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Combining Strategic and Adaptive Policymaking for Telecommunication. The Way Forward for EU's Connectivity

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Combining Strategic and Adaptive Policymaking for Telecommunication

The Way Forward for EU's Connectivity.

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Abstract

The European Union's attention to telecommunications and its infrastructure has increased over the past years. This invigorated approach highlights the need for adaptive policymaking to keep pace with technological advancements and market dynamics towards a unified European telecom market. This paper examines the concept of strategic legislation, emphasizing the need for adaptive, flexible, and forward-looking policies. It discusses the advantages of an adaptive and proactive legislative approach, which can enable the telecommunication sector to keep pace with and influence market dynamics and technology integration. With the digital landscape evolving faster than traditional policy cycles can adapt, this work advocates for a dynamic approach that integrates flexibility and responsiveness into EU telecommunications policy. This approach is identified as crucial for fostering a competitive landscape, encouraging innovation, and attracting investment.

Introduction

The rapid transformation of the European Union's (EU) telecommunications sector, driven by the evolution of technologies like 5G and the anticipated 6G, highlights the need for legislation that adapts to current technologies and anticipates future innovations, as outlined in various EU

policy documents. Acknowledging the pivotal role of this sector in economic growth, societal development, and global competitiveness, will benefit from the implementation of strategic legislation that aligns with long-term goals and upcoming technological shifts, as outlined in the EU's strategic commitments for telecommunications. The connectivity provided by advanced infrastructure supports the digital economy, the proliferation of the Internet of Things (IoT), and the integration of artificial intelligence into various industries. EU strategic objectives highlight that telecom networks' performance and scalability are vital for achieving economic resilience, digital sovereignty, and technological leadership. Moreover, Information and Communication Technologies (ICT) is a multifaceted environment, in which critical raw materials, semiconductors, software for edge and computing, and cybersecurity technologies and capabilities, are essential elements. Therefore, managing dependencies in these fields is necessary, and the EU has intensified efforts to address strategic dependencies (European Commission, 2022). These priorities are further relevant when considering this technology a strategic element in determining the EU's global influence (Crickermans, 2022).

The fast-paced nature of technological

advancement, its rapid evolution, and its impact on the European telecommunication sector, underscores the imperative for strategic legislation that not only adapts to but anticipates and shapes the technological and market landscapes, ensuring the EU's policies remain at the forefront of global telecommunications innovation and governance. This approach is required for the broad and complex range of policies in telecommunication, such as competition, spectrum policy, and security of the infrastructure and networks. As detailed in the Commission's Digital decade strategy¹, future telecommunication policies are meant to aim at lowering entry barriers and promote fair competition among operators, benefiting consumers with improved service quality and competitive pricing. In the upcoming years, policy documents suggest that the EU develop a comprehensive spectrum management strategy, promoting vendor diversity, particularly through the adoption of Open Radio Access Networks (Open RAN), contributing to reduce dependency on a few large suppliers while fostering innovation (Nelissen et. Al., 2023b).

Finally, in this digital era, it is crucial not to overly romanticize technology. This requires finding a balance between embracing advancements and pragmatically aligning investments and the regulatory framework with genuine societal needs. Thus, academics, stakeholders, and policymakers are seeking a comprehensive approach to infrastructure development that leverages the benefits of new telecommunication technologies, while pragmatically addressing environmental challenges, the digital divide, and competitiveness (Bohlin, 2003). Operators face the challenge of transitioning to more virtualized networks, and while societies and industries can fully benefit from 5G capabilities, 6G is on the horizon

¹ See: Europe's Digital Decade: digital targets for 2030 – Documents (https://commission.europa.eu/europes-digital-decade-digital-targets-2030-documents_en)

(Serentschy, Timmers, Matinmikko-Blue, 2023). Moreover, cybersecurity remains central in the discussion around telecommunication: securitising telecom infrastructures is recommended to be addressed holistically, consolidating international cooperation, and establishing robust frameworks against cyber threats (Department of Homeland Security [DHS], 2023).

Given these premises, the idea of strategic legislation² within the context of the European Union's telecommunication policies, emphasises a legislatively proactive and foresighted approach that aligns closely with the EU's overarching strategic imperatives. Strategic legislation pertains to a set of laws and regulations meticulously crafted to advance the EU's broader objectives, thereby ensuring that legislative frameworks not only respond to immediate challenges but are also anticipatory of future developments, particularly in dynamic and technology intensive sectors – such as telecommunication, space, cybersecurity and advanced computing.

These laws are meant to achieve well-defined, strategic goals that benefit an array of stakeholders, encompassing EU citizens, businesses, and international partners, thus fostering an environment of cooperation within the internal market and beyond. Moreover, strategic legislation must be developed as an evidence-based way of policymaking, so that regulators can ensure adherence to best practices and conduct ongoing evaluations to assess effectiveness, efficiency, relevance, and coherence. The continuous assessment and bottom-up feedback, facilitates the adaptation of laws to reflect emerging realities and challenges in a rapidly evolving global landscape.

² A first definition, here adapted for the purposes of this paper, is given in: Cappelletti, F., & Papakonstantinou, V. (2024). *A Question of Strategic Legislation: Can the EU deal with cybersecurity issues in space?* Paper presented at the ITS European Conference 2023 in Madrid.

Gigabit to Terabit: Challenges and Opportunities Ahead

The European Union's 5G Action Plan aimed to provide widespread 5G coverage and uninterrupted service in urban areas and along major transport routes. Despite these efforts, the EU's ambitions soon adopted a stance of 'fast follower' rather than a leader in 5G deployment, facing delays, inconsistent national laws, and security issues (Lemstra, 2018). Challenges such as investment hesitancy, spectrum fragmentation, and varied usage rights across EU countries further complicated deployment strategies (European Court of Auditors, 2022). These hurdles underscore the need for a harmonised spectrum allocation strategy and a unified regulatory framework, as suggested by several policy analysis from academia and telecom sector in order to facilitate a smoother rollout of 6G networks across Europe, ensuring the EU remains competitive on the global stage.

The European Commission's establishment of the Smart Networks and Services Joint Undertaking (SNS JU) marks a significant step towards building R&I capacities for 6G systems and developing lead markets for 5G infrastructure as indicated in the regulation. With a budget of EUR 900 million allocated for the SNS JU's activities from 2021 to 2027, and equal contributions from the private sector, the EU is poised to advance its telecommunications sector significantly (European Council, 2021). This strategic approach is aimed at establishing a competitive, secure, and resilient telecommunications sector, driving economic growth, and global influence for the EU.

Reports on the deployment of 5G highlighted several strategic misalignments and regulatory hurdles that impacted the technology's disruptive potential. Moreover, despite the global digital ecosystem remains concentrated in few areas (the US, China, and the EU), the EU's share of global revenue in the ICT market has been

falling in recent years, and therefore, its position in the global ecosystem can be further improved (Calza et. Al, 2023). Reflecting on the 5G rollout, it is evident that despite the strategic ambition of the EU's 5G Action Plan, several obstacles were encountered during implementation (Cappelletti & Bohlin, 2024). The plan aimed to align roadmaps and priorities for a coordinated 5G deployment, make provisional spectrum bands available, and promote early deployment in major urban areas and along transport routes (European Commission, 2016). However, delays in spectrum allocation, inconsistent national regulations, and security concerns hampered the effective rollout (European Court of Auditors, 2022). These issues highlight the need for a more harmonised and strategic approach to spectrum management and regulatory frameworks to support the deployment of a unified telecom market.

Lessons learned from the 5G era underscore the necessity for policies that encourage rather than hinder competitive dynamics and technological adoption (Cappelletti, Bohlin, 2024). A broad range of policy-oriented analyses, over the past years³, suggested that a unified approach to spectrum allocation and the adoption of common standards across the EU are critical for overcoming challenges, including designing auctions with clear coverage obligations to ensure widespread service availability and balancing economic gains from spectrum sales with public service mandates to achieve equitable coverage.

Specific challenges, ahead of 6G deployment, are still being studied by the technical and regulatory sides. The deployment of 6G may necessitate a more extensive overhaul of existing telecommunications infrastructure,

³ European Parliament. (2015). Radio spectrum: Policy and management issues. European Parliamentary Research Service; DIGITALEUROPE. (2017). 5G spectrum recommendations; Radio Spectrum Policy Group. (2023). RSPG opinion on UHF beyond 2030; GSMA. (2024). Spectrum policy trends 2024.

including new antennas, transceivers, and, potentially, a reimagining of network architecture to support ultra-high-speed data transmission (Bahare et. Al., 2023). As 6G aims to support more critical applications and services, ensuring ultra-high levels of security and privacy becomes even more crucial and challenging (Saad et. Al., 2022), especially considering the potential integration of AI and machine learning technologies and possibly quantum communications (Whang & Rahman, 2022). Current research (Serentschy et. Al., 2024) indicates that the evolution from 5G to 6G brings together essential considerations regarding opportunities and application implementations. As described in the literature some technical challenges are still being studied when it comes to signal propagation (Chen et. Al., 2023), materials, and important considerations that arise in the field of energy demand. Addressing these issues is crucial for realizing the potential of 6G, requiring innovations in hardware, network management, and sustainable practices to balance performance with environmental impact. Therefore, a future ‘Plan for 6G’ needs careful implementation. The already mentioned SNS JU is a significant step towards this goal (European Council, 2021). Moreover, given the expected increase in network complexity and capacity, designing 6G to be sustainable and energy-efficient from the ground up will be a significant challenge, especially considering global climate change concerns (Viswanathan et. Al., 2023). As with 5G, ensuring that 6G benefits are accessible to all population segments without widening the digital divide will be a major socio-economic challenge.

In this context, lessons learned from the 5G era prompt critical reflections for the future of telecommunications in the EU. When it comes, for instance, to ensuring ultra-high levels of security and privacy, especially considering the potential integration of new technologies, the role of regulators becomes even more crucial (Saad et al., 2022). In fact, developing the required

frameworks, standards, and systems to integrate these technologies seamlessly poses a considerable challenge that build upon and extend beyond those faced during the 5G rollout.

Despite the mentioned challenges, the strategic importance of 6G – a technology still in the early stages of discussion and research – presents an opportunity for the EU to lead in the next generation of telecommunications technologies. Addressing the lessons learned from the 5G rollout and adopting a strategic approach in regulating spectrum management and its framework are essential for the successful deployment of 6G and for maintaining the EU’s competitiveness on the global stage. This represents an opportunity, from the legislative point of view with a strategic perspective.⁴ The EU could proactively address the deployment challenges of 6G, considering a legislative approach that includes establishing a ‘Tech Fast Track’—a legislative mechanism designed to quickly adapt regulations based on technological advancements and sand boxes. Such an approach would ensure that the legislative environment keeps pace with rapid technological developments, reducing delays in spectrum allocation and standardization experienced with 5G, demonstrating both a strategic foresight and the needed adaptability for this in-developing technology.

⁴ In critical sectors of EU competencies, strategic legislation has proven crucial. For instance, the EU’s strategic approach to the legislative frameworks has facilitated rapid advancements in technology integration and market readiness in the renewable energy sector. Legislation such as the Renewable Energy Directive (RED II) has been instrumental in aligning market activities with the EU’s long-term energy and climate goals (see Directive (EU) 2018/2001). More recently, the approval of the amendment to the Common Agricultural Policy (CAP) by the EU Parliament showcases a prime example of strategic, adaptive legislation swiftly responding to the immediate challenges faced by farmers. This modification reduces burdens and adapts more effectively to local conditions and environmental goals. Drawing from this, strategic legislation in telecommunications could similarly align emerging tech like 6G with overarching EU objectives of digital sovereignty and economic resilience.

Future of EU Telecom: why next 5 years are crucial for Europe's connectivity.

As shown in the previous paragraph, it is recommended that the EU priorities a strategic roadmap to establish a competitive, secure, and resilient telecommunications sector. The next five years will necessitate unparalleled cooperation and consensus-building among stakeholders, including operators and policymakers, in the backdrop of the 2024 European elections and the shifts in the European Commission's top roles. Several recent documents from EU institutions underscore this imperative and highlight the critical importance of the telecommunications sector.

Firstly, the White Paper "How to Master Europe's Digital Infrastructure Needs" presented a comprehensive strategy to enhance the European Union's digital framework, focusing on the necessity for advanced, secure, and resilient infrastructures. The document aims to position the EU as a global leader in digital infrastructure and innovation, thereby supporting the broader objectives of economic growth and societal well-being. While existing gaps and challenges within the EU's digital landscape are recognized, the White Paper stresses the need for a more unified approach to spectrum management and the transition from legacy networks to optic-fibre. It also highlights the strategic importance of securing submarine cable infrastructures and establishing robust cybersecurity measures to safeguard the digital economy. This strategic approach is essential for maintaining the EU's competitive edge and ensuring equitable access to high-quality digital services across all regions, including rural areas.

Secondly, the recent report 'Much More than a Market' (Letta, 2024). It underscores the imperative of enhancing the Single Market to bolster the European Union's global influence and competitiveness. The report argues that by strategically scaling up EU companies within the Single Market, the EU can enhance its strategic

autonomy and global influence by diversifying supply chains, promoting European standards globally, and improving overall competitiveness.

Remarkably, Letta acknowledges the strategic importance of telecommunications within its broader economic and geopolitical framework. The Report highlights the EU's strengths, such as highly qualified engineers, excellence in research, and a solid manufacturing base. However, to maintain its global influence, the EU will need to find the right balance to scale its companies within the Single Market. The European Commission emphasises the need for a unified regulatory framework to foster a true Single Market for electronic communications. Harmonising spectrum policies and adopting common standards are critical steps toward this goal, ensuring a level playing field and addressing disparities in investment, market development, and territorial coverage across member states (Letta, 2024). It is interesting that in his report, Letta, draws a roadmap toward the implementation of a unified European telecom sector.

It can be stated that the White Paper and Letta's report share a common vision of enhancing the EU's digital and economic prowess but differ in their focus areas and strategic recommendations. While the White Paper adopts a more technical and infrastructure-centric perspective, Letta's report provides a broader economic and policy-oriented analysis, advocating for comprehensive integration and the scaling of EU markets to achieve global leadership.

Conclusions: Which Way Forward for EU's Connectivity?

Current policy-oriented and academic research suggests that a strategic approach towards adaptive legislation in telecommunications is a fundamental step for policymakers, given the increasing importance of telecommunications. This approach will enable the EU to develop a harmonised framework to deal with existing challenges and anticipate the

complexities of tomorrow's technologies (such as 6G), ensuring a cohesive and forward-looking telecom sector. As described in this paper, a unified strategy seems to be the best option to enhance the EU's global competitiveness and strengthen the internal market. In this sense, the proposed Digital Network Act could help establish a coherent framework for spectrum allocation, encouraging collaboration between policymakers and industry stakeholders.

Policy frameworks within the European Union, emphasise the importance of promoting innovative business models. Technical challenges and the need for research require a competitive landscape fostered by an entrepreneurial approach, free from premature regulatory constraints. This strategy is essential for driving innovation and attracting investments to advance the sector, emphasizing regulatory restraint to avoid stalling progress (Bauer & Bohlin, 2018).

Sustainability is equally important. Balancing technical performance with sustainability during the design, implementation, and operational phases is vital. Recent analyses recommend focusing efforts on energy-efficient, sustainable networks, capable to meet data demands while mitigating environmental impacts (Kumar et. Al., 2023). This commitment goes beyond Green Deal goals, addressing the broader needs of a digital society. The telecom sector, alongside hardware providers and R&D, is well-placed to influence sustainability decisions, necessitating a bottom-up approach from European institutions.

Moreover, critically reflecting on past challenges and successes, such as those experienced with 5G, highlights the need for strategic, adaptive, and well-informed policies. As the EU progresses, it is recommended to build on best practices and learn from previous mistakes, ensuring that policies benefit both the industry and society. Finally, encouraging a market-based competitive environment is paramount for

enhancing service quality in the telecom industry. Policies that lower entry barriers and promote fair competition among operators can lead to better consumer services and prices.

These objectives have significant implications for the next political cycle, highlighting the importance of strategic foresight and planning in the development of regulations. Given the rapid evolution of the telecommunications landscape and the complexities involved, relying solely on reactive policy adjustments is no longer a viable solution for long-term strategic governance. There is a need to rethink broadband policymaking to incorporate strategic foresight, as demonstrated by the fast transition towards future technologies such as 5G and soon, 6G.

The myriad variables generated by these technologies, including market changes, shifts in market structures, and the complex interplay of governmental, industrial, and regulatory approaches, underscore the necessity for strategically oriented policies that remain anticipatory and aligned with technological progress (Papakonstantinou & Cappelletti, 2023).

Therefore, it can be stated that a strategic regulatory framework is essential to address challenges in transitioning to future telecommunications technologies, while its adaptability to future challenges might be crucial in tackling issues like coverage gaps, market fragmentation, and the need for unified spectrum policies while prioritizing fine-tuning 5G technologies, fostering cybersecurity, and enhancing cooperation with like-minded partners. This forward-thinking approach, building on what has been termed 'anticipatory regulation' (Serentschy, Timmers, Matinmikko-Blue, 2023), advocates for regulatory frameworks to strategically evolve in anticipation of technological advancements, ensuring policies are not only reactive but also predictive and adaptable

to future challenges.

Strategically planned regulations are crucial for maintaining a competitive stance in the global digital landscape and represent the best response to the socioeconomic, technological, and environmental impacts of digital transformation. This strategic approach necessitates a critical examination of how the concept of ‘strategic regulation’ can serve as a foundation for developing policies that are both proactive and reflective, enabling regulators and policymakers to craft policies for future digital transformations with both agility and strategic foresight.

Another vital element for reinforcing the adaptive policymaking framework is the development of a modular regulatory structure that allows for rapid adjustments without overhauling the entire legislative system. This can be achieved by designing policy modules that specifically address different aspects of the telecommunications sector, such as spectrum management, cybersecurity, and infrastructure deployment. Each module should be adaptable and flexible, capable of being updated independently as technological and market conditions change, ensuring that regulatory responses remain timely and relevant. This structure would facilitate quicker adaptations to unforeseen technological advancements and market shifts, promoting a resilient and forward-thinking regulatory environment.

To effectively incorporate the strategic policymaking, policymakers in the EU could integrate technology forecasting into regulatory instruments. By establishing a formal mechanism for continuously evaluating emerging technologies and their potential impacts, such as AI, quantum communications, and next-generation wireless technologies, the EU can adapt its policies proactively. This could involve setting up a dedicated advisory panel consisting of technologists, market analysts, and policymakers

who regularly update the legislative framework based on predicted technological trends and market needs. This approach ensures that the policies are not only reactive to current issues but are also strategically aligned and adaptive to future technological landscapes.

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