

Apple Inc. (Apple) response to Lithuania Communications Regulatory Authority (RRT) Consultation: “Public survey on the prospects for the use of the radio frequency band 6425-7125 MHz”

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A. What would be the need to use the 6425-7125 MHz (U6 GHz) radio frequency band for mobile radio communications?

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

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

Apple recommends that an additional dedicated 160 MHz (6425-6585 MHz) be made available for licence-exempt use in the U6 GHz band. This is essential to complement the existing bandwidth in the L6 GHz band, enabling high-capacity, low-latency performance needed for next-generation Wi-Fi applications, including telemedicine, spatial compute (AR/VR), and advanced enterprise connectivity. To maximize the effectiveness of this allocation, it is critical that 6425–6585 MHz remain free from harmful out-of-band emissions originating from IMT above 6585 MHz. Only clean, interference-free spectrum will ensure reliable, high-performance Wi-Fi, foster global product harmonisation, and unlock the full socio-economic potential of licence-exempt 6 GHz spectrum.

Apple believes that any requirements for mobile are better answered by the Mobile Network Operators.

3. What network infrastructure would you develop in the U6 GHz band (e.g. macro/micro cells, etc.)? If so, how? Would you like to consolidate your existing network infrastructure?

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

For licence-exempt use in an additional 160 MHz channel from 6425-6585 MHz in the U6 GHz, Apple supports Low Power Indoor (LPI) under the control of a Wi-Fi Access Point, and Very Low Power (VLP) indoor and outdoor, with the same regulatory conditions as the L6 GHz. This additional 160 MHz within 6425-6585 MHz in the U6 GHz is to compliment the existing access for licence-exempt use in the L6 GHz band.

For those requiring access to spectrum above 6585 MHz for mobile use, Apple believes that this is better answered by the Mobile Network Operators.

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

In the U6 GHz, for licence-exempt Low Power Indoor (LPI) under the control of a Wi-Fi Access Point, and Very Low Power (VLP) indoor and outdoor, this could indeed be deployed in all of the areas listed, and indeed more.

From a mobile perspective, Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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

Apple has not provided a response to this question since we believe that this is better answered by the Mobile Network Operators.

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?

Apple notes that Wi-Fi products capable of supporting the full 6 GHz band are available today and these products have already been Wi-Fi Alliance Certified for quite some time.

Apple believes that shared use of U6 GHz via a band-split at 6585 MHz will likely bring the greatest overall benefits to citizens and consumers enabling both IMT and WAS/RLAN. We believe that the alternative of allocating the spectrum exclusively for either mobile or for Wi-Fi is no longer realistic noting the ongoing work within CEPT on spectrum sharing and the EC Mandate on Upper 6 GHz.

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)?

Apple believes it is challenging to specifically state how crowded the 2400–2483.5 MHz, 5150–5350 MHz, 5470–5850 MHz and 5945–6425 MHz frequency bands are since this is determined by a number of factors which include –

Population Density: Urban areas with higher populations experience more congestion due to the sheer number of devices.

Technological Adoption: Rapid integration of smart home devices, IoT applications, and high-bandwidth services increases demand on these frequency bands.

Regulatory Policies: Decisions by regulators to allocate or reallocate spectrum impact congestion levels due to spectrum availability or indeed imposed regulatory constraints will have an impact.

2400–2483.5 MHz: This band is widely utilised for Wi-Fi, Bluetooth, and various other wireless technologies. This is historically the most popular band being the first band to become available for licence-exempt use. Deployments especially densely populated areas mainly residential and commercial settings, often leads to congestion and interference.

5150–5350 MHz: Designated for Wi-Fi and other wireless technologies, this band supports higher data rates and is less congested compared to 2.4 GHz, however usage has significantly increased necessitating the need to also access to 5925-7125 GHz (6 GHz).

5470–5850 MHz: Also designated for Wi-Fi and other wireless technologies, offering additional channels to complement 5150-5350 MHz.

5945–6425 MHz (and 6425-7125 MHz): These bands, whether just 5945-6425 MHz or the whole 6 GHz range from 5945-7125 MHz, have generally only been, or are being, made available recently.

If only the L6 GHz (5945-6425 MHz) is being considered currently for licence-exempt use, Apple suggests that a further 160 MHz is required from 6425-6585 MHz in the U6 GHz to complement that already available in L6 GHz (5945-6425 MHz). We urge that if this additional 160 MHz channel is enabled for licence-exempt use in 6425-6585 MHz that the same regulations for the L6 GHz apply.

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

Apple notes that in 2024, the adoption of Wi-Fi 6E technology has seen significant growth across various device categories with the Wi-Fi Alliance referencing the following figures:

Overall Wi-Fi 6E Devices: Approximately 576.2 million Wi-Fi 6E devices were projected to ship in 2024.

Access Points: Around 147.2 million Wi-Fi 6E access points (APs) were expected to be delivered in 2024.

Total 6 GHz Wi-Fi Devices: Including both Wi-Fi 6E and Wi-Fi 7 devices, 807.5 million units were anticipated to ship in 2024, marking a 66% increase from 2023.

In 2024, Wi-Fi 7 technology experienced significant growth in device shipments:

Consumer Devices: Approximately 269 million Wi-Fi 7 devices were shipped.

Enterprise Access Points (APs): Shipments exceeded 500,000 units, representing about 2% of overall Wi-Fi AP unit shipments in the first nine months of 2024.

Q4 2024 Surge: Wi-Fi 7 adoption jumped by 5 points to 11% of indoor AP shipments in the fourth quarter.

These figures underscore the rapid adoption of Wi-Fi 7 across both consumer and enterprise markets during 2024.

Although still in its early stages, Wi-Fi 7 is anticipated to see broader adoption by late 2025 as infrastructure and technology support mature. The increasing demand for ultra-fast connections, driven by applications like AI, spatial compute (AR/VR), and IoT, is expected to propel Wi-Fi 7 adoption.

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

Apple suggests that with a combination of the L6 GHz (5945-6425 MHz) and also the U6 GHz (6425-7125 MHz) enabling large bandwidths, lower latency, and higher data rates, the services that could be offered include -

Spatial Compute (Augmented & Virtual Reality (AR/VR)): Wireless AR/VR headsets with high-throughput and low-latency connections for immersive gaming and training applications, remote collaboration, 3D meetings, and multi-gigabit high-performance applications e.g., 4K/8K video streaming.

Smart Factories & Industrial IoT: Ultra-reliable, low-latency wireless connections for automated systems and robotics.

Enhanced Public Wi-Fi & Municipal Networks: High-speed internet access in public spaces, hospitals, airports, and stadiums.

Smart Cities & Transportation: Smart Traffic and Infrastructure Monitoring including real-time sensor networks for efficient city planning and public safety.

Broadcasting & Content Delivery: Wireless Video Broadcasting including high-speed wireless transmission for live events, sports, and news reporting. Cloud Gaming & Streaming Services.

Delving deeper into just one transformative sector, “healthcare”, it becomes clear that Wi-Fi use in the 6 GHz band is poised to revolutionize how medical services are delivered, accessed, and experienced. With its ultra-high throughput, low latency, and ability to operate reliably in dense environments, Wi-Fi 6E and Wi-Fi 7 unlock powerful new capabilities that are essential for modern medical innovation. From enabling life-saving remote diagnostics to supporting real-time spatial compute (AR/VR) training for surgeons, the 6 GHz band provides the backbone for a smarter, faster, and more connected healthcare ecosystem. Some of the most compelling and high-impact use cases include:

Telemedicine & Remote Consultations: High-resolution video conferencing with minimal latency enables real-time consultations, diagnoses, and monitoring between doctors and patients especially in remote or underserved areas.

Augmented/Virtual Reality for Medical Training: Immersive spatial compute (AR/VR) simulations for training medical professionals in complex procedures (e.g., surgeries, diagnostics) without physical risk, using real-time 3D environments.

Remote Surgery Support: Though surgery itself may be robotically assisted over wired networks, Wi-Fi 6 GHz can support real-time remote guidance and high-definition video during procedures, especially in temporary or mobile facilities.

Mobile Medical Carts and Devices: In hospitals, connected carts and diagnostic tools need seamless mobility and consistent connectivity. The high capacity and reduced interference in the 6 GHz band allow for more reliable operation in crowded hospital environments.

Smart Patient Monitoring & Wearables: Continuous streaming of biometric data (e.g., heart rate, blood pressure, oxygen levels) from wearable devices, enabling real-time low latency monitoring.

Hospital Operations & Asset Tracking: Low-latency communication between systems, such as Electronic Health Record (HER) updates, nurse call systems, and tracking critical equipment like ventilators or infusion pumps.

Emergency and Temporary Field Clinics: During disasters or pandemics, Wi-Fi 6 GHz allows rapid deployment of high-bandwidth networks for temporary clinics or mobile testing centres, where speed and reliability are vital.

The full 6 GHz band is expected to be a key enabler of next-generation wireless technologies including Wi-Fi 7 and its evolution with faster internet connectivity, improved industrial automation, and more immersive digital experiences.

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)

Apple believes that opening the full 6 GHz band to license-exempt WAS/RLAN is the best option for consumers and businesses.

That said, if licence-exempt use of the U6 GHz is not feasible we suggest that consideration should be given on alternative options to licensing solely for IMT. One alternative option is a possible U6 GHz band-split enabling additional licence-exempt spectrum as well as additional licenced spectrum.

Apple would like to emphasise the importance of the outcome of WRC-23 relating to the 6425-7125 MHz band with the IMT identification but also the recognition of WAS/RLAN as detailed in footnote 5.457E -

5.457E 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 are also used for the implementation of wireless access systems (WAS), including radio local area networks (RLANs). (WRC-23)

As mentioned previously, we believe that if licence-exempt access to the U6 GHz band is not possible then consideration should be given to enabling shared use of U6 GHz.

Implementing an U6 GHz band-split would ensure fair access to the U6 GHz band for both licence-exempt (Wi-Fi) and licensed (5G/6G) it would be reasonable to enable access to an additional 160 MHz channel for licence-exempt. Apple suggests the U6 GHz band-split should be at 6585 MHz.

Apple further suggests that the adjacent 7125–7250 MHz band, which is the subject of WRC-27 Agenda Item 1.7, be considered for potential future IMT use. This band could lead to an additional 125 MHz of IMT spectrum. Combining the additional 125 MHz with part of the U6 GHz designated for IMT starting at 6585 MHz would provide additional contiguous spectrum enabling up to 665 MHz of spectrum for IMT. This is still of course subject to appropriate technical studies, including preventing interference to WAS/RLAN below 6585 MHz.

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

Apple notes that spectrum demand is most acute in environments with high user density, intense wireless device usage, and critical connectivity requirements, e.g., airports, hospitals, universities, enterprise campuses, residential areas, transport hubs, and large public venues. These locations are not only data-intensive but often support mission-critical applications, requiring robust and high-capacity wireless infrastructure. With the continued growth in mobile and connected devices, particularly those supporting advanced use cases like spatial compute (AR/VR), telemedicine, real-time analytics, and smart building automation, the pressure on available spectrum will only intensify. Ensuring broad, licence-exempt access to the 6 GHz band, especially in these high-demand environments, is essential to meeting user expectations for performance, reliability, and seamless connectivity. It also helps reduce strain on licensed mobile networks, improves spectrum efficiency, and accelerates the deployment of innovative services in areas where they are needed most.

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)?

Apple believes that for both the L6 GHz (5945-6425 MHz) and U6 GHz (6425-7125 MHz) Very Low Power (VLP) indoor and outdoor could be delivered by 25mW; Low Power Indoor (LPI) could be delivered by 200mW, and Standard Power could use up to 4W.

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?

Apple recommends that, should indoor and outdoor access to the entire 6 GHz band be granted for licence-exempt use, this access should be granted on a permanent basis without a future requirement to vacate the U6 GHz. As outlined in our response to question B4, if full licence-exempt access is not feasible, then serious consideration should be given to enabling shared use of the U6 GHz band between licence-exempt technologies (such as Wi-Fi) and licensed mobile services (such as 5G / 6G). In such a case, Apple strongly supports a band-split at 6585 MHz as the most balanced and forward-looking approach to spectrum sharing, enabling the continued growth of both ecosystems.