

**Regulation and Investment in Next-Generation Access Networks
A Note**

Johannes M. Bauer

Professor, Department of Telecommunication, Information Studies, and Media
Co-Director, Quello Center for Telecommunication Management and Law
Michigan State University, East Lansing, Michigan 48824, USA

and

President and CEO

Synthesys, Inc.

East Lansing Technology and Innovation Center
325 Grand River Avenue, Suite 300
East Lansing, Michigan 48823, USA
bauerj@msu.edu, +1517.944.4154

East Lansing
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As a researcher concerned with the effects of regulation on investment, I respectfully submit the following brief comments and reflections in response to the public consultation on Next-Generation Access Networks (NGAN).

The framework adopted by the European Union for the regulation of NGAN will have direct consequences for the level and structure of investment in these infrastructures. As well, it will affect the associated services and innovation in the entire information and communication technology (ICT) sector. Largely as a result of the reform measures adopted since the 1980s, the European Union (EU) was very successful in closing the historical performance gap to peer nations. In some areas, such as mobile communications, the EU even took a leading role. Individual EU member states also have been highly successful in facilitating high broadband penetration rates.

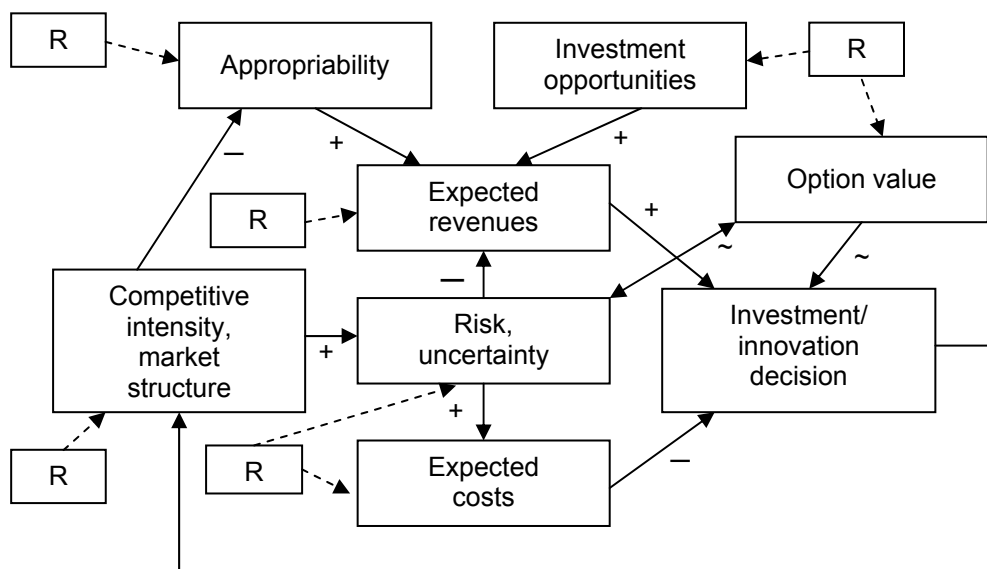
It would therefore seem natural to continue on the same path and adopt a similar framework for next-generation networks. Such a stance, as is reflected in the draft regulatory framework for NGAN and, more generally, the outcomes of the latest Communications Review, risks overlooking important differences between the traditional and the future tasks of regulation. Until recently, regulation was predominantly concerned with smoothing the transition from monopoly to a more open market framework. In the future it will have to have a stronger emphasis on facilitating investment and innovation in new networks and technologies. Whereas in the past considerable fixed network investment was already sunk, next-generation networks and associated services will require considerable new investment, even if they rely, in part, on existing infrastructures or are evolutions thereof.

In the past environment, as reflected in the European three-part test for significant market power (SMP), regulation was appropriately conceptualized as a response to the existing, and to a certain degree anticipated, market structure. In the new environment it is at least as important to understand how, in turn, the prevailing regulatory rules will affect the emerging market structure. There is a risk that an expectation that next-generation access network will exhibit significant market power, will turn into a self-fulfilling prophecy: the framework established with the intention to cope with this anticipated problem will, inadvertently, contribute to it. To

understand this potential effect, it is important to understand the dynamic effects of regulation on investment decisions.

Although regulation historically was envisioned as an institutional arrangement to balance the requirements of investors to finance large-scale infrastructure investments with the interest of users in low and affordable prices, the effects of regulatory choices on investment have not been studied as thoroughly as its implications on other performance measures. Regulation affects investment decisions of incumbent service providers and new entrants. Figure 1 represents in a stylized form important factors influencing investment decisions at the firm level. Traditional investment theory is largely based on variants of the net present value model, in which an investment project is deemed worthwhile if its discounted revenues exceed the discounted costs over the lifetime of the project. Modern investment theory, as reflected in real options theory, has augmented this approach with an explicit consideration of the effects of uncertainty. Expected revenues of an investment project are, in turn, influenced by the prevailing investment opportunities and the conditions of appropriating a risk premium.

Figure 1: Stylized effects of regulation on investment decisions at the firm level



Legend: + ... the two variables move in the same direction; - ... the two variables move in the opposite direction; ~ direction could either be positive or negative.

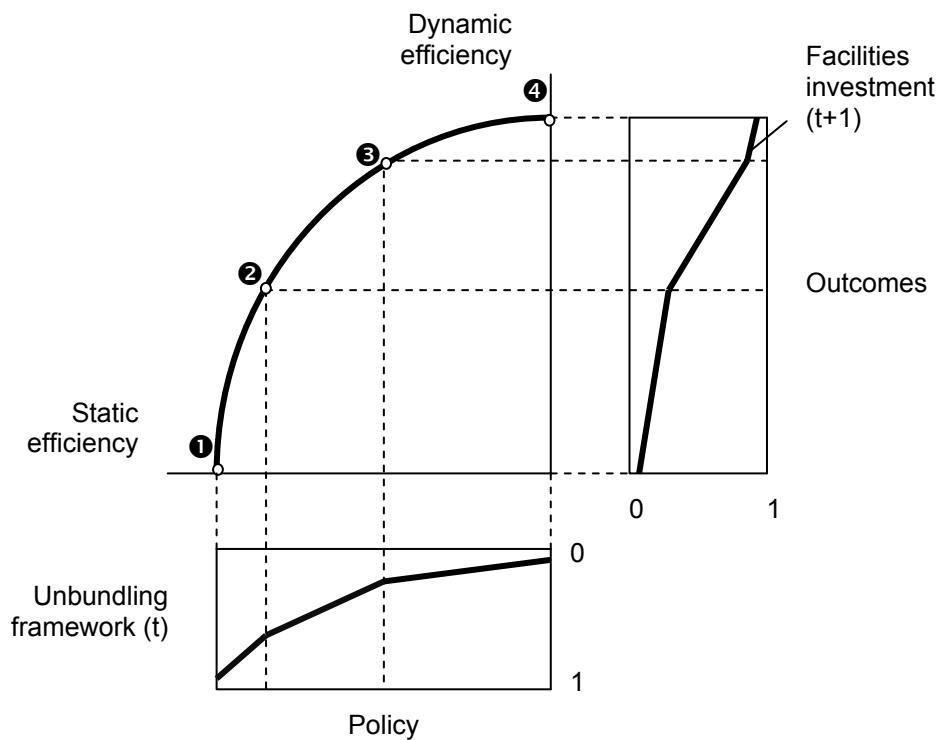
Regulatory measures affect important aspects of these relations. Of particular importance are the effects of regulation on competitive intensity and market structure, expected costs and revenues, appropriability, investment opportunities, and the option value of investment. Unbundling is one of the regulatory variables that have direct effects on the intensity of competition. Setting prices for unbundled access closer to incremental costs, for example, increases the competitive intensity of that market segment (other things equal). Conditions for interconnection and access likewise influence the intensity of competition. The relation between competitive intensity and investment follows an inverse U-shape: moving from monopoly toward more competitive intensity, investment incentives initially increase. However, if the intensity of competition is increased beyond a critical level, investment incentives eventually start to decline. Other types of regulation influence other variables that are of critical importance for the investment decision.

Altogether, these relations form a dynamic, non-linear system. Policy decisions “tune” the outcomes of this system in complicated but predictable ways. This is illustrated in Figure 2 for the case of unbundling decisions (again applying a *ceteris paribus* condition; empirical magnitudes are for illustrative purposes only). Regulatory agencies have a spectrum to specify an unbundling regime, ranging from conditions highly favorable to new entrants to conditions highly favorable to incumbents. In Figure 2 these are normalized to an interval ranging from 1 (unbundling highly favorable to entrants) to 0 (minimal or no unbundling). The first type of rules will tend to provide conditions favorable to service-based market entry and static efficiency that is, cost and price minimization predominantly using current technology. In the opposite case of limited or no unbundling requirements, conditions are more favorable to new facilities investment and dynamic efficiency, the deployment of new technology. The exact shape of the tradeoff between static and dynamic efficiency is subject to empirical verification. In Figure 2 it is illustrated as a convex relation, as much of economic theory would predict.

Given these relations, different unbundling regimes can be mapped onto sector outcomes. An observer would anticipate seeing more facilities-based market entry and higher investment in subsequent periods in markets where unbundling set conditions more conducive to dynamic efficiency. On the other hand, an unbundling

regime favoring service-based competition will result in less facilities investment both from the incumbent and the new entrants. This is illustrated on the right hand side of Figure 2 where the relative share of facilities-based investment is depicted (again normalized to the interval 0-1). These two scenarios are connected in the ladder of investment model, which asserts a migration of market entrants from the static to the dynamic end of the trade off. Whereas this is a possible evolution, empirical research has revealed several counter-examples (see Bauer and Bohlin 2008 for a more detailed discussion of the research literature). It is possible for the sector to remain locked in the initial position unless regulation is dynamically modified and adapted to support a transition to facilities investment, for example, by increasing prices for unbundled access over time.

Figure 2: Dynamic effects of unbundling on sector outcomes



Source: Bauer (2008)

For the regulation of NGAN this implies that policy frameworks that are based on stringent unbundling and/or separation rules may risk locking the market into a lower overall rate of investment as market entry is biased in favor of service-based entry (a position closer to point 1 in Figure 2). In this scenario regulatory intervention would also be prolonged. On the other hand, frameworks that do not impose such conditions

may lead to overall faster investment activity and more robust competition in the long run (a position closer to point 2 in Figure 2). Several policy options are compatible with such a dynamic market framework, including: (1) abstaining from unbundling altogether; (2) the pricing of access with methods that reflect the risk of investment in NGAN better; and (3) reliance on narrowly defined unbundling rules (e.g., focused on access to rights-of-way). Should, in these latter approaches, competition not evolve as anticipated, it is possible to introduce regulatory corrections ex post.

It would, therefore, be advisable to allow sufficient flexibility for national regulatory agencies to implement such minimal-intervention approaches. Although more evidence would be desirable to make such an assessment conclusively, the benefits of such flexibility and the associated institutional learning processes will likely outweigh the disadvantages of more differentiated regulation among the member states.

References

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