not be sufficient. New spectrum that can reuse existing infrastructure need to be considered even before 2030. Only with additional spectrum

in low and mid-bands, mobile growth and new 5G and 6G services remain affordable for consumers and businesses. Identification and availability of adequate spectrum is a key element for the successful development and launch of the 6G in Europe.

- WRC-23 provides opportunities in low and mid band to enable the further growth of mobile services in a sustainable economic and environmental manner to respond the growing demand of connectivity towards 2030.
  - o The upper 6 GHz band (6425-7125 MHz) represents the primary only opportunity for additional mid-band spectrum for 5G and 5G Advanced before 2030.
  - o Due to its superior propagation characteristics, additional low band spectrum below 1 GHz allows to sustainably upgrade the existing site grids to higher performance and capacity in rural areas and hard to reach places, reducing the digital inequality. Besides further improving eMBB user experience, services like smart agriculture, smart grid, smart transportation, eLearning, eHealth, etc., build on increased mobile network performance levels in rural areas. Last not least, Europe should consider benefit of low band spectrum options for PPDR and Defence.
- IMT-2030/6G<sup>2</sup> is set to enable new services and deliver enhanced performance in a sustainable manner, enabling industries and government sectors to reach their digitalization, productivity, automation, and sustainability targets, while also tackling the digital inequality. Efficient 6G deployment calls for the reuse of the existing urban infrastructure grids with new spectrum with large-carrier bandwidths. Further radio technology enhancements will allow spectrum from the 7-15 GHz to be deployed on the existing mobile networks, technology upgrades compensating the propagation disadvantage of these frequencies. A successful 6G market introduction in Europe starting 2030 needs identification of suitable spectrum bands from the 7-15 GHz range to be retained and studied for future IMT use in the WRC-27 cycle.

From Nokia's perspective, while advancements in mobile cellular technology will continue to improve performance of the networks, technology alone will not cope with the traffic growth and the new usages. Licensed spectrum refarming<sup>3</sup> and/or the use of complementary licensed-exempt spectrum alone will not compensate for the growth of traffic.

- As refarming depends on individual operators' strategy, it will lead to uncoordinated and fragmented release of spectrum sub-bands without a combined effect to create the needed economies of scale towards 6G by 2030.

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<sup>2</sup> For more detailed information see Spectrum for 6G explained, <https://www.nokia.com/about-us/newsroom/articles/spectrum-for-6G-explained/>

<sup>3</sup> See our latest white paper on DSS between 5G and 6G [https://onestore.nokia.com/asset/213378?utm\\_source=hootsuite&utm\\_medium=linkedin&utm\\_content=O&utm\\_campaign=spec-mig-23-1](https://onestore.nokia.com/asset/213378?utm_source=hootsuite&utm_medium=linkedin&utm_content=O&utm_campaign=spec-mig-23-1)

Also, such reformed spectrum will miss the required bandwidths expected for efficient 6G roll outs.

- Licence-exempt spectrum will continue to be used – on a non-protection non-interference basis – for the delivery of unmanaged QoS on a best-effort basis, and mainly for indoor coverage as extension of the fixed networks, as clearly stated by RSPG. Based on cases listed in the Opinion we conclude that its use is rather limited, and its main role is to be complementary to the licensed spectrum and continue to be also in the 6G era.

European countries experiences show that for the provision of coverage in rural areas, the use of licensed spectrum is prevailing for the reliability of both connections and services. We expect the same when 6G will be deployed.

As for the unlicensed spectrum, we expect that the NTN will be complementary in 6G to provide coverage in particular cases such as emergency situations and/or in low-populated/unpopulated areas where deployment of terrestrial networks is economically non-viable. As for the unlicensed spectrum that provides best effort connectivity, we agree with RSPG's view that NTN use for communications is constraint by the latency.

The mobile infrastructure will continue also in the 6G era to provide the expected coverage, capacity, and quality of service to citizens and businesses. This will not be possible in an economic and sustainable manner without additional new spectrum to start the 6G deployment. It is why outcomes of WRC-23<sup>4</sup> will allow to evaluate the future options regarding spectrum for 6G and the interest Nokia has, as well as the overall mobile industry, to study under AI 10 the potential use for 6G of bands in the 7-15 GHz range, including sharing with existing primary services, some which are international by nature. For this, we consider that the ITU-R WRC-27 cycle is the right place such studies to be undertaken, allowing participation and exchanges between all interested stakeholders.

Several contributions have been already made in other ITU regions supporting the search for additional spectrum for 6G and future networks, either under AI 10 or on a national level<sup>5</sup>. Nokia, in collaboration with other vendors and/or as GSA, have been also active in providing inputs in preparation for WRC-23 both internationally and in CEPT<sup>6</sup>

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<sup>4</sup> <https://www.nokia.com/blog/setting-the-stage-for-world-radio-conference-in-2023/>

<sup>5</sup> See contributions are listed below:

Brazil: Preliminary proposal for WRC-23 agenda item 10 – New agenda item on new spectrum for IMT. Contribution to the 41 meeting of permanent consultative committee II: Radiocommunications – CCP.II-Radio/doc. 5752/23

Korea, Vietnam, Laos: [Proposal for a new AI for IMT at WRC-23 - Contribution to the ITU Conference Preparatory Meeting CPM March 2023](#)

Japan, Korea, Vietnam: [Proposal for a new AI for IMT at WRC-23 - Contribution to APG Feb 2023 meeting](#)

India: [Proposal for a new AI for IMT at WRC-23 - Contribution to APG Feb 2023 meeting](#)

<sup>6</sup> See [PTA\(23\)047](#) contribution on AI 10, IMT-2030 (6G) Spectrum needs and candidate bands, April 2023 [PTA\(23\)131](#) on AI 10, Proposal for potential studies for IMT-2030 (6G), August 2023



preparatory meetings. We expect our calculations of spectrum needs for the new 6G use cases, as well as recommendations for bands to be studied for potential initial 6G deployments to be considered by RSPG in their work in defining their 6G strategy and the identification of the 6G pioneer bands.

Nokia encourages the RSPG to start its work on the 6G spectrum roadmap as soon as 2023, with a goal to publish it in 2024. We look forward and remain open to engage in further discussions with both RSPG and the European Commission to provide our latest inputs and exchange on spectrum and standardisation developments toward 6G.

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