Consultation Title	**Addendum to the Plan for the Development of Gigabit Infrastructure until 2030**
Deadline	26 January 2023
Geographical Scope	Slovenia
Co-Signatories	Amazon, Broadcom, Cisco Systems, Hewlett Packard Enterprise (HPE), Meta Platforms Ireland Limited, Microsoft Corporation
Date	25 January 2023

Dear Colleagues,

The undersigned companies, representing an important cross-section of the world's leading silicon vendors, system manufacturers, and application providers, welcome the opportunity to comment on the addendum to the Plan for the Development of Gigabit Infrastructure until 2030 that was drafted by the Office of the Government of the Republic of Slovenia for Digital Transformation.

Introduction and context

We very much welcome the publication of the key performance indicators and objectives in the addendum to the national plan for the development of digital infrastructure by 2030. We are also grateful for the opportunity to comment on this document and highlight the vital role that Wi-Fi will need to play if Slovenia is to achieve its connectivity objectives.

Both the national plan and the addendum make extensive references to the rollout of 5G. While 5G has a role to play, the provision of extensive gigabit connectivity really depends upon a combination of fibre and Wi-Fi 6E. Operating in the 6 GHz spectrum band, Wi-Fi 6E can support data rates of up to 9.6 Gbps, if there is sufficient spectrum available.

Although the national plan suggests 5G will drive the automation of industry, smart homes and smart buildings, Wi-Fi is actually the distribution mechanism of choice for broadband connectivity indoors. As a very cost-effective technology, Wi-Fi is widely used to connect a broad variety of devices, including mobile phones, tablets, televisions, cameras, speakers and sensors. Any Wi-Fi bottleneck means consumers experience reduced data speeds, curbing the value of the underlying broadband.

While the national plan highlights the growth in mobile broadband traffic, Wi-Fi continues to carry the vast majority of Internet traffic in Europe. In 2021, 95% of Internet traffic in Germany, for example, was transmitted over fixed networks and just 5% over mobile networks, according to a report[1] by regulator BNetzA. Statistics published by other European administrations also confirm that the vast majority of Internet traffic is transferred over fixed networks. Approximately, 92% of fixed broadband traffic in

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[1] Source: Tätigkeitsberichte Telekommunikation

Europe is relayed via Wi-Fi, according to ASSIA[2] . These numbers show that the absolute volume of traffic handled by Wi-Fi is far greater than that handled by cellular technologies. In Germany, at least, the breakdown by technology is approximately 88% Wi-Fi, 7% Ethernet and 5% cellular.

Even smartphones make much greater use of Wi-Fi than of cellular connectivity. For example, UK regulator Ofcom's most recent analysis[3] of crowd-sourced data from Android smartphones found that between January and March 2021, 73% of the traffic generated by smartphones travelled over Wi-Fi and merely 27% over mobile networks.

Noting that 80% of mobile users are static and only 20% are mobile, the national plan anticipates the deployment of 5G networks to serve indoor users. However, if Wi-Fi has access to sufficient spectrum, operators will not need to spend large sums trying to improve indoor 5G coverage: the attenuation of signals from outdoor 5G base stations (building entry loss) means 5G indoor coverage and performance are severely limited.

Wi-Fi has become ubiquitous

Since the WRC-03 (2003) decision to enable access to new spectrum in the 5 GHz range, there have been revolutionary changes in Wi-Fi technology, use cases, and demand. With a technical architecture that is device-centric and not centrally managed, Wi-Fi has become ubiquitous, enabling it to benefit from enormous global economies of scale. More than 18 billion Wi-Fi devices will be in use in 2022 (360 times as many Wi-Fi devices as were in use in 2003), with 4.4 billion new devices shipped every year, according to research firm IDC[4].

As the national plan notes, the number of fibre connections in Slovenia is rising steadily, with next-generation fixed broadband Internet access connections now serving more than 70% of households. These high-capacity fibre access networks need to be complemented by an equally performant wireless local connectivity solution to be economically viable and provide the envisioned user benefits.

However, studies by Quotient, Qualcomm and ASSIA have each pointed to major spectrum shortfalls for licence-exempt technologies, with ASSIA highlighting how congestion in both the 2.4 GHz band and the 5 GHz band has been impacting quality of service. From these studies, it becomes obvious that even the recently added 480 MHz of licence-exempt spectrum in the 6 GHz band will not be sufficient to satisfy the mid- and long-term capacity needs. Given the important role that Wi-Fi plays for the broadband ecosystem and its continuing growth, there is a need to make the full 1180 MHz in the 5945-7125 MHz (6 GHz) band available on a licence-exempt basis to enable Slovenia (and other European nations) to meet their broadband goals and objectives for a digital society.

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[2] Source: [ASSIA "State of Wi-Fi" report](#)
[3] Source: https://www.ofcom.org.uk/research-and-data/telecoms-research/mobile-smartphones/mobile-matters
[4] Source: https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-2022-wi-fi-trends

With Wi-Fi traffic doubling every three years and congestion increasing[5], it is vital to ensure that Wi-Fi has access to adequate mid-band spectrum. Countries that have opted for a rapid deployment of 5G, such as South Korea and the US, recognise the need to allow licence-exempt access to the entire 6 GHz (5925-7125 MHz) band.

Meeting the needs of citizens and companies

In particular, Wi-Fi 6E, and the forthcoming Wi-Fi 7 standard, need access to the full 1180 MHz to utilise the full extent of their capabilities and support evolving and emerging innovative use cases. Opening only 480 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 1180 MHz, a larger number of these wide channels could be accommodated, 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 and virtual reality.

In the enterprise market, the large number of channels and the diversity of channel widths made available by 1180 MHz of spectrum will be particularly important. Depending on capacity and quality of service requirements, channels of different widths can be grouped and assigned to specific services, allowing a variety of services to run over one 6 GHz Wi-Fi network. A typical example would be a hospital network where high-bit rate, low latency imaging applications are run over multiple 160 MHz channels, administrative and other data applications over 40 or 80 MHz wide channels, and voice services over multiple 20 MHz wide channels. In addition, data and voice services for guests could be run over the 5 GHz legacy network.

Wi-Fi 7 is set to arrive in 2024

In the near future, Wi-Fi 7 will rely on access to 320 MHz channels to further improve latency, throughput, reliability and quality of service relative to Wi-Fi 6E. Wi-Fi 7 is scheduled for official launch in 2024, and some manufacturers are likely to launch products in 2023. Supporting throughput speeds of up to 46 Gbps, Wi-Fi 7 will also provide highly responsive connectivity, as well as greater flexibility in using network and spectrum resources. It is designed to support use cases with strict latency and reliability requirements at scale.

In the enterprise market, Wi-Fi 7 will be particularly valuable for Internet of Things applications, such as industrial automation, surveillance, remote control, XR and other video-based applications. In the consumer sector, Wi-Fi 7 will enhance gaming, XR and video applications, and smart-home services.

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[5] Source: https://lp.assia-inc.com/hubfs/summit-v7.7.pdf

Further, Wi-Fi 7 and 5G will work together to introduce edge computing, distributed and cloud architectures, virtualization, and digitalization in private wireless networks.

More generally, Wi-Fi 7 will continue to expand the availability of Wi-Fi in a cost-effective way and further improve spectrum efficiency.

Wi-Fi is a sustainable connectivity solution

Low-power wireless connectivity technologies, such as Wi-Fi, are more energy-efficient than higher-power technologies, such as IMT cellular networks. Most Wi-Fi networks operate at much lower power levels than cellular systems and do not have to contend with external building entry loss, so they will be the most energy-efficient connectivity option in many scenarios. Indeed, French regulator Arcep[6] found that the combination of fibre and Wi-Fi is the most efficient solution in terms of energy consumption, performance, and flexibility. Further, Wi-Fi is becoming more efficient, thanks to new features, such as target wake time and the OFDMA radio interface, which reduce power consumption.

The ITU has forecast[7] that the energy used by mobile networks around the globe will emit 73.0 Mt CO_2 equivalent (CO2e) in 2025, compared with 35.2 Mt CO2e for fixed networks. Considering the share of mobile data and fixed broadband lines in Europe, around 4.8 Mt CO2e will be emitted from fixed networks and 10 Mt CO2e from mobile networks in the EU. That suggests fixed networks produce less than half the CO2e of mobile networks, even though they transport more than ten times the amount of data.

Global harmonisation now well underway

Countries representing more than 40% of the global gross domestic product (GDP) have opened, or have proposed opening, the full 6 GHz band (5925-7125 MHz) for licence-exempt use[8], and international harmonisation of that band for licence-exempt use is progressing fast.

Under Agenda Item 1.2, WRC-23 will discuss a potential IMT identification of the 6425-7025 MHz band (Region 1 only) and the 7025-7125 MHz band (globally). As the 6425-7125 band already has a mobile allocation in the Radio Regulations, an IMT identification is unnecessary. Furthermore, such a development would severely restrict administrations' freedom of choice for the future usage of that band. With a large part of the world already having opened the 5925-7125 MHz band for licence-exempt use, an IMT identification of that band in Region 1 could lead to dis-harmonisation, reduced economies of scale, and increased costs for citizens and businesses in Europe.

[6] Source: ARCEP, Achieving Digital Sustainability, 2022.
[7] Source: ITU, Greenhouse gas emissions trajectories for the information and communication technology sector compatible with the UNFCCC Paris Agreement, 2020.
[8] Disclaimer: This data is compiled 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.

Therefore, the undersigned companies respectfully ask the Slovenia administration to endorse a position of "No Change" for the corresponding Agenda Item (AI 1.2) at WRC-23 and to open the 6425-7125 MHz band for usage by WAS/RLAN on a licence-exempt basis.

Respectfully submitted,

/s/

Signatories

Jaime Hjort
Public Policy, Telecom
Amazon, Inc.
Email: jhjort@amazon.com

Christopher Szymanski
Director, Product Marketing
Wireless Communications and Connectivity Division
Broadcom, Inc.
Email: chris.szymanski@broadcom.com

Scott Blue
Director, Global Wireless Policy
Cisco Systems, Inc.
Email: scblue@cisco.com

Detlef Fuehrer
Senior Manager, Spectrum Management and Regulatory Affairs, EMEA
Hewlett Packard Enterprise
Email: detlef.fuehrer@hpe.com

Guillaume Lebrun
Global Connectivity Policy
Meta Platforms Ireland Limited
Email: guillaumelebrun@fb.com

Michael Daum
Director of Technology Policy
Microsoft Corporation
Email: mdaum@microsoft.com