Driving innovation together

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SURF's response on the public questionnaire for the long-term vision for the upper 6 GHz band

The questionnaire mentions to favour responds through associations. SURF is the ICT cooperative of Dutch education and research institutions. SURF functions among other things as the National Research and Education Network (NREN) for the Netherlands and has a very good view of the needs and desires for wireless communications of the majority of the more than a million users within the institutes for education and research in the Netherlands. Wi-Fi in general and particular 'eduroam', the worldwide authentication service for Wi-Fi, is an important topic during each TNC, the yearly research and education networking conference that attracts over 800 participants from more than 70 countries. Based on discussions with network engineers from other NRENs within Europe, we conclude that the needs are similar at institutes for research and education in other countries within the European Union. These needs can be summarized as a continuous growing need for more available bandwidth for Wi-Fi.
From the perspective of SURF, WAS/RLANs is the preferred candidate to use the upper 6 GHz band in Europe (and globally). In what follows, we substantiate this statement by answering part A of the call for comments for the long-term vision of the 6 GHz frequency, as published here: https://radio-spectrum-policy-group.ec.europa.eu/consultations-0_en

I) Demands for MFCN or WAS/RLAN in the upper 6 GHz band
Within most institutes for research and education, the wall outlets for wired communications have moved from the working area to a location above the ceiling, to be used by a Wi-Fi access point. Wi-Fi is without doubt the primary technology to connect the phones/laptops/tablets/smart watches of students and staff with the internet. 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 they visit other institutes, either in their own country or in one of the more than 100 other countries world-wide that offer eduroam.
In addition, Wi-Fi increasingly starts playing an important role in the smart office, connecting e.g., cameras, and other equipment with the network.

We observe that within the research and education community the Wi-Fi network has grown over the years from a nice to have to a *must have*. It may take a week to receive a complaint if the plumbing is not functioning, but if the Wi-Fi does not work, it will be reported immediately. 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 constructed. We expect that Wi-Fi stays the dominant technology for the research and education community for the years to 2030 and beyond.

II) Sustainability of the demand as explained in answer I)

1) Environmental impact assessment on sustainability
The lifetime of a Wi-Fi access point has increased substantially. As an example, in 2016 the Mean-time-Between-Failures of a popular brand access point for the Enterprise market was 325000 hours. Today, data sheets of access points mention a Mean-Time-Between-Failures of 1,128,980 hours. That is a mean time of more than 128 years between consecutive failures of a single Wi-Fi access point.

The increase of the lifetime of Wi-Fi access points may lead to the situation that the availability of new spectrum may be the main reason to upgrade a Wi-Fi network for a relative long time (together with vendor support). Increase of spectrum reduces the errors and hence provides faster and more reliable access to the network. Apart from the 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 which reduces the power consumption. Our observation is that the Wi-Fi technology is about to become a very sustainable communication protocol.

2) Social economic impact
IT staff at institutions for research and education is familiar with Wi-Fi, BLE and LoraWAN products as they follow the same working processes in terms of the planning for budgets and procuring as switches and routers. The working processes associated with these technologies work for them. Some institutions have their own staff who maintain the networks whereas others request SURF or another third party to install and maintain the (wireless) networks on their behalf. In all cases the institution is in the driving seat and can keep tight control of the ICT projects where they focus on the interfaces and the interworking of technologies which allows them to translate goals into actions at strategic, tactical and operational levels. This in contrast to purchasing and operating cellular user equipment and sensors which are hard to find, is more expensive, and may not work with the cellular protocols or the frequency bands that the institution may or may not use for its private mobile network and/or for the interworking with the mobile operator. The working processes of the cellular equipment aim at products where the wireless communication forms a subset of an integrated product; a product where the equipment vendor seeks for channel partners to design, market and sell the final product. An example of the mismatch of the working processes of Wi-Fi versus cellular that comes to mind is when we discovered that one of the nodes of an indoor private cellular network needed an additional power supply unit to meet the requirements of the data centre of the institution. Installing a power supply unit is a common task for a network engineer. However, the cellular node required a certified engineer who had to travel across the country, resulting in long waiting times and a high price for executing a simple task.

III) Information about the possible role of the upper 6 GHz and use cases
The 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 improve the performance for these and other upper-layer application technologies substantially. It is important that Wi-Fi remains aligned with these and other emerging technologies at the application layer as this results in the positive effects of amplification, superposition, and multiplication that are needed to continue the fusion of technologies. This requires more spectrum for wireless communications protocols since additional spectrum allows for less interference from nearby positioned Wi-Fi access points which reduces errors and hence realises higher throughputs and less retransmissions

by the Wi-Fi protocol which subsequently results in lower transfer times for upper-level applications.
These opportunities are offered by the upper 6 GHz band for Wi-Fi and they should not be restricted to organisations in e.g., USA, Canada, Brazil, Saudi Arabia, and South Korea who have already decided to allocate the upper 6 GHz band to Wi-Fi but should also be available to organisations in Europe (and should preferably become globally available).

The upper 6 GHz band is not suitable for large area coverage of mobile communications. The usage of private cellular networks is a niche market. Hence, from a spectrum efficiency point of view a license free spectrum is a logical choice for the upper 6 GHz band.

The global availability of the 2.4 and 5 GHz frequency bands for Wi-Fi has contributed a lot 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 6 GHz band to wireless communications in general and for license free protocols such as Wi-Fi in particular.
Please consider EU's position that the decision to harmonise the upper 6 GHz band with leading 5G nations such as the United States, Canada, South Korea and Saudi Arabia may convince other countries such as e.g., Australia and New Zealand to take the same decision. This provides the institutes of research and education in all these countries the benefit of the deployment of low cost 6 GHz Wi-Fi equipment that is already available and deployed in the other countries mentioned.

IV) Information about standardization and technology impact
SURF is a big supporter of the interworking of Wi-Fi and cellular protocols. However, this interworking should not take place at the physical layer as the 3GPP and IEEE 802.11 protocols do not work together when they share the same frequency bands (where Wi-Fi loses out as it is more polite, even when 3GPP protocols use Listen-Before-Talk).
Many trials[1] to study the coexistence of Wi-Fi and cellular protocols in the same frequency band have started but all efforts to bring them to practise seem to have failed, including the standardized solutions such as LWA, LWIP, LAA, and LTE-U.

Since 3GPP and IMT-2020 have adopted the 26 GHz band for future short range communication needs and Wi-Fi products operating in South Korea, USA and in other broadband progressive countries use the upper 6 GHz band, we kindly request the RSPG to allocate the upper 6 GHz band in Europe for solely WAS/RLANs.

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