

INFRASTRUCTURE INNOVATION IN INDIA: WHAT CAN BE INFERRED FROM EU REGULATION?

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February 2018

ABSTRACT *This article assesses the innovation policy objectives underlying the proposed EU Telecom Single Market (TSM) regulation considering disruptive technological developments and asks what the regulator in India can infer from such regulation. The paper explores the network operator's dilemma of how to deal with investments in a time where fundamental innovation comes from outside, and the regulator's dilemma of how to improve the conditions for access to the operators' networks and safeguard a level playing field. The measures with respect to two technological developments: the deployment of 5G and the goal to ensure very high-speed broadband access in the EU have been analysed. Thought is given to the effectiveness of imposing active and passive infrastructure arrangements. Should private law prevail over market regulation? A mix of regulatory measures is considered.*

JEL codes: [TBA]

Key words: Infrastructure; innovation; interoperability; law and technology; Telecom Single Market proposal; 5G frequencies; broadband access; incentive regulation; private law contracts; deregulation.

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I. REGULATORY DILEMMAS

A. Infrastructure Innovation in India and the Telecoms Single Market Proposal

Where disruptive technologies change the way people live, work, and socialize, the robustness of communications infrastructure becomes a key policy consideration in European and other markets, especially those that are not fully competitive yet.² Following the take-off of new services, such as the Internet of Things (IoT) and Machine to Machine (M2M) communications on a global scale, the demand for broadband and mobile transmission is likely to require additional network capacity and innovative infrastructure specifications to support these new technologies.³ Economic analysis has shown a robust growth in telecommunications networks in India over the past decades.⁴ This growth was due, amongst others, to applying a successful mix of regulation and policy initiatives.⁵ India's planning focuses upon policies that promote technological innovation and global competitiveness. As Gopalakrishnan, S., and Dasgupta, J. put it, "India's dominance in innovation capacity has not been mere coincidence. It is a result of the gradually increasing focus of its policy regime, a focus that has moved from science to technology and on to innovation and entrepreneurship and supported by years of planning and implementation."⁶ In the advent of 5G and mobile/fixed telecommunications, India may face different challenges than Europe, for instance, in terms of the size of the territory, economic growth, population, and technology innovation. The political make-up of India is also different from the EU. But, there is a connection between telecommunications infrastructure investments and economic growth.⁷ This may be a rea-

² McKinsey Global Institute, *Disruptive technologies: Advances that will transform life, business and the global economy* (May 2013).

³ T.U. Delft & T.N.O., *Steps Towards a Truly Internal Market for e-Communications*, 2015 (TNO, TU Delft. 2015).

⁴ V. Sridhar, *THE TELECOM REVOLUTION IN INDIA: TECHNOLOGY, REGULATION, AND POLICY* (Oxford University Press, 2015); M.R. Narayana, *Telecommunications services and economic growth: Evidence from India*, 35(2) TELECOMMUNICATIONS POLICY 115 (2011).

⁵ See, S. Gopalakrishnan and J. Dasgupta, *Policies to drive innovation in India* in FINANCING ENTREPRENEURSHIP AND INNOVATION IN EMERGING MARKETS, (L. Casanova *et al* ed(s)., Elsevier Inc., 2018); <https://doi.org/10.1016/B978-0-12-804025-6.00005-8>, adapted from an earlier version which appeared in the *Global Innovation Index 2015: Effective Innovation Policies for Development*, Chapter 8, 121–130 (WIPO, Geneva, 2015).

⁶ For an analysis of innovation policy in India over the past decades, see S. Gopalakrishnan and J. Dasgupta, *Policies to drive innovation in India* in FINANCING ENTREPRENEURSHIP AND INNOVATION IN EMERGING MARKETS, 118-120 (L. Casanova *et al* ed(s)., 2018).

⁷ For an extensive analysis of this link, see K.S. Shridhar and V. Shridhar, *Telecommunications infrastructure and economic growth: evidence from developing countries*, 7(2) APPLIED

son why the Commission of the European Union (EU) is concerned with the competitiveness of the European companies, in comparison with companies in India, and other lesser regulated, bigger markets – such as China,⁸ and the United States.

Although the political make-up of India and the EU is different, some parallels may be drawn from the approaches in regulating infrastructure innovation policy. This article is not meant to compare the different policies of India versus the EU. Rather, it asks the question of what the Indian telecoms regulator can infer from the EU approach. For this reason, this article discusses the proposed EU regulation for the Telecoms Single Market (TSM) in terms of how it services innovation in the telecommunications industries.

The EU's Digital Single Market (DSM) Package is aimed at regulating of digital platforms to improve the Union's competitiveness in the globalised economy.⁹ The recast proposal for a European Communications Code is one of the key regulatory initiatives of the DSM strategy.¹⁰ Just as is the case in India, the TSM Proposal attempts to strike a balance between the interests of electronic communications networks (ECN) operators, electronic communications services (ECS) providers, and end-users. One of the EU's aims is to simplify the existing regulatory framework (also known as the new regulatory framework (NRF)), by bringing seven EU directives together in one electronic communications code.¹¹ This is not a form of deregulation, but rather a form of re-organization. Overall, the proposal aims at combining the repeal of parts of the NRF with the introduction of new industry-directed cluster regulation. The TSM Proposal has gone through several phases in the legislative process; the initial proposal – known as the draft Connected Continent Regulation – dates to November 2013; it never materialized. The recast proposal dates from September 2016. At the time of closing of this contribution (February 2018), it was not yet known whether the Council would adopt the recast proposal. In comparison with the Connected Continent Proposal, the TSM Proposal is more forward-looking. The Commission signals numerous

ECONOMETRICS AND INTERNATIONAL DEVELOPMENT 37, 37-56 (2007).

⁸ M.R. Ward and S. Zeng, 40(2-3) TELECOMMUNICATIONS POLICY 89, 89-101 (2016).

⁹ TNO *et al*, *Digital Platforms: an analytical framework for identifying and evaluating policy options* (2015).

¹⁰ ('TSM Proposal 2016'); *see also*: G. Amendola *et al*, *Re-thinking the EU telecom regulation*, 93(1) DIGIWORLD ECONOMIC JOURNAL 17, 17-35 (2014).

¹¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *Regulatory Fitness and Performance (REFIT): Results and Next Steps*, COM (2013) 685 final, Brussels, 2 October 2013 (REFIT 2013).

developments in the period up until 2020.¹² The Commission focuses on achieving better access to very high-speed broadband networks and the most advanced spectrum, including their rollout. The Commission is also looking for a way to mirror financial instruments – for instance, the amounts that parties interested in obtaining spectrum must pay – with the requirement for all stakeholders to be more innovative.¹³ *Prima facie*, this seems sensible, but – different from India – the preferred allocation mechanism for frequency licences is based on auction procedures in all EU countries. Auctions tend to drive up investment costs. The financial instruments hardly are aimed at enabling innovation. The TSM Proposal emphasizes ‘commercial’ innovation that will push the demand for services over very high-speed broadband networks;¹⁴ increased competition at the local level as a result of the activation of smaller frequency cells, that will enable more intricate networks;¹⁵ the improvement of the existing instruments for EU spectrum policy;¹⁶ and the separation in market analysis of ‘*wholesale only models*.¹⁷ Next to regulation, EU funding is made available to support the rollout of cross-border networks. Horizon 2020 (H2020) is the Commission’s workplan to achieve smart and sustainable growth.¹⁸ H2020 offers a host of subsidies to market parties in terms of network improvement.¹⁹ It includes a strong emphasis on

¹² Such as: (i) the ongoing transition from traditional telecommunications infrastructure to an all-IP environment; (ii) the technical possibilities offered by new and improved underlying infrastructure, which supports almost unlimited transmission capacity of fibre networks; (iii) the continuous convergence between fixed and mobile networks, which will lead eventually to seamless service provision to end-users, wherever they are and no matter what terminal equipment they use; and (iv) the development of innovative technical network management, with the advent of Software Defined Networks (SDN) and Network Function Virtualization (NFV). SDN and 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; P. Alexiades and T. Shortall, *The Advent of 5G: Should Technological Evolution Lead to Regulatory Revolution?*, 3 COMPETITION POLICY INTERNATIONAL ANTITRUST CHRONICLE (2016); see also TSM Proposal 2016, p. 1.

¹³ The Commission wants “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. [...]” TSM Proposal 2016, consideration 26.

¹⁴ REFIT 2013 and Impact Assessment, part 1/3, p. 19.

¹⁵ *Id.*, at part 1/3, p. 24.

¹⁶ *Id.*, at part 1/3, p. 101.

¹⁷ *Id.*, at part 1/3, p. 77.

¹⁸ Horizon 2020, 2017, *Work Programme 2018-2020 available at* http://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/stratprog_overarching_version_for_publication.pdf.

¹⁹ WP2018-2020.

stimulating research and ‘innovation activities’, including on telecommunications issues.²⁰

Typical for the EU’s policy to harmonize rules across the Union, the Commission’s institutional approach is to continue letting national regulatory authorities (NRAs) in the EU Member States apply the (new) rules, whilst strengthening the NRAs’ powers. It is interesting to see whether a form of regulation by independent regulatory authorities could become a part of the Indian approach to infrastructure innovation policy and regulation.

B. Research question and approach

The question is to what extent a mix of deregulation and cluster regulation will improve the competitiveness of telcos and OTTs on the global telecoms markets? The research attempted to define what mix of regulatory measures could be employed to stimulate innovation and safeguard interoperability in the European electronic communications sector in the next years of services transition. A sub-question is whether there is room for incentive regulation that will stimulate innovation, or whether deregulation is more appropriate in the transition period.²¹ The desired output needs to be based upon different regulatory tools that could complement or supplement existing measures to safeguard competition:

- In paragraph 2, regulation as a tool to stimulate innovation will be explored. The TSM Proposal, driven by rapidly involving technological developments, results in effective and sustainable regulation?²² Dilemmas of stakeholders – regulators, incumbents and new entrants – are also discussed.
- When contemplating regulatory models, it must be considered that contracts at the wholesale level remain a practical form of self-regulation (paragraph 3). This paragraph includes a short discussion of cases, notable agreements on infrastructure sharing, and long-term cooperation.
- Paragraph 4 contains a synthesis and a few recommendations.

²⁰ M. Granieri and A. Renda, *Innovation Law and Policy in the European Union: Towards Horizon 2020* (Springer, 2012); European Commission, *A guide to ICT-related activities in WP2018-20*, 2017.

²¹ The research focuses on analysis of the legislative framework and proposed regulation; it includes studying economic analysis and a few informal empirical discussions with stakeholders who remain anonymous.

²² S.J.H. Gijrath and J.M. Smits, *European Contract Law in View of Technical and Economic Regulation* in *THE FUTURE OF EUROPEAN CONTRACT LAW*, 53 (K. Boele-Woelki, and W. Grosheide ed(s)., Deventer, Wolters Kluwer, 2007).

II. REGULATION AS A TOOL TO STIMULATE INNOVATION AND SAFEGUARD INTEROPERABILITY

This chapter discusses: shifting regulatory perspectives (2.1), price cap regulation versus incentive regulation (2.2), subsidization innovation (2.3), incentive regulation versus deregulation (2.4), and the options for a smarter mix of regulation (2.5).

A. Shifting regulatory perspectives

The emphasis of regulation often lies on intervening in harmful situations.²³ Often, regulation is aimed predominantly at restricting anti-competitive behaviour. Such regulation is designed to prevent the occurrence of undesirable activities – in the telecoms sector activities to create barriers to entry and predatory pricing. Roughly, the European rules consist of two possible ways of imposing price measures on access.²⁴ The first way is cost-based pricing – which may be subjected to many different models to determine the cost-base 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.²⁵ It remains to be seen whether innovation can be regulated as an element of price cap regulation. But, there is a second way of intervening that has a link – albeit weak – with innovation: the NRA can also impose an obligation on the regulated ECN operator to charge ‘reasonable’ prices.²⁶ As such, price cap regulation may already incentivize cost reduction measures and replacement investments by the ECN operators. But what about innovation regulation per se?²⁷

Before discussing this second way of regulation as a tool to stimulate innovation (2.1.3 – 2.1.5), a glance will be cast at the dilemmas that ECN operators (2.1.1) and the regulator (2.1.2) are facing in times of disruption.

²³ Organisation for Economic Cooperation and Development, FRASCATI MANUAL, PROPOSED STANDARD PRACTICE FOR SURVEYS AND RESEARCH AND EXPERIMENTAL DEVELOPMENT, (6th edn., OECD Publishing, 2002); B.F. Mooij, *Dynamic Efficiency Concerns in EU Competition Law: What role is awarded to innovation under the EU’s antitrust rules?*, JUR-4IERSCRI Master Paper (B.F. Mooij, 2014).

²⁴ R. Baldwin *et al*, UNDERSTANDING REGULATION, 461 (2nd edn., Oxford University Press, 2012).

²⁵ J.A. Hauge and D.E.M. Sappington, *Pricing in Network Industries* in OXFORD HANDBOOK OF REGULATION, 462-499 (R. Baldwin *et al* ed(s)., Oxford University Press, 2010).

²⁶ *Id.*, at 462.

²⁷ A. Butenko and P. Larouche, *Regulation for Innovativeness or Regulation of Innovation?*, TILEC Discussion Paper, DP 2015-007.

i. The operator's dilemma

The electronic communications sector is atypical as it is subject to specific characteristics that pose recurring significant investment issues. Following various periods of market liberalization, regulated ECN operators – especially those with SMP – may be turning into gatekeepers of networks at the wholesale level. An example is the need to determine and achieve optimum interoperability levels as wholesale markets' requirements change over time. Investments made in the ECNs may be lost because of having to adapt to these technological advances that keep coming from the outside. Generally, ECN operators will exhibit economies of scale, which will persist over a wide range of output caused by their customers' needs. However, their business models are increasingly being challenged by the OTTs.

There is a tension between the gatekeepers' capacity to innovate incrementally, and the game changers' ability to innovate more fundamentally.²⁸ The ECN operators 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 increasing data processing, does not, necessarily, yield sufficient revenue to stimulate the ECN operators to invest substantially in infrastructure innovation. This then causes a risk of lumpiness of investments by the operators.²⁹ The sunk costs resulting from investments in infrastructure imply risks associated with the real options the operator has.³⁰ 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 the ECN operators to predict the long-term durability of their investments, where regulatory intervention could result in price cap regulation, thus making their investments less tenable.

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? Price-cap regulation could 'stimulate' the ECN operator to maintain a lower network quality as a substitute for price increases that would normally result from the investments made. Price-cap regulation would be a negative consideration

²⁸ M. Cave, *Encouraging Infrastructure Competition Via the Ladder of Investment*, 30(3-4) TELECOMMUNICATIONS POLICY 223, 223-237 (2006).

²⁹ I. Vogelsang, *Incentive Regulation, Investments and Technological Change* in REGULATION AND THE PERFORMANCE OF COMMUNICATIONS AND INFORMATION NETWORKS, 1 (G.R. Faulhaber *et al* ed(s), 2012).

³⁰ *Id.*, at 11-19ff. Many of the economic aspects discussed in this paper 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.

where the operator's investment would surpass the acceptable benchmark – and thus result in less or no profits.³¹ Because prices are often determined after the investments have been made, the desire to impose price caps and enforce lower prices thus creates an ex-post conflict with the ex-ante desire to stimulate innovative investments.³²

ii. The regulator's dilemma

The regulatory climate will require a careful weighing of the factors that are influenced by the industry-specific features, firm behaviour, and regulatory incentives.³³ In a time where the Commission wants to steer towards more convergence between fixed and mobile infrastructure, it must be observed that the impact of regulation on fixed ECN operators is rather different from the impact on mobile ECN operators. Fixed ECN operators still are subject to stronger regulatory scrutiny than mobile operators. Unlike the case of 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 licences. Whereas mobile ECN providers operate under a fixed term frequency licence, once an ECN or a 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 NRA administration fees depend on the same factors, notably, turn-over. Besides, special conditions are hardly ever imposed on fixed operators at the issue of the registration/licence.

Still, irrespective of the shorter life-cycle of radio frequencies' licences, it appears that mobile ECN operators are more inclined than fixed operators to make innovative network investments that they can write off during the licence term. The fixed term entails that mobile ECN operators need to

³¹ J. Kwoka, *Investment Adequacy under Incentive Regulation*, (Working Paper No. 09-001, Department of Economics, Northeastern University, 2009).

³² See D. Brito et al, *Can Two-Part Tariffs Promote Efficient Investment on Next Generation Networks?*, Mimeo 2008 (Brito et al, 2008); S.J.H. Gijrath, *Telecommunications Law in the Digital Age 3.0: Interoperability, Innovation, Internationalisation & an Imploding Soufflé*, inaugural speech, 2014 (S.J.H. Gijrath, 2014), and Granieri, M., Renda, A. 2012.

³³ H. Gruber and P. Koutroumpis, *Competition enhancing regulation and diffusion of innovation: the case of broadband networks*, 43(2) JOURNAL OF REGULATORY ECONOMICS 168, 169 (2013).

replace or modify their mobile radio access network (RAN) equipment every time they acquire a licence 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 on fixed ECN operators is likely to decrease over the coming years, the Commission is looking for another way to steer the innovation it desires so much. Again, this highlights the regulator's dilemma on how to deal with asymmetry of information and the need to safeguard a level playing field, as expressed by the Commission.³⁴ A more lenient approach, considering the rise of innovative services competition at the retail level, could lead to symmetric regulation.³⁵

iii. Innovation regulation

The Commission wants to improve the conditions for access to financial sources for research and innovation purposes³⁶ and provide assurance that innovative ideas could be turned into products and services that create growth and jobs.³⁷ These are broad and generic objectives. I will look at these from the perspective of infrastructure competition, meaning that I am focusing more on regulation for innovativeness rather than on regulation of innovation.³⁸ There is a material side to translating the policy objectives into regulation – what type of behaviour does the Commission wish to regulate or deregulate; and an institutional side – which agencies

³⁴ “*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.*” TSM Proposal 2016, p. 15.

³⁵ In the current era, a differently balanced market regulation is becoming 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.*” Impact Assessment Part 1/3, p. 28.

³⁶ *Europe 2020: A Strategy for smart, sustainable, and inclusive growth*, COM (2010), 2020; and *Commission Communication Europe 2020 Flagship Innovation Union*, COM (2010) 546, 6 (Commission Communication 2010).

³⁷ See also *Commission Communication: An Investment Plan for Europe*, COM (2014) 903 final (Commission Communication 2014).

³⁸ See also the interesting perspective of L.B. Moses, *How to Think about Law, Regulation and Technology, Problems with ‘Technology as a Regulatory Target* available at <http://dx.doi.org/10.5235/17579961.5.1.1> (Bennet Moses 2013); P. Larouche and A. de Streel, *An Integrated Regulatory Framework for Digital Networks and Services*, CERRE Policy Report, 27 January 2016 (P. Larouche, A. De Streel, 2016).

should supervise and stimulate such behaviour. There is a marked lack of considering how innovation within the EU can be stimulated. The Impact Analysis of the TSM Proposal reiterates that infrastructure competition and innovation are important driving forces for economic growth in the coming years. However, the 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, i.e., for the construction and roll-out of Next Generation Networks (NGN), or whether the investments will focus on funding incremental innovation, i.e., for the maintenance and updating of network protocols and equipment.³⁹ This makes it difficult to consider the actual legal impact of the proposed regulation.⁴⁰

On the material side, the supplementary documents to the TSM Proposal show that the Commission struggles in dealing with innovation that comes from within (incumbents) or from outside OTT players, including companies with innovative mobile offers from India. One of the regulator's dilemmas is that the costs made to maintain the gatekeeper's network are relatively transparent but the costs made for fundamental innovation are not. Asymmetry of information between the regulator and the incumbent operators remains a prevailing problem, hence, probably, the 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. 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. It is an important economic question in the debate about how to optimize investments in ECNs – especially the non-core intelligent elements – by operators who are still subject to market regulation. Especially the highly important investments in NGN should be subject to scrutiny as the cost will be difficult to plan and the level of intervention is unknown to the operator.⁴¹

iv. Which regulatory tools are effective?

The TSM Proposal attempts to map the economic and social impact of the regulatory tools it prescribes. The Proposal also presents a host of options

³⁹ A. Butenko and P. Larouche, *Regulation for Innovativeness or Regulation of Innovation?*, TILEC Discussion Paper, DP 2015-007.

⁴⁰ As can be seen in REFIT 2013.

⁴¹ M. Arve and G. Zwart, *Optimal Procurement and Investment in New Technologies under Uncertainty*, TILEC DISCUSSION PAPER, DP 2014-028.

for innovation regulation.⁴² Any chosen mix of regulatory tools is likely to have profound effects on investment,⁴³ which is ultimately necessary to enable end-users to adopt innovations.⁴⁴ Innovation in the rapidly changing electronic communications markets goes beyond product innovation.

At the basic level, the available toolkit leaves the following options: (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.⁴⁵

At the institutional level, the TSM Proposal is aimed at bestowing the execution of policy goals more on the NRAs. Article 3, second paragraph, of the recast TSM Proposal emphasizes four tasks for the NRAs: (i) the – already existing task of – 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;⁴⁶ (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 electronic communications networks, associated facilities and services; which goal shall be achieved through the development of *common regulations and predictable regulatory methods*, which 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 will take up the widespread high fixed and mobile capacity and the underlying ECS, and realization of the maximal advantages in terms of choice, price, and quality.

The TSM Proposal also seems to factor in that the differentiation between fixed and mobile infrastructure becomes less visible. It is unclear what the effect of that is for infrastructure regulation.

⁴² TSM Proposal 2016, 121ff.

⁴³ G. Guthrie, *Regulating infrastructure: The impact on risk and investment*, 44(4) JOURNAL OF ECONOMIC LITERATURE 925, 925-972 (2006).

⁴⁴ H. Gruber and P. Koutroumpis, *Competition enhancing regulation and diffusion of innovation: the case of broadband networks*, 43(2) JOURNAL OF REGULATORY ECONOMICS 168, 169 (2013). Gruber, H., Koutroumpis, P. 2012.

⁴⁵ TNO, TU Delft, 2015.

⁴⁶ See: *Support for the preparation of an impact assessment to accompany an EU initiative on reducing the costs of high-speed broadband infrastructure deployment* (SMART 2012/0013) (Analysys Mason, 2013).

B. From price cap to incentive regulation?

Some authors consider the current EU framework a “regulatory distortion of competition”, which inhibits investments.⁴⁷ They point out that regulatory distortion has three causes:

- (i) The inability of ECN operators (they seem to refer to incumbents) 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 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.⁴⁸ According to these authors, asymmetric 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 has a lot to do with the prices realized in the allocation of spectrum, which are so high that these costs may have a negative impact on the speed of the 4G long term evolution (‘LTE’) and 5G rollouts. This does not benefit end-users. Both economists and the Commission argue that barriers to entering already fragmented mobile markets are a problem too;⁴⁹ 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.

The third argument is not very convincing. At least, the Commission is very much concentrating on harmonization measures. About the challenges of making investments, these authors conclude that a shift at the policy level towards measures that reinvigorate investments is much needed.⁵⁰ Would the solution also point at turning the level playing field approach upside down? Should NRAs have an eye for the challenges that these gatekeepers face from

⁴⁷ A-M Allouët *et al*, *Achieving a Level Playing Field between the Players of the Internet Value Chain*, 93(1) Communications & Strategies 17-34 (2014); W.D. Bock *et al*, *Reforming Europe’s Telecoms Regulation to Enable the Digital Single Market*, 93(1) Communications & Strategies 17-34 (2014); in: G. Amendola *et al*, *Re-thinking the EU telecom regulation*, DIGIWORLD ECONOMIC JOURNAL 17-35 (2014); Boston Consulting Group, *Reforming Europe’s Telecoms Regulation to Enable the Digital Single Market*, report for ETNO 2012 (Boston Consulting Group 2012).

⁴⁸ Deloitte and Touche, *Will 4G further disrupt telecoms markets? Opportunities and threats for incumbent players*, D&T, COMPUTER WORLD (Deloitte and Touche 2014).

⁴⁹ W.D. Bock *et al*, *Reforming Europe’s Telecoms Regulation to Enable the Digital Single Market*, 93(1) Communications & Strategies 24-25 (2014).

⁵⁰ *Id.*, at 27.

the game changers?⁵¹ 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 gatekeepers. To some extent, 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 the cost of access with the help of the current regulatory framework. Some argue that the disruption caused by OTTs is the new imbalance that distorts the level playing field.⁵² Their solution seems to be: no more price cap regulation – at least not in relation to services offered with the help of innovative investments.⁵³ Although the critics of price regulation do not really address the possibility of being made subject to a “reasonable price” regulation, it can be inferred from their arguments that their preference is for no more price regulation at all on ECN operators. The proponents of no regulation argue that such absence would, by default, function as an incentive to free financial means to innovate. An alternative to a regulatory holiday would be for the EU to make available more special funds to ECN operators to enhance or even fundamentally improve their network infrastructure. An example is the already mentioned H2O2O program.⁵⁴

Incentive regulation could serve to stimulate a regulated ECN operator to make more fundamental innovative investments in its network to solve the bottlenecks in the 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 for the ECNs. Thus, the value of the network is safeguarded. Increased competition could stimulate innovation in terms of investment to solve bottlenecks, by both the gatekeepers and the game changers. An example is service providers developing alternative by-pass infrastructure.

⁵¹ *Id.*, at 21.

⁵² A-M Allouët *et al*, *Achieving a Level Playing Field between the Players of the Internet Value Chain*, 93(1) Communications & Strategies 17-34 (2014).

⁵³ W.D. Bock *et al*, *Reforming Europe’s Telecoms Regulation to Enable the Digital Single Market*, 93(1) Communications & Strategies 27-30 (2014); 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 non-discriminatory approach”.

⁵⁴ EU subsidies by their nature do not fall under the state aid provisions of Articles 107-109 TFEU simply because these provisions apply to the Member States offering such aid, and not to the Commission; cf. Commission Communication 2010.

C. Subsidization of innovation?

It makes sense for all ECN operators to become global frontrunners in terms of network convergence in a future where IoT and M2M are to become a part of daily life. This paragraph discusses briefly the investments in very high-speed broadband networks (also known as NGN), which may be a marked difference in comparison with India.

The Commission remains determined to continue its support of ECN investments in NGN to pursue its desire for sustainable job growth in the EU. The Commission has launched various initiatives providing subsidies to support the rollout 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 H2o2o. 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 outcome of subsidization is uncertain. The actual execution is a matter of interested parties actively knowing and pursuing announcements of financial aid.

The EU subsidies programs are not always easy to access. It is not entirely clear from the assessments so far, what the results have been so far. Nor is there enough data to determine what subsidies will be or have been effective.⁵⁵ As pointed out, there is a clear downside for the gatekeepers when only the fundamental innovators are given access to or benefit from government funds to innovate. Such an approach would entail the risk that the game changers are in a better position to profit from subsidized innovation at the expense of the ECN operators.

What subsidies could be granted to operators for the deployment of NGN in the context of 5G convergence? 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. H2o2o 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.⁵⁶ The Communications that

⁵⁵ European Ideas Network, *Overall Assessment of the Communication from the Commission, Europe 2020, a Strategy for smart, sustainable and inclusive growth*, (2010); H2020 2017; *Taking stock of the Europe 2020 strategy for smart, sustainable and inclusive growth* and 3 annexes, COM (2014), 130 final/2 (Commission Communication 2014-2017).

⁵⁶ TSM Proposal 2016.

accompany the 2014 Regulation⁵⁷ contain the conditions under which aid to parties wishing to roll-out very high-speed networks may be justified.⁵⁸ Moreover, the conditions for subsidies appear to have a geographical scope, *i.e.*, 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 NGNs are active – black areas state aid will not be permitted).⁵⁹ 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, the speed of communication, and innovation. 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. The TSM Proposal does not consider how subsidies for NGN technological innovation in the electronic communications sector could be designed better. The Proposal is focused on market regulation in a different universe than the H2020 environment. The power of an incentive is related closely to the risk that the operator must bear. With Vogelsang, I agree that the non-committed regulator should better consider what different forms of incentive regulation could be applied. Soft profit-sharing regulation could include a softer approach to what (excess) profits an ECN operator, who *does* invest heavily in fundamental innovation, could keep. Such an approach would still preserve the extent to which the regulated operator would remain a claimant of residual profits. Conversely, according to Vogelsang, more profit sharing could also reduce incentives to invest. He also believes that asymmetric network sharing that favours the regulated operator will not work. 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.⁶⁰

⁵⁷ *EU Competition law Rules applicable to State Aid*, http://ec.europa.eu/competition/state_aid/legislation/compilation/index_en.html, 2014 (Handbook 2014).

⁵⁸ Commission Communication 2014-2017; *see also* Commission Recommendation on consistent non-discrimination obligations and costing methodologies to promote competition and enhance the broadband investment environment (2013/466/EU), *OJ EU L* 251/13, 21.09.2013 (Commission Recommendation 2013).

⁵⁹ Commission Regulation (EU) No 651/2014.

⁶⁰ I. Vogelsang, *Incentive Regulation, Investments and Technological Change in REGULATION AND THE PERFORMANCE OF COMMUNICATIONS AND INFORMATION NETWORKS*, 1 (G.R. Faulhaber *et al* ed(s), 2012).

D. From incentive regulation to deregulation?

Case law developments suggest that the Commission may hinge more on relying upon the market investor principle: less subsidization *and* less regulatory intervention.⁶¹ Deregulation does not mean further liberalization of NGN per se. In the EU, less intervention and more reliance on the market investor principle is likely to be supplemented by the harmonization of NGN QoS in the Member States.

The choice of regulatory instruments 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. Vogelsang points out that, from an economic perspective, 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. This may be difficult to achieve and the choice for the type of regulation also creates governance issues, as reasonable market expectations need to be honoured.⁶² From an administrative law perspective, regulation must be non-discriminatory, predictable, precise, and sustainable, and it makes sense if other countries adopt such principles. But, it will be challenging to create a meaningful governance framework for incentive regulation.⁶³ Besides, it is difficult to see how the benefits for society that may come from incentive regulation could surpass the benefits from innovation in deregulated markets.

To a large extent, the criteria for scoping the legal aspects of subsidizing innovation are dependent on economic analysis based on the rate-of-return of investments made.

By the spring of 2018, the provisions in the TSM Proposal concerning the Commission's plans to coordinate the timings and conditions for the frequency allocation procedures in the Member States appeared to be in dire straits.⁶⁴ Innovation as a policy goal of the allocation of the 5G spectrum

⁶¹ European Commission v. France and Orange on the application of the market investor principle as regards the participation of France in Orange, Case C-486/15 P, 2013 (ECJ 2013).

⁶² G.E. Marchant *et al*, INNOVATIVE GOVERNANCE MODELS FOR EMERGING TECHNOLOGIES, (Edward Elgar Publishing, Cheltenham, 2013).

⁶³ *Id.*

⁶⁴ The legislative procedure is complex and long. In 2018 the status was that the proposal was going to a trialogue, which includes feedback from the European Parliament. *See* also the

comes 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 level.⁶⁵ 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 to 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. In all likelihood, the reason is instrumental: only a national government is competent to issue specific regulations together with the rules for frequency allocation and subsequent licences.⁶⁶ From a contract law perspective, this is an interesting option, but it leaves little room for negotiation since it is the issuing agency that decides the terms of the licence single-handedly.

III. SMARTER REGULATION: A MENU FOR CHOICE

A. The benefits from smarter regulation

Where ECN must be reconfigured to enable and support technological innovations, such as IoT, M2M, and the digital transformation of different industries, in my view, this should go hand in hand with increased certainty on regulation of market parties in the IoT and M2M value chains; 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

requirements laid out by the Bureau Européen des Unions de Consommateurs, *European Electronic Communications Code, BEUC key demands for trilogue negotiations on consumer protection*, (2017). This paper also brings in regulatory concerns as regard data security and personal data protection.

⁶⁵ Art. 54, TSM Proposal 2016.

⁶⁶ An example of imposing innovation through the process of allocating a frequency licence occurred in the Netherlands in 2011 and again in 2017. The Minister in charge of the allocation and renewal of licences for commercial radio frequencies required the licence holders to safeguard that digital radio reception (DAB+) would become available throughout the Netherlands. The Minister wanted the licence holders to invest in digital radio in addition to their continued analogue wireless broadcast. However, this approach also had a downside, which the Minister did not investigate *a priori*. The digitization requirement could serve as an unassailable hurdle for new entrants to a very competitive market with an atypical business model. Commercial radio stations generate nearly all their income through advertising deals.

home and to street cabinets. This should also safeguard a sustainable backbone, which is required for many IoT and M2M applications. Moreover, there are many technical reports that underline that the 5G rollout must go together with investments in upgrades of the mobile network *and* fixed infrastructure. But there is no position yet on whether the ECN licence holders should finance both.

This synthesis contains a few remarks on the Commission's reasoning and its menu for choice in terms of policy, and the effective governance of innovation in electronic communications markets and what India's regulator could infer from this in terms of promoting infrastructure innovation.

i. A policy menu for choice

It appears that the Commission, considering the diverging aims and goals attached to technological innovation, finds that more delegation to the NRAs, combined with a mix of measures and means is likely to yield the best results for effective intervention. This is not an issue for a federal state with national policy objectives for infrastructure, such as India. The stimulation of access to very high-speed broadband networks is a policy goal and not a means per se that NRAs can apply pro-actively.

The case of India is very different from the EU. It is clear from the analysis of the TSM Proposal that the policy goal of innovation could be anchored more securely in the law. But the question as to how is difficult to answer and so it may be hard to infer a sustainable regulatory approach from the EU.

This paper asked what type of regulation could be a suitable instrument 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. Moreover, given that the law simply cannot keep up with the speed of technological change, more flexibility is needed. This may be an area that India's regulator could explore.

Although often market players propagate stable and sustainable regulation, the menu of choice in times of rapid technological changes may boil down to mixing different approaches to create the best regulatory cocktail. An example of mixed regulation could be the provision of incentives for the parties who obtain 5G licences and who are under a rollout obligation for new infrastructure. Such incentives could be subject to symmetric and

clearer access rights and obligations to enable the provision of innovative services over such (possibly even partially shared) infrastructure.

By mixing the regulatory approaches, it is probably easier to achieve a balance between the need for investments incentives, whilst maintaining the level playing field. It seems that both gatekeepers and game changers would benefit from such a mixed *and* intermediate regulatory approach. When done properly, intermediate regulation can be equal to incentive regulation, which is usually based on a mix of cost reduction and efficient pricing. Moreover, regulators should ask whether negative side effects of interoperability of networks, such as possible network congestion and increased risks for network integrity and security, are a part of the game. If so, this justifies an approach that is not solely concerned with safeguarding competition and enforcing competition law but is also concerned with protecting end-users' interests better. An option for the regulator could be to make temporary compensatory adjustments.⁶⁷ There we agree that 'incentive-mitigation' such as some form of subsidy or adjustments to the tightness of regulation, even for a limited period, could be necessary and effective.⁶⁸

In the transition period, if no rollout incentives are available, an asymmetric regulatory holiday could well be considered as a part of the mix.

The regulator should explain why and how the governance and enforcement measures it expects support innovation.⁶⁹ Perhaps it would be a good idea to investigate further that in what manner the specialized regulatory agencies can act pro-actively to stimulate technological innovation. 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. Perhaps such an overall body in the vein of the Federal Communications Commission (FCC) could serve to ensure the quality of market regulation.

Looking backwards and forward, a key issue is how the regulator can ensure that governance structures are in place. Such structures should monitor effectively not only where the money goes, but also whether the ensuing investments indeed result in reaching the goals of cooperation initiatives. What is needed to make a governance structure efficient? There must be a fair and transparent process for decision making, for instance, on incentive

⁶⁷ I. Vogelsang, *Incentive Regulation, Investments and Technological Change in REGULATION AND THE PERFORMANCE OF COMMUNICATIONS AND INFORMATION NETWORKS*, 19 (G.R. Faulhaber *et al* eds., 2012).

⁶⁸ As discussed, *supra*, para. 2.3.

⁶⁹ Impact Assessment, part 3/3, p. 383.

regulation. The recast TSM Proposal aims at coordinating the diverse practices for network innovation in the Member States by standardising the conditions for frequency allocation in the Member States. But, there is no political consensus in the EU on the coordination of 5G allocation.⁷⁰ Hence, it does not make sense to place all cards on harmonization of 5G regulation to stimulate innovation. One lesson from this is that it makes sense for a national or a federal regulator to be predictable when it comes to timing, allocation method, and – in particular regarding innovation policy – notice to market parties on what their licence obligations will prescribe in terms of investment and/or sourcing obligations.

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. Current regulation on network and information security should be taken into account when considering how to best promote infrastructure competition and innovation.

The considerations to the recast TSM Proposal glorify innovation; yet, innovation hardly forms part of the legal provisions. It is self-evident that innovation is the key driver of economic growth. But, hollow considerations to regulatory proposals do not really provide meaningful guidance to interested and affected parties.⁷¹ What is the Commission telling the governments, the markets, and the end-users when the policy goal of innovation is not supported by clearly described, concrete, measurable and enforceable terms? Surely, India's regulator can infer from this lack of depth that it can translate its policy objectives for the coming years more concretely and, if necessary, anchor them in forward-looking regulation. An important precondition for effective intervention is that the regulator must be equipped to anticipate economic and social effects of business models that are required to constant adaptation to fast going technological and market developments.

⁷⁰ ECJ, Case C-687/15 (Commission/Council) on the competencies with regard to the ITU spectrum policy, 25 October 2017, ECLI:EU:C:2017:803.

⁷¹ *cf.* Commission Recommendation 2013, Recital 4.