# GSMA and Connect Europe Response to the 6G Strategic Vision Draft RSPG Report

December 2024

## Introduction

As 5G begins to mature, planning for the next generation of mobile networks that will be used in the 2030s and beyond is gathering pace. The proactive approach from the RSPG to develop better regulatory understanding of 6G networks is important and recognition of the developing needs of the mobile sector will facilitate long-term planning on spectrum issues.

Mobile networks are expected to run out of capacity towards the end of this decade. Therefore, the reuse of only existing bands for 6G would not be possible, and a new technology on a new band represents the best solution to deliver both capacity and new 6G capabilities and use cases, as well as other benefits 6G can offer.

While 6G development is starting, any framework that is put in place must be broad enough to facilitate development without forcing regulatory-led choices on the service. Technology and service neutrality are important as are a number of the best-practice regulatory activities.

The draft report currently presents a compilation of status updates, inputs, views, and opinions from various stakeholders. While this is valuable, the report would benefit from more concrete proposals that align with higher-level EU policy goals.

Recent policy initiatives from the European Commission and key figures such as Enrico Letta and Mario Draghi call for urgent actions to ensure European competitiveness and investments, particularly through spectrum policy. Therefore, it is crucial that the RSPG's work, including strategies on upper 6 GHz, sub-700 MHz, and the peer review process, should reflect those imperatives and share a unified goal: to bolster Europe's success in the journey towards 6G.

### Spectrum roadmap

Mobile data traffic has experienced strong growth globally over the past ten years, driven by the increasing adoption of smartphones, rising data usage and growing consumption of high-bandwidth applications such as video streaming and gaming. Between 2019 and 2023, global mobile data traffic grew 3.5 times from 39 Exabytes to 137 EB per month, and mobile traffic per connection grew to 17.3 GB/month.

Demand in Europe for broadband traffic in publicly available mobile networks is expected to continue for the current and future mobile generations. While it is impossible for data to increase as rapidly in percentage terms in the future, the exabyte volume of data will continue to grow rapidly – in 2023, the increase in global mobile data traffic was more than the absolute traffic level in 2018[1].

Despite this, data growth is expected to continue at double digit rates across the EU into the foreseeable future[2]. Mainstream uses such as on-demand and live video streaming (e.g. live sports events, news, TV series), social networks (including short videos), gaming, e-commerce and web browsing will all lead to an increase in the amount of GB per hour used, driven by higher definition screens and content that is more intensive in video, as well as content platforms using technologies such as AI to increase engagement and interaction.

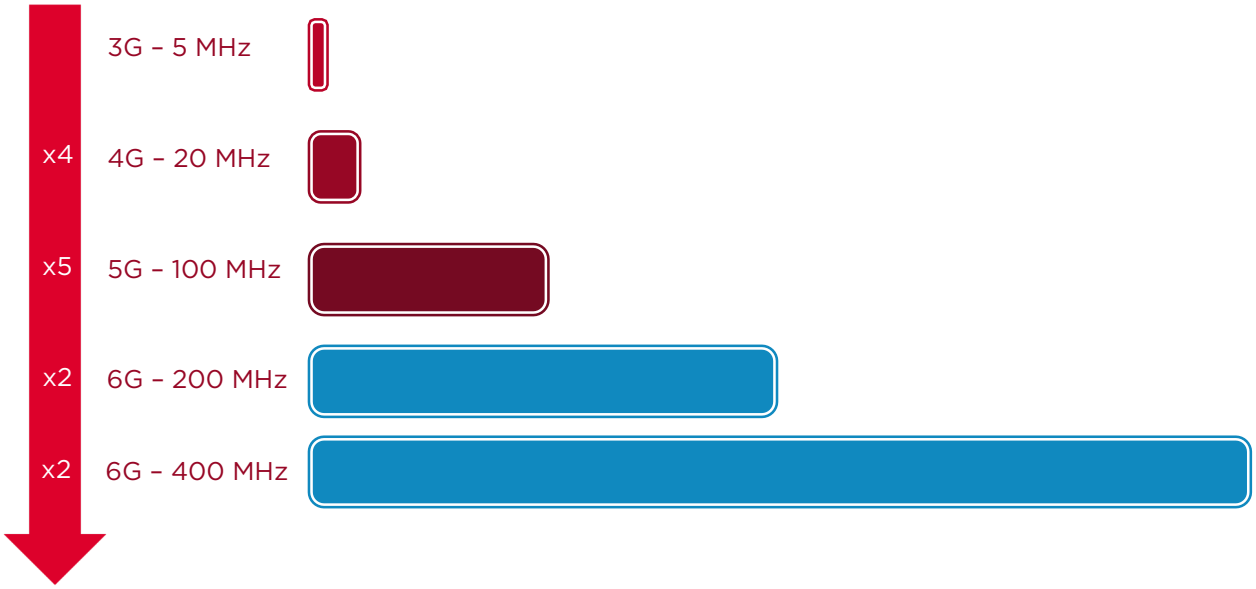
Therefore, when RSPG is developing the 6G spectrum roadmap, it is important to focus on new bands due to the above data growth as well as in response to the capabilities and new use cases 6G is expected to unlock. The continuous migration of legacy mobile spectrum bands towards new, and

[1] GSMA Intelligence
[2] GSMA Intelligence, Ericsson

more efficient technologies, is a natural evolution. Operators will migrate currently available bands towards 6G when it is possible from the traffic perspective, noting that many customers and use cases will rely on earlier generations still years after the launch of 6G.

The ability to use larger channels is a key capability for RSPG to consider when developing its spectrum roadmap. High-capacity 5G today operates with around 100 MHz channels. 6G will continue the progression seen over the last 40 years. Since the smaller channels of 2G, each new generation has increased the channel size by a factor of 4-5x. This historical trend has been consistent across 2G, 3G, 4G and 5G. Typically, such channel sizes have been made available to MNOs in mid-bands while in low bands, where demand will always outstrip supply, MNOs have restricted assignments.

Larger channel sizes are a key component for a sustainable growth of mobile services, avoiding site densifications and reducing energy consumption, but, most importantly, they deliver higher speeds and reliability to the end user in a more cost-effective manner.




Continuing this trend of increasing channel size by 4x would take 6G channels up to 400 MHz. This figure is considered feasible by RF component suppliers but presents significant regulatory challenges in Europe and elsewhere. Achieving multiple 400 MHz channels is possible (the UAE has already put a 350 MHz channels in place for its two operators), but in markets with three or more operators it will be harder to achieve.

Work will thus begin, both in 3GPP and in broader planning, on the use of wider channels for 6G. 200 MHz and possibly up to 400 MHz channels are anticipated. The development path into 400 MHz channels may come in the form of using 2x200 MHz aggregated channels or one 400 MHz channel, but initially the focus will be on 200 MHz in Europe and elsewhere for 6G launch deployments.

As the only feasible spectrum opportunity to launch 6G in Europe at the end of this decade it is crucial for the EU to make available full-power use of the upper 6 GHz band.

In the longer term, some of the adjoining spectrum in 7-8 GHz (under study for WRC-27) could be considered for evolved 6G requirements.

While the upper 6 GHz mid-band spectrum will be key to cost-effectively address network capacity and the deployment of 6G service capabilities in urban and high demand areas, spectrum in low band ranges will also play a role in 6G. The band (470-698 MHz) will be important for delivering 6G to wider and more sparsely populated areas supporting digital equality.

Spectrum in mmWave bands cannot substitute mid-bands for cost-efficient delivery of wide-area coverage and capacity across cities and other areas , but can serve very high capacity needs in localised areas (e.g. smart factories, very high speed Fixed Wireless Access, stadiums).

Spectrum for IMT is used most efficiently at full power. This also helps ensure that equipment follows international guidelines and thus widens harmonisation and economies of scale. Any reduction in power levels will also impact the full delivery of 6G capabilities and thus the focus on full-power spectrum will remain important.

Therefore, as we advance towards the 6G era, it is clear that strategic planning and regulatory foresight are essential to accommodate the increasing demand for mobile data traffic and the launch of 6G. The introduction of wider channels and additional spectrum, in particular the upper 6 GHz spectrum band, will be crucial in supporting the continued growth of mobile services, while also ensuring sustainable development goals in Europe are met.

**Coverage solutions through NTNs**

The GSMA tracks mobile coverage and connectivity in its annual State of Mobile Internet Connectivity report. This includes the percentage of any population that are not covered by the mobile internet. Globally, that figure is around 4 % while in Europe it is 1%. There are a number of regulatory activities which can further improve mobile coverage, largely centred around enhancing regulatory certainty and long-term investment clarity for mobile operators. Maximising access to low-band spectrum is also an important component for coverage in terrestrial mobile networks.

Hybrid terrestrial / satellite networks have received a great deal of commentary in the past twelve months, and along with HAPS/HIBS solutions may in the future become a common technology that is adopted by mobile operators. However, the business case for their use is not known, the extent of the quality/speed of the service offering is very unclear and their use in the densely populated countries of Europe may well be significantly less than in other parts of the world.

6G development is in its infancy and we do not believe that RSPG should necessarily point it towards one particular technology or service. NTN may have a role to play in widening coverage, but government-led activity to force it to do so will stifle market choice and creativity.

**Enabling enterprise use cases**

The digitalisation of industry is a priority for every country but approaches to providing connectivity for private and local networks have varied in the 5G era. Industrial and local connectivity is a policy area in which careful planning is required to use the valuable public resource of spectrum to benefit business and consumers simultaneously.

Private and local networks take a variety of forms today, delivered by regulation which varies from light-touch to interventionist. They are provided by mobile network operators, either through network slicing on public network equipment, through dedicated solutions on national spectrum licences or a hybrid of these systems. Bespoke private network solution providers may lease spectrum from mobile operators for their own network installations. At the other end of the scale, spectrum set-asides have been made by regulators for use on local and private networks, some of which exclude mobile operators from using the spectrum.

The practice of setting aside spectrum for private or local networks has been carried out in some European countries, but this does not have any particular advantage over other less-invasive solutions. At the halfway point in the 5G era China, which has no spectrum set-aside in core bands is the leading country in terms of number of private networks, and the idea that enterprise connectivity necessarily requires spectrum set-asides is starting to fade.

In the 6G era, enterprise connectivity will again be an important part of overall connectivity but the damaging impact of paring out significant spectrum bands for private networks must come under increasing scrutiny. Such a practice also gives a huge regulatory encouragement to equipment duplication in areas where it may not be needed, which will have a detrimental effect on Europe's ability to reach its net zero targets.

To guide the connection to other goals, the BEREC report on private networks provides a relatively neutral overview of the situation in Europe, recognising that the demands are also served in conjunction with public mobile networks, and acknowledging the role of MNOs as private network providers. We suggest that the RSPG therefore collaborates with BEREC on local/private/vertical demands.

In countries where mid-band spectrum has been reserved for private networks, the number of licenses reported in the BEREC report varies from none to about 400 and not all licenses have led to actual deployments. Nevertheless, these are relatively low numbers compared to the number of base stations that mobile operators have deployed in the same spectrum range. This comparison is fair, noting that public mobile networks serve society more broadly, including both public and private demands, and represent the best alternative use of spectrum allowing. This would allow a more effective and efficient use of spectrum.

GSMA and Connect Europe have provided comments on private networks to the recent BEREC consultation, as well as for the development of EC decision on the harmonization of the 3800-4200 MHz band.

**Sharing**

In the context of 6G development, we agree it is important to consider the topic of spectrum sharing thoroughly. While primary incumbent services require solutions that will ensure sufficient protection, sharing should not be used as a tool to continue inefficient incumbent uses longer than their need is justified. When considering sharing between different new uses (services/applications) in a spectrum band, the starting points should be thorough demand and socioeconomic benefits assessment of those uses, especially if the sharing solution between them can be expected to add overhead and complexity, limiting performance, creating inefficiencies and increasing the cost for providing the services to the society.

We advocate for the consideration of sharing solutions that can be implemented through licenses (e.g. geographical separation supports protection of a set of incumbent services), and emphasise the need for practical, operational solutions over simply increasing the cost of technology. Analysing the operational feasibility and commercial viability of spectrum sharing is crucial. Additionally, exploring how spectrum sharing can enhance Europe's digitalization and 6G success, rather than setting it as an end goal, would be more beneficial.

6G technology may present an opportunity to facilitate spectrum sharing that was previously unattainable, but discussions should include all potential coexistence scenarios considering the prioritisation of full-power mobile implementations. Successful spectrum sharing approaches must be commercially viable, technically feasible, reliable, and ultimately must deliver net benefits for end users.

It is also important to learn from past experiences with spectrum sharing as it has not yet been a successful solution globally. For instance, sharing among new end users and different MNOs should be evaluated for spectrum efficiency. The GSMA and Connect Europe have previously responded to RSPG discussions, highlighting our views on spectrum sharing, and it is vital to incorporate these lessons into the current discussions. By doing so, we can ensure that spectrum sharing, when needed, contributes positively to the overall success of 6G deployment and digitalisation in Europe and does not limit the power and growth of mobile technologies.

**Below, the GSMA and Connect Europe bring some non-extensive proposals related to the above comments, to be considered for possible further development of this report.**

**A set of ongoing activities of RSPG, such as strategies on 6 GHz, sub-700 MHz, and not the least the peer review have relevance to 6G. All of these activities must have the same ultimate goal to support the European success and competitiveness on the way towards 6G.**

## Comments to the draft report text

***Page 2 (proposal to modify): "Stakeholders stated a need of 200 MHz for each MNO in mid band spectrum with conditions that allow the use in macro base stations without undue power restrictions. This would enable implementation of 6G use cases that require more capacity than 5G services and provide reasonable coverage in suburban/urban areas utilising the same base station towers as for 3.5 GHz. Further, operators have expressed their need for more spectrum to provide increased network capacity in the coming years."***

In addition to the large bandwidths, mobile operators that presented in the RSPG 6G hearing brought up the importance to allow full power for IMT base stations to support macro deployment using existing site grid.

It is important to highlight a critical data point that might sometimes be overlooked in the discussions: irrespective of whether we are discussing 5G or 6G, mobile networks are expected to reach their capacity limits towards the end of this decade. Therefore, existing bands for 6G would not be sufficient to alleviate this capacity crunch, and deploying new technological solutions on a new bands may be needed to provide both the necessary capacity and the additional benefits 6G can offer to mobile networks.

This factor is crucial for delivering services efficiently, in addition to the mentioned channels of 200 MHz per operator. Furthermore, the ability to utilise full power macro levels is essential for achieving adequate coverage using the 3.5 GHz grid, as indicated in the following statement and commented in the introduction above.

***Page 3: "Researchers propose that spectrum sharing between MNOs and local/private networks needs to be incorporated into 6G spectrum discussions from the beginning of the technology development phase and not be a restriction posed afterwards"***

Mobile Network Operators (MNOs) currently cater to both local and private demands within their existing networks and spectrum. This can also be viewed as a method of sharing spectrum resources to meet both public and private needs. The draft BEREC report on 5G private networks correctly acknowledges the role of MNOs in this regard.

In addition to local and private networks, the term 'vertical' is mentioned in the report couple of times. For clarity, it may be beneficial to provide an explanation and examples of what is meant by verticals. It is important to note that many vertical use cases can be served within public networks and converged in broadband in general (e.g. TV being one example). Consequently, they may not necessarily require dedicated spectrum or even a network slice.

***Page 5: "Although intra MNO sharing is a very effective tool for a smooth migration from 4G to 5G, there are limitations to consider in its adoption, especially in low bands, impacting peak transfer and affecting the user experience"***

Dynamic Spectrum Sharing (DSS) has proven particularly effective in the 700 MHz band, facilitating a smooth transition between 4G and 5G as the penetration of 5G-enabled devices increases. In 700 MHz frequency bands, the primary focus has been to deliver 5G wide-area coverage rather than peak capacity.

***Page 5 (proposal to modify): "Currently, there are still a significant number of European MNOs in an intermediate stage of 5G adoption, as they maintain the massive use of 5G NSA without a clear perspective for adopting 5G SA. This implies relevant limitations, innovative features of 5G, including network slicing based on the 5G SA version, preventing the efficient deployment of a set of relevant use cases"***

It is important to recognise that numerous use cases can indeed be deployed without Standalone (SA) networks. However, it should be noted that while these deployments may operate effectively, they might not achieve the same level of efficiency or performance as they would with SA networks.

As we look towards the future, it is crucial to acknowledge the potential of future spectrum strategies to address these challenges. This will ensure that both local and vertical demands are sufficiently met, paving the way for continued innovation and development within the industry.

***Page 8 (proposal to modify): "Currently the availability of dedicated spectrum for local networks varies between countries, but the harmonisation of the band 3800-4200 MHz for low and medium power terrestrial wireless broadband (WBB LMP) may improve the situation and provide better possibilities to fulfil the specific requirements of verticals and local use in certain use cases, noting that there are also other means to serve these demands.***

***The spectrum need for local and vertical use may increase, although no justification on this, noting that local and vertical demands are also served in conjunction of public mobile networks. This may need to be taken into account in future spectrum strategies, considering also relevant developments and timing of harmonisation."***

Section 2 discusses lessons learnt in 5G, presenting statements of fact for future reference. The increasing spectrum need for local and vertical use, including in 3.8-4.2 GHz or even beyond, should still be justified. This was not donewhen RSPG recommended this approach, nor later when EC submitted mandate to CEPT to develop harmonized conditions for the band.

Currently, there is no proof of the demand for 400 MHz for local and private networks, nor evidence that it would be an efficient use from a technical or socioeconomic perspective when compared to alternative uses. This consideration is particularly relevant for private networks, and it might be beneficial to review the BEREC report for additional insights.

When comparing the number of local deployments in dedicated spectrum to public 5G deployments in similar spectrum ranges, the number of local networks remains low. This section also refers to private networks with wide or national coverage, and refers to 3.7-3.8 GHz band in Germany as an example. It would be be good to elaborate this wide or national wide coverage a bit further. It is worth noting the status of private networks in the 3.7-3.8 GHz range, which have not achieved wide-national coverage. The GSMA has published replies to BEREC and a detailed position of 3.8-4.2 GHz harmonisation, also mentioned above.

***Page 9: "In recent years, there has been a growing demand for high-speed and reliable connectivity leading to a significant densification of IMT networks and fixed broadband networks served by WAS/RLAN."***

The densification mentioned in this part is not clear if it refers primarily to IMT, as WAS/RLAN did not need to densify in recent years due to a lack of capacity constraints. It is important to note that the lower 6 GHz band is not extensively in use at this time.

Additionally, it seems somewhat unusual to state that fixed broadband is served by WAS/RLAN and the GSMA has published a new report on the matter recently (https://www.gsma.com/connectivity-for-good/spectrum/gsma_resources/6-ghz-for-5g/); it would be more accurate to say that WAS/RLAN provides access to fixed broadband networks.

***Section 8 Input from Research and Development***

While we agree research and development are key for 6G success, it may be good to consider summarising this input, especially those parts which are already extensively covered elsewhere in the report, e.g. spectrum sharing and locals and verticals. Alternatively part of this section could be considered to be moved to an annex. This may provide more balanced approach considering the inputs from other stakeholders, noting that input from manufacturers and mobile operators which eventually deliver and deploy the 6G is summarised in half a page each.

***Page 26: "Market structures change and local 5G networks that were strongly opposed 8 years ago are a reality today"***

It is not clear at what extent local 5G networks were "strongly opposed 8 years ago are a reality today". Historically, there have been local and regional licenses for various networks. It is important to evaluate these past efforts and their success. Local 5G networks must be examined for their potential to be more successful compared to earlier initiatives. Additionally, emphasis should be placed on the actual efficiency and demand for these networks. We also note that if local networks in this context refer also to private networks, many of them can be served also in conjunction of public mobile networks.

***Page 35 (proposal to modify): "All operators indicate that the spectrum need in upper 6 GHz band would be 200 MHz for each operator with conditions that allow deployment with standard macro base station power levels"***

The need for wide channel bandwidths and possibility to use full power in macro base stations were highlighted by Mobile Network Operators during the hearing. It is important to ensure that the key points are accurately covered in this section which summarizes the views provided by MNOs.

**Page 38: "Switch-off of 2G or 3G in low frequency bands 900 MHz/1800 MHz may provide opportunities for 6G use cases requiring only limited bandwidth, e.g. Massive communications (IoT)"**

Many countries have already decommissioned 3G networks, and the spectrum resources previously in use to these networks have/will be repurposed prior to the availability of 6G. Currently minimal spectrum resources are used for 2G in many countries, and some operators already have and many plan to phase out 2G networks before 2030 when 6G becomes available. The spectrum made available by the decommissioning of these networks will be utilised by existing technologies to meet customer demands, rather than being reserved solely for 6G.

As noted in the main body of this input, it will be important to focus on new spectrum bands when developing the 6G spectrum roadmap. Migration of currently available bands to newer technologies is a natural evolution and will happen also with 6G.