Questionnaire on Long-term vision for the upper 6 GHz band
The consultation deadline is 20th August 2024

Content

Context
The RSPG intends to build a long-term vision for the upper 6 GHz band by providing policy recommendations on how to best organise the future use of this band in Europe, with the goal to maximise the contribution of this part of the spectrum to the achievement of digital connectivity targets for Europe, as laid down in the Digital Decade Policy Programme 2030 (DDPP)5. The DDPP highlights the importance of **connectivity infrastructure and accordingly sets political targets for 2030, including for the deployment of networks with gigabit speeds. All end users at a fixed location should be covered by a gigabit network up to the network termination point and all populated areas should be covered by a next-generation wireless high-speed network with performance at least equivalent to that of 5G.** In this context, please answer the following questions:

Questions

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

II) Provide information about the sustainability of the above explained demand, especially the:
1) Environmental impact assessment
2) Social economic impact

III) Provide information about:
1) the possible role of the upper 6GHz for MFCN or WAS/RLAN
2) use cases, expected deployments (e.g. number of BS for MFCN) and timeframe

IV) Provide information about standardisation and technology impact

2. GÉANT suggested response to part I. (questions I-IV)

Intro:

GÉANT is a European Research and Education Network Association of 41 NRENs in Europe (EU 27 and Countries associated with the EU Research Programmes). The GÉANT Network benefits from different EU programmes to interconnect researchers and research entities. GÉANT contributes to the DDPP through its high-speed cross-border network and services, to strengthen the Freedom of Knowledge, to respond to the big Societal challenges (e.g. Health and Environment), and to the EU's global ambition to offer the EuroHPC fleet globally (moving from gigabit to terabit speed). GÉANT is a centre of gravity at the global stage, aligning international cooperation with other continents, regions and countries.

In addition to connectivity, our Trust & Identity (T&I) services and our globally known and used eduroam service for seamless WiFi roaming globally create High Added European Value and add to the global leadership of the EU.

Both connectivity and T&I services were proven in the „natural stress-test" during the pandemic, when we could operate without a single breakdown. The stress test and, on the other hand, the significant growth of eduroam over time (from 6,3 to 7,4 billion authentications in 2022- 2023) are clear indicators of our sustainability and scalability.

The European and global experts in the field meet every year at the Technical Network Conferences, organised by GÉANT. This year TNC 2024 was held in Rennes (FR) where the general view was that the Wi-Fi base is the solution for the foreseeable future, at least for the next decade.

In the context of the Questionnaire we fall under:

- "**fixed location should be covered by a gigabit network up to the network termination point"** (out of scope, but should be compatible and wherever possible should generate synergy with the 5G, 6G solutions),
- The eduroam service which is a Wi-Fi-based technology (out of scope, but should be sonsidered)

GÉANT welcomes the approach of the Radio Spectrum Policy Group (RSPG) consultation to find a complementary solution securing both the fixed networks with its above net services (including the Wi-Fi-based services) while providing the maximum possible growth of the 5G and 6G networks. It means that the cost of non-Wi-Fi-based services supporting the gigabit networks should be evaluated as part of the work in the RSPG. The outcome of the work should offer synergies between the gigabit networks and their Wi-Fi-based services and the 5G and 6G technologies and their application.

In the following we respond to the first part of the questionnaire to explain the need to include Wi-Fi in the solution.

I) Explain the demand for MFCN or WAS/RLAN in the upper 6GHz band before and beyond 2030
Wi-Fi is without doubt the primary wireless technology used to connect phones, laptops, tablets, smart watches of students and staff to the network. The network federation eduroam allows these end-users to use the Wi-Fi network free of charge in a secure and hassle-free manner when users are visiting one of over 35.000 institutes, either in their own country or in more than 100 countries worldwide that offer eduroam.

II) Provide information about the sustainability of the demand explained above, especially the:
Wi-Fi is still evolving to respond to the demand. New technologies such as Wi-Fi6e and Wi-Fi7 demonstrate that the technology has evolved significantly. This year the IEEE working group for Wi-Fi8 was set up. We expect that Wi-Fi stays the dominant technology for the research and education community for the years up to 2030 and beyond.

1) Environmental impact assessment

Wi-Fi access point lifetime and the meantime between failures (MTBF) of a Wi-Fi access point have increased continuously over the years. The increase of lifetimes may lead to the situation that the availability of new spectrum may be the main reason to upgrade a Wi-Fi network. Increase of spectrum reduces the errors and hence provides faster and more reliable access to the network.
Apart from the economic sustainability of an access point, various vendors have implemented the ability to put an access point in deep sleep when there are no users in the building, therefore reducing power consumption.

2) Social economic impact

Global Leadership: eduroam is the best-known European brand worldwide in the Research and Education sector, securing European leadership globally. The eduroam service is underpinned by a global governance system managed by GÉANT. Assessment of any new technology must carefully consider the non-technology related elements (tangible and intangible), including the priceless trust in the current international environment. The best indicator of maturity growth: "*Following on from 2022's record 6.4 billion national and international authentications, eduroam has reached new heights with 7.5 billion authentications in 2023 in over 100 countries*." https://eduroam.org/where/

Socio-Economic Driver: The GÉANT network and eduroam services cover all regions including less populated areas. Thanks to national and European funds and the non-for-profit nature of GÉANT and its NREN community, the values laid down in International and European Treaties and, lately in the EU Digital principles, are secured.

Wi-Fi and eduroam services are well known and easily accessible to all users at no cost at the point of use. Any change would require significant training effort and likely increase the cost for the end-user.

III) Provide information about:

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

Digital transformation is running fast and builds on cloud and other new ICT infrastructures. Wireless networks provide the underlying support for cutting-edge technologies, such as cloud computing, edge computing, AI, and blockchain. The leap in network performance and capabilities substantially improves the performance for these and other upper-layer application technologies.
It is important that Wi-Fi remains aligned with these and other emerging technologies. The opportunity of using the Upper 6GHz band for Wi-Fi should also be available to organisations in Europe (and should preferably become globally available), instead of creating an unintended distinctive advantage for organisations in, e.g., USA, Canada, Brazil, Saudi Arabia, and the Republic of Korea at a global level.

The global availability of the 2.5 and 5 GHz frequency bands for Wi-Fi has significantly contributed to the success of Wi-Fi at the institutes of research and education in the Netherlands and around the globe. We fully support the allocation of the Upper 6GHz band to wireless communications in general and for license free protocols such as Wi-Fi in particular. The European Commission has the potential to realise that the 6GHz becomes a frequency band that is (almost) globally available for Wi-Fi.

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

IV) Provide information about standardisation and technology

As explained above, the interworking of Wi-Fi and cellular protocols, as facilitated by the 5 and 6G architectures, is very beneficial, and allows for the selection of a best fit for purpose solution between fixed and mobile networks. However, we believe that the interworking should not take place at the physical layer, as the 3GPP and IEEE 802.11 protocols do not work together well when they share the same frequency bands (where Wi-Fi loses out as it is less aggressive, even when 3GPP protocols use Listen-Before-Talk). Many trials to study the coexistence of Wi-Fi and cellular protocols in the same frequency band have started[1], but all efforts to bring them to practise have failed, including the standardised solutions such as LWA, LWIP, LAA, and LTE-U. Given these issues and the continued need for WiFi spectrum due to its success, and the niche character of private cellular networks, we believe that the focus for local area wireless access should be on WiFi.

[1] see GSMA: https://gsacom.com/paper/lte-in-unlicensed-spectrum-trials-deployments-and-devices/

Since 3GPP and IMT-2020 have adopted the 26 GHz band for future short-range communication needs, and Wi-Fi products operating in the Republic of Korea, the USA, and in other broadband progressive countries already use the Upper 6GHz band, we therefore kindly request the RSPG to allocate the Upper 6GHz band in Europe for solely Wi-Fi usage.