Response to Questionnaire on Long-term vision for the upper 6GHz band

A. Questions directed to the MFCN and the WAS/RLAN stakeholders:

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

From the perspective of PIIT members who are converged operators and mobile operators, both IMT technology - to handle the growth in mobile broadband traffic and Wi-Fi - to facilitate the mobility of fixed network investments in the home and office are key. We believe that the upper 6GHz (6425-7125 MHz) band should be considered within the context of the entire 6GHz (5925-7125 MHz) band. The lower 6GHz (5925-6425 MHz) band was already designated for WAS/RLAN technologies by the EC's 2021/1067 decision in 2021. This allocation of 480/500MHz of additional spectrum bandwidth resulted in an 80% increase in capacity over the existing spectrum bandwidth in the 2.4 and 5GHz bands, providing the largest channel bandwidths available for maximum peak performance. Furthermore, recent Wi-Fi field measurements[1] have shown that by using the existing 2.4GHz, 5GHz, and lower 6 GHz bands Wi-Fi can consistently achieve Wi-Fi throughput levels which readily exceed 1 Gbit/s even in high-interference urban scenarios, and thereby meet the European Union's Digital Decade Policy Programme 2030 target that "end-users should be able to use gigabit services provided by networks at a fixed location deployed up to the network termination point".

PIIT advocates that IMT technologies in the critical mid-range frequencies should also experience a similar 80% increase to ensure a balanced approach. This is crucial because, as mobile data services continue to grow and are used both at home and outdoors, a proportional increase in spectrum capacities for IMT will be necessary.

Therefore, a **dedicated allocation for IMT in the entire upper 6GHz band** is essential to achieve this balance, as decided by WRC-23.

By 2030, according to independent studies undertaken by Coleago and those by the GSMA[2][3][4], it is expected that up to 2GHz of mid band spectrum bandwidth is required to support mobile broadband by 2030. Around 1150MHz is available now in most European markets leaving a gap of 850MHz. The 700MHz in the upper 6GHz band significantly helps to bridge this gap, as mid-band spectrum is highly efficient for both coverage and capacity. It is expected, that by the end of the decade there will be between 2 and 7 times more traffic in European cellular networks than today, depending on the country. For example, Ericsson's latest Mobility Report[5] estimates mobile data traffic per active smartphone per month in Western Europe to grow, on average, at a compound annual growth rate (CAGR) of 17% from 19 GB in 2023 to 49 GB in 2029. This is growth by factor of 2.6 by end of decade, and excludes traffic generated by Fixed Wireless Access (FWA) and Internet of Things (IoT), which we expect both to contribute to the traffic growth in cellular networks. Arthur D. Little[6] estimates a CAGR of 25% on average for mobile uses (i.e. excluding FWA but including mobile-only homes), a growth factor of 4.75 on average for the EU, with current low-usage countries like Germany, Greece or Belgium experiencing growth factors above 7 times.

The customers request high performing mobile broadband capacity which requires the usage of high channel bandwidths. Beside the already deployed 3.6GHz spectrum, only the upper 6GHz spectrum band could provide such additional capacity provision with good propagation characteristics for macro networks. It has been demonstrated in several European trials that coverage levels comparable to 3.6GHz band can be reached while using the same site grid of 5G base stations.

After analysing all potential spectrum opportunities to be considered at WRC-27, we believe that no other bands can meet requirements of the increased demand for traffic in mobile networks.

[1] https://www.comtelitalia.it/indoor_connectivity_test_en/
[2] 6-GHz-in-the-5G-Era.pdf (gsma.com, 6-GHz-IMT-Ecosystem-Demand-Drives-Scale.pdf (gsma.com)
[3] Estimating-Mid-Band-Spectrum-Needs.pdf (gsma.com)
[4] https://6ghzopportunity.com/wp-content/uploads/2022/06/22-06-09-Licensed-6-GHz-opportunity-v2.pdf
[5] ericsson.com/49ed78/assets/local/reports-papers/mobility-report/documents/2024/ericsson-mobility-report-june-2024.pdf
[6] THE EVOLUTION OF DATA GROWTH IN EUROPE (adlittle.com)

Beyond 2030, this growth in demand is expected to continue, and with the potential 6G deployments around this date, the growth rate might increase due to the introduction of more advanced services such as virtual reality and augmented reality. 6G will require mid-band spectrum in order to provide a base network. **The only band that has been identified that can deliver this is upper 6GHz.**

A.II. Provide information about the sustainability of the explained demand, especially the:

1. **Environmental impact assessment**

Allocating upper 6GHz entirely to IMT will improve the efficiency of mobile networks, with positive sustainability results. Respected consultants Analysys Mason conducted a study into the carbon footprint comparison of mobile networks with and without 6GHz[7]. They concluded that allocating additional upper 6GHz mid-band spectrum to mobile networks would reduce CO2 emissions by eliminating the need for the many additional mobile transmitter sites which would otherwise be required to deliver the 5G/IMT-2020 data rate requirements in urban areas and as set out in the Digital Decade Policy Programme 2030 target that "all populated areas are covered by next-generation wireless high-speed networks with performance at least equivalent to that of 5G".

2. **Social economic impact**

The GSMA analysis "6GHz in the 5G Era"[8] concludes that an additional 0.38% of Europe's GDP could be realized by 2030 if 5G mobile networks were not constrained by the unavailability of the upper 6GHz band.

The rollout of the 6 GHz band is essential for mobile and/or convergent operators to meet the growing demand for higher capacity and to deliver ITU-R IMT-2020 requirements (100 Mbit/s download and 50 Mbit/s upload) in a cost-effective manner.

Depending on the market's characteristics and traffic growth, the additional spectrum in the upper 6GHz will be used to address the service-impacting high traffic load that macro base stations are expected to experience in the 2027-2028 timeframe, facilitating the high-performance of 5G services and laying the foundation of 6G. As each new generation of mobile technology benefited of an initial deployment band, and taken into account the shortage of suitable spectrum for 6G early rollouts, a direct connection between 6G and the upper 6GHz band has also been made. Independent reports, such as those from BIS Research, suggest that by 2035, the 6G market in Europe could be worth up to $240.02 billion[9]. However, upper 6GHz alone will not be able to sustain such growth and spectrum from the 7.125-8.4 GHz is needed to be further studied for 6G.

A.III. Provide information about:

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

The upper 6GHz band will serve as a capacity extension for existing 5G deployments once the capacity of the 5G pioneer bands and re-farmed legacy bands is exhausted, anticipated to occur before 2030.

Due to the technical characteristics and agreed regulatory conditions of the upper 6GHz band, as mentioned above, PIIT believes the band can be deployed on the existing or currently being developed 3.5GHz grid of 5G base stations.

Since the lower 6GHz band provides the necessary spectrum bandwidth for enhanced Wi-Fi services in terms of capacity and performance, we do not foresee any role for WAS/RLAN in the upper 6GHz band.

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

Upper 6GHz will be required to support forecasted mobile broadband demand by 2030. Deployments are expected to be made on the existing or currently being developed 3.5GHz grid of 5G base stations from around 2027 (country dependent).

[7] https://www.analysysmason.com/contentassets/7fc3f228704a4f0697716fc0555a85c6/impact-of-upper-midband-on-carbon-footprint-of-5g---final-report-020623.pdf
[8] https://www.gsma.com/connectivity-for-good/spectrum/wp-content/uploads/2022/07/6-GHz-in-the-5G-Era.pdf
[9] https://www.globenewswire.com/news-release/2024/02/06/2824055/28124/en/Europe-6G-Market-Research-Report-2029-2035-European-Union-s-6G-Action-Plan-Aims-to-Secure-Europe-s-Leadership-in-Innovation.html

A.IV. Provide information about standardisation and technology impact

Upper 6GHz has already been standardised for IMT, band id n104, with regulatory conditions agreed at WRC-23.

There are no viable alternatives to upper 6GHz for a mid-band spectrum range. Mid-band is vital to provide a viable wide-area network rollout. As such any technology evolutions beyond current 5G will be dependent on a viable solution for IMT in the upper 6GHz.