Radio Spectrum Policy Group ("RSPG")
Secretariat
CNECT-RSPG@ec.europa.eu

RE: A.I.I.P. COMMENTS TO RSPG "*QUESTIONNAIRE ON LONG-TERM VISION FOR THE UPPER 6 GHZ BAND*".

Associazione Italiana Internet Provider ("AIIP") has been established in 1996 and represents more than 60 (sixty) Italian ECS providers, mainly SMEs and a couple of large ones, many of which provide UBB access networks and services, by installing VHCN with both fiber and wireless access technologies (about 40% of which in grey and –formerly- white areas).

AIIP appreciates RSPG attention for achieving a long-term pan-European industrial policy for the future use of upper 6 GHz band, especially in the light of the different possible allocations of the same after ITU-R World Radiocommunication Conference 2023 (WRC-23).

Many AIIP members are already using lower 6GHz band (5945-6425 MHz) and AIIP deems that also upper 6GHz (6425-7125 MHz) band should be available especially for Wi-Fi, which relays more than 90% of all traffic volume generated in EU, exponentially increases and needs more spectrum now.

EXECUTIVE SUMMARY

According to AIIP It is pivotal that the frequency bands 6 425-7 125 MHz be allocated to WiFi/RLAN, as allowed by the *FINAL ACTS of the World Radiocommunication Conference - WRC-23 (Article 5 - Frequency allocations, Section IV – Table of Frequency Allocations, note* 5.457E[1] and Resolution 220[2]). As s a matter of fact:

- *Wi-Fi is pivotal to achieve EU digital connectivity targets for Europe, as laid down in the Digital Decade Policy Programme 2030 (DDPP), as it relays more than 90% of all BB/UBB traffic generated in EU and its volume is exponentially increasing;*
- *constant and exponential growth of Wi-Fi Traffic requests the immediate granting of further frequencies bandwidth to Wi-Fi to prevent systemic failures;*
- *Wi-Fi provides affordable connectivity to close the digital divide and to achieve EU aims;*
- *Wi-Fi Enables Europe to shift towards energy sustainability;*
- *5G has already sufficient spectrum; MNOs capacity will be integrated by a new constellation of very low earth orbit satellite by Spacelink, providing further mobile capacity at affordable prices.*

I) EXPLAIN THE DEMAND FOR MFCN OR WAS/RLAN IN THE UPPER 6GHZ BAND BEFORE AND BEYOND 2030

FTTH, whose spreading is also boosted by EU PNNR funds, increases overall access capacity available to end users; as a matter of fact, the latter are able to have more accesses simultaneously through different devices (each of which will request additional UBB access and minimum bandwidth capacity) such as *smart TVs,* IPADs and tablets, smart-phones, PCs, home and office IoT equipment, etc..

However, all such devices in almost all cases are connected at the OLT of the FTTH network or the router of the FTTx, through Wi-Fi wireless access and one or more repeaters.

Therefore, Wi-Fi is a bottleneck where most if not all communications traffic generated by the different home or office equipment have to access in order to be carried into the fiber optic stream.

[1] "*The frequency bands 6 425-7 125 MHz in Region 1 and 7 025-7 125 MHz in Region 3 are identified for use by administrations wishing to implement the terrestrial component of International Mobile Telecommunications (IMT). This identification does not preclude the use of these frequency bands by any application of the services to which they are allocated and does not establish priority in the Radio Regulations. Resolution 220 (WRC-23) applies.*

The frequency bands [6 425-7 125 MHz, NdA] are also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs)".

[2] RESOLUTION 220 (WRC-23) Terrestrial component of International Mobile Telecommunications (IMT) within the frequency band 6 425-7 125 MHz: " *The World Radiocommunication Conference (Dubai, 2023), Considering: … e) that the frequency band 6 425-7 125 MHz, or parts thereof, is allocated on a primary basis to the fixed, mobile, fixed-satellite (Earth-to-space) (space-to-Earth) and space operation services (Earth-to-space); […]".*

A wide capacity and very high-performing Wi-Fi is thus necessary in order to safeguard user experience and not to vanish all investments made on FTTH and other mixed optic fiber access infrastructure.

The following data make clear that Wi-Fi is pivotal to achieve EU's connectivity aims, as:

- **in 2020 more that 90% of total fixed broadband/UBB traffic in Europe was relayed via Wi-Fi**[3, 4], and, due to the multiplication of equipments based on Wi-FI access, such traffic volume is exponentially increasing;
- in December 2023 **80 % of internet traffic in Italy was transmitted over fixed networks vs. just 20% over mobile networks** according to AGCOM (Italian regulator) report "*Communication markets monitoring system*" no. 1/2024[5];
- UK regulator Ofcom forecasts that Wi-Fi demand in residential environments could grow from six to ten times in decade 2020-2030, driven by increases in video quality and virtual reality devices[6];
- **Wi-Fi traffic doubles every 3 years**[7] (as per estimates based on a linear regression of past data, Wi-Fi spectrum-need score –SNS- rises 25% annually in Europe[8]);
- according to FTTH Council Europe[9] FTTH connectivity will cover 309 million homes by 2027 in the EU from 217 million in 2022 as fiber is increasingly being deployed in less densely populated areas. Some of these fiber networks will be capable of delivering 10 Gbps to a building in both the uplink and the downlink. Wi-Fi enables this bandwidth to be easily shared by multiple users simultaneously and will very likely carry an even higher proportion of traffic, in excess of present 95% of total (fixed and mobile) traffic.

These numbers show that the absolute volume of Wi-Fi traffic in 2030 will be enormous and by far greater than that handled by cellular technologies and make it clear that **development of Wi-Fi (rather than IMT) is pivotal to effectively reach the EU aims** (e.g. among other, the Gigabit Society ones).

II.1) Provide information about the sustainability of the above explained demand, especially the Environmental impact assessment

II.1 From an environmental impact, Wi-Fi (with FTTH) is the access technology which better enables Europe to shift towards energy sustainability and to achieve the European Green Deal objectives.

Wi-Fi is becoming more efficient, thanks to new features, such as target wake time and the OFDMA radio interface, which reduce power consumption. It should be noted that the max. power output of Wi-Fi network has remained the same (around 100mW) since the inception of the technology.

All Wi-Fi networks operate at much lower power levels than cellular systems, so they could be the most energy-efficient connectivity option in many scenarios.

Indeed, the French regulator ARCEP[10] found that the combination of fibre and Wi-Fi is the most efficient solution in terms of energy consumption.

The ITU has forecast[11] that in 2025 the energy used by mobile networks worldwide will emit 73.0 Mt CO_2 equivalent (CO_2e), compared with 35.2 Mt CO_2e for fixed networks. Considering the share of mobile data and fixed broadband lines

---

[3] See JOHN M. CIOFFI, EE prof.at Stanford University, "*State of Wi-Fi Reporting DSA 2021 Global Summit June 8, 2021*", http://dynamicspectrumalliance.org/wp-content/uploads/2021/06/ASSIA-DSA-Summit-Presentation-v7.8.pdf

[4] Source: the ASSIA "State of Wi-Fi" report, http://dynamicspectrumalliance.org/wp-content/uploads/2021/06/ASSIADSA-Summit-Presentation-v7.8.pdf

[5] https://www.agcom.it/sites/default/files/documenti/osservatorio/Osservatorio%20sulle%20comunicazioni%201%3A2024.pdf (see pp. 6 e 13).

[6] See UK Ofcom Improving Spectrum Access for Wi-Fi, July 2020, at ¶ 3.24, available at https://www.ofcom.org.uk/__data/assets/pdf_file/0036/198927/6ghz-statement.pdf

[7] See "STATE OF WI-FI..." quoted at fn.. 4, pag. 43.

[8] See "STATE OF WI-FI..." quoted at fn 4, slide 19.

[9] FTTH Forecast for EUROPE - Market forecast 2022-2027, FTTH Council Europe, https://www.ftthcouncil.eu/knowledge-centre/all-publications-and-assets/1462/ftth-market-forecasts-2022-2027

[10] https://en.arcep.fr/uploads/tx_gspublication/achieving-digital-sustainability-report-dec2020.pdf

[11] Source: ITU, *Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement, 2020.*

in Europe, around 4.8 Mt CO2e will be emitted from fixed networks and 10 Mt CO2e from mobile networks in the EU.

Fixed networks produce less than half the CO2e of mobile networks, even though they transport more than ten times the amount of data.

Employing Wi-Fi, rather than IMT, in the upper 6 GHz band will require less power, helping Europe to make better use of scarce energy resources.

Next-generation Wi-Fi routers (all 6E and most 7) already utilise the lower 6 GHz band. Enabling the full 6 GHz band wouldn't require the addition of new devices (unlike 5G networks in the 6 GHz band, which would need to be installed from scratch). Wi-Fi routers with access to the entire 6 GHz band can reduce retransmissions in dense networks. Moreover, having more 160 MHz and 320 MHz channels available allows devices to transmit for shorter periods, which helps to alleviate network congestion, improve service predictability, and, importantly, minimise transmission energy.

In addition to the above, as to environmental sustainability, it should be considered that (i) Wi-Fi routers with access to full 6 GHz bandwidth would allow to reduce the data flows due to retransmission in dense fixed networks and that (ii) by using more channels from 160 MHz and 320 MHz would allow equipment to transmit same amount of data in less time (which would reduce energy consumption at for same data transmitted); (iii) Wi-Fi 6 introduces new features to support IoT deployments, such as support for large numbers of simultaneous connections. As a result, more IoT devices will be able to send more information and use less power.

Mobile networks are frequently used to provide fixed wireless access (FWA). However, FWA power consumption is much greater than that of a fibre connection. As a matter of fact, according to a March 2022 study conducted in North Rhine-Westphalia (representing a typical rural to urban settlement): to deliver data at 50 Mbps, FWA consumes more than three times as much power as fibre. For 250 Mbps, FWA consumes more than five times, and for 500 Mbps, more than nine times as much power[12].

II.2) Social economic impact

From a social and economic point of view, to prevent negative impacts, the constant growth of Wi-Fi Traffic highlighted in par. I.1 requests immediate intervention to prevent failures and implies that the following issues shall immediately be faced:

- *Wi-Fi Latency*: sensibly degrading over time as Wi-Fi traffic increases;
- *Interference[13]/Access Denial*: due to the growth of Wi-Fi traffic over time, time percentage that a channel is unavailable because other routers/equipments occupy that same channel is increasing;
- *Congestion*: QoE-extrapolated measure of end-customer frustration as a function connection-bandwidth use by stations associated to this router;
- *Wi-Fi Transmit Rate[14]* rapidly decreases with saturation;
- Demanding industrial applications, such as factory robots and sensors, augmented reality (AR), healthcare monitors, and wireless medical equipment, can be realised with licence-exempt technologies, specifically with Wi-Fi 6E and Wi-Fi 7, which are based on OFDMA technology with more precise clocking and can achieve very high quality of service (QoS) levels, particularly in managed networks run by enterprises.

The above limits of Wi-Fi are destined to become exponentially worse in the near future if no further frequencies are granted to Wi-Fi.

Therefore, from a social and economic point of view it is necessary to prevent negative impacts due to Wi-Fi QoE degrades due to spectrum limitations.

This is so the more relevant if one considers that the next generation applications will require very low latency, which is sensitive to spectrum "quality".

---

[12] I.B.M.T, Meschede, March 2022, via Europacable (link)

[13] Wi-Fi interference represents the percent of time that the channel is not available due to interference from other APs and from unassociated stations.

[14] Wi-Fi transmit rate is the theoretical maximum data rate, as determined by the Modulation and Coding Scheme (MCS), the channel bandwidth, guard interval, and the number of spatial streams.

III) Provide information about:

III.1) the possible role of the upper 6GHz for MFCN or WAS/RLAN

III.1 As to the possible role of the upper 6GHz for MFCN or WAS/RLAN, for the above reasons (esp. at par. I.1), there is a strong need to allocate the 6 425 - 7 125 MHz frequency band for such purposes.

Indeed, access to a broader spectrum of unlicensed frequencies and to wider channels for new Wi-Fi technologies is essential to allow customers of VHCN landlines to effectively enjoy the full features of the Internet access service they purchased, in terms of high speed, low latency and jitter.

From a social and economic point of view, to prevent the social and economic negative impacts examined at par. II.2, due constant growth of Wi-Fi traffic highlighted in par. I., it is necessary an immediate intervention to grant the full (including upper) 6GHz bandwidth to Wi-Fi on a non exclusive and collective use (as for lower 6GHz bandwidth).

In addition, please note that IMT-5G already has access to sufficient spectrum and more spectrum below 6Ghz is still to be assigned to IMT.

As a matter of fact, successive WRCs have identified specific frequency bands for the deployment of IMT systems, and this spectrum constitutes a good mix of 'coverage' bands (below 5 GHz) and capacity bands (mmWave spectrum above 24 GHz). In Europe, 1018.5 MHz of low and mid-band spectrum can be used by Wi-Fi, whilst 1368 MHz is allocated for IMT services, although Wi-Fi carries over 90% of all BB/UBB traffic.

In Europe, CEPT has already made all the IMT mid-bands technology neutral, allowing the use of this spectrum for 5G.

However, as of 31 August 2021, only 56% of the EU harmonised radio spectrum for 5G had been awarded across the Member States[15].

In addition, for the bandwidth below 6 GHz, about 19% of spectrum still needed to be assigned.

The large amount of spectrum below 5 GHz that has already been identified for IMT could, and should be, harnessed to improve coverage before specifically identifying more spectrum for IMT in other , higher, bands. For example, the 3.8-4.2 GHz band should provide ample capacity for 5G to cover the use cases that need licensing.

Mobile network operators (MNOs) greatly benefit from Wi-Fi's capacity to offload (or extend) traffic from cellular mobile devices (not only for data, but also for voice, eg. Wi-Fi Calling); if this capacity were not available, IMT/5G networks would be more costly, as mobile operators would need to deploy many more small cells in dense urban areas to offer gigabit throughput and provide adequate quality of service, and this would be to mobile users only.

Today, Europe's 5G networks are operating well below capacity. A study of mobile data usage in 2021 found that, even in the top 5% of the busiest sectors, 5G traffic runs at only 7.7% of capacity on average[16]. In other words, usage of 5G to date tends to show that additional mid-band spectrum is not required.

According to AIIP, for the above reasons, a regulatory framework that would allow in the upper 6GHz for the coexistence of the IMT (5G) and RLAN (Wi-Fi 6.0), provided that it is effectively feasible on a technical point of view[17], would only decrease the benefits for the whole system and for final users of having licence-exempt access to the entire 6 GHz band.

In any case, if coexistence between Wi-Fi and IMT is required in upper 6GHz band, it is essential that Wi-Fi has full access to the entire 6 GHz band, at least indoors and that, if IMT is used in upper 6 GHz band, transmission powers outdoor should be low enough not to cause interference with Wi-Fi.

III. 2) Provide information: as to use cases, expected deployments (e.g. number of BS for MFCN) and timeframe

[15] The bands are 700 MHz, 800 MHz, 900 MHz, 1.5 GHz, 1.8 GHz, 2 GHz, 2.6 GHz, 3.4-3.6 GHz, 3.6-3.8 GHz, and 26 GHz. Source Digital Economy and Society Index (DESI) 2021.

[16] Analysis based on the 82 5G networks considered in EU27 by Rewheel research's study "*Mobile data usage in 2021 and 4G & 5G operator capacity potential*", March 2022. https://research.rewheel.fi/downloads/Mobile_data_usage_2021_capacity_potential_170_operators_50_countries_PUBLIC_VERSION.pdf

[17] As a matter of fact due to the huge unbalance between the transmitting powers of IMT vs RLAN, IMT would impede Wi-Fi from transmitting.

Allocation of full 6GHz band to Wi-Fi would address a variety of widespread and already existing use cases, considering that the necessary Wi-Fi 6 devices are already available on the market.

The most critical use cases regard businesses and the public sector, which are increasingly connected with Internet access above 1 Gbps, and up to 10 Gbps, while being stuck with WLANs that are prevented from matching these performances. This imbalance undermines the overall user-experience of connectivity services, and decrease demand for VHCN, hindering the potential take-out rate of our networks. In light of the deployment of IoT solutions, this situation is bound to affect all kind of businesses/public administrations, but is particularly urgent for three sectors, well represented in the client base of AIIP members: healthcare, education, and tourism.

Hospitals, hotels, schools and libraries all make an extensive use of Wi-Fi networks. In all these cases, a full internal fiber cabling, or "fiber to the room", is usually unfeasible. And even where feasible, such a "solution" is not directly accessible through laptops and smartphones, and thus does not limit the demand for Wi-Fi from the guests/patients/visitors.

The availability for Wi-Fi of the full band would also be immediately beneficial to residential users, living in densely populated areas and, in particular, in the historical centres of Italian cities, with buildings where fixed LANs are impratical. The density of WLANs in these areas often makes it impossible, with the available band, to prevent channel interferences on all three axes (x, y, z), leading to dramatic performance drops..

The new 6GHz band introduced in the Wi-Fi 6E and 7 standards allows for not only larger channels but also a completely different client management system compared to the old Wi-Fi standard, and one that is much more similar to 5G. This technological divergence enables not only higher performance due to the massive channels of up to 320MHz but also an extremely efficient use of these channels, shedding years of technological legacy. The goal of making as much bandwidth as possible available on the new 6GHz band is to maximize the speed of this sort of "5G accessible to all operators and/or end users," which is entirely different from the "old" basic Wi-Fi 6 technology. This completely disruptive technology is the key not only for the success of the Digital Compass 2030, but also for all new digital live inside homes, like IoT, demotics, advanced alarming system with IA CCTV, that nobody want to connect by wires.

IV) Provide information about standardization and technology impact

As to the effect of standardisation and technological impact, the *largest interoperability of services/apps, which also will granted by the provisions of Digital Markets Act,* will boost "contents" to be transmitted and, consequently, it would increase FTTH (and Wi-Fi) access bandwidth demand.

Therefore, according to AIIP, in order to allow users to enjoy a proper performance (in terms of reliability, latency, speed, etc.), European Union in no way can continue to delay an obvious decision to allocate in favour of Wi-Fi also the upper 6 GHz band, as this would enlarge the gap with the countries as USA, Canada and others which have already allocated the full 6GHz band to Wi-Fi.

Any further delay in allocating the full 6GHz band to Wi-Fi will cause an unrecoverable loss of competition to EU.

Giovanni Zorzoni
AIIP Chairman

Associazione Italiana Internet Provider
c/o MIX s.r.l. – Via Caldera 21, Palazzo Orange/3 – Caldera Park - 20153 Milano (MI)
Cod. Fis.: 97166260154 – P. IVA: 07549520968 – EU Transparency Register n. 255497819753-30
Website: www.aiip.it - Contact us: segre@aiip.it