Meta

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Lithuania: Public Survey on the Prospects for the Use of the Radio Frequency Band 6425-7125 MHz [1] (the "Consultation")

Meta Platforms Ireland Ltd ("Meta") welcomes the opportunity to provide comments on the above Consultation.

Meta sets out below its general position, followed by more detailed responses to the individual questions in the Consultation.

Executive Summary

We are at a critical juncture in terms of creating an enabling environment for AI. Wearables (e.g. AR/VR connected headsets, smart glasses etc) represent the 'window' into the next generation of AI ready consumables, and offer huge potential for the medical, educational, industrial and consumer sectors. In order to fully benefit from this potential, the Wi-Fi industry needs certainty that sufficient 6GHz spectrum will be available on a permanent license-exempt basis, without delay.

We therefore, respectfully urge Lithuania to move quickly, and specifically within the remainder of 2025, so as to take the following positions:

- Make at least 160 MHz (6425-6585MHz) available to WAS/RLAN. This is consistent with all proposals currently discussed at EU level.
- More specifically, the Radio Spectrum Group (RSPG) should recommend that ECC Decision (20)01[2] be updated to include 6425-6585 under the same conditions as the 5945-6425 MHz band.
    - A decision on how to allocate further spectrum for RLAN can be made at a later stage.
- RLAN terminals should be certifiable ie, compliant for operation across the entire 5945-7125 MHz band, with operation in 6585-7125 MHz only be allowed under the control of a Low Power Indoor (LPI) Access Point (AP).
- Designating at least 6425-6585MHz for licence-exempt permanently, with rules consistent with those for the 5925-6425 MHz frequency range as early as possible, would deliver immediate benefits to users, with a readily available ecosystem and significant capacity benefits (in particular enabling 4 channels of 160 MHz).

[1] https://www.rrt.lt/wp-content/uploads/2025/02/20250228_Apklausa-6425-7125-MHz.pdf
[2] ECC Decision (20)01 on the harmonised use of the frequency band 5945-6425 MHz for Wired Access Systems including Radio Local Area Networks (WAS/RLAN) approved 20 November 2020: https://docdb.cept.org/download/1448

An analysis of practical solutions should be performed to enable sharing between WAS/RLAN and Mobile or Fixed Communications Networks (MFCN) (opportunistic access, coordination between public and private networks, VLP, etc.).

As part of the above analysis, due consideration should also be given to the needs of enterprise and industrial networks for reliable and sustainable wireless broadband connectivity.

Countries should have the latitude to implement some of these solutions early, according to their national situation. That being said, should Lithuania adopt the above position, this position is also consistent with that being taken by other countries in Europe such as France, Germany and the United Kingdom (UK), where 6425-6585MHz is proposed to be identified to WAS/RLAN by these three administrations.

Making 6425-6585MHz available (as proposed above) is a minimum recognised by all; while there remains open discussions about how much additional spectrum should be open to RLAN, as noted above, a decision on this last point can be taken at a later stage.

It is important that existing and future innovation is not stifled at such a critical juncture, when a blossoming ecosystem for devices already exists. To do so, would risk Europe - and specifically Lithuania - missing out on important societal benefits for health, education, enterprise and consumer use cases.

Meta is firmly of the view that the additional RLAN channel of 160MHz (requested above) will be essential for scalable adoption of the wearables ecosystem. There are already concrete use cases identified that will benefit from this additional RLAN channel, such as important enterprise and multi-dwelling residential use cases, that require more than an additional 160 MHz for scalable adoption.

Meta's responses to the Consultation Questions

A. What would be the need to use the 6425–7125 MHz (U6 GHz) radio frequency band to provide public mobile radio communications (IMT) network services in Lithuania and when could such a need arise?

1.What is the current need for new radio frequency resources? Please indicate how loaded the available spectrum resources (1800/2100/2300/2600/3600 MHz) are?

Meta draws attention to the following statistics for Lithuania provided by the EU Observatory, below.

EU Observatory[3]:

- Only 51% of EU 4G Base Stations (BSs) are equipped with 5G

[3] Available at https://5gobservatory.eu/observatory-overview/interactive-5g-scoreboard/#5G-base-stations

- 3.6GHz 5G => only 12% of all MSs

The 6 GHz band is only going to be deployed on the 3.6GHz BS that are saturated => a fraction of the 3.6GHz band BSs.

There is currently no demand for 6GHz.

2.If you were to use the U6 GHz band, how much radio bandwidth would one operator need?

For existing infrastructure (base stations deployed outdoors), the U6 band would enable additional capacity for outdoor and supplemental downlink indoors, but very limited uplink capacity[4]. Typically 100MHz would almost double the 3.6GHz capacity, albeit on a reduced coverage/performance. It is already challenging at 6GHz to close link budgets. Wider channels are not helpful.

3.What network infrastructure would you develop in the U6 GHz band (e.g. macro/micro cells, etc.)? Would you and how would you densify the existing network infrastructure?

Meta considers that the U6 GHz band only makes sense by reusing the 3.5GHz macro Base Stations (BSs).

If a mobile network operator (MNO) were to deploy a denser network, we consider there are much better frequencies to do this. For example:

- The 3.5GHz band: which has a much better ecosystem, and
- The 26GHz band: which would enable improved performance.

Conversely, the 6GHz band has little ecosystem and worse performance than the 3.5GHz band.

4.What effective isotropic radiated power (eirp) of base stations would you use (e.g. up to 50 dBm/100 MHz, between 50–60 dBm/100 MHz, between 60–83 dBm/100 MHz, etc.)? Please justify this need.

From the ECC studies, it is clear that if MNOs want to approach the coverage available at 3.5GHz, they would need between 60 and 83 dBm/100MHz. While this would allow correct downlink (DL) performance, we note that the uplink (UL) performance will always be shaky or, more simply put - bad, at 6GHz.

[4] See Telefonica / Huawei study for Stuttgart available at https://api.cept.org/documents/ecc-pt1/81128/ecc-pt1-24-005_telefonica-6-ghz-stuttgart-coverage-test-results

5.Where do you plan to ensure radio communication (e.g. outside and indoors, outside only, indoors only)?

We hear MNOs indicating that they want to cover everywhere. In our view, however, outdoor and light indoor is likely to be achieved.

6.In which areas would you plan to provide services using the U6 GHz band (e.g. urban, suburban, rural, industrial areas, etc.)?

Based on MNO contributions to CEPT PT-1, MNOs primarily see value in serving indoor users and limited value in additional outdoor capacity. Hence we believe that MNOs would seek to provide services only at a fraction of existing 3.5GHz sites, and specifically only in dense urban areas where indoor capacity is constrained..

Per CEPT PT1 (25)020r1 GSA - Upper 6 GHz needs full power MFCN[5] –

> "Most MFCN usage is indoor, any outdoor-only use of the upper 6GHz would provide limited opportunity to offload capacity from other MFCN bands.
> Considering that mobile network operators have explained that the usage of their networks mostly happens indoors, and specifically "indicating around 60% to 90% indoor usage ", any potential MFCN / RLAN sharing frameworks which are based on a reduction of the MFCN BSs e.i.r.p. aiming at outdoor-only MFCN coverage (or outdoor MFCN with limited indoor MFCN coverage) would not address the basic capacity and performance requirements of MFCNs. In addition, any outdoor-only MFCN would only provide limited capacity relief for other bands which are becoming congested mostly due to the indoor traffic"

7.What new services could be offered using the U6 GHz band (or part of it)?

We believe that these would be the same services as any of the other MFCN layers, i.e. mobile broadband.

8.When would you start deploying networks in the U6 GHz band?

N/A

9.How many and what kind of base stations do you plan to build within the first 5 years of operation?

[5] Available at https://cept.org/documents/ecc-pt1/86820/ecc-pt1-25-020r1_gsa-upper-6-ghz-needs-full-power-mfcn

N/A

10.Which of the mechanisms for sharing the U6 GHz band (see draft ECC report) would be most advantageous for the combined use of IMT and WAS/RLAN?

Meta consider the most advantageous would be a band split, with:

- A purely Wi-Fi sub-band (ideally 320 MHz or more). Stakeholders from the Wi-Fi industry have already indicated that at least 320 MHz of clean Upper 6 GHz spectrum is required to meet the demand for Wi-Fi services.
- An IMT section of the band where Wi-Fi is allowed to operate, where IMT is not deployed. The exact mechanism to ensure non-interference would need to be further studied.

We consider that enterprises, factories, hospitals, universities must have ways to operate Wi-Fi on the full 1200 MHz on their premises.

B. What would be the need to use the 6425–7125 MHz (U6 GHz) radio frequency band for wireless access systems in Lithuania, including radio local area networks (WAS/RLAN), and when could such a need arise?

1.What is the current need for new radio frequency resources? Please indicate how crowded the available spectrum resources are (2400–2483.5 MHz, 5150–5350 MHz, 5470–5850 MHz and 5945–6425 MHz)?

- Spectrum use is fairly high, and congestion is impacting quality of service.

  As noted in the DSA/ASSIA State of Wi-Fi Reporting, DSA 2021 Global Summit June 8, 2021 report[6],

  "*Both 2.4 GHz and 5 GHz bands at or headed to saturation*
    - *annual increase in 5 GHz band is higher than 2.4 GHz band in North America (USA, Canada) and Europe;*

  …
    - *The next generation of applications will require very low latency, which is sensitive to spectrum "quality"*."

- The need for spectrum is not just linked to high spectrum use, it is to enable wider channels which cannot be supported in 2.4 and 5GHz.
- 6GHz is the only band for gigabit Wi-Fi.
- 80/160 VLP channels are key enablers for AR/VR/AI devices.

[6] https://dynamicspectrumalliance.org/wp-content/uploads/2021/06/ASSIA-DSA-Summit-Presentation-v7.8.pdf

For further details, we recommend the 6GHz.info website[7], which sets out the case for the Wi-Fi industry's requirement for the full 1200 MHz available in the 6GHz band, and the need for wider channels:

"*Opening only 480/500 MHz of the 6 GHz band would mean that Wi-Fi networks in dense deployments would have to continue employing small channel bandwidths, as only one 320 MHz channel or three 160 MHz channels would be available. With access to the full 1200 MHz, a larger number of these wide channels could be accommodated (see graphic), significantly improving the performance available to each user.*

Wider channel bandwidths increase spectrum efficiency and deliver high-bandwidth applications and services while maintaining the ability to share spectrum with incumbents and other licence-exempt systems. A shortage of wider channels would have a detrimental impact on real-time video services and high-bandwidth immersive services, such as augmented reality, virtual reality, and extended reality (AR/VR/XR) services.

Enterprise use cases (in manufacturing, education, healthcare and other sectors) requiring different data rates, latencies, and quality of service within one deployment depend on the large number of channels and the diversity of channel widths (20/40/80/160 MHz) that become available with 1200 MHz of spectrum.

Wi-Fi 7 relies on access to 320 MHz channels to further improve latency, throughput, reliability and quality of service relative to Wi-Fi 6E."

2.What is the current distribution of WAS/RLAN device standards used on the market (e.g. WiFi-5, WiFi-6/6E, WiFi-7, etc.)?

According to 6ghz.info[8], a wide range of 6 GHz Wi-Fi equipment, compatible with the Wi-Fi 6E or Wi-Fi 7 standards, is now available.

6ghz.info indicates that there are more than 2,000 different client devices and access points supporting Wi-Fi 6E, including more than 1,000 laptop models, 300 desktop PCs, scores of consumer and enterprise access points, and more than 90 smartphones, as well as 69 smart televisions, according to Intel[9].

[7] https://6ghz.info
[8] https://6ghz.info
[9] Disclaimer: This data is compiled by Intel from vendor websites, press releases, and third-party device reviews. Intel provides this assessment for informational purposes only, does not guarantee its accuracy, and it is subject to change without notice.

As of March 2024, there were already 63 smartphone models and 62 access points that support Wi-Fi 7[10].
As the market grows, economies of scale are kicking in, ensuring that Wi-Fi 6E will be highly affordable.

IDC estimated more than 807 million Wi-Fi 6E/Wi-Fi 7 devices would be shipped worldwide in 2024. As with previous generations of Wi-Fi, these new technologies are set to be included in almost every phone, tablet and laptop, as well as other appliances, such as printers, televisions, cameras and wearables. Grand View Research has forecast that the Wi-Fi 6/7 chipset market will grow rapidly. It projects that more than 7 billion Wi-Fi 6E chipsets and more than 3 billion Wi-Fi 7 chipsets will be shipped in 2030 globally[11].

In short, the Wi-Fi 6E/7 ecosystem is expanding fast. That buoyancy is underpinned by the Wi-Fi Alliance certification program, which ensures devices comply with the IEEE 802.11ax standard no matter where they are deployed. In simple terms, this certification ensures they will work and work well.

3.What new services could be offered using the U6 GHz band (or part of it)?

Meta notes that such services already exist today (see response above to Q2). The devices are available but they are software restricted in Europe.

4.What is the minimum amount of radio frequency spectrum resources required for a WAS/RLAN system to meet the quality and diversity of the intended services? What are the requirements for new services (e.g. virtual/augmented reality devices, etc.)?

160 MHz clean channel is required for VLP/AR/VR. This is in competition with, for example, the Wi-Fi network at a university.

Please see our response to Q5 below, which cites examples of recent studies conducted in a) school environment, and b) hospital environment, that demonstrate the criticality of having the full 6 GHz band (ie., 7 channels versus 3 channels) available for WiFi on an unlicensed basis.

5.What types of locations (e.g. airports, hospitals, universities, residential areas, etc.) currently have the greatest demand for radio frequency resources?

Local stakeholders, such as hospitals, universities, factories etc already have advanced current uses, including low latency applications.

[10] According to a LinkedIn post by Gabriel Desjardins, Director, Wireless Connectivity Division at Broadcom.
[11] Grand View Research, Market Analysis Report.

We refer to a Paper produced by IEEE "***AR/VR Spectrum Requirement for Wi-Fi 6E and Beyond"***[12]. The Paper takes a school as a good example of a challenging scenario where a large number of AR/VR devices have high data rate and latency-sensitive traffic, and require reliable wireless connectivity.

The Paper noted that in order to encourage emerging applications such as AR/VR, several leading countries including the USA, South-Korea, Brazil and Canada released 1200 MHz of the spectrum in the 6 GHz band for the unlicensed use cases. Other countries, including European Union member states, only released the lower 500 MHz of the 6 GHz band and many have yet to decide on the future use of the Upper 6 GHz band. In the Paper, the consultants quantified the impact of spectrum scarcity on the feasibility of the AR/VR applications for e-education. They compared the maximum number of AR/VR devices supported in each classroom of a given school, depending on whether 500 MHz or 1200 MHz are available for unlicensed use cases[13].

In short, the Paper shows that with:

- **500 MHz** of spectrum availability, the capacity is **4 students per classroom** with 4 classrooms per floor.
- **1200 MHz** of spectrum availability, **up to 22 students per classroom can concurrently use the VR headsets** in 14 classrooms per floor (whole school).

The Paper further demonstrates that the number of classrooms can be extended beyond 14 per floor without affecting the capacity of each classroom. The authors of the Paper conclude that the results ***"highlight the significance of 1200 MHz spectrum availability for supporting AR/VR applications in high-density large-scale scenarios and 500 MHz of spectrum is not enough to support AR/VR applications"***.

Further studies have also been conducted for other use cases, such as hospitals. For example:

1. A joint study in July 2024 by **Wi-Fi Alliance® with Ramathibodi Hospital, Mahidol University looking at AR/VR use cases for medical applications**[14].

   The study highlighted two use cases using only the three 160 MHz channels available in the lower 500 MHz (lower 6 GHz band) versus the seven channels available in the full 1200 MHz of the 6 GHz band (full 6 GHz band). According to the authors of the study, the demo underscored the criticality of the full 6 GHz band for maintaining an optimal user

[12] https://ieeexplore.ieee.org/abstract/document/9994727
[13] The school scenario modelled in the Paper was for: a three-story building. Each story has 14 classrooms, and the classrooms are in two rows which are separated by a hallway. The size of each classroom is 10m×10m , and the hallway is 6m wide. The material of the inner walls is thick brick, and the material of the floors is reinforced concrete. There is one AP in each classroom serving 20 to 30 students (STAs), where each student wears a VR headset for e-education.
[14] https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-and-ramathibodi-hospital-demonstrate-advanced-6-ghz-healthcare

experience under high network loads. The demonstration highlighted the following key use cases:

- ***Efficient use of AR/VR technologies for medical training***: AR/VR technologies like immersive virtual anatomy visualization allows for in-depth analysis of the human anatomy, providing doctors and medical students with an immersive 3D view of the human body including skeletal, muscular, neural, and soft tissue structures.

- ***Dense deployment streaming and file transfer***: Next generation Wi-Fi supports the ability for every person in a 500-seat classroom to independently stream HD video, transfer files, or utilize 5 GHz and 6 GHz multi-layer network segmentation and deployment.

2. A **7-month long pilot between Wi-Fi Alliance® and Faculty of Medicine Ramathibodi Hospital, Mahidol University,** with results published in December 2024[15]. Wi-Fi Alliance member partners who participated in this pilot, included Meta, as well as Hewlett Packard Enterprise, and Intel.

- The full 6 GHz band was used to enhance teaching and learning capabilities to doctors and medical students. The full band 6 GHz was fully integrated with the hospital's curriculum and offered performance insights from medical students and faculty that used advanced connectivity technologies in a dense environment for medical training and educational purposes.

- According to the study, key takeaways from the pilot trial included:

    - Using the full band 6 GHz, hospitals and healthcare facilities can reduce network congestion and support advanced AR/VR technologies while ensuring stable and fast connections crucial for real-time medical applications and data-intensive trainings.
    - The full band 6 GHz is critical for maintaining an optimal user experience for high network loads.
    - Unlicensed use of the full 6 GHz band for Wi-Fi was needed for Ramathibodi Hospital – and the Thailand healthcare industry overall – to maintain a leadership position in medical education and care in Southeast Asia.
    - The latest Wi-Fi innovations in Wi-Fi 6E and Wi-Fi 7 are fully capable of delivering efficient, robust, and reliable service across diverse market segments, provided regulatory decisions enable this critical spectrum access.

6.What maximum effective isotropic radiated power (eirp) would you use (e.g. 25 mW, 200 mW, 4 W) in the U6 GHz band (or part thereof) and where would you plan to provide radio communication (e.g. outdoors and indoors, outdoors only, indoors only)?

[15] https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-and-faculty-of-medicine-ramathibodi-hospital-drive-6-ghz-wi-fi

We would have the same as for the L6 GHz, i.e. mainly:

- 14dBm indoor and outdoor (VLP)
- 23dBm indoor (LPI)

Standard power deployment would be relevant for professional deployments.

7.Would it be relevant to use the entire U6 GHz band for the WAS/RLAN system for a defined period (e.g. until 2030, 2032) indoors and/or outdoors on a non-interference basis, with the proviso that the equipment may be required to be switched off in the future?

Lithuania should open 6425-6585MHz immediately under the same conditions as L6 GHz to support innovation and to enable terminals to support the full band under the control of an Access Point (AP). This will be required in any event, when WAS/RLAN can operate opportunistically under IMT.

In our view, how a country authorises APs above 6585MHz in an interim period should really depend on the national situation. That being said, opening 6425-6585MHz as early as possible would deliver immediate benefits to users, with a readily available ecosystem and significant capacity benefits (in particular enabling 4 channels of 160 MHz); and would avoid Lithuanian businesses and users missing out on the benefits that innovative AR/VR will bring.

We remain at your disposal should you wish to discuss any aspect of the above positions.

Sincerely

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