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# Local 5G/6G Network Business in Europe: Regulatory Analysis and Legitimacy Considerations

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> The intersection of law, politics, and technology is going to force a lot of bright thinking.
>
> (Bill Gates)

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P. Ahokangas and A. Aagaard (eds.), *The Changing World of Mobile Communications*,
https://doi.org/10.1007/978-3-031-33191-6_8

## The Challenge of Local Networks

Local 5G networks have gained attention in recent years, and different stakeholders have started to establish local and often private mobile communication networks within specific settings, such as factories (Ahokangas et al., 2021; Matinmikko et al., 2018). This kind of local 5G networks may be expandable to a variety of location and context-specific use cases in locations such as hospitals, campuses, shopping malls, and mass event arenas or to accommodate the distinct business-related requirements of various sectors such as the automotive, media, entertainment, health, utility, and industry vertical sectors and the rated opportunities for tailored offerings (Ahokangaset al., 2022). Indeed, several key business opportunities for local 5G operators have been identified including offering hosted local connectivity to different mobile network operators (MNOs) in specific locations resulting in a neutral host model, and/or providing secure local networks for vertical-specific needs with locally tailored services resulting in private networks (Matinmikko et al., 2017). The local 5G/6G networks offer connectivity to local data, improved service quality, and privacy and security assurances (Ahokangas et al., 2019). Security, privacy, reliability, and the management of local data of 5G/6G networks are essential for businesses.

As the next step, the development of 6G as a new general-purpose technological platform is increasingly being framed by new tensions to innovate the entire business ecosystem (Yrjölä et al., 2021, 2022). These tensions can be explained as resulting from different policy areas, including the need to protect users' privacy, security, and safety, whether

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they be people or machines (Yrjölä et al., 2020), as well as from sharpened innovation and competition policies (Van Duijvenvoorde, 2020) and fragmented regulatory developments (Ahokangas, 2022).

## Regulating Local Mobile Communication Networks

Different countries have employed different strategies related to local 5G/6G networks (Cave, 2018). The difficulties in developing a reliable local 5G/6G network business require a multidisciplinary approach, involving economic, regulation, and technology concerns. Since local 5G/6G networks respond to some already identified business security concerns this emphasizes a range of emerging challenges alongside the security and privacy ones. Local 5G/6G secure mobile connectivity for multimedia communications and content represents an option for ensuring better security. The cybersecurity of 5G and 6G must, therefore, be improved (Bauer, 2022) so that people and businesses can trust, use, and benefit from innovation in connectivity and increased automation. Additionally, it is important to protect fundamental human rights and freedom including the right to privacy and the protection of personal data, as well as the freedom of expression and information.

However, that would not be sufficient since the emergence and commercial success of local private networks in 5G/6G depend on their recognition and acceptance. In short, the emergence and success depend on legitimacy (Suchman, 1995) in the eyes of the different stakeholders of the mobile communications industry/ecosystem (Marano et al., 2020; Thomas & Ritala, 2022), and specifically the regulatory authorities (Ahokangas et al, 2021; Yrjölä et al., 2022). Legitimacy can be seen as a 'proxy-indicator' for assessing the complex institutional dynamics that influence the embedding of a new industry in relevant structures (Bergek et al., 2008). Moreover, a solid regulatory framework is imperative for the establishment of local 5G/6G networks to ensure competition, innovation, and the emergence of new services. Thus, the process that is needed to gain legitimacy for local private 5G/6G networks is not only a multifaceted regulatory challenge but also a business challenge impacting the business models and ecosystems needed to provide connectivity services

in local settings securely. In this, a specific challenge is the legitimation of local private network services that are offered by non-MNOs in the mobile communications ecosystem (Matinmikko-Blue et al., 2021).

## The Legitimation of Local Mobile Communication Networks

Regulations and regulators act as enablers for the legitimacy that currently the 5G/6G local network are lacking. The literature mentions that there is an essential lacking component associated with the regulatory frame of future localized networks. As a disruptive and developing innovation, private local 5G networks face several 'industry legitimacy' or 'industry acceptance'-related issues (Kwak & Yoon, 2020; Marano et al., 2020), which must be taken into account. Regulatory approval should aim to not only mitigate the risks, but also strike a proper balance between defining risk and benefits, developing effective mechanisms for proper regulation of local 5G/6G networks business and promoting innovation. In Europe, the current landscape for telecommunication regulation is evolving at the EU level (Bauer & Bohlin, 2022).

Telecommunication regulation in the EU member states is quite complex and undertaken on the national, European, and international levels. The EU regulatory framework for electronic communications is formulated as a set of policy objectives, which national regulatory agencies implement with the help of instruments defined at the European level. The member states are currently implementing the provisions of the European Electronic Communications Code (EECC) (EU, 2018a) established in 2018, relying on related hard law and soft law legal provisions. Regarding the legitimacy of local private mobile communication networks, one of the challenges is the lack of definition for this concept in the EU legal act. More importantly, newly developed initiatives such as the Digital Services Act (EU, 2022b) and the Digital Market Act (EU, 2020a) are silent about their specific features influencing local private networks. At the same time, new regulations such as those governing the use of artificial intelligence are being introduced, potentially influencing local private networks and related services. What regulatory solutions

can be developed for local 5G/6G networks operated by different stakeholders are currently on the agenda of the countries that aim to promote innovation in the context of mobile communication.

## Aims of the Chapter

Analyzing the landscape of the EU legal framework of (secure) electronic communications, the chapter proposes a new, legitimation-based approach for understanding and analyzing relevant regulations for local private 5G/6G networks, especially focusing on non-MNO entities. Decisions to start providing local private mobile communications services are fundamentally business decisions, made under the prevailing regulatory conditions and based on the available enabling technologies in the business ecosystem. The success of these new businesses is influenced by the legitimacy received from the institutional environment (EU, 2018b). Creating a new business with the new technology can thus be seen as a way of testing the legitimacy of that technology, provided that the regulation allows or supports it.

Building on the above argumentation, this chapter presents an assessment of the most relevant EU legal developments and underlines the legitimacy challenges for local private 5G/6G networks. It aims to frame the EU telecommunication legal framework relevant for local 5G networks and presents future perspectives to be developed by policymakers. While identifying that the upcoming 5G/6G local networks will have a large societal impact and that the regulation will enable their future deployment, there is very little prior research on regulatory challenges or the ecosystem legitimacy of local 5G/6G networks. Therefore, this chapter aims to address the following research questions:

- What comprises the legal framework and its elements which are relevant to local 5G/6G networks in Europe?
- How could the emerging legitimacy challenges of local 5G/6G networks be addressed?

- Which managerial choices and consequences impact the legitimacy of new local 5G/6G network businesses?

Our analysis follows a thematic analysis, which is described as a method for identifying, analyzing, and reporting pattern themes within data (Braun & Clarke, 2006). In general, the analytical interventions used in a thematic analysis cover the identification of the themes, reviewing the themes, and searching for themes that are the units of analysis (Elo & Kyngäs, 2008). A theme is defined as a coherent integration of the disparate pieces of data that constitute a finding. By applying the thematic analysis method, we want to contribute by comprehending, ordering, and revealing the implications to extant research (Alvesson & Sandberg, 2020). As an emerging phenomenon the local private networks require a novel approach to reframe the problem-field, re-order the elements that are relevant to it, and to support sense-making.

The chapter proceeds as follows. We first discuss the context and the key concepts of the research, then we continue with thematic analysis of the key regulations related to local networks, and close with the regulatory and managerial implications of our analysis.

## The Emerging 5G/6G Local Mobile Communication Network Business

Digital technologies are transforming our world. Information and communication technologies (ICTs) have an essential role in this transformation and have a major impact on practically every aspect of society. The traditional mobile communication business value chain has been changing incrementally. However, mobile network operators' (MNOs) market dominance has been shaken by the Internet giants that offer over-the-top (OTT) services that have reduced MNOs' role to operating as bit pipes (Matinmikko-Blue et al., 2019).

The development of 5G networks has expanded from the traditional MNO-centric deployment models to alternative local network operator models. Local 5G operators are emerging on the mobile market, offering local high-quality services in high-demand spatially confined

locations, such as factories, sports arenas, and campuses (Matinmikko et al., 2017). Moreover, the 5G technology is expected to further change the mobile communications market structures, by addressing different vertical sectors' specific local service demands. This market development challenges the traditional MNO dominance and progressively opens the market to new business opportunities and new stakeholders, including the local private network service providers.

There is growing interest in the vertical sectors toward the deployment of their own local 5G networks tailored for specific service delivery without being tied to the existing MNOs. The use of 5G within vertical sectors, such as manufacturing, has particularly attracted recent attention and regulators have already taken actions to promote the spectrum assignment decisions in several countries, such as Finland and Germany, and many others are considering it. How the spectrum allocation and assignment decisions will influence the emerging local deployment and new operational models is linked to nations' competitiveness through the growing digitalization in all aspects of society. This also shapes the business opportunities for many companies. Previous research on 5G local mobile communication network (Matinmikko et al., 2019) showed that the MNO market dominance has continued in many countries with the early 5G spectrum decisions, and only a subset of countries have allowed market entry for local and often private 5G networks by introducing local spectrum licensing (see Matinmikko et al., 2018). For regulators, there is a choice of how to balance promoting efficient spectrum use, fairness, competition, and innovation in spectrum allocation. Currently, different countries have different goals for their spectrum policies and employ different strategies for local networks. At the same time, the spectrum awarding decisions taken by the regulators in the new 5G bands have varied between different countries significantly (see e.g. Matinmikko et al., 2019; European 5G Observatory, 2021). As the spectrum and competition regulation have played a pivotal role in allowing, delimiting, or protecting/safeguarding certain business models applied by the operators, technology-oriented business studies have been complemented with research on regulation and policy as an antecedent for new business opportunities (Yrjölä et al., 2022).

From the local operator's perspective, a diverse set of service offerings can emerge, ranging from serving MNOs' customers as a neutral host to operating private networks for specific verticals with different revenue potential and models. Recent studies on regulatory developments and legitimacy for local 5G networks (Matinmikko et al., 2018) have identified several key regulatory elements to be considered by policymakers including access regulation, consumer protection, competition enforcement and economic regulation, intellectual property, privacy and data protection, resource management, network security, taxation, and universal service and accessibility. The future development of 5G technology and markets is undetermined and regulations must be developed with incomplete knowledge and under conditions of uncertainty. Such conditions call for an adaptive policy (Bauer & Bohlin, 2022). Therefore, monitoring the experience at the national and international level of the regulatory developments will facilitate global learning and help improve the efficiency of the policy framework. The ecosystem identity, which means a "*set of mutual understandings among ecosystem participants regarding central, enduring, and distinctive characteristics of the ecosystem value proposition*" (Thomas & Ritala, 2022, p. 3), is essential to ecosystem legitimacy attainment and value realization.

## Key Concepts of Research

As an emerging innovation, private local 5G/6G networks may share several 'industry legitimacy' challenges (Kwak & Yoon, 2020; Marano et al., 2020). Regarding the existing legal provisions in force, some regulatory-related challenges that need to be considered have been identified in recent studies (Matinmikko et al., 2018). In general terms, legitimacy can be seen to mean that the converged connectivity and data platform constellations are considered appropriate for and accepted by the industry's relevant stakeholders (Kwak & Yoon, 2020; Suchman, 1995). To successfully legitimize a new venture such as a private local network in an emerging new industry, managers will have to change and/or create a new structural meaning of norms, practices, and values for it (Turcan & Fraser, 2016). Legitimacy in the industrial context means the

consonance of an industry with its institutional environment (Kwak & Yoon, 2020) and can be defined as the ability to select the 'right thing to do' (Palazzo & Scherer, 2006).

Regulatory interventions influence emerging businesses directly and indirectly, impacting their legitimacy. The regulatory design provides important boundary conditions to route legitimacy. The definition of legitimacy as a right thing to do (Palazzo & Scherer, 2006) can be interpreted from the mobile communications business perspective as action-oriented choices focused on the available opportunity, value creation and capture, and opportunities for (competitive) advantage. Similarly, the consequences of these actions should be that the business is scalable, replicable, and sustainable (Yrjölä et al., 2022). An emergent ecosystem can be considered legitimate by ecosystem participants and other actors in the broader environments when the key managerial choices regarding business opportunities, value creation and capture, and competitive advantages and consequences of the mentioned choices, the scalability, replicability, and sustainability, are covered or achieved. With the definition by Adner (2017), who described ecosystems as "*the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize*," it becomes clear that value propositions represent an integral and central part of an ecosystem (Adner, 2017, p. 40).

According to the recent studies on the ecosystem (Phillips & Ritala, 2019), when such organizational forms are emerging, they require legitimacy to overcome the 'liability of newness.' Adopting a collective action lens and taking legitimacy as a process approach, a process model of ecosystem collective action has been proposed, where orchestrators, complementors, users, and external actors together rule ecosystem legitimacy. Within this research, we consider legitimacy as a process focusing on the aspects that lead to the emergence of legitimacy (Suddaby et al., 2017). The symbiosis of actions based on the business thinking approach in regulatory and business actions may lead to ecosystem legitimacy.

The business model has become the contemporary paradigm for innovating revealing about business and researching firm behavior in increasingly dynamic business environments. The business model is perceived as a tool for conducting boundary-spanning analysis in contemporary

business research (Lanzolla et al., 2020; Zott et al., 2011). Business models are made of concrete choices and the consequences of these choices. Scholars contend that they are composed of two different sets of elements: the concrete choices made by management about how the organization must operate and the consequences of these choices, in addition to the effects on value creation and/or value capture different designs have different specific logics of operation and create different value for their stakeholders (Casadesus-Masanell & Ricart, 2010). Scholars distinguish three types of choices: policies, assets, and governance structures. Policy choices refer to courses of action that the firm adopts for all aspects of its. Asset choices refer to decisions about tangible resources. Governance choices refer to the structure of contractual arrangements that confer decision rights over policies or assets. The three types of choices may be depicted from the business constructs as well as for regulatory mechanisms.

The business model can be perceived as a driver for creating competitive advantage through opportunity exploration and exploitation. Given the contemporary business environment, an advantage is rarely sustainable and can be quickly rendered uncompetitive (McGrath, 2010). A business model analysis also gives us a sense of firms in action. Advances in ICT and the demands of societally motivated enterprises constitute important sources of recent business model innovations (Casadesus-Masanell & Ricart, 2010). As the theoretical focus of this research, the symbiosis between managerial choices, opportunity, value, advantages, and consequences—scalability, replicability, and sustainability—in the business ecosystem and regulatory actions for the purpose of legitimacy attainment will be analyzed.

## Thematic Analysis of Relevant Regulations

Adopting a business-orientated approach toward the regulatory measures reflected in the EU documents developed under the Digital Single Market Strategy (EU, 2015), we depicted nine EU legal acts from the overall EU regulatory system. Particularly, these include the following: (a) the EU 2030 Digital Compass (EU, 2021b); (b) the Digital Markets

Act (EU, 2020a); (c) the Digital Services Act (EU, 2022b); (d) the Data Act (EU, 2022a); (e) the Data Governance Act (EU, 2020b); (f) The Cybersecurity Strategy (EU, 2022c); (g) the E-privacy Regulation (EU, 2017); (h) the Directive (EU), 2018/1972 of the European Parliament and of the Council establishing the European Electronic Communications Code (EU, 2018a); and (i) the AI Act (EU, 2021a) as depicted in Fig. 8.1.

Analyzing the specific relevant legal provisions that may be developed further in the national context and tailored toward the deployment of local 5G/6G networks, we depicted the managerial choices and consequences for emerging 5G/6G businesses. In the thematic analysis of the EU Digital Legal Framework, we established the key elements and then

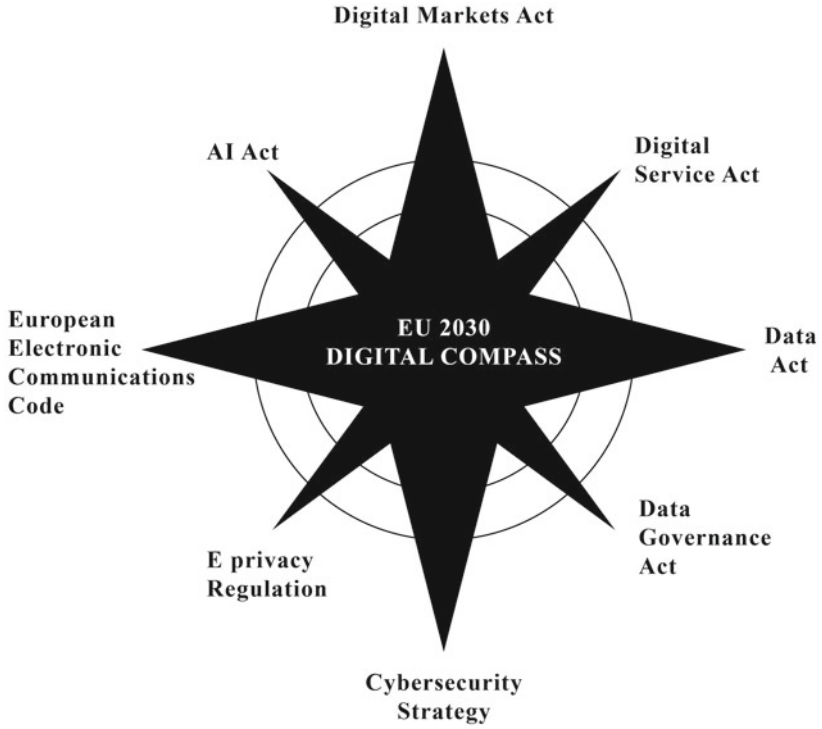


**Fig. 8.1** The EU's priorities for the digital single market

prioritized the business needs for 5G/6G networks to develop a broad understanding of future regulatory settings. Moreover, relying on the regulatory and business perspectives, the analysis proposes for discussion of challenges and future perspectives that policymakers may undertake at the national and international level that pose significant weight for legitimacy attainment. New insights into the studied phenomenon informed practical action (Krippendorff, 2004). The process comprises three steps. First the identification of the relevant regulatory landscape and its key elements for local and private networks for 5G/6G. Second the assessment of the managerial implications in terms of managerial choices and consequences, and third, the discussion of the consequent regulatory challenges and perspectives.

The European Union's Governments the European Parliament and European Commission have agreed on key regulations that will overhaul the EU digital market. The European Commission aspires to make the EU's single market fit for the digital age, moving from the 28 national digital markets to a single market. The digital single market opens new opportunities, as it removes key differences between online and offline worlds, breaking down the barriers to cross-border online activity and moving beyond technology frontiers. The Digital Single Market Strategy (EU, 2015) was adopted in May 2015, and it is made up of three policy pillars:

- *An environment where digital networks and services can prosper*. The digital single market (EU, 2015) aims to create the right environment for digital networks and services by providing high-speed, secure, and trustworthy infrastructures and services supported by the right regulatory conditions. Key concerns of the single market include cybersecurity, data protection/e-privacy, and the fairness and transparency of online platforms,
- *The digital technology as a driver* for growth pillar aims at maximizing the growth potential of the European digital economy so that every European can fully enjoy its benefits, notably by enhancing digital skills, which are essential for an inclusive digital society, and

- *Improving access to digital goods and services*.

The strategy seeks to ensure better access for consumers and businesses to online goods and services across Europe, e.g., by removing barriers to cross-border e-commerce and access to online content while increasing consumer protection. The review of the Telecom Framework is one of the pillars of the EU Digital Single Market Strategy. As one of the EU political priorities, the Digital Single Market Strategy (EU, 2015) echoes the aspirations toward synchronizing European values from the physical to the digital world.

Figure 8.1 presents the identified legal instruments and provides a comprehensive structure of the main legislative initiatives that were identified as connected (Seretschy, 2021) via the key objectives and emphasizes another viewpoint from the three-dimensional path outlined by this research. EU legislators are focused on creating more effective regulation enforcement, creating a more flexible regulatory environment, and even new, future regulatory frameworks. Allowing businesses to bring a product to market more quickly under existing regulatory conditions, or by testing out adaptations to existing regulations, an iterative, flexible regulatory system may be developed. This will also help obtain a nuanced understanding of a technology's impact on businesses. However, it is difficult to predict the effects of a technological change until it has become widely adopted. However, once a technology has become entrenched in business and social practices, changing its effects would be difficult. Ex-ante regulation legislation aims to resolve the conflict between the lumbering legislative process and the rapidly evolving technology.

## Identified Legal Instruments

This section presents the identified regulatory developments with an impact and increased relevance for local 5G/6G networks, discussing the objectives, aim, and key content of the regulations and highlights the stakeholders' obligations.

## EU 2030 Digital Compass

In March 2021, the European Commission presented a vision and avenues for Europe's digital transformation by 2030—the Digital Compass for the EU's digital decade (EU, 2021b). The Digital Compass aims to empower citizens and businesses with a human-centric, sustainable vision for a digital society. The Digital Compass evolves around four cardinal points or aims: *Government* for the digitalization of public services, *Skills* in terms of developing digitally skilled population and highly skilled digital professionals, creating secure and performant sustainable digital *Infrastructures*, and ensuring digital transformation of *Businesses*. The Commission will first create the anticipated EU trajectories for each goal before assessing how well the EU member states are doing in achieving these goals. Each Member State would also specify national anticipated trajectories and offer national strategic roadmaps that outline their coordinated actions to meet the objectives. Every year, the progress will be evaluated along with the national and EU trajectories. The Digital Compass provides the following obligations:

- Putting people and their rights at the center of the digital transformation
- Supporting solidarity and inclusion
- Ensuring the freedom of choice online
- Fostering participation in the digital public space
- Increasing safety, security, and empowerment of individuals
- Promoting the sustainability of the digital future

## Digital Markets Act

In March 2022, a political agreement was reached on the Digital Markets Act (DMA) (EU, 2020a) that aims to make the digital market in Europe more transparent, safe, and accountable. It aims to promote fair competition in digital markets and give SMEs (small and medium-sized firms) a chance to participate better in the data economy by fostering innovation,

growth, and competitiveness, and facilitate the scaling up of smaller platforms, small and medium-sized enterprises and start-ups under a clear framework at EU level and preventing gatekeepers from imposing unfair conditions on businesses and end users and at ensuring the openness of important digital services.

The DMA concerns the largest online platforms, social networks, search engines, online marketplaces, advertising services, among others. The new regulations, which address a range of digital challenges in the less digitally developed economies, might have an impact on the entire planet. The DMA would grant the European Commission new enforcement powers that could influence the business models of major Internet corporations because it will oversee enforcing the compliance of 14 digital gatekeeper platforms with 21 new competition laws. With the DMA, Europe is setting standards for how the digital economy of the future will function. The European parliamentarian Andreas Schwab (EPP, DE) mentioned in an EU press release in 2022 that the law avoids any form of overregulation for small businesses. "*App developers will get completely new opportunities, small businesses will get more access to business-relevant data and the online advertising market will become fairer.*" (European People's Party, 2022). The DMA establishes clearly defined obligations vis-à-vis a very limited number of cross-border providers of core platform services:

- Transparency
- Due diligence
- Prohibition of unfair practices
- Data portability & interoperability
- Access for business users

## Digital Services Act

To complement the DMA, agreement on a common set of rules was reached in April 2022 on intermediaries, for example online marketplaces, social networks, content-sharing platforms, app stores, and online

travel and accommodation platforms, and their obligations and accountability across the single market that aim to open new opportunities to provide digital services across borders while ensuring a high level of protection to all users. The proposed Digital Services Act (DSA) (EU, 2022b) aims to set common but tailored obligations and accountability rules for providers of network infrastructure, cloud computing services (such as Internet access providers), hosting service providers, and particularly for online platforms (i.e., online marketplaces, and social media platforms). For the first time, full-fledged oversight and enforcement rules are envisaged with the ability to set fines of up to 6% of the global annual turnover of platforms. According to the law, *"digital services are a broad category of online services, from straightforward websites to services for internet infrastructure and online platforms*" (EU, 2022b). Regardless of where the company is located, all digital services that operate in the EU are subject to the Digital Service Act, including small and micro-businesses; albeit the requirements are adapted to firm size. 90% of the impacted enterprises in the EU are small to medium-sized businesses that will be spared from the most expensive requirements. The DSA is fundamentally a legislative framework that will set guidelines for how platforms must manage their content, marketing, and how they apply algorithmic techniques. It strengthens the responsibilities and supervision of intermediary service providers to ensure less citizen exposure to illegal content and products online, contributes to the proper functioning of the internal market for intermediary services, and set out uniform rules for a safe, predictable, and trusted online environment, where fundamental rights enshrined in the act are effectively protected.

The key stakeholders of the DSA include intermediary service providers, social networks, online marketplaces, and hosting services. The DSA sets obligations for:

- Transparency
- Due diligence
- Content moderation
- Risk management
- Online advertising rules

## Data Act

The proposed regulation on ten harmonized rules on fair access to and use of data, the Data Act (DA) (EU, 2022a), makes an important contribution to the digital transformation objective of the Digital Decade. It is a key measure for making more data available for use in line with EU rules and values for business-to-business and in some cases business-to-government transactions. The DA creates a mechanism to enable the safe reuse of given categories of public-sector data that are subject to the rights of others. The DA establishes guidelines for the use of data produced by Internet of Things (IoT) devices, ensuring fairness in the allocation of data value among actors within the data economy. It covers the technical, economic, and legal problems that result in underutilization of data. The DA specifies who can use data to generate value and under what circumstances. The DA addresses a wide range of organizations, from service providers and gatekeepers to device makers and governmental agencies, and the key ramifications and prospects for European firms are related to aims for data exchange and access requirements. Cloud switching, interoperability standards, and data sharing are all impacted by the Data Act (EU, 2022a). The DA is highly relevant for SMEs as data portability requirements allow shifting between services.

The key stakeholders of the DA comprise product manufacturers and service suppliers in the EU, data holders and data recipients in EU, public bodies and EU institutions, and providers of data processing services, setting the obligations for the:

- Access and use of non-personal data
- Data portability, facilitating switching, and interoperability
- The fair, reasonable, and non-discriminatory approach in data sharing contracts
- Public usage of data

## Data Governance Act

In May 2022, the European Council approved a new law to promote the availability of data and build a trustworthy environment to facilitate their use for research and the creation of innovative new services and products. The Data Governance Act (EU, 2020b) represents a robust mechanism to facilitate the reuse of certain categories of protected public-sector data, increase trust in data intermediation services with third countries, and foster data altruism for common good across the EU. The act is an important component of the European strategy for data, which aims to bolster the data economy. The Data Governance Act (EU, 2020b) complements the 2019 Open Data Directive (EU, 2019a), which does not cover such types of data, and creates a framework to foster a new business model—data mediation services—that will provide a secure environment in which companies or individuals can share data.

For businesses, these services can come in the form of digital platforms that encourage voluntary data sharing between businesses and make it easier to comply with the data-sharing requirements imposed not only by this law but also by other legislation, whether it be at the national or European level. By utilizing these services, businesses may share data without worrying about it is being abused or losing its competitive edge. Providers of data intermediation services must be listed in a register. The Data Governance Act (EU, 2020b) also makes it simpler for people and businesses to voluntarily make data available for initiatives for public good like research projects and innovation.

The key stakeholders of the DGA include the public sector, data sharing "trust" services, and citizens. The DGA sets obligations for confidentiality and one-stop shop mechanism for data requests.

## EU Cybersecurity Strategy and Cybersecurity Act

The EU's cybersecurity strategy (EU, 2020c) and the related Cybersecurity Act (EU, 2019b) aim to boost Europe's collective resilience against cyber threats and help to ensure the fundamental rights that all citizens and businesses can fully benefit from trustworthy and reliable services

and digital tools including open global Internet. These exist to fortify efforts for secure digitalization and promote norms for world-class solutions and standards of cybersecurity for essential services and critical infrastructures and drive the development and application of new technologies. The key stakeholders for the Cybersecurity Strategy include key services and infrastructures like energy, transport, banking, financial market infrastructures, health, drinking water, wastewater, and digital infrastructures as well as public administration and space EU.

Under the new Cybersecurity Strategy (EU, 2020c), Member States are urged to finish implementing the EU 5G Toolbox, a thorough and unbiased risk-based strategy for the security of 5G and future generations of networks, with the help of the Commission and ENISA, the European Cybersecurity Agency. The Commission's Recovery Plan for Europe, the Security Union Strategy 2020–2025, and Shaping Europe's Digital Future are all important parts of the new EU Cybersecurity Strategy (EU, 2020c) for the Digital Decade. The obligations of the Cybersecurity strategy include:

- Addressing both cyber and physical resilience of critical entities and networks
- Reforming the rules on the security of network and information systems
- Boosting cybersecurity and matching EU level investment
- Completing the implementation of the EU 5G Toolbox, a comprehensive and objective risk-based approach for the security of 5G and future generations of networks

## E-Privacy Regulation

The regulations for e-privacy is intended to provide up-to-date rules and procedures, for instance, for the increasingly popular messenger services—and to do so uniformly throughout the EU. The e-Privacy Regulation (ePR) (EU, 2017) is a proposal for the regulation of various privacy-related topics, mostly in relation to electronic communications within the European Union. It lays down rules regarding the protection

of fundamental rights and freedoms of natural and legal persons in the provision and use of electronic communications services. It ensures free movement of electronic communications data and electronic communications services within the EU member states. The ePR specifies what forms of electronic information enjoy its protection and how businesses can use such data. It introduces rules on cookies, direct marketing, and business-to-business communications and will replace the outdated e-Privacy Directive from 2002. It also aims to increase user security, the confidentiality of communication and metadata, to define clearer rules for technologies such as cookies, and control of spam.

The key stakeholders of the ePR include electronic communications services, electronic communications software providers, and natural and legal persons who use user-related information to send marketing messages. It sets obligations for:

- Adjusting data anonymization
- Rules for the use of metadata
- Access to information on end-user devices

## The European Electronic Communications Code

The directive (EU, 2018a) puts in place one of the essential building blocks for a digital single market in Europe (EU, 2015). The EU Directive marks a significant revision of the regulatory framework, dating from 2009. It creates a legal framework to ensure freedom to provide electronic communications networks and services. It represents the main legal act which aims to stimulate competition and increase investment in 5G and very high-capacity networks (fixed and mobile) so that every citizen and business in the EU can enjoy high-quality connectivity, a high level of consumer protection, and an increased choice of innovative digital services. It also aims to develop an internal market across the EEA and ensure the protection of consumers. The directive introduces a series of new objectives and tasks: strengthened consumer rules aim to make it easier to switch between service providers while offering

better protection. Basically, the EEEC responds to the increasing convergence of telecommunications, media, and information technology so that all electronic communications networks and services should be covered to the extent possible by a single European electronic communications code.

The key stakeholders of the EEEC include various electronic communications networks, electronic communications services, over-the-top internet players, and public bodies and EU institutions. The EEEC sets obligations for:

- Providing operators with predictable regulation
- Ensuring there is no discrimination between network and service providers operating under similar circumstances
- Applying the regulation in a technology-neutral fashion whenever possible and relevant rules facilitating new market entrants
- Implementing the "use it or lose it principle" with respect to the withdrawal of spectrum licenses
- Facilitating a shared use of mobile frequencies

## AI Act

The proposal for harmonized rules in the Artificial Intelligence Act (AIA) (EU, 2021a) amend certain EU legislative acts. With the AIA, the Commission aims to address the risks generated by specific uses of AI through a set of complementary, proportionate, and flexible rules. It applies to all sectors (except for the military), and to all types of artificial intelligence. These rules will also provide Europe with a leading role in setting the global gold standard. The legal framework for AI proposes an approach based on three risk categories. First, applications and systems that create an unacceptable risk, such as government-run social scoring of the type used in China, are banned. Second, high-risk applications, such as a CV-scanning tool that ranks job applicants, are subject to specific legal requirements. Lastly, applications not explicitly banned or listed as high-risk are largely left unregulated. Like the European Union's General

Data Protection Regulation (EU, 2016), the AI Act (EU, 2021a) could become a global standard. It is already having impact beyond Europe by:

- Ensuring that AI systems are safe and respect fundamental values
- Creating legal certainty to facilitate investment and innovation in AI
- Addressing the risks stemming from the various uses of AI systems and promotes innovation in the field of AI

The key stakeholders of the AIA include providers placing AI systems on the EU internal market, users of AI systems within the EU, and the providers and users of AI in a third country when outputs are used in the EU. The AIA sets obligations for:

- Ex-ante risk assessments
- Respect for fundamental rights
- Transparency toward users
- Post-market monitoring and reporting
- Human oversight

## Discussion and Conclusions

This chapter set out to examine three research questions related to the local 5G/6G networks. The first question—What comprises the legal framework and its elements relevant to local 5G/6G networks in Europe?—was answered by the review of telecommunication provisions presented in the previous section, covering the main pillars of the EU Digital Single Market Strategy influencing local 5G/6G networks. The second question—How could the emerging legitimacy challenges of local 5G/6G networks be addressed?—we see as related to the regulatory framework in general, and it will be discussed in detail in the subsequent section. The third question—What managerial choices and consequences impact legitimacy of new local 5G/6G network businesses? —we see to concern the local 5G/6G businesses directly and will be examined in the last part of this section.

## Regulatory Challenges and Future Policy Considerations

The cross-cutting impact of digital innovation and data has already removed old sector boundaries and created new legitimacy challenges for emerging sectors. Emerging businesses have removed old system boundaries, directly challenging old practices. In response to these changes, we observe the need for the emergence of proactive, future-oriented, and innovation-enabling approaches to regulation in Europe. We are beginning to see a change in the theory of regulation with the emergence of a new field as 'ex-ante' regulation or 'anticipatory' but practice lags behind. The new approach to regulation helps reframe regulation as a supportive tool for the responsible development and use of new technologies and business models. New and existing methods are helping regulators to better support innovation as it emerges, drive innovation directly, and respond faster or act preemptively to prevent public harm.

This study identified regulatory challenges and particular elements relevant for 5G/6G local networks from the EU Digital Legal Framework that pose legitimacy challenges that may be considered further. Figure 8.2 shows the identified regulatory challenges and perspectives for legitimacy attainment.

The EU legal framework provisions ensuring security within and between the networks and coordination and control across multiple locations do not cover in detail the specific features and main characteristics of 5G/6G local mobile communication networks, especially for those not deployed by the MNOs. However, security and privacy are the main elements that need to be considered in all the network installations for local 5G/6G network deployment. Clear and tailored provisions for vertical-specific industries concerning managing and ensuring the confidentiality of data ownership or exploitation of personal data are not defined and developed in the EU legal framework, which may have a cascading effect on the quality of implementing measures by the NRAs at the national level. Current spectrum management awarding mechanisms are designed for wide area MNO networks and do not properly address the emerging local 5G/6G networks.

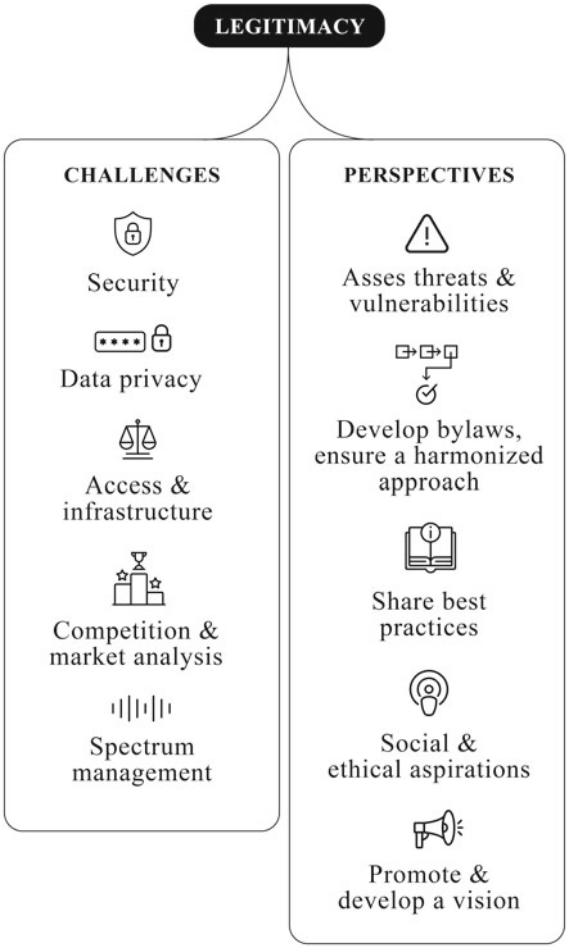


**Fig. 8.2** Regulatory legitimacy challenges and perspectives

One of the core elements vital to the emergence of 5G/6G local networks are market analyses and competition provisions. Clear and transparent delineation of the relevant markets and firms present in multiple-related markets were not reflected in the analyzed content. The lack of a market monitoring framework and developed criteria pose obstacles for emerging of 5G/6G local network. Our analysis emphasizes

future perspectives for regulators and business in ensuring a qualitative step beyond, for legitimacy attainment. First and foremost, promotion and developing a vision on local 5G/6G networks to disseminate knowledge and promote a positioning for acceptance among companies and other relevant stakeholders needs a prioritization approach. Building best practices and common instruments and facilitating the harmonization of implementation of legal provisions would be an efficient tool for tackling regulatory and business challenges. To elaborate and share best practices and tailored implementation mechanisms to encourage the active participation of the NRA is a perspective that needs to be treated with proper allocation of resources at the EU level. Ensuring a harmonized approach of the NRAs in developing bylaws and guidelines for implementation of EU directives with the support of EU monitoring bodies needs to be expanded. Additionally, promoting a social and ethical approach via the government and public–private–people (PPP) programs are on the agenda of some governments that promote innovation. Sharing best practices in this will provide efficient insights for national regulators on the complex regulatory and business landscape.

This chapter has identified and provided an analysis of the complex regulatory landscape that impacts the emerging local 5G/6G networks, depicting its relevant elements. It characterizes the connection to business opportunities around the current local 5G networks and upcoming local 6G networks and identifies regulatory challenges and perspectives for legitimacy attainment. The analysis results indicate that reviewing the evolution of the European digital framework from a legitimacy attainment perspective following the incorporated European values is a powerful way of illustrating the shift of the parameters of the regulatory in promoting European standards. Analyzing the EU legal framework relevant to electronic communications, it proposes a new approach for considering the legitimacy of emerging 5G/6G local network regulation. Also, the business thinking approach helps technology adoption, promotes regulation supporting experimentations, and considers systemic effects of policy and regulation.

The chapter also analyzed the potential effects of identified regulatory interventions that are currently in place or under consideration. In contrast to earlier research, the discussion relies on an approach inspired

by ecosystem legitimacy. As mentioned by Boyd (2000), legitimacy is the result of a process and can be defined as a strategy effectuated by an organization. New business models claim legitimacy to grow, expand, and exist. Ecosystem legitimacy could represent a way for business models to be more active in establishing and promoting a competitive system that encourages the adoption of emergent business models throughout the ecosystem and ensure efficient private and public cooperation.

Following the previous research, we may assume that regulatory interventions influence the emerging business models directly and indirectly. The regulatory design provides important boundary conditions to guide legitimacy and represents an enabler for innovation. Opportunities, value creation and capture, and advantages as managerial choices and scalability, replicability, and sustainability as managerial consequences provide an overarching approach for guiding the policymakers in developing and streamlining the regulatory actions.

Applying the novel theoretical approach of ecosystem legitimacy developed in this study, the in-depth analysis identifies the EU legal acts that are relevant for local 5G/6G networks business consideration. Moreover, the analysis provides systematized key concepts, actors, and obligations that are under consideration of the policymakers agenda. It identifies that security, data privacy, spectrum management access and infrastructure, and competition and market analysis are regulatory elements that may pose challenges for legitimacy attainment. Future perspectives for stakeholders were presented and discussed. Ensuring, developing, and promoting a vision will increase social political support and will raise awareness of 5G/6G local networks. Building and sharing best practices will boost the transparency of regulatory mechanisms and will assist NRA to promote clear and efficient implementation mechanisms. Developing and ensuring a harmonized approach via bylaws and sectorial legislation will ensure that the core provisions are properly implemented. Ensuring social and ethical aspirations via human-centric regulations will support awareness on sustainability and trustworthiness. Adopting a proper mechanism for assessing vulnerabilities will determine the allocation of resources in network access and infrastructure.

Although the proposed theoretical approach has reflected on the legitimacy challenges arising from the EU Legal Digital Framework overall,

certain regulatory actions and provisions may require extra, context-specific variables when determining such challenges. As legitimacy is an audience-dependent construct, certain stakeholders and audiences might have specific needs that might have been overlooked within the selected proposed framework and will be addressed in some further work. Additional research into how to facilitate the process of legitimation of 5G/6G local network is needed particularly from the stakeholder's perspective. In the same vein, discussions on national sovereignty not only for critical infrastructures but the all ICT technologies have become a concern, raising the need for new kinds of governance and regulation. In the current political and economic climate, which is evidently more open to industrial policy considerations, and in which, regarding local 5G/6G network business, some countries have routinely engaged in some form of industrial intervention, despite their varied economic choices. Further discussion with a focus on a regulatory approach should not be delayed any longer. Regulators should consider handling both ex-ante and ex-post mechanisms: ex-ante when local 5G/6G networks are designed and ex-post when they are implemented. Future research needs to be conducted on the development and application of the proper regulatory mechanisms for the widespread adoption of local 5G/6G networks businesses.

## Managerial Implications Related to the Legitimacy of Local 5G/6G Networks

With the emergence of new technologies and business models, policymakers face the question of whether the existing legal and regulatory framework is appropriate, or whether a different market design might more fully realize the potential benefits for society. Our analysis indicates that the regulatory landscape of mobile communications networks, especially concerning the case of local private networks in 5G/6G, has changed and includes now new areas to be considered. Clearly, a new and holistic approach is needed to make sense of the changes in the regulatory landscape. Following the thematic analysis of the EU identified legislative pillars for digital ecosystem provisions, the EU Digital

Legal Framework, we identify a set of *managerial choices* related to new opportunities, value creation/capture, and advantages that regulations should consider for local 5G/6G networks. Similarly, we identify a set of *managerial consequences* related to scalability, replicability, and sustainability of local 5G/6G networks. Table 8.1 presents some examples of managerial choices and consequences for MNOs and non-MNOs regarding 5G/6G local network businesses that arise from the analyzed EU Digital Legal Framework.

The EU Digital Legal Framework *does not* contain definitions or specific rights or obligations for local 5G/6G networks for offering services. However, the EU Digital Legal Framework may trigger several managerial choices as new opportunities are expected to emerge based on new digital communication features such as high-precision holographic media or digital senses provided over the network. For example, gigabit network connectivity will allow value creation by meeting various vertical-specific industry demands. SMEs in manufacturing could have local access to cloud-based innovative industrial service platforms such as manufacturing-as-a-service systems and market places to boost the efficiency of their production capacities. Within healthcare, health data and records could be processed quickly locally, and in agriculture the deployment of edge capabilities connected to farming machinery would allow collecting data in real time and could provide advanced services to farmers for harvest prediction or farm management and the optimization of food supply chains. Especially, the areas labeled as strategic areas under the provisions provided by the 2030 Digital Compass may present various business opportunities for companies. New choices may be related to remote application servers that will be easier to access, bring more information content, utility applications, and realistic forms of communication directly to the consumer via edge clouds.

The uptake of digital solutions and the use of data will trigger managerial consequences related to transitioning to a climate-neutral, circular, and more resilient economy. As highlighted in the European

**Table 8.1** Managerial choices and consequences derived from the identified legal framework for emerging local 5G/6G private networks

| **Choices**<br>Opportunities, Value, Advantages | **Legal frame-Work** | **Consequences**<br>Scalability, Replicability, Sustainability |
|---|---|---|
| *Relevant for 5G local mobile communication networks deployed by all*<br>• Develop use cases and expand in priority vertical ecosystems<br>• Incorporate edge computing<br>• Monetize 5G technology for higher data rates, lower latency, and massive device density<br>• Participate and cooperate in data-sharing<br>• Benefit from better access to data<br>• Facilitate data flows through technical standards and interoperability<br>• Develop new data-based business opportunities<br>• Benefit from transparent procedures of data portability<br>• Take advantage of data sharing in common goods and services<br>• Create a secure and trusted online environment<br>• Apply to risk-aware mechanisms in adopting and promoting AI | **Digital Compass**<br>**Digital Market Act**<br>**Digital Service Act**<br>**Data Act**<br>**Data Governance Act**<br>**Cyber-security Strategy**<br>**e-Privacy Act**<br>**EECC**<br>**AI Act** | *Relevant for 5G local mobile communication networks deployed by all*<br>• Align business objectives with social, economic, and ecological sustainability, trust, the digital green transition, fair and responsible utilization of data, digital inclusion and equality<br>• Develop a strategy to clarify the legal conditions for AI adoption<br>*Relevant for 5G local mobile communication networks deployed by MNOs*<br>• More alternative technology vendors<br>• Increased competition<br>• International digital partnerships under the digital decade strategic framework are expected to become more common<br>• Coopetition strategies (parallel competition and collaboration) may become an efficient tool for developing business<br>*Relevant for 5G local mobile communication networks independent of MNOs*<br>• A stand-alone, isolated network under the spectrum management system may become an efficient option<br>• Sharing of data between the partners may become more efficiently secured and faster<br>• Capital and operational expenses may be minimized by using simple radios, the edge cloud, and the core network at the edge of the cloud |

(continued)

**Table 8.1** (continued)

| **Choices**<br>Opportunities, Value, Advantages | **Legal frame-Work** | **Consequences**<br>Scalability, Replicability, Sustainability |
|---|---|---|
| *Relevant for 5G local mobile communication networks deployed by MNOs*<br>• Expand cloud infrastructure<br>• Benefit from standardization efforts<br>*Relevant for 5G local mobile communication networks independent of MNOs*<br>• Activate a more secure business ecosystem<br>• Apply for rights to use spectrum<br>• Benefit from network slicing, interoperability and interconnection | | |

Data Strategy,[1] the volume of data generated due to increasing digitalization is greatly increasing and a growing proportion of data is expected to be processed at the edge, closer to the users and where the data is generated. This shift will require the development and deployment of fundamentally new data processing technologies encompassing the edge and moving away from centralized cloud-based infrastructure models. These new trends will result in new managerial consequences related to increasing distribution and decentralization of data processing capacities and suitable supply of cloud services. Seeking replicability of solutions, managers are expected to draw on partnership development under the legal provisions. Acting in a clear risk aware environment and stable regulatory conditions will enable resource allocation and planning for reaching scalable business decisions. We may conclude that the adoption of a business-oriented approach in regulation—that considers both managerial choices and consequences—would enable easier deployment of local and private networks in 5G/6G and facilitate their legitimation throughout the 5G/6G ecosystem.

**Acknowledgements** The authors would like to acknowledge LNETN-project from the European Union's Horizon 2020 research and innovation program under the Marie Skłodowska-Curie grant agreement No 860364 and 6G Flagship program at the University of Oulu (Grant No. 318927).

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[1] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en.

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