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journals.sagepub.com/home/crn**Serge J.H. Gijrath**

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Abstract

This article assesses the innovation policy objectives underlying the proposed European Union (EU) Telecom Single Market regulation considering disruptive technological developments. The article explores the network operator's dilemma how to deal with investments in a time where fundamental innovation comes from outside and the regulator's dilemma how to improve the conditions for access to the operators' networks and how to safeguard a level playing field. The EU measures with respect to two technological issues are discussed considering the EU's policy objectives with respect to the deployment of 5G and the goal to ensure very high-speed broadband access in the EU. Thought is given to the effectiveness of imposing active and passive infrastructure arrangements. A mix of regulatory measures is considered in moving towards smarter electronic communications networks regulation.

Keywords

Telecommunications networks, ECN, infrastructure, innovation, interoperability, Telecom Single Market proposal, network function virtualization, 5G frequencies, broadband access, ex ante regulation, cost-orientation, incentive regulation, deregulation

Introduction

The expected take-off of new services, such as Internet of Things (IoT) and Machine to Machine (M2M) communications, and the coming allocation of 5G frequencies are likely to increase the demand for mobile data transmission and broadband services (Ecorys, TNO, TU Delft, 2011; McKinsey Global Institute, 2013). The technological possibilities offered by new and improved underlying infrastructure support almost unlimited transmission capacity on optical fibre networks.

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These developments will result in a deeper convergence of mobile and fixed networks. A spectrum plan is a key pillar of the Digital Single Market (DSM) initiative. The European Union's (EU) Telecoms Single Market (TSM) regulation is aimed at coordinating spectrum licensing and bringing seamless service provision to end-users, wherever they are and no matter what terminal equipment they use. At the same time, the on-going transition from traditional telecommunications systems to all-IP packet switched data grids will challenge the electronic communications networks (ECNs) operators' business models further. The operators must upgrade or replace their existing networks to cater for the implementation of 5G frequencies. This requires heavy infrastructure investments (Alexiades, & Shortall, 2016; TSM Proposal, 2016, p. 1).¹ The advent of software-defined networks (SDNs) and network function virtualization (NFV) could bring innovative opportunities for network operators. NFV and SDN may be the key to achieving better network and services interoperability and to breathing new life into networks – albeit at uncertain costs and unknown profit-sharing revenue (Gijrath, 2018).² Meanwhile, competition between the operators of ECNs and new entrants with disruptive service offerings (often referred to as over the top players (OTTs)) will intensify. Infrastructure capacity sharing and enhanced security will be at the centre of discussion in contract negotiations. The new entrants desire no, or at most light, regulation to ensure a level playing field. The operators prefer to stick to the existing regulation. This period of transition comes with a host of regulatory challenges. These challenges range from coordination measures to specific topics such as creating incentives for ECN operators; from safeguarding the level playing field to regulating OTTs; and from detailed considerations, such as infrastructure-sharing obligations to institutional measures for regulatory authorities.

Based on a literature overview, this article explores which mix of regulatory measures could be employed to stimulate innovation and safeguard interoperability in the European electronic communications sector in the next years of transition. Two sub-questions are whether (1) the Commission makes a case for incentive regulation that will stimulate innovation and whether (2) deregulation in the transition period could be effective. In section 'Shifting regulatory perspectives?', shifting regulatory perspectives will be addressed. Subsequently, the TSM Proposal and the conflicting interests of market players will be explored briefly (section 'The recast Telecoms Single Market proposal'). 'Which regulatory tools are effective?' section explores which regulatory tools may be effective. 'Cost-oriented regulation' section discusses cost-oriented price regulation. 'Yardstick regulation, state aid – or some profit sharing?' section explores yardstick regulation. It also discusses the impact of subsidies, and H2020³ is discussed in the context of stimulating innovation and the prohibition on state aid. 'Deregulation' section assesses the option of deregulation. In section 'Redefining converging network levels for services interoperability', a look is had at whether interoperability levels could be regulated differently considering network convergence. When contemplating regulatory models, it must be considered that contracts at the wholesale level remain a practical form of self-regulation. Private law is an open system of judicial standards that is more suitable than telecommunications regulation to shape technological

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1. Recast Proposal for a Directive of the European Parliament and the Council Establishing the European Electronic Communications Code, COM(2016) 590 final, 2016/0288 (COD), Brussels 14.9.2016.
 2. Software-defined network (SDN) and network function virtualization (NFV) will be discussed below. In short, SDN enables access of third parties to network control functions, whereas these third parties continue to control their own physical and virtual core network elements. NFV enables that certain network functionality can be translated into software, which can run on cheaper, generic, hardware.
 3. Horizon (2020, 2017), 'Work Programme 2018-2020', unauthorized version (H2020).

innovation. ‘Market regulation and smarter contracts’ section discusses whether parties can reach effective agreements even where there is market regulation. The institutional aspects of the next round of EU telecommunications network regulation will be discussed briefly in section ‘Institutional aspects’. The final section gives the conclusion. An important question in this article is how legislative proposals driven by rapidly involving technological developments affect contracts that are subjected to market regulation (Gijrath & Smits, 2007, p. 53). How should technological developments be translated in balanced and enforceable contract provisions? Another way to approach telecommunications networks is to ask whether there is ground for the regulation for innovation (rather than regulation of innovativeness; Butenko & Larouche, 2015)? The ideas offered in this article are meant to be high-level, and this article attempts providing a forward-looking view to regulation of technological developments.

The regulatory landscape: The EU, operators and OTTs

Prior to the analysis of elements in the TSM Proposal that are relevant to telecommunications networks, the shifting in regulatory perspectives will be discussed.

Shifting regulatory perspectives?

The emphasis of regulation often lies on intervening in or the prevention of harmful situations (Mooij, 2014, pp. 3–4; OECD, 2002). Put simply, regulation is aimed predominantly at restricting anti-competitive behaviour. For parties outside the EU, the regulatory choices made are sometimes difficult to follow. This may be partly due to the distinction made in the EU between anti-trust and *ex ante* regulation. The investigations against companies like Facebook, Google and Qualcomm expose the dominance of US companies in global digital markets. The EU Commission has expressed concern about access to these services and fears that innovation will be stifled, and market parties are pushing the Commission to intervene (Soros, 2018). Conversely, the TSM focus is on *ex ante* regulation designed to prevent the occurrence of undesirable activity – in the telecoms sector, activities to create barriers for entry and predatory pricing. Regulatory intervention occurs predominantly at the wholesale level. A host of obligations may be imposed on a party that is considered to have significant market power (SMP). These obligations relate to safeguarding access to infrastructure of the SMP party and transparency and non-discrimination for the SMP party’s competitors with respect to technical and pricing information. When new players cause market disruption, the system of *ex ante* intervention is not automatically coming into play. Only once the Commission and the national regulatory authorities (NRAs) have reassessed the relevant market, could symmetric rather than asymmetric measures be imposed. EU *ex ante* market regulation relies heavily on the imposition of price measures for access services. Roughly, the European rules consist of two possible ways of imposing these (Baldwin, Cave, & Lodge, 2012, p. 461). The first way is cost-oriented pricing. Cost-oriented pricing may be subjected to many different models to determine the calculation method. The underlying thinking is to evaluate what would be the cost for a new entrant to build an alternative network to be able to supply similar services (Hauge & Sappington, 2010). Cost-oriented price regulation may thus incentivize cost reduction measures and replacement investments by the ECN operators. Yet, often there is contention among the market parties on the models’ different outcomes. Besides, where the focus is on stimulating innovation, it remains to be seen whether innovation can be an element of price regulation. There is a second way of intervening that has a link with innovation: The NRA can

also impose a more generic obligation on ECN operators to charge ‘reasonable’ prices (Baldwin et al., 2012, p. 462).

The recast TSM Proposal

The TSM Proposal was one of core initiatives of the EU’s DSM strategy, which houses a broad range of regulatory initiatives from the free flow of data to cross-border parcel deliveries.⁴ Undoubtedly, the Commission will have weighed its regulatory options carefully. Indeed, the coming regulatory period requires a *‘careful weighting of the factors that are influenced by the industry specific features, firm behavior and regulatory incentives’* (Gruber & Koutroumpis, 2012, p. 2; Hauge & Sappington, 2010). But the DSM strategy is all-encompassing. The regulation to improve the TSM falls under the somewhat poetic initiative to create *‘(...) the right conditions for digital networks and services to flourish’*. It attempted to strike a balance in the interests of ECN operators, electronic communications service providers, OTTs and end-users (Amendola, Gassot, Lebourges, & Stumpf, 2014). One of the legislative aims was to simplify the existing regulatory framework, by bringing seven EU directives together in one electronic communications code.⁵ The 5G action plan aimed, predominantly, at coordinating mobile spectrum licensing.⁶ The EU Commission planned to combine the repeal of parts of the New Regulatory Framework (NRF) with the introduction of new directed cluster regulation. The TSM Proposal went through several phases; the first proposal dates from November 2013. The recast proposal was issued in September 2016.⁷ The TSM regulation focuses more than its predecessor, the draft Connected Continent Regulation on promoting innovation. In addition to achieving better access to very high-speed broadband networks and the most advanced spectrum, including their roll-out, the Commission was looking for a way to mirror financial instruments – for instance, the amounts that parties who are interested in obtaining spectrum must pay – with the requirement for all stakeholders to be more innovative:

to ensure optimal use of resources, fees should reflect the economic and technical situation of the market concerned as well as any other significant factor determining their value. At the same time, fees should be set in a manner that enables innovation in the provision of networks and services as well as competition in the market. [...].⁸

The Commission defined two broader policy goals: first, the improvement of conditions for access to financial sources for research and innovation purposes and second, the assurance that innovative ideas could be turned into products and services that create growth and jobs.⁹ I will look at the TSM regulation from the perspective of infrastructure competition, meaning that I am focusing more on regulation for innovativeness, rather than on regulation of innovation (Bennet Moses, 2013; Larouche & De Streel, 2016). The starting point is that commercial innovation will push the

4. European Parliament (2017).

5. REFIT (2013).

6. In 2017, an internal institutional battle between the European Union’s Council and the Commission resulted in a victory for the Commission (CJEU, 2017).

7. After this article was finalized (March 2018), a political agreement was reached after a trilogue in the Council on 6 June 2018, see http://europa.eu/rapid/press-release_IP-18-4070_en.htm.

8. TSM Proposal (2016), consideration 26.

9. Commission Communication (2010).

demand of services over very high-speed broadband networks¹⁰; increased competition at the local level as a result of the activation of smaller frequency cells, will enable more intricate networks¹¹; the existing instruments for EU spectrum policy have been improved¹²; and ‘*wholesale only models*’ are likely to feature more prominently in *ex ante* market analysis.¹³ The Commission’s institutional approach is to continue letting NRAs in the EU member states apply the (new) rules. EU funding is available to support the rollout of cross-border networks. The H2020 initiative plans to fund smart and sustainable growth. H2020 puts its emphasis on stimulating research and ‘innovation activities’, including on telecommunications issues (Granieri & Renda, 2012; Commission, 2018).

At the institutional level, the Commission bestowed the execution of policy goals more on the NRAs. To achieve that, Article 3, second section, of the TSM Proposal emphasized four tasks for the NRA: (i) the – existing task of – the stimulation of competition in the electronic communications markets should be focused more on the stimulation of efficient competition at the infrastructure level; (ii) the stimulation of access to and take-up of very high-speed broadband networks by all EU citizens and companies; (iii) the contribution of the further development of the internal market through the removal of the remaining obstacles and the creation of convergent conditions for the investment in and the delivery of ECNs, associated facilities and services; which goal should be achieved through the development of *common regulations and predictable regulatory methods*. This would serve the effective, efficient and coordinated use of spectrum, open innovation, the establishment and development of trans-European networks, the availability of interoperability of pan-European services and end-to-end connectivity; and (iv) the assurance that EU citizens would take up the widespread high fixed and mobile capacity and the underlying Electronic Communications Services (ECS), and realization of the maximal advantages in terms of choice, price and quality. The tasks of the NRAs about access and interconnection also contained a very general obligation for the NRAs to consider technological innovation when considering imposing obligations on parties providing or authorized to provide ECN.¹⁴

The electronic communications sector is atypical as it is subject to specific technological characteristics that pose recurring significant investment issues. Where the Commission expressed its keenness on steering towards more convergence between fixed and mobile infrastructure, it must be observed that impact of regulation on fixed ECN operators is rather different from the impact on mobile ECN operators. Fixed ECN operators continue to be subject to stronger regulatory scrutiny than mobile operators. Unlike the case for regulating fixed networks, *ex ante* market regulation of mobile ECN operators is less likely to occur. This is due to the circumstance that (most) mobile players are not considered to have SMP (a past exception being the market for mobile terminating tariffs). However, national governments are likely to attempt generating or imposing very substantial fees on the mobile operators who acquire new frequency licenses. Whereas mobile ECN providers operate under a fixed term frequency licence, once an ECN or cable operator has obtained a registration or licence to operate in the EU, there is no predetermined end date or life span for exploitation of such registration/licence. The fixed operator’s administrative fee is significantly lower than the price of a frequency lot – and the differences between

10. REFIT (2013). Impact Assessment, part 1/3, p. 19.

11. Impact Assessment, part 1/3, p. 24.

12. Impact Assessment, part 1/3, p. 101.

14. The third para. new, sub (f) of Article 59.

NRA administration fees depend on the same factors (turn-over). Besides, special conditions are imposed hardly ever on fixed operators at the issue of the registration/licence. The fixed license term entails that mobile ECN operators need to replace or modify their mobile radio access network (RAN) equipment every time they acquire a license to use a new generation of frequencies. It should also be kept in mind that, contrary to the procedures used for registering fixed operators or permitting them to enter the market, the government agency that allocates the frequency licence has the option to attach special conditions to the exploitation of the frequency licence (see below). Since the emphasis on asymmetric regulation for fixed ECN operators is likely to decrease over the coming years, the Commission was looking for another way to steer the innovation it desires so much:

In services, competition between local providers of electronic communications services that bundle network access with services and global providers of services over the top of the networks reinforces the right of the EU to act to ensure a level playing field.¹⁵

A more lenient approach taking into account the rise of innovative services competition at the retail level could lead to symmetric regulation. Indeed, differently balanced market regulation was a major policy concern:

[...] Disruptive innovations, while very convenient and financially beneficial to end users, bring the need to analyse their impact on existing competition conditions and possible distortive effects stemming from differentiated regulatory treatment, as well as the adequacy of existing regulation in a changed environment.¹⁶

The ECN operators will exhibit economies of scale. These will persist over a wide range of output caused by their customers' needs. However, more and more their business models are challenged by OTTs. There is also tension between the gatekeepers' capacity to innovate incrementally, and the game changers' ability to innovate more fundamentally (Cave, 2006). Investments made in the ECNs may be lost because of having to adapt to these technological advances that keep coming from the outside. The ECN operators also need to facilitate the processing of growing data streams, enabled by innovative applications developed and marketed by the OTTs. But possible additional income because of increased data processing, does not, necessarily, yield sufficient revenue to stimulate the ECN operators to invest substantially in infrastructure innovation. This then leads to a risk of lumpiness of investments by the operators (Vogelsang, 2012, p. 1). The sunk costs resulting from such investments imply risks associated with the real options the operator has (Vogelsang, 2012, pp. 11–19ff.).¹⁷ The operator's dilemma is how to strike the balance between network capacity shortages and excess capacity and how to avoid unnecessary duplicate investments. Moreover, it is difficult for ECN operators to predict the long-term durability of their investments, where regulatory intervention could result in price regulation, thus making their investments less tenable.¹⁸

15. TSM Proposal (2016), p. 15.

16. Impact Assessment Part 1/3, p. 28 second last section.

17. Many of the economic aspects discussed in this article emanate from Vogelsang (2012). I am indebted to his clear views on how economic aspects can influence a regulator's choices in terms of dealing with technological change.

18. The Dutch incumbent faced an investment dilemma in 2009, when it had to decide when and how to substitute its copper infrastructure with optical fibre. As it was implementing the necessary changes, it became subject to strict

On the material side, the supplementary documents to the TSM Proposal showed that the Commission struggled in dealing with innovation that comes from within (incumbents) or from outside OTT players. One of the regulator's dilemma is that the costs made to maintain and update the gate keeper's network are relatively transparent. But the costs made for fundamental innovation are not. The ECN operator has information regarding technical specifications at its disposal, which may put it at a competitive advantage. It has a menu of choice on how to configure its network. It may have a head start where it can weigh the different risks and, thus, different outcomes it may expect. Asymmetry of information between the regulator and the incumbent operators is a prevailing problem. Hence, probably, the regulatory focus on incumbents rather than OTTs. Whether a fixed or mobile ECN operator is subject to market regulation or not, it must decide on investing in infrastructure to ensure its networks adapt flexibly to customer demand. Especially, the highly important investments in next-generation network (NGN) should be subject to scrutiny, as the cost will be difficult to plan, and the level of intervention is unknown to the operator (Arve & Zwart, 2014). Hence, the question how smart regulation can be achieved and with what regulatory tools (Gunningham & Grabosky, 1998).

Which regulatory tools are effective?

At the basic level, the available toolkit leaves the following options (TNO, Ecorys, IVIR 2015): (i) the repeal (parts of) the NRF; or, conversely; (ii) the enhanced application, re-interpretation and/or stricter enforcement of the NRF; or (iii) the imposition of renewed and directed regulatory instruments. Where and how networks are connected impacts the effectiveness of communications traffic and its cost (Ecorys, TNO, TU Delft, 2011, p. 10). Hence, where pan-European telecommunications networks gain in prominence, a closer look must be had at regulation as a tool for innovation.

Vogelsang (2012) ranks four types of regulatory initiatives that could be imposed on regulated ECN operators based in the risks and incentives they provide for the operators:

- Rate-of-return regulation combined with other cost-plus types of regulation – which is the lowest risk and incentive, in his view;
- Profit sharing – which is a medium risk and incentive;
- Cost-oriented regulation – it is not mentioned whether he considers this form in conjunction with access specific regulation – carries medium to high risk and incentives;
- Yardstick/benchmarking – which is considered to carry the highest risk and, conversely, the strongest incentives, possibly.

This section focuses on cost-orientation (section 'Cost-oriented regulation') and yardstick regulation (section 'Yardstick regulation, state aid – or some profit sharing?') and addresses profit sharing and rate-of-return. It will also discuss whether deregulation or reliance on self-regulation in the telecommunications sector could be a viable option.

To cater for the possible side-effects of overuse of yardstick regulation, it is important for the regulator to consider whether it is feasible and sustainable to leave the societal interest of having

scrutiny by the national regulatory authority (NRA). As part of its *ex ante* market analysis, the NRA was investigating whether and to what extent it would impose proportionate measures on the incumbent, such as obligations as to grant non-discrimination, transparency, cost-efficiency and access to certain network elements. The mere fact that the NRA was intervening led to a more careful and conservative approach to investment in fibre.

safe, secure, end-to-end, continuous electronic communications traffic (clearly: at reasonable end-user prices) to the ECN operators (and ECS providers) who control the end-to end connections only. This choice poses societal rather than pure economic questions (Bennet Moses, 2013; Butenko & Larouche, 2015). It begs the question whether the policy goal of stimulating innovation fits within the current mould of EU electronic communications' policy objectives set forth in Article 8 Framework Directive. In addition to the enhancement of competition, these are the development of the internal market and the enhancement of end-users' interests in terms of price and quality. In principle (Baker, 2007), innovation of ECN and ECS and services interoperability will thrive through competition. In the past decade, there has been a marked shift from network to services interoperability: in short, allowing different kinds of applications to collaborate seamlessly, no matter over what networks they are transmitted. This change must lead to the regulator reconsidering what are the most effective tools for regulation, bearing in mind that the current framework for electronic communications focuses on rules to enhance network rather than services interoperability; and that EU regulation may have a global impact. Any chosen mix of regulatory tools is likely to have profound effects on investment (Guthrie, 2006), which is ultimately necessary to enable end-users to adopt innovations (Gruber & Koutroumpis, 2012).

Cost-oriented regulation

Economic analysis is not unanimous on whether price regulation functions as a lever or a barrier to invest (Baldwin et al., 2012, p. 7ff). Some authors identify neutral or even positive effects from price regulation, but the analysis is focused on retail markets (Banerjee, 2003, pp. 243–249). Come what may, ECN operators who are subject to cost-orientation will make different choices as how-to time, spread and use investments considering regulation. They must consider if and how their investments may be impacted – whether positively or adversely – by existing and future regulation. Regarding the second way of imposing price regulation – the more open-ended requirement to charge reasonable access prices to competitors – an important question for the regulator is whether and how long the operators should be allowed to keep the resulting higher profits (Borrmann & Brunekreeft, 2009). In the coming regulatory period, this may be justified, for instance, where the operator has demonstrably introduced innovative elements into its network infrastructure that may be of interest to competing, non-regulated operators and service providers. In this case, it would be acceptable for the operator to include a mark-up for the innovative investments made. The economic imperfection is that the real performance of the operator may not (yet) be in line with what would come out of a benchmarking process as 'best practice'. This then creates a gap in terms of efficiency (Borrmann & Brunekreeft, 2009).

Clearly, the effectiveness of 'reasonable' price regulation needs to be explored further, especially since the test of whether prices charged by ECN operators to market parties who want access to their networks, is likely to be tested *ex post*. Benchmarking – which is associated often with yardstick regulation, may be necessary. The complexity of the current technological developments also appears to point at the differences between the regulatory initiatives (Vogelsang, 2012) becoming more fluid. Because prices are often set after the investments have been made, the desire to enforce lower prices thus creates an *ex post* conflict with the *ex ante* desire to stimulate innovative investments (Brito, Pereira, & Vareda, 2008; Gijrath, 2014; Granieri & Renda, 2012).

Dissent has been expressed by several parties, notably, the incumbents. Some authors consider the current EU framework a '*regulatory distortion of competition*', which inhibits investments (Allouët, Le Franc, Marques, & Rossi, 2014; Bock, Wilms, Soos, & Roeber, 2014b, pp. 17–35;

Boston Consulting Group, 2012). They point out that regulatory distortion has three consequences: (i) the inability of ECN operators to make a fair return, which return – according to the authors – is needed to fund further network investments. This inability to be profitable is made worse by an uneven level playing field with the entry on the market of game changers: the OTTs who mostly come from outside the EU and are not subject to any form of ex ante regulation (Bouygues I, 2009; Bouygues II, 2013). According to these authors, asymmetric price regulation could well miss the mark in achieving the goals of better end-user services; (ii) the mandated inefficiencies in the mobile communications market. This is closely connected with the prices realized in the allocation of spectrum, which are so high that – in their view – these costs may have a negative impact on the speed of the 4G long-term evolution and 5G roll-out. This does not benefit end-users. Both economists and the Commission argue that barriers to enter already fragmented mobile markets are a problem too (Bock et al., 2014, pp. 24–25); and (iii) the lack of a harmonized EU approach, according to them, is an issue as well. Here the authors seem to refer to different access conditions across the EU. This last argument reads like a snake biting its tail; on the one hand, the authors preach less regulation, on the other hand, they want more harmonization regulation, which seems to be focused on equivalent market access conditions for ECN operators in the EU. The TSM regulation contained some provisions on fulfilling fair and open access. As will be suggested below, a point could be made for more harmonized contract measures. In the context of investments, the authors ask for a shift at the policy level from mere price regulation to measure that reinvigorate investments (Bock et al., 2014, p. 27).

What about the role of the NRAs? Should they have an eye for the challenges that these gatekeepers face from the game changers (Bock et al., 2014, p. 21)? According to some, the answer should be positive. The justification for intervention is that the past measures to ensure network capacity and better QoS have come at a significant cost to the ECN operators who tend to become gatekeepers rather than service providers. To some extent, it is felt that the ECN operators facilitate the provision of innovative services of the game changers, who do not have to make network investments and are able to minimize cost of access with the help of the current regulatory framework. Some even argue that the disruption caused by OTTs is the new imbalance that distorts the level playing field (Allouët et al., 2014). They use this argument to support a solution of no more price regulation – at least not in relation to services offered with the help of innovative investments (Bock et al., 2014, p. 27). The gatekeepers must be allowed to *‘set different prices for their services to develop innovative network management solutions so they can offer differentiated, value-adding services, while maintaining a nondiscriminatory approach’* (Bock et al., 2014, p. 30).

Although the critics of price regulation do not really address the possibility of being made subject to a ‘reasonable price’ rather than cost-oriented regulation, it can be inferred from their arguments that their preference is for no more price regulation at all. The proponents of no regulation argue that such absence would – by default – function as an incentive to free financial means to innovate. In addition to a regulatory holiday, the EU could make available more special funds to ECN operators to enhance or improve their network infrastructure fundamentally. An example is the H2020 program.¹⁹ H2020 offers a host of subsidies to market parties in terms of

19. European Union subsidies by their nature do not fall under the state aid provisions of Articles 107–109 Treaty of the functioning of the European Union (TFEU), simply because these provisions apply to the member states offering such aid, and not to the Commission.

network improvement (WP2018-2020). Whether this conflicts with the prohibition on state aid will be discussed in section ‘Yardstick regulation, state aid – or some profit sharing?’.

Yardstick regulation, state aid – or some profit sharing?

It seems to make sense for ECN operators to become global frontrunners in terms of network convergence in a future where IoT and M2M are to become part of daily life. This section discusses briefly the investments in very high-speed broadband networks (also known as NGN) in the context of yardstick regulation and the limits imposed by State Aid rules.

The Commission is determined to continue its support of ECN investments in NGN to pursue its desire for sustainable job growth in the EU. Yardstick regulation can take many forms and is used mostly in utility sectors (Mizutani, Kozumi, & Matsushima, 2009). The outcome is uncertain. Measures in the telecommunications sector could run from subsidizing network innovation, to removing spectrum caps, or financial payment schemes to support the market parties that acquire 5G licenses. An option for the NRA could be to make temporary compensatory adjustments (Vogelsang, 2012, p. 19). There, we agree that ‘incentive-mitigating’, such as some form of subsidy, or adjustments to the tightness of regulation – even for a limited period – could be necessary and effective.

The Commission has launched various subsidies to support the roll-out and deployment of NGN across the EU, especially where such would enhance interoperability of such networks. The basis for this initiative can be traced back to H2020. The subsidization of very high-speed broadband networks may be used by the Commission to promote and enhance the so desired IP connectivity of the EU citizens and companies. However, funds are limited, and the success of subsidization is uncertain. The actual execution is a matter of interested parties actively knowing and pursuing announcements of financial aid. Subsidization may fit very well in the EU’s strategy, provided that, whenever these are considered, the allocation must be transparent, sustainable and enforceable. The EU subsidies programs are not always that easy to access. It is not entirely clear from the assessments what the results have been so far. Nor is there enough data to determine what subsidies have been or will be effective.²⁰ As it is difficult to determine whether the shift from *ex ante* to *ex post* regulation includes incentivizing the parties with SMP (the gatekeepers) to be innovative, the question is whether, and if so, to what extent, the gatekeepers should perhaps not also be able to tap subsidies more. As pointed out before, there is a clear downside for the gatekeepers, when only the OTTs are given access to or benefit from government innovation funds. Nevertheless, any form of subsidizing will give rise to the question whether this distorts the level playing field.²¹

Even if the Commission succeeds in better coordination of frequency allocation procedures, the actual deployment of 5G and broadband networks remains a matter of national law. H2020 appears less focused on supporting 5G research. Rather, there is a steady flow of money towards parties who investigate better security measures. Another area of material concern to the Commission is the lack of access to networks in rural areas in the EU.²² The 2014 Regulation on the assessment of state aid came at a convenient time.²³ The Communications that accompany the 2014 Regulation²⁴

20. EIN 2010; H2020 2017, Commission Communication (2014–2017).

21. Bouygues I; Bouygues II.

22. TSM Proposal (2016).

23. Commission Regulation (651/2014).

24. Handbook (2014).

contain the conditions under which aid to parties wishing to roll-out very high-speed networks may be justified.²⁵ Moreover, the conditions for subsidies appear to have a geographical scope, that is, national aid may be granted to ensure that EU citizens in rural areas will not be prevented from access to NGN: these are called ‘white’ areas, as opposed to ‘black’ areas where NGN’s are active – black areas state aid will not be permitted.²⁶ However, the conditions formulated for aid also contain circular reasoning and assessment. The money spent on research must bring significant improvements in terms of network capacity, speed of communication and innovation. But the rules provide little guidance on what would be the most reliable benchmark to assess actual results for NGN improvements. This is a difficult hurdle for agencies granting subsidies. NGN-specific subsidies could ring-fence the freedom of the recipient operators or construction firms to make choices necessary in catering for the consequences of innovative technological changes to the accompanying specifications of very high-speed broadband networks. It is a pity that the TSM Proposal did not consider how subsidies for technological innovation in the electronic communications sector could be designed better.

The Commission mentions the use of financial instruments to promote innovation in consideration 26 of the Proposal: ‘[...] [F]ees should be set in a manner that enables innovation in the provision of networks and services as well as competition in the market. [...]’. It is not clear how the Commission wants to achieve this. The Impact Analysis of the TSM Proposal lacks an in-depth analysis on whether the investments that must be made by both the fixed and mobile ECN operators in their infrastructure in the coming years include the cost of fundamental innovation, that is, for the construction and roll-out of NGNs, or whether these are aimed at incremental innovation, that is, for the maintenance and updating of network protocols and equipment (Butenko, & Larouche, 2015). This makes it difficult to consider the actual legal impact of the proposed regulation (REFIT, 2013). Yet the available literature suggests we are looking at fundamental innovation.

Lacking regulatory clarity, I agree with Vogelsang that it is up to the non-committed regulator to consider the different forms of incentive regulation. Rather than relying on state aid, soft profit-sharing regulation could include a more relaxed approach to what (excess) profits an ECN operator, who *does* invest heavily in fundamental innovation, could keep. According to Vogelsang, this approach would still preserve the extent to which the regulated operator would remain a claimant of residual profits. Conversely, more profit sharing could also reduce incentives to invest (Vogelsang, 2012). He also believes that asymmetric network sharing that favours the regulated operator will not work. This is simply because the operator would be incentivized to overinvest, as there would be a much lower risk in terms of *ex post* price regulation. In his analysis, cost-reducing incentives should be deemed largely independent of the price-cap levels, so that investment incentives would be safeguarded.

The choice for incentives also creates a governance issue (Marchant, Abbott, & Brown, 2013). From an administrative law perspective, regulation must be non-discriminatory, precise and sustainable. Incentive regulation to stimulate innovation is much more complicated to manage than *ex post* market intervention to correct market failure. Incentive regulation could be built on erroneous expectations. It will be difficult to create a meaningful governance framework for incentive regulation (Marchant et al., 2013). It is difficult to see how the benefits for society that may come

25. Commission Communication (2014–2017) and Commission Recommendation (2013).

26. Commission Regulation (651/2014).

from incentive regulation could surpass the benefits from innovation occurring in deregulated markets.

Deregulation

When considering how and when to formulate subsidies, the question arises whether, rather than through incentives, results can be achieved through a regulatory holiday. This juxtaposed approach would relieve gatekeepers from further regulation during a defined period, while creating a shared subsidies pool that aims not only at promoting fundamental innovation but also incremental innovation. To get the benefits from this sort of regulatory holiday, ECN operators would have to commit to significant infrastructure investments and be willing to report the scope of their investments. They would have to account for the innovations; they would have to be transparent regarding the scope of innovations.

Case law suggests that the Commission hinges more on relying the market investor principle: less subsidization and less regulatory intervention for NGN deployment.²⁷ Yet, deregulation does not mean further liberalization of NGN per se; less intervention and more reliance on the market investor principle should be supplemented by harmonization of NGN Quality of Service (QoS) in the member states, otherwise the policy goals of establishing pan-European networks would be moot. A shifting focus on harmonization and away from liberalization measures may be opportune where markets are more open than in the past. Any approach begs the question whether the Commission has the clout, the legitimacy and the tools to translate its policy goals in 'soft' incentive regulation.

The choice of the regulatory instrument creates timing issues. It is difficult for a regulator to warrant that incentive regulation could serve to lengthen the regulatory commitment period necessary for the successful grant and implementation of incentives. From an economic perspective ((Vogelsang, 2012), making such a commitment for the full-time horizon of infrastructure or innovation investments is impossible for an ECN operator. The compatibility of incentive subsidies that aim at stimulating efficient investments could become uncertain. It is exactly for this reason that any form of incentive regulation for innovative network investments requires periodic reviews and, possibly, interim modification.

Redefining converging network levels for services interoperability

Could innovation in the converging electronic communications sector be supported by a stronger focus on dealing with interoperability issues? Could the threat of imposing access obligations on an ECN operator with SMP function as a lever for incentive regulation? This section explores how safeguarding interoperability may have a positive effect on innovation.

Interoperability is a collective notion for all measures that enable the end users of separate networks or services to communicate with each other and to purchase services from providers other than their own network provider. Network interoperability used to be defined as stimulus for competition by linking up networks. Countless combinations of physical infrastructure are possible (ABB, 2007; Gijrath, 2006). Where and how these networks are connected will impact the effectiveness of communications traffic and its cost (ABB, 2014; Ecorys, TNO, TU Delft, 2011, p. 10).

27. CJEU (2016).

Indeed, if interoperability is not achieved at the right level, then this may lead to undesirable product homogeneity: Everything will start to look alike and the freedom of choice of users will be limited. In that case, uniformity becomes an obstacle to innovation because it hinders diversity in ICT applications.

The levels of network interoperability are likely to change if SDN and NFV take off (Gijrath, 2018). The goal of SDN is to enable cloud and network engineers to respond immediately to changing business requirements and thus network specifications. SDN uses different network technologies, which can make the infrastructure as such more agile. The core network (including data) can be excluded from the infrastructure, making active sharing arrangements more attractive. Consequently, with the transition towards IP being almost concluded, the notion of services interoperability needs to be redefined. The traditional OSI model will no longer be leading.

In the coming period, interoperability requirements of service providers are likely to present both mobile and fixed infrastructure access issues. Broadband access is a building block at the wholesale level for providing internet access to end-users, so the mobile operators will face interoperability issues with optical fibre providers. Imposing and enforcing detailed technological interoperability standards is not an easy task. Meanwhile, the TSM Proposal showed the Commission's keenness on stimulating mobile ECN providers to aim at establishing effective forms of partnerships in sharing network elements, essential facilities and/or infrastructure. Examples range from site-sharing agreements, to passive network sharing, to sharing of active network elements, spectrum sharing or trading, national roaming or innovative MVNO constructions.²⁸ It is just not certain whether the Commission wanted to go beyond stimulating through enforcing a duty to negotiate. The TSM Proposal contained more detail on mobile/fixed sharing than did the NRF.

By March 2018, it became clear that the 5G Action Plan was revived.²⁹ In the proposal, innovation as a policy goal of the allocation of 5G spectrum came to the fore. The member states must describe their innovation goals in a clear manner in the allocation instrument; where possible, the responsible minister must also calculate in advance the cost of such measures both at the national and the EU.³⁰ With this sub-clause, the Commission orders the member states to include measures to promote innovation and business improvements. The power to include specific measures in the licensing process is left with the member states' government agencies in charge of 5G allocation. Since the NRAs are supposed to be independent agencies from the issuing ministry, the question is why the Commission leaves the stimulation of innovation for mobile networks to the national governments. Similarly, the reason is instrumental: Only a national government is competent to issue specific regulations together with the rules for frequency allocation and subsequent licenses.

Initially, the Commission wanted NRAs to impose a transnational requirement upon regulated market parties to provide a European virtual broadband product. This is a form of access realized in the form of a virtual link with the active layer in a fixed or wireless broadband network (Ecorys, TNO, TU Delft, 2011, p. 88). The virtual broadband product would offer maximum network *and* services interoperability. As usual, technological developments have overtaken slowly turning

28. There is a difference between active and passive network elements. Active elements: Base Transceiver Station (BTS), microwave radio equipment, switches, certain antennae, transmitters/receivers; passive elements: masts, cabinets, electricity, rights of way, cable ducts.

29. 5G Action Plan (2016).

30. TSM Proposal (2016), Articles 54, section 2, subsection (d).

wheels of the legislative procedures. The draft from 2013 never made it for lack of political support. But the TSM regulation was not an improvement. It wanted to limit the NRAs discretion to assess the access requirements. The reason for this is a draft appendix that prescribed which access levels could be imposed. This may seem justified from the perspective of the wish to standardize very high-speed broadband access in Europe, but the complexity of the administrative law procedures should have been investigated in greater detail beforehand. It is likely that NRAs throughout the member states will interpret and apply the requirements differently. There must be ample room for parties to contract the technical requirements. At the same time, the EU Council focused on measures to reduce the cost of deploying high-speed ECN.³¹ Describing technological requirements may prove to be risky; it is unlikely the appendices to the TSM Regulation will be future proof – although they can be amended in a flexible manner.

Market regulation and smarter contracts

It is uncertain whether threats of regulation will bring competitors to agree a form sharing voluntarily. Although NRAs must consider technological innovation in market analysis, it is by no means clear from the Impact Assessment how that will enhance innovation. Moreover, this approach clashes with the market parties' desire for deregulation.

Where there is a commercially feasible and equivalent alternative, the TMS Proposal provided that the NRA should not impose access obligations in the context of infrastructure sharing.³² Conversely, the relevant section contained a concrete provision ordering the member states to ensure that the NRAs are given the necessary powers to impose obligations to ECN providers either: (i) with respect to the sharing of passive and/or active infrastructure; or (ii) to execute local roaming agreements; or (iii) to engage in a joint roll-out of infrastructure that includes use of frequencies, in so far as necessary for the provision of local services, in particular in rural areas. The practice of *ex ante* intervention in contract formation continues in the coming period.

Infrastructure sharing can take very different forms, going as far as parties agreeing on joint ownership of certain network elements that can serve to balance their needs, while also sharing financial risks that will occur during the period of investment. In the event of a form of joint ownership of infrastructure elements, this should affect the level playing field positively, as the parties will truly share the risks of the innovative investments on an *ex ante* basis. Such arrangement is likely to be agreed once the new frequencies have been allocated. This entails that the party controlling the infrastructure will have to give up some of its first mover advantage for the benefit of the party entering the sharing arrangement. There is not yet enough data available on the long-term economic and legal advantages of these types of arrangements. They create competition law concerns at a different level and most certainly raise a host of issues between the parties regarding the division and exploitation of intellectual property rights in new products. Probably, it would be best to see this form of cooperation more as a business and organization offer and deal with it as such in the contract terms; this is likely to make the arrangements more workable and, perhaps also, more sustainable. Conversely, it is likely that sharing arrangements could offer the parties more flexibility and freedom in creating opportunities for both incremental and fundamental infrastructure investments. ECN operators who will prepare for their networks or infrastructure to be shared

31. Commission Recommendation (2013) and Council Directive (2014/61/EU).

32. TSM Proposal, Article 59, section 2, third paragraph.

with others are likely to be the first to reap the benefits of these arrangements – hence the ‘wholesale only models’ contemplated by the Commission. If these arrangements include the use of SDN, the parties cooperating could make a head start, it seems.

From a technology and infrastructure perspective, the variations between sharing arrangements are substantial. Looking closer at infrastructure agreements, roughly speaking, we can distinguish between (i) passive and (ii) active infrastructure sharing and (iii) spectrum sharing (BEREC, 2011; Borba Lefèvre, 2008).³³ The first example is passive sharing of infrastructure elements such as masts, sites, cabinets, racks, power or conditioning; also known as site sharing, this is the lightest (and from a competition law perspective least worrisome) form of cooperation. The party gaining access to existing network elements of the other party is unlikely to get access to the competitive facilities of that party. The second example includes active sharing of antennae, nodes, and, possibly the RAN. This form of cooperation may include sharing of the backhaul that goes to the different Radio Network Controls (RNCs). The implementation of SDN/NFV will make this approach feasible and sustainable for competitors who wish to share. In fact, SDN could imply that traditional hardware suppliers will come to the fore and be an important partner in such arrangements. Hence this form of cooperation approach can vary even more than with passive sharing, but it can also be expected to raise more concerns with (national) competition authorities. These authorities are likely to require strong Chinese walls between the core network and the shared elements. When SDN/NFV become a proven technology, many aspects – from infrastructure separation to security arrangements – will be easier to achieve. Hopefully, the space used by such equipment and the connection with optical fibre networks can be achieved as well. It seems plausible that these contracts will become smarter – not in the meaning of smart contracts in the context of blockchain technology (although that might be a protocol that parties could explore).

No matter which type of infrastructure sharing is applied, the contract terms will be different. They must be as future proof as possible. Simple clauses that acknowledge the possibly required consequences of market regulation (as, e.g. a change of circumstances; a contract governance issue; or, perhaps, force majeure) do not suffice. The very detailed and technological scope of the arrangements between the various market players requires a different contractual approach and contract management is more than ever key. Think about the varying specifications, infrastructure separation; contracts with landlords; security arrangements, network continuity and services levels; and much more. A disadvantage of sharing arrangements probably is that such an arrangement may be difficult to disentangle, which could create uncertainty regarding future divergences and the costs thereof between the cooperating parties (Commission Decision, 2004). This requires thinking on smart clauses regulating termination, transition and transformation.

In a period of disruptive innovation, an ECN operator might have two choices (Baldwin et al., 2012, pp. 493–496): (i) implementing a ‘tried and tested technology’ into its intelligent network elements, with predictable outcome, about the cost of implementation, maintenance and the corresponding income it could generate; or (ii) implementing an untested technology, such as NFV, which could yield a higher average but more variable return on income. Engaging in a joint roll-out of infrastructure that includes use of frequencies requires careful weighing of the R&D elements. When thinking of long-term agreements, arrangements could include the delivery of novel network equipment to the other party; they could include specific new forms of access arrangements; a

33. The third example concerns competitors who are using a specific radio frequency band simultaneously. Since I am concerned with infrastructure competition, I will not discuss this form of sharing.

compensation by the party obtaining access to the ECN operator's network to be able to offer innovative services can be considered. These types of arrangements also include detailed provisions on the access and interoperability levels. Presumably, these agreements contain less risk-taking elements for the party seeking access, unless such party would commit itself to paying a partial compensation related to future technological enhancements by the operator. Yet, it seems somewhat difficult to envisage how such a party would justify such a financial commitment to its shareholders. Again, competition law concerns abound, as well. The ECN operator may focus on preservative maintenance, rather than on innovation. Hence, operators and service providers are likely to focus on closely defined outsourcing projects. Whereas this is logical, and probably not that problematic from the regulator's perspective (risk aversion is not a bad thing), voluntary outsourcing of activities aimed at innovation requires a reassessment of how the investments fit in with incentive and cost-oriented regulation. Outsourcing parts of an infrastructure prove to be a fake resolve for an ECN operator and it will still face the same dilemmas on investment risk. Any sourcing agreement an ECN operator might enter with a supplier of innovative technology should cater for flexibility regarding investment decisions. The operator should cater for a right to postpone investment decisions, until it can resolve certain future uncertainty regarding cost evolution of its network (Arve & Zwart, 2014, p. 21). This possibility should perhaps not be limited to making decisions on the cost side, but also on the revenue side.

What regulatory measures could be applied for these sharing and joint roll-out agreements? Where not always there is a scope for game changers to duplicate the regulated operator's networks, a regulatory measure might be to what Baldwin et al. refer to as 'the contestability of network investments' (Baldwin et al., 2012, p. 470ff.). This approach could range from imposing terms on the regulated operator to outsource – parts of – infrastructure developments to, say, equipment suppliers; or enable game changers to introduce product improvements to innovation and dynamic efficiencies on the operators' networks. Both of which examples follow under the sharing and sourcing agreements discussed above. The upside of contestability is that it can be introduced in a wide range of formats (Baldwin et al., 2012). This could enhance technological flexibility. But, as the authors observe correctly, the current tendency remains limited to partial and voluntary outsourcing of certain network activities, ranging from maintenance and support, to partial or full ownership of network elements, and a full range of various contracts may be used to achieve the sourcing of these activities. This begs the question as to whether and how the Commission could rather focus on using regulation to further stimulate services interoperability as an alternative to price regulation or imposing regulatory measures on parties who are negotiating complex infrastructure sharing or roll-out arrangements. As has been demonstrated in representative literature on regulation, risks and economic issues are often subject to *networks of regulation* (Teubner, Collins, & Everson, 2011). Smart contracting to fend-off intervention is very much alive.

Institutional aspects

Any discussion on the material aspects of telecommunications networks regulation triggers questions typical to the functioning of the EU. What role could the Commission, the NRAs in the member states play and how this would support sustainable and effective regulation and contractual arrangements? Considering the current roles attributed to NRAs, one would expect a clear and well researched set of tools to be made available for these entities to safeguard infrastructure competition. Yet, the tasks assigned to NRAs appear to have been formulated at a very high level.

There is no clear line or test for NRAs when it comes to stimulating innovation or supporting discussions on new telecommunications networks agreements. More specifically, the Commission is not very clear as to whether it is concerned with ECN operators perceiving certain forms of regulation – think of cost-orientation obligations – as a barrier to investment, or – conversely – whether it believes that the way forward is to proactively impose obligations to invest in networks.

The main regulatory governance variable is the regulatory commitment *of and to* the EU, or rather, the apparent lack thereof. Catering for network reliability cannot solely be a task for gatekeepers. Although no one will argue that the liberalization of electronic communications should be undone, to put the onus for network reliability predominantly on the sitting ECN operators probably misses the mark. Network reliability and security remain a government task and a joint responsibility. Game changers, who do not operate their own networks, have an interest in ensuring that data traffic is as hassle-free and as safe as possible.

The Commission should investigate better why and how governance and enforcement measures it expects support innovation.³⁴ The decision on the Commission's competence in determining a 5G strategy is helpful.³⁵ It should be investigated further in what manner the NRAs can act proactively to stimulate technological innovation and whether there would be any meaningful role for BEREC.³⁶ BEREC envisages a stronger role for itself, bearing in mind that the current ecosystem is based on a balance between the Commission (pursuing the vision of the single market), the NRAs (individually), and BEREC acting collectively.³⁷ But it is unclear whether there is consensus on increasing BEREC's powers at expense of the NRA's. For the moment, flexibility and openness in their governance models must be improved to enable the NRAs to better deal with the developments on an increasingly dynamic playing field. Whether the NRAs will be willing to intervene will, likely, be connected closely to the degree in which proactive, aggressive market parties will request the NRAs to impose access or price measures on these parties' competitors; and more far-reaching, order them to enter into a passive or active infrastructure-sharing agreement. Moreover, it is uncertain how BEREC overall coordination and advice will turn out, certainly where it concerns contract formation conflicts.

Conclusion: Smarter telecommunications regulation and smarter contracts

This article asked what type of regulation can be a suitable to further stimulate innovation. Having looked at available regulatory tools, the shifting regulatory perspectives, possible side-effects, two proposals for regulating network levels for services interoperability, subsidies, standardization and self-regulation, the general feeling is that a fresh approach is required.

Given that the law simply never keeps up with the speed of technological change, more flexibility is needed. Repealing outdated parts of the NRF is smart; conversely, the enhanced application, re-interpretation and/or stricter enforcement of the new electronic communications code requires further scrutiny. The imposition of renewed and directed regulatory instruments makes sense. Although I believe that the dissenters – who propagate the inversion of the level

34. Impact Assessment, part 3/3, p. 383.

35. CJEU (2017) and Gijrath (2017b).

36. BEREC (2013).

37. BEREC (2016).

playing field by arguing for incentives for gatekeepers versus no right for game changers – may overstate their case, it is in the interest of society at large that the long-term robustness of fixed and mobile ECNs is safeguarded. That does not mean I propagate more regulation. I do believe in having more regard for the proportionality of measures and the need for better governance. A form of ‘intermediate’ regulation fits better at this juncture. In conclusion, I am not entirely convinced a ranking of regulatory options can still be applied in the electronic communications markets that, on the one hand, have become more competitive, and on the other hand, must face the immense challenges arising from disruptive technologies and OTTs.

Where ECNs are configured better to support technological innovations, such as the use of IoT and the digital transformation of different industries, this should be accompanied by, for example, increased certainty regarding the regulation of market parties in the IoT value chain; the reduction of heterogeneity in regulation in favour of start-ups; the improvement of connectivity for SIM-based M2M services; the increase of confidence in information and network security as well as privacy; a faster adoption of 5G and ubiquitous roll-out of very high-speed networks both directly to the home and to street cabinets; this should also safeguard a sustainable backbone, which is required for many IoT applications. There are many technical reports that underline that the 5G roll-out must go together with investments in upgrades of the mobile network *and* fixed infrastructure.

Yardstick regulation for network operators could well be in the books. However, it appears that the Commission, considering the diverging aims and goals attached to technological innovation, finds a solution in more delegation to the NRA, combined with a mix of measures and means is likely to yield the best results for efficient intervention. Yet, the stimulation of access to very high-speed broadband networks is a policy goal and not a means per se that NRAs can apply proactively. Unfortunately, the Commission does not provide more clues than repeating its adage that the NRAs must promote efficient competition – in this case infrastructure competition.³⁸

By mixing the regulatory approaches, it is probably easier to achieve a balance between the need for investments incentives, while maintaining the level playing field. It seems that both gatekeepers and game changers would benefit from such a mixed *and* intermediate regulatory approach. Continuing asymmetric regulation in converging fixed markets – especially cost-oriented regulation at the wholesale level – does not appear to be in synch with the expected network convergence following the distribution of 5G and the advent of SDN/NFV in the coming years. These developments appear to justify a softer stance towards regulation of ECN-fixed operators, that is, more incentive regulation and self-regulation, or a period of deregulation.

When done properly, a regulatory holiday can be equal to incentive regulation, which is usually based on a mix of cost reduction and efficient pricing.

The Commission wanted the NRAs to reapply the well-known principles of openness, objectiveness, transparency, non-discrimination and proportionality, while focusing on the stimulation of efficient investments and innovations in new and improved infrastructure. This entails that NRAs must see to it that any access obligation they consider imposing must consider the investment risks of the parties involved. Another point of view, in a situation of asymmetrical regulation, would be to determine whether an SMP party shows a willingness to invest. If it does, it could face less stringent access obligations. Conversely, an interested party looking to achieve that an NRA imposes SMP obligations could find a willing ear where it would demonstrate the scope and depths

38. TSM Proposal (2016), Article 2 subsection (b).

of innovative investments it made so far. Where the NRA is asked to judge the permissibility of a form of cooperation *ex post* (a joint venture, or a horizontal technology agreement) it is required to determine how various market parties could and should divide the risk of investments in infrastructure, while safeguarding competition and having regard at the non-discrimination principle. Hence, it appears that the NRAs partly must convert themselves from an *ex ante* supervisory agency to an agency that will intervene in cooperation arrangements that have been notified to it and that bear investment risks.

It is better to leave the translation of technological developments in contracts as much as possible to the market parties. Too much guidance on contract terms could stifle competition. It would be wise for the Commission to seriously study the effectiveness of the various bargaining models in current and future, increasingly convergent markets. It could also research the differences between new legislation in terms of the effectiveness of the duty to bargain and imposed entry requirements in the member states. Such knowledge might help prevent the fifth generation of legislation from being up for another review in just a few years.

The proponents of smart regulation suggest a mix of both mandated government intervention with various intervention means; and these could well be mixed with incentives, whether through subsidies or tax laws. Incentive regulation could serve to stimulate a regulated ECN operator to make more fundamental innovative investments in its network to solve bottlenecks in transmission of data. As such, these operators could anticipate alternative investments by game changers in complementary infrastructure, if they feel they can do this better, quicker and/or more (cost-) effectively. Increased competition would lead to lower prices and increased demand of the ECNs. Thus, the value of the network is safeguarded. Increased competition could stimulate competition in terms of investment to solve bottlenecks, by both the gatekeepers and the game changers.

Finally, the interest of ECN operators to get clarity about the regulatory horizon is evident. They need to know: is the sunset in sight, or should they expect continuity of *ex ante* intervention and asymmetric regulation?

Author's note

Attorney-at-law in private practice – active for clients in the IT, media and electronic communications sector, including network operators and IT suppliers. The views expressed in this article are my own. This article contains reworked excerpts from a Dutch paper written on the level playing field for telecommunications (Gijrath, 2017a).

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