Radio Spectrum Policy Group

12 August 2022

Public Consultation on the Draft RSPG Opinion on ITU-R World Radiocommunication Conference 2023

Dear Sir/Madam,

Innovation Lambda is a consulting firm specialising in connectivity founded in 2020 by Dr Pasquale Cataldi and based in London. We provide consulting services in the Information and Communications Technology (ICT) and the Telecommunications, Media and Technology (TMT) sectors to support companies, policymakers and regulators to unleash innovative and sustainable products and services, with a particular focus on radiofrequency spectrum matters.

Innovation Lambda welcomes the RSPG's invitation to provide a written response to public inquiry on the opinion with respect to the Agenda Items to be discussed at the World Radiocommunication Conference 2023 (WRC-23).

Executive Summary Position

Innovation Lambda PIP respectfully companies respectfully ask the Radio Spectrum Policy Group to recommend Option 2 on the band 6 425 - 7 125 MHz - "No IMT identification". The justification for this request is contained in the following sections.

I. Wi-Fi is integral to the European Commission's objectives

In the 2021 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions titled *2030 Digital Compass: the European way for the Digital Decade*, several arguments indirectly support licence-exempt use of the 6 GHz band in place of its IMT identification. Throughout this response to the consultation, we will quote text from the EC Communication and present our interpretation.

"Digital infrastructure and rapid connectivity bring people new opportunities."[1]

In the above statement, the word rapid means both super-fast broadband connectivity and the rapidity in which the connectivity infrastructure is deployed and delivered to people. In the context of the 6 GHz band, the obvious interpretation of the sentence is that the band is best to be used leveraging existing ecosystems that can deliver super-fast connectivity and are future-proof. The apparent ecosystem able to fulfil the aspiration of the above statement is the combination of fibre + Wi-Fi.

Whilst European governments are investing heavily to implement broadband plans[2] based on fibre connectivity, citizens cannot enjoy the benefits of this investment unless they have Wi-Fi equipment that can fully leverage it –

[1] From "2030 Digital Compass: the European way for the Digital Decade".
[2] See https://digital-strategy.ec.europa.eu/en/policies/broadband-eu-countries for country-specific initiatives in the EU.

i.e., the new Wi-Fi equipment can use the entire 6 GHz, which has been deployed in several countries around the world already.

Opening the upper 6 GHz band for licence-exempt use would mean that the European Union member countries would be ready to take advantage of a new generation of digital services which can be accessed cost-effectively in the home and the enterprise because of the latest Wi-Fi 6E and 7 standards.

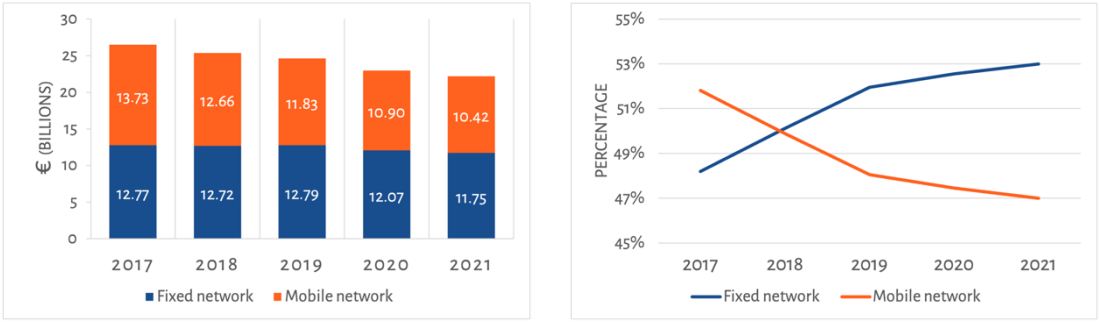
With access to the entire 1200 MHz, Wi-Fi could employ multiple non-overlapping channels of 160 MHz and 320 MHz bandwidth. Access to these wider channels would increase spectrum efficiency while maintaining the ability to share spectrum with incumbents and other licence-exempt deployments. Next generation Wi-Fi, known as Wi-Fi 7, will employ 320 MHz channels to improve further latency, throughput, reliability, and quality of service.

Unlike previous generations of Wi-Fi, Wi-Fi 6/6E and Wi-Fi 7 are based on OFDMA technology, enabling them to achieve very high quality of service (QoS) levels, particularly in managed networks. In other words, Wi-Fi has evolved to a point where it can address the most demanding enterprise use cases assuming access to sufficient spectrum.

A recent report by STL Partners says that Wi-Fi will retain its preeminent position for enterprise in-building connectivity, despite the hype about 5G. New Wi-Fi 6/6E/7 generations are game-changers that entrench and extend their role and utility in verticals, especially with access to the 6 GHz band. Crucially, the report's call to action is for telcos and policymakers to broaden their vision towards "network diversity" rather than solely focusing on 5G[3].

From an economic point of view, the expenditure of residential and business users shows that the importance of fixed networks with respect to mobile is further growing. As observed by AGCOM[4], starting from 2018, the total expenditure of users on fixed networks compared to mobile networks is progressively widening. Furthermore, AGCOM observes that, although characterised by strong pressure on prices, fixed network revenues benefit from the progressive spread of ultra-broadband, where the guarantee of services with better performance guarantees unit prices in the fees and charges associated with the subscription of broadband subscriptions higher than those allowed by accesses with lower performance. In this context, the importance of enabling the latest Wi-Fi technology has become crucial.

Final expenditure of residential and business users in Italy (in billions of € and percentage). Source: AGCOM.



[3] https://stlpartners.com/research/enterprise-wi-fi-6-7-5g-is-not-enough/
[4] AGCOM 2022 report, https://www.agcom.it/relazione-annuale-al-parlamento-2022

II. IMT identification for the upper 6 GHz band would be a mistake

Not having an IMT identification under WRC-23 Agenda Item 1.2 does not necessarily represent challenges in the deployment of cellular mobile services, as we have seen in Europe for the L-band and C-band in CEPT countries.

Indeed, countries interested in deploying cellular mobile do not need to wait for IMT identification to proceed. However, if the upper 6 GHz band were to receive an IMT identification in Region 1, regulators would have to spend considerable time and resources to develop licensing frameworks that would facilitate cellular mobile deployment whilst ensuring coexistence with the incumbents.

In practice, the restrictions on 5G deployments required to coexist with incumbents (e.g., separation distances from fixed links and deployment density) would make using the band commercially challenging for mobile operators. In turn, these challenges would significantly impact the revenue governments would raise from the actioned licenses.

IMT identification would cause a predictable delay in using the band, followed by low deployment of IMT services only in specific and limited locations when equipment is available in the market.

Those countries wishing to deploy cellular mobile services in the band can do so if they are willing to wait for IMT equipment capable of using the band and are prepared for the cost of setting up the licensing framework and deploying more expensive equipment than Wi-Fi – which in turn will have an impact on the cost of mobile services for citizens and businesses.

The outcome of the great effort in opening the band for cellular mobile services would not be worth the loss in GDP provided by the Wi-Fi equipment already available in the countries that have opened or have proposed opening, the full 6 GHz band for licence-exempt use and that account already for 40% of global GDP.[5]

Finally, it is worth recalling the following statements from the "*2030 Digital Compass: the European way for the Digital Decade*".

"This [Digitalisation] will enable a society where geographical distance matters less, because people can work, learn, interact with public administrations, manage their finance and payments, make use of health care systems, automated transport systems, participate to democratic life, be entertained or meet and discuss with people anywhere in the EU, including in rural and remote areas."

"Digitalisation endows people with new sources of prosperity, allowing entrepreneurs to innovate, set up and grow their business wherever they live, opening markets and investments across Europe and globally, and creating new jobs at a time when an increasing number of Europeans feel threatened in their economic security or environment."

The above statements are important because they provide the "where" and "when" for the Digital Decade.

The first sentence indicates that Digitalisation shall include rural and remote areas. Mobile operators would sparingly (if any at all) deploy 6 GHz networks outside the most congested locations in urban areas. This means that such use of the band would not align with the EC view.

The second statement states the importance of Digitalisation when citizens' socioeconomic security worsens, and governments are taking active steps toward environmental sustainability. Delaying the use of the upper 6 GHz

[5] http://dynamicspectrumalliance.org/wp-content/uploads/2021/08/6GHz-License-Exempt-Band-Why-1200-MHz-and-Why-Now.pdf

band to allow few IMT services in 5-7 years instead of allowing a ten times more environmentally friendly technology[6] goes directly against the EC strategy.

III. The vast majority of internet traffic in Europe is carried by Wi-Fi

Innovation Lambda would like the European Commission to take into consideration evidence-based studies that discuss the advantages of opening the 6 GHz band to licence-exempt use.

In a recent white paper, the Dynamic Spectrum Alliance showed that mobile networks only carry at most 7% of wireless traffic compared to 90% of Wi-Fi.

Considering that IMT and Wi-Fi have a comparable amount of spectrum in the low and mid spectrum, that the lower 6 GHz band recently opened for licence-exempt use will not be enough to address the needs of Wi-Fi, and -crucially- that there are no other mid bands available for Wi-Fi, then the rationale for identifying the band for IMT use is not supported by data.

Note that a full repository of policy reports, economic analyses, and technical studies on license-exempt access to the 6 GHz band is available at www.6ghz.info.

IV. Mobile operators would not use the upper 6 GHz band extensively and efficiently

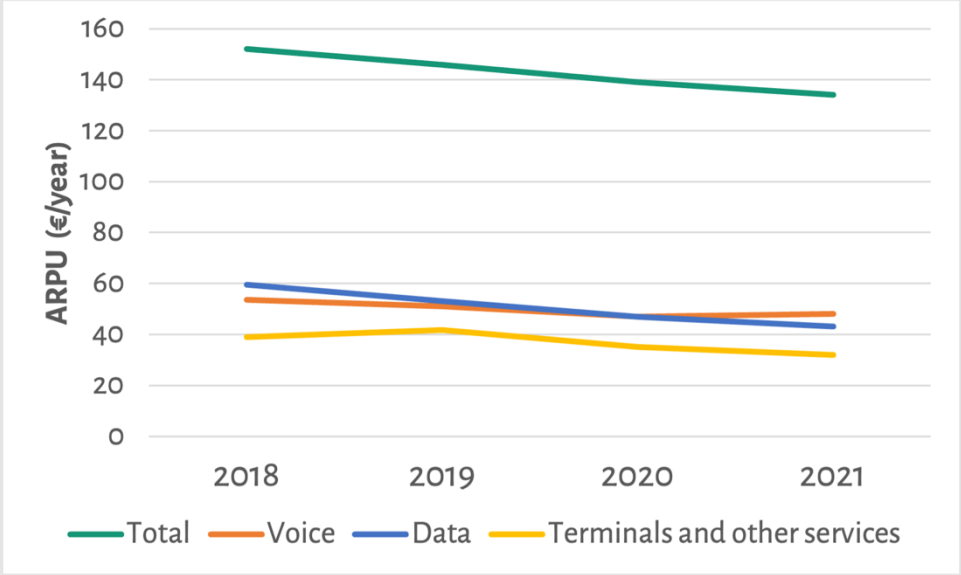
Innovation Lambda is unconvinced on whether many European mobile operators would be financially able and keen to deploy services in the upper 6 GHz band to serve a substantial portion of the population.

Once the band is identified for IMT services, mobile operators would have to obtain spectrum licences (presumably via auction) and then spend CAPEX to deploy equipment capable of using the band. Whilst we do not expect the cost of the licences to be as high as the ones in the 3.5 GHz band, due to coexistence restrictions that would limit the density and location of the deployments, it is certainly true that deploying dedicated equipment to operate in the band would be financially onerous.

These costs are particularly unappealing to all mobile operators that are struggling financially. Indeed, whilst using mobile data has never been cheaper, the erosion in the revenue per gigabyte is affecting the overall profitability of the MNOs' business. If we look at the latest annual report from AGCOM, we can observe that the Average Revenue per User (ARPU) has been declining for years (see graph below).

[6] ARCEP, "Achieving Digital Sustainability", December 2022 – available at https://en.arcep.fr/uploads/tx_gspublication/achieving-digital-sustainability-report-dec2020.pdf

ARPU (in € per year) of mobile services in Italy. Source: AGCOM annual reports.



The situation is not unique to Italy, but as a tefficient report shows, the erosion in the revenue per gigabyte is common across countries, although its entity varies a lot between markets.

If the increase in mobile data usage cannot be monetised (which is demonstrated by the decrease in ARPU), then what would be the incentive for mobile operators to acquire nationwide licences for capacity?

It is therefore clear that deployments, if any, would be focused on a small set of locations in the densest areas of the country, hence it raises the question of whether enabling licensed mobile services in the upper 6 GHz band would be an efficient way of managing a national resource.

In terms of economic sustainability, it is also worth pointing out the pressure that some telecoms operators (in particular mobile) in Europe are applying on the European Commission to put forward legislation that would ensure Big Tech firms partly finance telecoms infrastructure in the bloc[7]. Whilst this consultation is not the place to debate the fairness of this request, we observe that the fundamental reason is that the current business model of such operators might not be sustainable. In this scenario, it appears difficult to believe that mobile operators would be keen to expand their investments in 5G deployment to provide services in yet another band.

Indeed, either mobile operators want to use the 6 GHz extensively, which would require huge investments – but MNOs complain that they should get money from Big Tech, or MNOs foresee the deployment in the band to be limited (and therefore with limited investment) – in this case, the benefits to the whole country of an IMT identification would be minimal if any.

What MNOs cannot ask the European Commission to have content providers share network costs while also claiming that they would make extensive use of the 6 GHz band.

[7] https://www.reuters.com/business/media-telecom/exclusive-france-italy-spain-call-tech-firms-pay-telecoms-networks-2022-08-01/

V. Sharing between IMT and WAS/RLAN is not the solution

During the last months, a few administrations have inquired about the possibility of sharing the spectrum between IMT and RLAN. For example, high-power IMT outdoors and low-power WAS/RLAN indoors, or via a database to manage access to sub-bands of the upper 6 GHz spectrum.

It is worth highlighting that while WAS/RLAN technology is designed to share spectrum and employ several mechanisms and 'politeness protocols' for that purpose, IMT is not. Also, coexistence studies between IMT and WAS/RLAN have never been conducted, and it would be surprising for administrations to consider this approach without the necessary technical assessment. To allow co-channel operation of IMT and WAS/RLAN, either sufficiently large separation distances have to be guaranteed, so that harmful interference will not occur, or the IMT channel access mechanism would have to be fundamentally re-designed. Whilst it is difficult to imagine future IMT technology re-designed to employ polite protocols (see 5G NRU), it is also important to observe that the very same areas in which 6 GHz IMT would be deployed, i.e., dense urban and, to a lesser extent suburban areas are those that also feature the highest RLAN densities – In such locations, separation distances could not be realised.

Also, the vague definitions of outdoors and indoors do not provide enough statistical confidence that a high-power signal generated outdoors would not penetrate indoors (and, to a smaller degree, that a low-power signal generated indoors would leak outdoors). As building entry loss can vary between a few dB and more than 50 dB, separation distances would have to be calculated for the worst-case scenario which precludes an efficient use of spectrum. In practice, any interference caused by IMT operation would prevent WAS/RLAN equipment from accessing the spectrum.

As for sharing through databases, which can be an effective enabler of spectrum efficiency in several cases[8], technical and commercial reasons suggest that this approach would not be a solution to enable IMT and WAS/RLAN coexistence in this band. Firstly, databases' effectiveness depends greatly on the data available. In the case of indoor operation, it is challenging to provide location accurately and affordably, especially for consumer products. Without accurate location, the database will make worse case assumptions to avoid potential interference among spectrum users. Secondly, the operation of the database would require a revenue model which would inevitably impact the deployment of both IMT and WAS/RLAN technologies. In particular, it would impact the cost of the low-power WAS/RLAN equipment and therefore their use.

Conclusions

In conclusion, Innovation Lambda respectfully asks the RSPG to adopt Option 2 of their proposal, i.e. "No IMT identification" for the 6425-7125 MHz band.

Innovation Lambda also encourages European administrations to move at speed to enable European citizens and businesses to enjoy the socio-economic benefits that Wi-Fi delivers.

Kind regards,

Dr Pasquale Cataldi

Managing Director, Innovation Lambda Limited

[8] http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf