

GSMA response to the Draft RSPG Opinion on the ITU-R World Radiocommunication Conference 2023

12 August 2022

About the GSMA

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry, and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good,Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that makemobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

We invite you to find out more at gsma.com. Follow the GSMA on Twitter: @GSMA and @GSMAEurope

Introduction

The GSMA welcomes the RSPG's ongoing work to prepare recommendations, including on European Union position(s), on items which are of particular importance for Union policies as early as possible in the preparation process for WRC-23 and welcomes the opportunity to comment on the RSPG's draft Opinion on the World Radiocommunication Conference 2023.

WRC-23 can support expansion of 5G into all areas and enable affordable connectivity for all people. The 2023 World Radiocommunication Conference will look at both mid-band and sub-1 GHz frequencies for mobile. Our response focuses in particular on WRC-23 Agenda Items 1.2, 1.3 and 1.5, for which the ultimate outcome will be vital for the success of 5G. We note that Agenda Items 1.2 and 1.5 address essential spectrum for 5G expansion in Europe, while Agenda Item 1.3 allows Europe's existing 5G spectrum to be used more effectively (particularly in countries at the Eastern edge of the EU) and further harmonised elsewhere.

Through these Agenda Items, the WRC can allow Europe and other Region 1 countries access to more mobile spectrum and give them the capacity to level up affordable connectivity in different geographical areas. Increased spectrum availability is a pre-requisite for sustainable investments and increased welfare. Mobile broadband has been proven to be a catalyst for GDP growth[1], as a basis for social inclusion and wellbeing and a powerful tool in the fight against climate change. [2] As Europe seeks to emerge from the uncertain environment of the pandemic and deliver the twin digital and green transition, mobile has an important role to play in connecting everyone and everything everywhere.

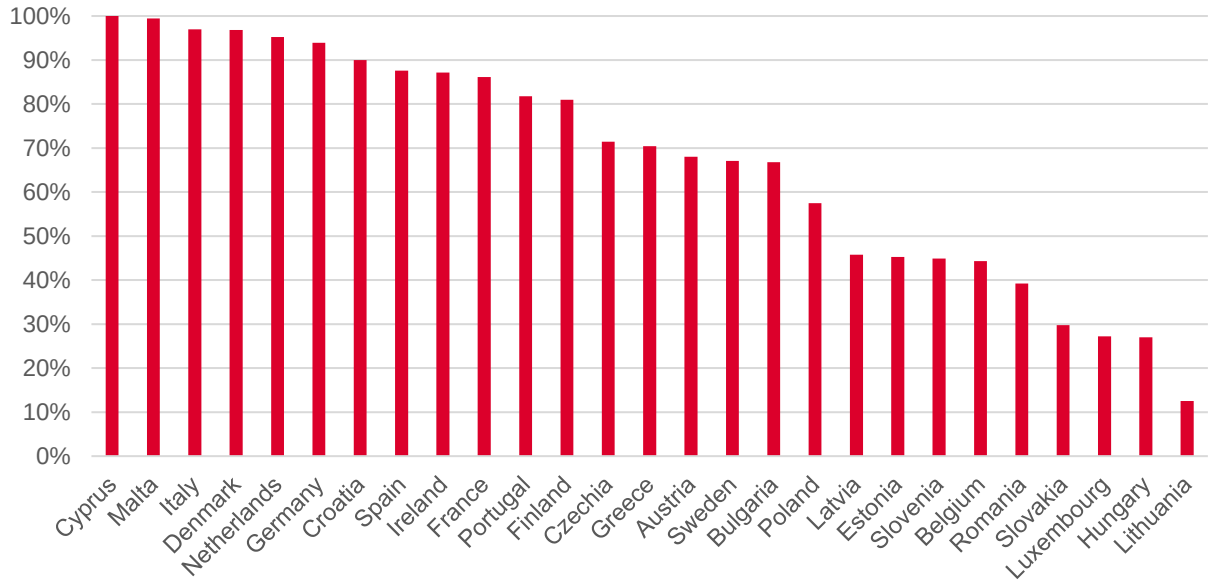
5G is accelerating globally with 198 operators in 77 markets launching commercial mobile and FWA services as of Q1 2022. This is expected to increase to 422 operators in 132 markets by the end of 2025.[3] It is forecasted that more than 275 million smartphones will be shipped in 2022, reaching over 5 billion by 2025[4] with 5G connections expected to total 2.3 billion.[5] Over 1300 5G designs[6] have been launched or are in development as in addition to smartphones, connected devices also include AR glasses, watches and other wearables as well as integrated modules for connected cars, machines, laptops etc. requiring anytime, anywhere connectivity.

The EU's ambitious digital vision for the decade envisages full 5G or 5G equivalent coverage by 2030. In this context, it is important to recall the current status of connectivity across the Union. According to GSMA Intelligence, a majority of European countries (34 out of 50) have

[1] The Socio-Economic Benefits of Mid-Band 5G Services, GSMA, February 2022
[2] The Enablement Effect 2021, GSMA, October 2021
[3] 5G in Context Q1 2022, GSMA Intelligence, May 2022
[4] Qualcomm estimates, February 2022
[5] 5G in Context Q1 2022, GSMA Intelligence, May 2022
[6] GSA, May 2022

already deployed 5G, and just over half of operators in the region (92 out of 173) have launched 5G networks as of Q4 2021. This indicates the significant work that is being undertaken by mobile operators to deliver the Commission's vision and deliver full 5G coverage across the Union by 2030. However, it is clear that there are large differences between Member States and indeed between Europe and other leading regions.

Figure 1 5G network coverage by population, Q2 2022



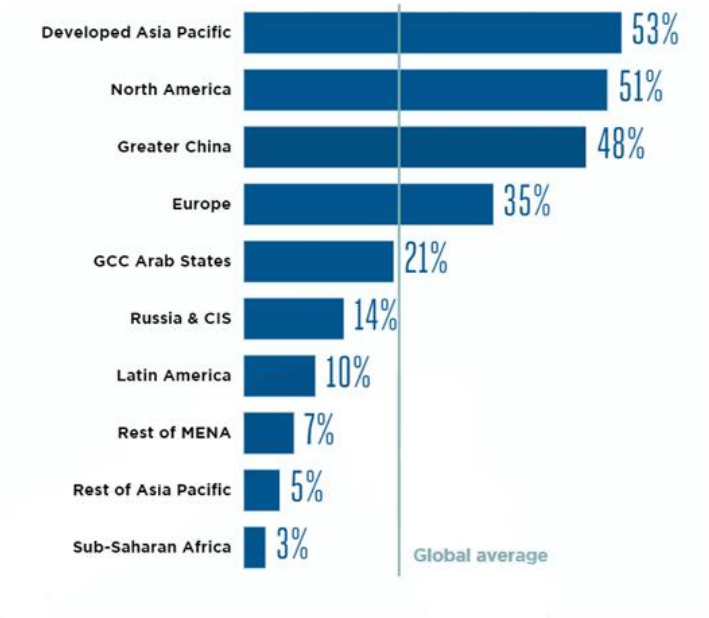
Source: GSMA Intelligence

It is important to note that operators' 5G rollout depends heavily on their 5G spectrum holdings across low, mid and high bands in order to deliver both speed and geographical coverage. 5G has the potential to deliver a significant amount of value to the European region, but as data use expands, additional spectrum capacity will be required to satisfy demand for mobile broadband and achieve the EU's ambitious connectivity goals and reduce the gap with other regions in terms of digitisation of EU citizens and businesses.

In addition, overall 5G coverage is just one high-level indicator by which to measure the Union's progress. We understand that it is the Commission's intention to further specify associated key performance indicators (KPIs) for each Digital Decade target by way of an implementing act to be adopted at a later date. In this context it is also necessary to consider 5G adoption, capacity, quality of service (QoS) and investment levels especially in comparison with other regions.

Despite some early commercial launches in Europe, in terms of 5G adoption, China, the US and South Korea are proving to be the frontrunners. By the end of 2025, Europe will be home to 276 million 5G connections, with the Nordics and Western Europe recording the highest adoption rates.

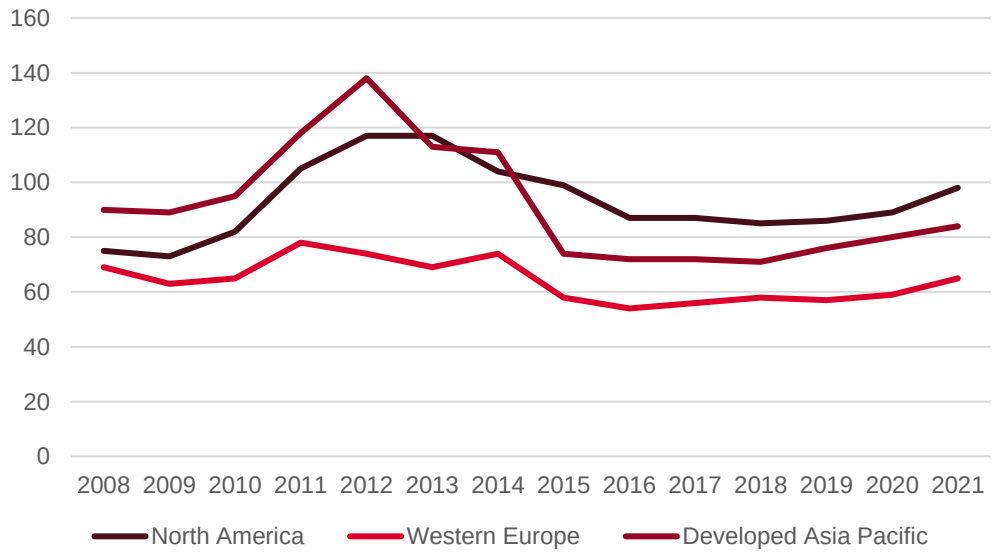
Figure 2 5G adoption in 2025



Source: The Mobile Economy Europe 2021, GSMA

Investment per capita in mobile networks has also been significantly lower in Western Europe than in the US and developed Asia Pacific at least for the last fifteen years (see Figure 3). For every euro spent per pop in mobile deployments in Western Europe since 2008, excluding spectrum, North America and the developed Asian countries have invested roughly one and a half.

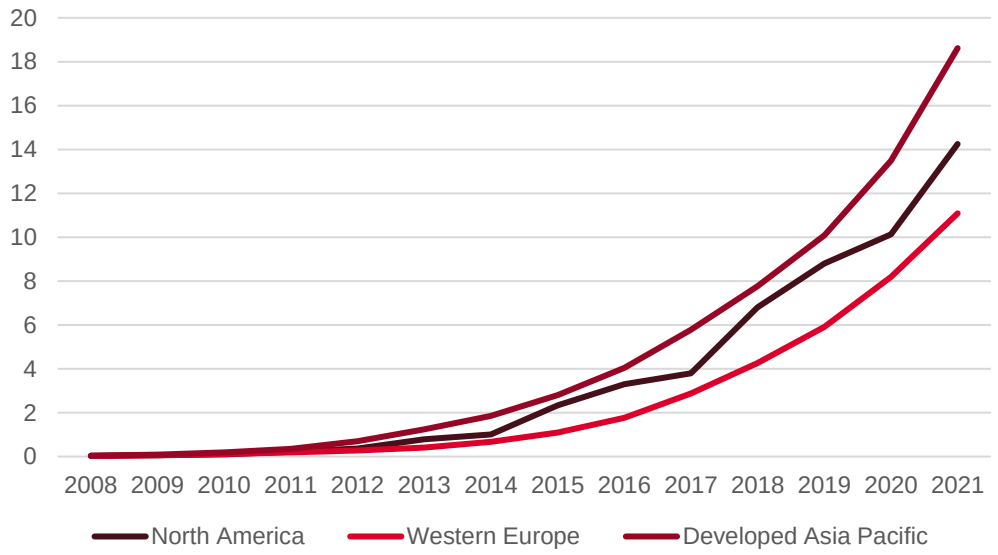
Figure 3 Capex per pop



Source: Omdia. Communications Provider Revenue and Capex Tracker- 4Q21

This gap is undoubtedly related with the parallel gap in usage (see Figure 4). In 2021, an average North American consumed 28% more Gigabytes in cellular networks than an average European, and an average end user in developed Asia Pacific extracted 67% more Gigabytes from cellular connectivity than an average Western European. It is ironic that the lower mobile prices that Western Europeans enjoy have not translated into higher usage, something that in our view is very much linked to the constraints on mobile investment generated by lower revenues and lower profitability.

Figure 4 Cellular traffic per pop



Source: Analysys Mason Data Hub (retrieved July 2022)

Meeting the Digital Decade digitisation goals requires powerful cellular networks in rural and dense areas and significant work is needed to deliver this vision. Spectrum policy is one of the levers in the hands of policymakers that can help achieve the 2030 vision. The Commission has already highlighted this its proposal and accompanying Staff Working Document for the "Path to the Digital Decade". To ensure Europe keeps up with the global 5G pacesetters, European policymakers must provide mobile operators with the means to enable both consistent 5G user speeds at the edges of their networks and sufficient capacity to support 5G in densely populated areas.

Spectrum policymakers can help by preventing artificial spectrum scarcity. Burdened by lower profitability and by physical and economic constraints on densification, it will be challenging for European mobile operators to lay the connectivity foundations for the digitisation of European citizens and businesses. The ambitious Digital Decade targets will very likely not be met unless a clear roadmap of increased spectrum capacity for cellular networks is tied into

European digital plans, and those new frequencies are made available in a timely manner at a fair price. We need to act now to ensure full digital inclusion.

The GSMA would therefore like to provide detailed comments on these three specific WRC-23 Agenda Items and we hope that the following can serve as a constructive contribution to the RSPG's deliberations on its final Opinion.

WRC-23 Agenda Item 1.2

Agenda Item 1.2 focuses on the development of mid-band capacity for IMT networks. Mid-band 5G spectrum can play a central role in sustainable social and industrial development. As metaverse applications, enhanced broadband services, IoT, data, analytics and insight, permeate every aspect of society, smartphones and other wearable devices (e.g. AR glasses, watches, neckbands) deliver connectivity into our work and play, and enterprises transition from manufacturing or commerce to also becoming industrial data platforms, mobile networks will require spectrum capacity plans that are integrated into a long-term vision of each nation's industrial future.

Mid-bands play a key role for 5G. According to GSMA Intelligence, 40 operators in 17 European region countries have already launched 5G services using the 3-4 GHz range as of June 2022. However, the existing available spectrum will not be enough to meet long term needs. Depending on end user demand, GSMA expects that mobile networks will need, on average, 2 GHz of mid-band spectrum per country by 2030. The spectrum, which is required to meet the International Telecommunications Union (ITU) data speed requirements by 2030 according to a recent study by the GSMA.[7] In Europe, that goal leaves a shortfall of around 0.95 GHz compared to today's assignments in most markets. Detailed traffic forecasts and projections from Mobile Network Operators (MNOs) confirm that 5G network capacity will be exhausted before the end of this decade. Without this additional spectrum, it will not be possible to economically meet customer demand and realise the full potential of 5G.[8]

In Europe, additional mid-band capacity is likely to come from the 700 MHz available in the upper 6 GHz band, which is standardised as 3GPP Band n104. Ensuring this spectrum is made available for licensed 5G is thus crucial to meeting broadband development goals.

In particular, additional spectrum in mid-bands is critical to address 5G consumer take up and usage. In Europe, additional mid-band capacity is likely to come from the 700 MHz

[7] Vision 2030 Insights for Mid-band Spectrum Needs, GSMA, July 2021
[8] See also 6 GHz in the 5G Era: Global Insights on 5925-7125 MHz, GSMA, July 2022

available in the upper 6 GHz band, which is standardised as 3GPP Band n104. Ensuring this spectrum is made available for licensed 5G is thus crucial to meeting broadband development goals.

In February 2022, the GSMA released a study on the socio-economic benefits of mid-band spectrum.[9] Europe is expected to benefit both significantly and quickly from mid-band 5G. The study showed that the socio-economic value generated by mid-band 5G could contribute an additional US$ 67 billion to European GDP in 2025 with a further uplift of US$121 billion in 2030. This latter figure represents approximately 0.4% of European GDP according to GSMA Intelligence.

Beyond the potential economic benefits, the study also concluded that if no additional mid-band spectrum is assigned to mobile services, the GDP boost would be reduced by up to 40%. If spectrum is limited to current levels as demand for services grows, increased network congestion and deployment costs will stifle 5G. Network quality and speed will suffer, limiting 5G adoption and its economic impact. The use of the upper 6 GHz for licensed 5G is critical to keep pace with the new connectivity leaders, particularly in terms of mobile revenues and 5G adoption, in East Asia, the Middle East and elsewhere.

Therefore, governments in Europe and around the world need to support use of 6 GHz spectrum for use by licensed 5G. It represents the largest remaining single block of mid-band spectrum that can be allocated to licensed mobile services in the foreseeable future.

6 GHz mobile capacity can match the 5G coverage already delivered today with mid band, enabling increased wide-area capacity in urban areas for enhanced mobile broadband (eMBB), ultra-reliable low-latency communication (URLLC) and massive IoT (mIoT), as well as the provision of fixed wireless access in small towns and villages. Achieving the 2 GHz of mid-band 5G spectrum which will be required to enable these by 2030 is challenging without 6 GHz capacity. If additional mid-band spectrum is not made available, this would significantly increase the cost of public mobile network deployments, including significant impacts on energy consumption, carbon emissions and the environment. Operators would need to densify networks across many locations, both indoor and outdoor, to an extent that will not be economically feasible or indeed could result in a degradation in network quality, especially if operators reach the technical limits of network densification.

Although Agenda Item 1.2 specifically focuses on IMT allocation, it is important to note that the lower part of the 6 GHz band accounting for 500 MHz of spectrum is already allocated to WiFi in Europe. Radio spectrum is a critical and scarce natural resource and the licensing choices made by governments and regulators impact all aspects of connectivity. Careful

[9] The Socio-Economic Benefits of Mid-Band 5G Services, GSMA, February 2022

consideration and a holistic view are therefore necessary. A balanced allocation across IMT and WiFi is now needed to address the overall needs of customers and digital economies in general and deliver the greatest socio-economic benefits overall.

A recent report by GSMA intelligence[10] shows that, on a global basis, the greatest socio-economic benefit from the 6 GHz band will be driven by using it fully for licensed 5G while fibre to the premises (FTTP) speeds remain under 10 Gbps. This speed should be compared to Cisco's predicted global average of 101 Mbps in 2023, meaning fibre speeds will need to increase 100 times beyond this to make any case for licence-exempt use of the 6 GHz band. Until this point, Wi-Fi 6 and 7 requirements can be met with 2.4 GHz and 5 GHz capacity.

6 GHz spectrum is thus vital to ensuring 5G provides digital inclusion through affordable connectivity and to achieve the Digital Decade goals for 2030. The GSMA believes that 6 GHz is the most viable range to fulfil mid-band spectrum needs for the future of 5G expansion. To maximise these benefits, policymakers should:

- Support 6425-7125 MHz for IMT identification at WRC-23.
- Make at least 6425-7125 MHz available for licenced 5G in their regional/national plans.

WRC-23 Agenda Item 1.3

The 3.5 GHz range at 3.3-4.2 GHz is the launch range for 5G in the vast majority of the world. Ensuring there is sufficient 3.5 GHz access spectrum to meet the needs of communications networks is one of the most critical decisions to influence the widespread availability of affordable 5G.

Agenda Item 1.3 considers a primary mobile allocation in the band 3600-3800 MHz and thus gives an opportunity to achieve greater harmonisation to the band which is already in use in Europe. This spectrum provides capacity for city-wide coverage and has provided the perfect environment for much of the earliest 5G connectivity. It is important to note that this spectrum band is already part of one of the key "5G pioneer bands" in the EU (3.4-3.8 GHz). However, it is currently subject to restrictions in a subset of Member States. A WRC-23 mobile allocation would make the coordination situation clearer in Member States that have borders with non-EU countries.

Therefore, the GSMA supports:

[10] The socioeconomic benefits of the 6 GHz band: considering licensed and unlicensed options, GSMA Intelligence, June 2022

- Mobile allocation on a primary basis in the 3600- 3800 MHz band at WRC-23.

This would make the coordination situation clearer in Member States that have borders with non-EU countries.

WRC-23 Agenda Item 1.5

Additional spectrum below 1 GHz is being discussed under Agenda Item 1.5. Low-band spectrum is an enabler of digital equality and a driver of widespread and affordable connectivity. It is a national asset that can build bridges towards digital inclusion and ensure the impact of mobile's economic and social benefits are felt in all communities. Increased sub-1 GHz IMT spectrum can give users and connected devices in wider network areas, in particular rural areas including road, rail and other locations, with more comparable IMT access to those in urban areas and help ensure cost-efficient network deployment.

The lower UHF band offers good propagation properties and the possibility to efficiently re-use existing sites for providing higher data rates. It is key for the growth of ubiquitous mobile services. There is already an existing equipment ecosystem in parts of the band not used in Europe. 3GPP Band 71 is being used in North America. A new APT 600 MHz band plan is being developed in APAC, where an existing allocation to mobile in Region 3 has been in place for many years without prejudicing broadcasting.

Additional UHF spectrum would allow improved performance of IMT networks in areas where higher frequencies have less effective propagation characteristics, such as over wide rural, suburban areas and in buildings. Densification or use of higher bands in rural areas and other challenging environments is not feasible.

A new GSMA report based on analysis by Coleago Consulting[11] quantifies the capacity and quality gains that could be achieved due to the possibility to install additional carriers in existing sites. It discusses how additional sub-1 GHz spectrum could boost rural mobile broadband speeds and mobile speeds in hard-to-reach urban areas such as deep indoors. As speeds are directly related to spectrum capacity, places which rely on low-band in Europe could see a download speed increase of 37% if 3GPP Band 71 (600 MHz) is introduced in Europe.

In addition, the report shows that low band spectrum typically carries between 10-20% of the network traffic. Given the limited amount of available low band spectrum this results in a "capacity gap" that will widen the differences in QoS between areas covered only with low

[11] Vision 2030: Low-Band Spectrum for 5G, GSMA, June 2022

bands and the rest of the network, as traffic demand and mid-band capacity increase without additional low-band assignment. Additional low-band assignment can alleviate this capacity gap and is crucial for maintaining digital equality.

The report also demonstrates that even with existing spectrum assets, additional low band spectrum would reduce the sites needed to provide 20 Mbps consistent coverage. For example, an additional 2x20 MHz of 600 MHz could lead to a reduction in cell sites of 33%. As population coverage nears 100%, more area will need to be covered for each incremental coverage percentage as networks reach more and more sparsely populated areas and as a general principle every additional per cent of population coverage is more expensive than the preceding per cent. Consumers and businesses in newly covered areas will not benefit from high volume data at high speeds unless mobile operators can reduce the cost per bit. Having more sub-1 GHz spectrum is essential to improve investment efficiency and thus reduce the cost per bit. In the context of the EU's twin digital and green transition as well as the current global energy crisis, it is also important to note that decreases in the number of macro sites needed will also lead to lower energy consumption.

Table 1 Reduction in cell sites from additional spectrum

	No additional spectrum	Plus 2x10 MHz of 600 MHz	Plus 2x20 MHz of 600 MHz
Spectrum	900 MHz–2x10 MHz 800 MHz–2x10 MHz 700 MHz–2x10 MHz	900 MHz–2x10 MHz 800 MHz–2x10 MHz 700 MHz–2x10 MHz 600 MHz–2x10 MHz	900 MHz–2x10 MHz 800 MHz–2x10 MHz 700 MHz–2x10 MHz 600 MHz–2x20 MHz
Cell edge downlink speed	20 Mbit/s	20 Mbit/s	20 Mbit/s
Single-user cell range[1]	27.0 km	30.5 km	33.1 km
Single-user cell area	1,897 km^2	2,412 km^2	2,843 km^2
Typical cell range[2]	9.0 km	10.2 km	11.0 km
Typical cell area	210 km^2	269 km^2	316 km^2
Reduction in cell sites	-	21%	33%

1. Simulation assumes a single cell-edge user per site; rural near line of sight, 50m 40W base station and using the Okumura-Hata propagation model; SINR performance simulations for 4x2 MIMO 64 QAM.
2. The typical cell range is how operators design their network, considering non-line of sight, terrain and cell loading.

The GSMA recognises that broadcasting services that currently use the UHF band are still valuable to some users. However, broadcasting is no longer the main distribution form for audio-visual content in Europe. Time spent consuming on-demand digital content and live streams over the internet is growing rapidly, while time spent on linear TV is decreasing. Furthermore, UHF Digital Terrestrial Television broadcast is not the only means to distribute

linear TV content efficiently. The channels offered through DTT are generally also available through cable-TV, IPTV or broadcast satellites across Europe, in many cases with additional value-added features such as time-shift. In addition, some broadcasters are already making certain content and replays available on their on-demand platform only, thus reducing their number of linear channels.

Action at WRC-23 is therefore a necessary step to keep options of operational use of the 470-694 MHz band in Europe open. This is a prerequisite to allow the EU to determine an appropriate action plan by 2025 or earlier[12] in the context of the EC "*report to the European Parliament and to the Council on developments in the use of the sub-700 MHz frequency band, with a view to ensuring efficient use of spectrum*" as required by article 7 of Decision EU 2017/899[13] and envisaged by Recital 12 of this decision. The "unlocking" of the existing ITU regulatory status of the band in 2023 would simply offer legal flexibility in due time without causing any harm to existing users or prejudging any future decisions at EU level.

Planning for scenarios beyond 2030 is crucial and the GSMA therefore supports:

- Co-primary mobile allocation to the mobile service in the band 470-694 MHz.

Together with the clarity given by preserving the rights enshrined in the UHF Decision until 2030, such a decision would provide a roadmap for investors, mobile operators, EU countries and EU neighbours, while allowing for the development of options for those Region 1 countries that wish to utilise the bands or parts thereof for IMT. It would also give EU institutions and EU Member States sufficient time to set the right long-term co-existence framework and would allow Europe to keep all options open for its ultimate decision.[14]

Other comments

On Article 21, the GSMA considers that unnecessary restrictions for mobile networks in bands that are already used or planned for IMT should be avoided.

[12] Pascal Lamy Report on the future use of the UHF band
[13] DECISION (EU) 2017/899 on the use of the 470-790 MHz frequency band in the Union
[14] See also "Use of the UHF Band in Europe – A new look at an old debate", GSMA Europe, June 2022