



**European Spectrum Policy for the Digital Decade – options for
the new Radio spectrum policy programme**

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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.

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About ETNO

ETNO (European Telecommunications Network Operators' Association) represents Europe's telecommunications network operators and is the principal policy group for European e-communications network operators. ETNO's primary purpose is to promote a positive policy environment allowing the EU telecommunications sector to deliver best quality services to consumers and businesses.

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Introduction

Global events over the last three years have reminded us that advanced telecom networks are essential if Europe is to be successful in its pursuit of global leadership in the digital economy, remaining secure and resilient in the face of unpredictable global threats, and able to achieve its migration towards net-zero.

Digitalisation will revolutionise the global economy over the next 10 years, by transforming everything from transport, manufacturing, healthcare, education, energy management and public services. By 2030, digital technologies and connectivity will be the very fabric of our societies and economies. The ubiquitous availability of high speed, low latency 5G connectivity will drive this revolution - and it will be those regions of the world that deploy 5G first that will be positioned for global success in creating and controlling these new digital environments and economies. Europe is in a “lead or lose” situation. Our strategic interest is to lead the future of connectivity. As European telecom operators, we work to stay ahead of the curve in roll-out of 5G and FTTH, development of new network and cloud technologies, digital inclusion and the twin green-digital transition.

The EU’s Digital Decade envisages full 5G or 5G equivalent coverage by 2030, which means ensuring digital equality and inclusion for all European citizens and businesses no matter where they are. Mobile broadband has been proven to be a catalyst for GDP growth^{1,2}, as a basis for social inclusion and wellbeing and a powerful tool in the fight against climate change.³ 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.

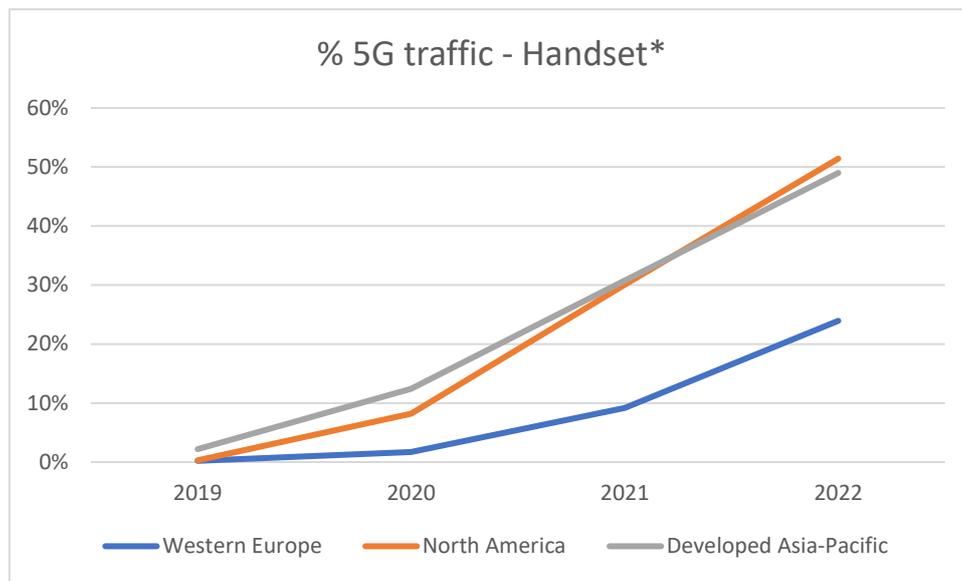
The important question is how do we deliver on this vision? While most countries in Europe have deployed commercial 5G services, and nearly two-thirds of operators in the region have launched 5G networks, it is clear that there are large differences between Member States, between urban and rural areas and most worryingly between Europe and other leading regions.

¹ [The Mobile Economy 2023](#), GSMA, March 2023

² [The Socio-Economic Benefits of Mid-Band 5G Services](#), GSMA, February 2022

³ [Mobile Industry Impact Report: Sustainable Development Goals](#), GSMA, September 2022

Figure 1 Percentage of 5G traffic (handset)



*Excludes IOT & FWA

Source: Analysys Mason

Moreover, ‘full’ standalone 5G — where 5G is also deployed in the core of the network — is needed to deliver the promise of the technology. We remain far from that point in the EU, and significantly behind the leading countries. Asia Pacific leads the way in terms of live standalone 5G deployments, while such services are only now starting to be deployed in a few EU Member States.⁴

In addition, 5G coverage is just one high-level indicator by which to measure the Union’s progress. It is also necessary to consider 5G adoption, capacity, quality of service (QoS) and investment levels especially in comparison with other regions. Furthermore, in those areas with larger rural or dispersed populations there is a danger that a lack of sufficient 5G services will compound inequalities in poverty, social exclusion and digital skills.

Europe already has an investment gap in telecom networks and services (€174 billion as estimated by the EC⁵), in conjunction with overall declining or flat revenues in the sector, returns below the cost of capital, weak market valuations and high levels of debt. In our view, policy change can help shape a future in which Europe innovates, grows and stays in control of its connectivity. However, reversing the downward trend in mobile investment in Europe requires a set of remedies - including radical reform of spectrum policy - to recreate an environment that can recover investor appetite for the sector and rehabilitate a healthy investment capacity for the sector.

⁴ Austria, Bulgaria, Finland, Germany, Italy and Spain, GSMA Intelligence

⁵ Exploratory consultation - The future of the electronic communications sector and its infrastructure, European Commission, February 2023

At a time when telecom networks are widely acknowledged as critical network infrastructure (CNI) and enablers of the twin digital and green transition, the sector faces serious challenges that, if not addressed, will prevent Europe from establishing itself as a digital leader for the coming decades.

Critically, this must include, from a spectrum policy perspective: prolonging existing licences to align with investor timeframes; preventing distortive or inefficient awards for new spectrum; minimising the cost burden of annual spectrum fees; and securing a pipeline of new harmonised mobile spectrum bands (such as 6 GHz) to accommodate future traffic demands in an energy and cost effective way – the RSPG therefore must take a more pro-investment approach and ensure the broad spectrum provisions already in the European Electronic Communications Code (EECC) are clarified further to achieve a more harmonised approach to licensing and more concrete and ambitious investment outcomes across the Union.

Furthermore, with 5G networks having much greater minimum scale at local level⁶, consolidation is essential. While consolidation falls under the competence of DG-COMP, it is imperative that also through the RSPG, the RSPG and DG-CNECT set out clearly why the scale which can be achieved through consolidation is necessary for 5G deployment as it will benefit consumers and speed up the achievement of the EU Digital Decade's targets.

Need for increased investment capacity

While the European telecom sector has collectively invested €500 billion over the past 10 years⁷, the next technological transition will require an even deeper investment to meet growing data demand. Total global mobile data traffic — including fixed wireless access — reached around 118 Exabytes (EB) per month by the end of 2022, and is expected to reach a staggering 472 EB per month by the end of 2028. This is compared to a figure of 27 EB per month in 2018, a predicted increase of over 1,648% in the space of just 10 years.⁸

These developments are driving the need for additional investment in the EU's digital transformation by 2030, amounting to an estimated €42 billion per year for communication networks.⁹ A further €14 billion per year is required for cloud and cybersecurity investment.¹⁰ This investment gap represents a major challenge for the rapid evolution of 5G in Europe and the ability of European operators to deliver the connectivity required to

⁶ A large majority of investments are made in assets that need to be geographically close to end users

⁷ [Europe's internet ecosystem: socio-economic benefits of a fairer balance between tech giants and telecom operators](#), Axon Partners Group, May 2022

⁸ [Mobility Report](#), Ericsson, June 2023

⁹ [Identifying Europe's recovery needs](#), European Commission, June 2020

¹⁰ Ibid

succeed and lead in the new tech-driven era and support future demands (e.g. Metaverse), and very likely putting the Digital Decade targets at risk.

Mobile revenue and investment per capita in mobile networks have been significantly lower in Western Europe than in the US and developed Asia Pacific for at least the last fifteen years (see Figure 2 and 3).

Figure 2 Mobile revenue per pop

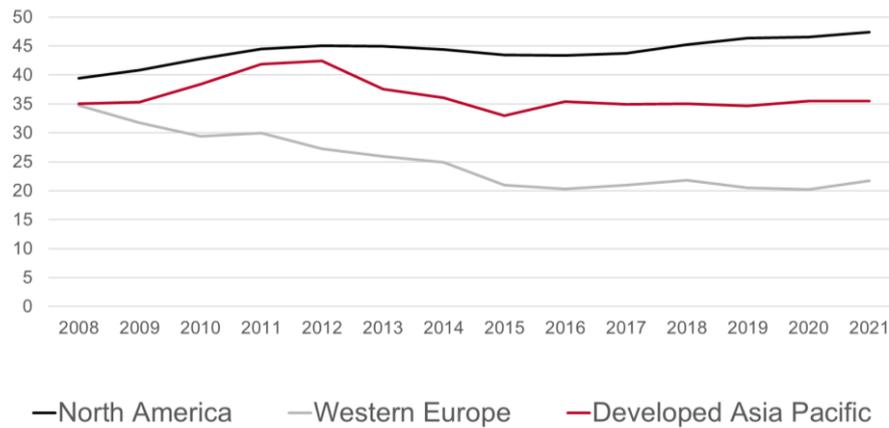
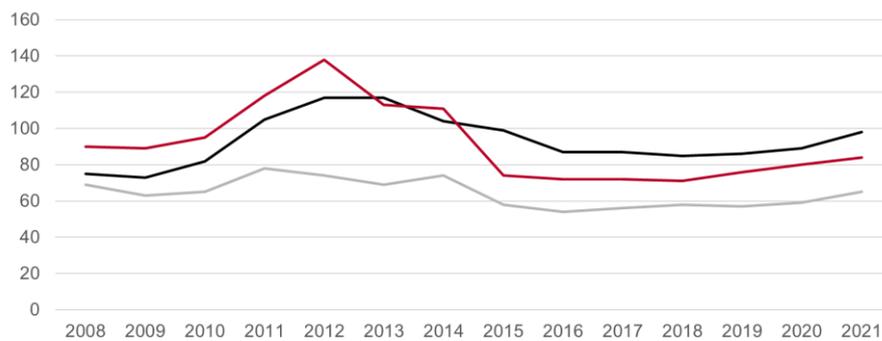


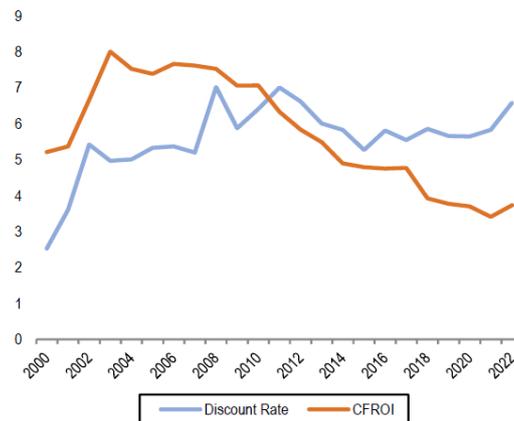
Figure 3 Capex per pop



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

In Europe, due to strong competition, exacerbated by a high regulatory burden, telecoms companies cannot capture sufficient returns to support continuous, necessary investment in network capacity, reach, security and capabilities (see Figure 4).

Figure 4 Industry returns still below the cost of capital



Source: Credit Suisse, Telecoms 2023 Outlook

*CFROI: Cash flow return on investment

Even though connectivity is one of the most critical enablers of Europe's digital potential and green transition, smart connectivity as a business is undermined by declining revenues and shrinking investment resources, a situation compounded by regulatory decisions as well as geopolitical, economic, financial and environmental crises:

- Over-regulation: strong competition, exacerbated by a high regulatory burden, leading to artificially low retail prices.
- Economic environment: expected to be more challenging in Europe than in the rest of the world in 2023.
- Inflation: rising business costs combined with decreasing or flat revenues are likely to further inhibit investment.
- Interest rates: rising rates could impact operators' decisions on capital allocation and short-term vs. long-term strategies.
- Climate resiliency: network costs will rise as telcos work to make infrastructure resilient to the increasing number of extreme weather events.
- Security challenge: physical and cyberattacks on Europe's critical infrastructure have increased in recent years, and the costs of protecting telecom networks continue to rise. Geopolitical tensions, including sanctions, have disrupted network equipment supply chains, causing further cost implications for operators.
- Energy crisis: the increased baseline for wholesale energy prices offsets network efficiency gains and puts added pressure on free cash flow, constraining investment capacity with potential spillovers for deployment timelines.

Achieving full 5G across the entire EU will require a stronger sector and a policy and regulatory framework that reverses investor flight and enables the sector to meet the investment gap. Radical reform of the telecom policy environment is needed to change the

economics of telecom networks in Europe, and spectrum policy is one of the key levers in the hands of policymakers to ensure that telecoms networks deliver strong and sustainable economic growth and full 5G for all European citizens and businesses by the end of the decade.

Need for spectrum policy reform

ETNO and the GSMA consider that there is an urgent need to adapt the policy principles initially established 20-30 years ago to the new context.

First, spectrum policy has the potential to address some of the challenges of climate change. Efficient use of spectrum can lead to a reduction in carbon emissions while simultaneously generating economic benefits to society. A recent report by GSMA¹¹ found that sub-optimal spectrum policy can lead to tens of millions of tonnes of additional CO2 emissions. Inefficient spectrum policy can raise the cost of building and operating mobile networks and lower the adoption of emission-saving technologies, which could result in a missed opportunity to reduce emissions from households and other sectors that rely on mobile connectivity.

Second, digitalisation penetrates all areas of society and requires secure and resilient connectivity. Various services that have earlier been provided in dedicated networks, are provided within broadband networks today. This network convergence will continue because it is efficient from economical, ecological, and spectrum use perspective. Thus, also spectrum policy should support this development. We do not see a need for distorting the market and diminishing operators' ability to provide high quality services by making dedicated spectrum available for services/verticals that are and can be served within multipurpose broadband networks. Examples of such services are audio-visual media (broadcast content), transport, internet of things, public safety, industry applications. In addition, market distortion that is emerging as satellite (free of charge) spectrum and mobile spectrum increasingly overlap in the markets they seek to serve (e.g. fixed wireless access) must also be addressed.

Finally, in order to make spectrum policy a lever for investment and growth, we consider that a number of key issues need to be addressed:

1. Licence prolongation – ensuring long term business certainty and aligning with investors' timeframes
2. Awards procedures - preventing distortive or inefficient awards for new spectrum
3. Annual fees - minimising the cost burden of annual spectrum fees
4. Spectrum availability - underpinning ongoing business expansion and securing a

pipeline of new harmonised mobile spectrum bands (such as 6 GHz) to accommodate future traffic demands in an energy and cost effective way

5. Minimum scale – recognising that 5G deployment requires a scale that consolidation can help deliver¹² and that needs to be taken into account in the context of spectrum policy

We believe a new RSPP is an opportunity to improve on all of these fronts:

- Across the EU, usage rights spanning core cellular bands (e.g. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz) expire in a ten year horizon. New investments linked to those bands, either to enhance capacity for 4G or to introduce 5G, generally have an asset life that goes beyond the current duration of licences. The prospect of renewal of use rights creates a risk – through bad auction design – of spectrum pricing that is inconsistent with a sustainable investment plan.
- Many of the recent 5G awards have resulted in artificially high prices, due to reserve prices benchmarked to other contexts (e.g. past auctions in the same market, or awards for similar bands in other markets) or to scarcity created by the regulator (e.g. set asides for verticals, different lot sizes).
- Despite industry calls for clearer expectations of additional spectrum suitable for cellular macro deployments in low (e.g. UHF) and mid-bands (e.g. 3.8-4.2 GHz, 6 GHz), the current prospects are uncertain.
- Market shaping provisions giving preferential treatment to new entrants in spectrum awards are still not properly justified, despite the reference to a need for a prospective market analysis in article 50 of the EECC. Similarly, the prospect of spectrum set asides for verticals is creating an artificial regulatory bias in favour of business connectivity solutions that bypass national public 5G networks.

The wider adoption of best practices and rules based on these principles would improve investment conditions. This is discussed further in the following sections.

Achieving a more consistent and investment friendly EU licensing framework

ETNO and the GSMA consider that there are two concrete measures that can be introduced in the RSPP, building on the path already initiated by the EECC:

¹² We note that this generally falls within the competence of DG Comp but consider that DG CNECTs expertise in this area is vital in providing the relevant insights in this regard

1. A mandate to Member States to assess the renewal of licences as soon as possible or at least five years before the licence expiry date

Article 50 of the EECC already mandates Member States to assess renewals sufficiently ahead of the end of the licence term. There are precedents in Europe that show the value of doing that analysis long before expiration. In 2010, the UK switched to a regime of indefinite licences for 900, 1800 and 2100 MHz, with administrative prices after year 20. Along the same lines, Spain introduced the possibility for licensees to ask for a 10-year extension of all existing licences, up to a maximum of 40 years total duration in the latest Telecoms law. In order to provide certainty for new investments, we believe there would be benefit in establishing in the RSPP a deadline for all Member States to do the article 50 assessment by the end of 2025 for licences that expire before 2034 for example.

2. A strengthened review process for spectrum awards

Looking forward towards the next wave of awards, a proper review process would reassure investors against artificially high spectrum prices or undue market-shaping measures. In particular, a stronger role for the European Commission would foster compliance with the key provisions in the EECC. In particular:

- Reserve prices should be based on opportunity cost (art. 42)
- Maximising public revenues should not be an objective of award processes (art. 55)
- Market shaping measures should be justified with a market analysis (art. 52)

3. Increased transparency for spectrum annual fees

In addition, we consider that more transparency on the level of annual spectrum fees across the EU 27 would make studies and comparisons on the impact of spectrum prices more feasible. A strengthened review process should therefore also include the collection of information from NRAs on spectrum fees and the establishment of a public database on the basis of this information.

Increasing spectrum availability

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.

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.

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 due time consistently with market needs at a fair price.

Securing future options for better mobile quality in rural areas by facilitating the use of the band 470-694 MHz for Mobile Services

Sufficient low band spectrum availability is necessary for delivering the growing demand for mobile broadband services in rural areas and for enhancing mobile broadband indoor coverage. It supports targets for digital inclusion and equal digital opportunities, and provides better access to digital healthcare, education and media services, as well as strengthening nationwide networks for future usage scenarios such as automated driving.

While EU decision (EU) 2017/899 protects broadcasting until 2030, it also requires ensuring efficient spectrum use and to consider changes in consumer behavior, and the requirements in connectivity to foster growth and innovation in the Union. We aim at extensively deploying and efficiently using all available low band spectrum that has been made available to mobile operators well before 2030. We refer to the Coleago consulting study for the UK Spectrum Policy Forum¹³, which provides a thorough analysis of the extent to which increased spectrum availability in low bands is the optimal way to meet traffic demand expectations. Their conclusion is clear: refarming would provide an increase in spectral efficiency, but not sufficient to meet the expected increase in traffic demand. Additionally, we would like to emphasize that operators are keen to refarm their low bands and have done so in the past. However, at the moment there are barriers to such refarming such as the low penetration of 5G devices in rural areas, and the need to serve IoT legacy technologies and services such as eCall.

At the same time the media consumption is changing, and there is large variation on Digital Terrestrial Television popularity among member states. Other TV distribution platforms (e.g. cable, IPTV, satellite) are more popular than DTT for linear TV viewing in many member states. In addition, people throughout the EU use increasingly more on-demand video content and streaming services. This increases data in broadband, including mobile broadband, but also raises the question on reasonable number of linear TV channels from the perspective of spectrum and socio-economic efficiency, when only few of them reach significant ratio of population, and large part of the transmitted content is available also in

broadcasters' on-demand platforms. In addition, the efficient distribution of TV content in future should be considered in the broader EU policy context. For example, the gigabit connectivity that is set as a 2030 target in the Digital Decade Policy Programme provides sufficient capacity to all end users also for TV content reception via broadband connection.

Acknowledging the variety of national circumstances and building on the forthcoming RSPG opinion on the future of the UHF band, ETNO and the GSMA consider that the RSPP is an opportunity to prepare for the possible introduction of mobile by 2030 and prevent unnecessary delays. To that end, it would be valuable to set a deadline in the RSPP for the EC to report on concrete proposals to reduce barriers to the introduction of mobile post-2030 in interested Member States. We suggest December 2026 as a deadline that gives sufficient visibility on market trends, and at the same time provides sufficient time for possible changes to the UHF Decision to be introduced by 2030.

Securing future options for advanced 5G services with additional spectrum in the 6 GHz band

The frequency range 6425-7125 MHz is of particular importance for the mobile operators since it uniquely delivers both coverage and capacity for mobile networks across cities and other networked areas. Additional mid-band spectrum is required to support and evolve mobile services to meet the society demands in economically and environmentally sustainable manner. It is estimated that 40% of the expected socio-economic benefits of mid-bands 5G could be lost if no additional mid-bands spectrum is assigned to mobile services.¹⁴ Mid-band spectrum need for IMT is estimated to be in total about 2 GHz within 5-10 years.¹⁵ In European countries the current mid-band spectrum availability is less than 1 GHz.

There is ongoing discussion in Europe whether this spectrum should be used for IMT or Wi-Fi or both. EU has recently assigned the lower 6 GHz band to license-exempt RLAN use. ETNO and GSMA members provide a large proportion of fixed broadband connections in Europe and thus acknowledge the importance of license-exempt spectrum for distributing the broadband access over Wi-Fi within homes and offices, but do not foresee the need or benefit for allocating additional spectrum for license-exempt use in the upper 6 GHz band.

A GSMAi report¹⁶ on the socio-economic benefits of the 6 GHz band, concludes that on a global basis, the greatest socio-economic benefit from the entire 6 GHz band (5925-7125 MHz) will be driven by using it fully for licensed IMT. Even in countries with very high Wi-Fi demand, where fibre to the premises (FTTP) adoption is widespread and supports above 10

¹⁴ [GSMA report on the socio-economic benefits of mid-band 5G services](#), Feb 2022

¹⁵ [Vision 2030: Insights for Mid-band Spectrum Needs](#), GSMA, July 2021

¹⁶ [GSMAi report on the socioeconomic benefits of the 6 GHz band](#), June 2022

Gbps user speeds, assigning the upper 6 GHz band (6425-7125 MHz) for licensed use is the most beneficial scenario. Therefore, we have requested Europe to support IMT identification for the upper 6 GHz at WRC-23 as it would provide regulatory predictability for the future spectrum supply as well as equipment availability that are critical for delivering the services that meet the EU targets and users demand in a sustainable way.

A rigorous cost-benefit analysis of the different options for the band is key to ensure efficient use, including the impact of regulatory technical conditions over the value of the band . The RSPP is a useful tool to provide guidance on how that analysis could be done, ensuring that all options, their value to end users and their opportunity costs are properly accounted for.

Promoting a neutral approach in 3.8-4.2 GHz

The 3.8-4.2 GHz band comprises 400 MHz of valuable mid-band spectrum. Its use in national public mobile networks in Japan and the USA has fostered the development of a 5G ecosystem, and the frequencies are very well suited to meet spectrum demand for wireless broadband deployments in Europe on a shared basis with incumbent satellite and fixed services. These additional 400 MHz would help achieving the 2 GHz mid-band spectrum needed together with the upper 6 GHz band.

The importance of the band for 5G expansion as well as the diversity of the possible uses of the band, and the variety of technologies and deployment strategies that could be used to address them, call for a policy that is neutral at the assignment stage and flexible from a forward-looking perspective.

In the specifics of the European context, if a band is to be set aside with bespoke conditions, we consider that the regulatory conditions should be focused on alleviating the risk of underused spectrum. The portion of the band intended to specifically meet demand for local private networks should be minimised. Spectrum that is set-aside exclusively for local low-power use in core mobile bands risks being underused, can undermine fair spectrum awards and can also threaten the wider success of 5G – including slower rollouts, worse performance and reduced coverage. In addition, artificial limitation to low-power use would lead to small coverage area per base station. Similar coverage areas could be reached in higher spectrum bands which, unlike the mid-bands, are not applicable for providing continuous coverage serving also mobility demands.

If such an approach were to be considered, a number of guiding principles and steps would be fundamental in ensuring that the disadvantages are minimised.

1. Mapping of incumbent users and definition of least restrictive technical conditions

2. Establish initial amount of spectrum required for the development of local network ecosystems
3. Assignment for local networks with embedded flexibility
 - a. Initial partial assignment with power restrictions at fees that account for opportunity cost
 - b. Second wave licences protecting the incumbent but without other power restrictions

Institutional framework

Enhancing EU sovereignty in the management of spectrum by ensuring full control of decision-making in spectrum harmonisation

The participation of non-EU countries/entities in technical preparatory work for EU decisions on spectrum harmonisation and international negotiations is generally not an issue of concern for EU sovereignty, resilience, or security. In Europe there is a well-established process of harmonising technical usage conditions based on service and technology neutrality. Although the work is usually based on consensus, with final decisions taken by European administrations only, the EU27 represent the majority.

The current process allows for the involvement of all relevant stakeholders and enables Europe to be best prepared for international negotiations. As such there is a concern that the establishment of an ad hoc or permanent body of EU national telecoms regulators may not allow for the same level of participation or transparency in terms of the decision making process. Under the current regime, EU decisions are also backed by CEPT preparatory work, which decreases fragmentation between the EU and other European countries.

However, in the context of 6GHz, the RSPG failed to provide a clear opinion on the upper 6GHz being allocated for mobile use, and instead relied on other regions to take the lead. Non-EU countries thus influenced WRC preparatory meetings and large US tech firms may have influenced some EU states (and thus the CEPT process). Possibilities to address this should be considered.

In recent years more national requirements have appeared in area of security, and national regulations and legislations are fragmented. In some countries, these requirements have also been linked to the licensing process, causing delays and making the application phase more complicated and uncertain. In addition, strict national requirements on how networks should be deployed and operated increase cost, complexity and may decrease resiliency of the mobile networks. The requirements and process should be predictable and fragmentation in national requirements should be mitigated.

Ensuring a coherent EU response to harmful interference from third countries

As a first step, the EU should ensure good conditions in international agreements (e.g. Radio Regulations) for harmonised EU mobile bands. Recent experiences (e.g. 3.6-3.8 GHz) show that an important precondition to secure against use restrictions is that EU services operated in the EU are backed by a primary allocation in the Radio Regulation. Only then do EU Member States have the right to request coordination from third countries.

It is also important to note that the severity of interference can depend on the band, geography, radio service, third country demand and demand in the EU Member State itself, so the same coordination agreement with a third country and all Member States may not be optimal for all borders. The existing process is largely sufficient and Member States bordering third countries have established mechanisms to deal with issues bilaterally.

However, enhanced information exchange within the EU and a fallback option of EU support upon the request of an affected Member State (e.g. similar to RSPG process) would be useful to account for scenarios in which a Member State faces difficulties in reaching bilateral agreements.

Additional measures to facilitate EU-wide satellite services

With regard to satellite services, it should be noted that satellite licences need to be limited to spectrum that is specifically allocated to the Satellite services (FSS or MSS). However, we note recent activities of satellite providers to use LEO satellites in IMT bands where exclusive usage rights have been granted (and bands not being allocated to the Satellite Service) to provide “direct to device” satellite services, establishing connections between standard mobile handsets and satellites. These services are intended to complement terrestrial coverage. However, the terrestrial networks are the primary usage in these harmonised mobile bands. It is important that this innovative use case ensures the protection of terrestrial services. The usage of terrestrial bands or parts of it by satellites needs in any case an agreement with the respective MNO. National administrations are responsible for the compliance with regulatory provisions at country borders.