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A Regulatory Framework for New and Emerging Markets (*)

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Abstract: The future of the information society crucially depends on investments in upgrading existing infrastructures and building new networks. Traditional cost-based regulation, which focuses on issues of static efficiency and service-based competition necessarily has negative effects on innovation incentives and the emergence of infrastructure-based competition in the highly dynamic telecommunications industry. This paper presents a regulatory framework for new infrastructures, which makes *ex ante* regulation contingent to the tendency towards effective competitive structures. Unlike the standard Significant Market Power-test (SMP), this approach takes a longer term perspective and therefore secures operators' investment incentives. The proposal has several desirable incentive effects. Firstly, it counters incentives to free-ride on investments by potential competitors, and secondly, it makes preemptive and other predatory practices by the investing firm less attractive. As a result, our proposal of contingent regulation in emerging markets promotes infrastructure-based competition in telecommunications.

Key words: new markets, infrastructure investments, regulation<

In recent decades telecommunications markets have changed dramatically. Only twenty years ago telecommunications industries were characterized by large (often state-owned) monopolists. While there was little variety and technological progress in those days, consumers were happy to obtain access, even at high costs.

(*) This paper is based on an in-depth study by the authors (see BAAKE, KAMECKE & WEY, 2005).

In the 1980s and 1990s many countries started to privatise and liberalize their telecommunications markets, and by the second half of 1990 the development of competitive structures in traditional fixed-line telephony was encouraged by new laws and the installation of national regulatory authorities.

At the same time, progress in information and communications technologies has transformed business models in the telecommunications industry substantially. Most importantly, new infrastructures and the convergence towards so-called next generation networks (NGNs) has enabled ubiquitous access to telecommunication and internet services. Higher bandwidth capacity enables operators to offer new bundles (double- or triple-play) and should blur the traditional market boundaries between fixed and mobile networks.

Besides such fundamental changes, telecommunications markets remain subject to strong *ex ante* regulations, which were designed to prevent incumbent monopolists from abusing their dominant positions and to ensure the efficient use of legacy networks. Asymmetric regulation has been used as a commitment to attract entrants by providing access to the incumbent's essential facilities and interconnection with the existing network. More recently, unbundling policies have been implemented to give entrants access to the incumbent's local copper lines. With this, additional incentives for entrants to build into their own complementary infrastructures have been created. While unbundling of the copper line can be seen as an attempt to provide a level playing field, where the incumbent is deprived from its essential facility advantage, a more restrictive type of regulation – for example, bitstream access – appears to be more problematic. As bitstream access requires the incumbent to provide a DSL access service to other operators, incentives to undertake infrastructure investments in the first place can be hurt significantly.

With the emergence of new networks and infrastructures, regulators' face many difficult challenges, such as, for example, whether or not to regulate access and interconnection and how to promote efficient competition, and it is often difficult, if not impossible, to strike a balance between promoting static efficiency and dynamic efficiency considerations.

In this paper we will characterize a regulatory procedure for new networks and infrastructures leading to potentially new markets. Our approach incorporates insights into the theory of dynamic competition. Usually, the creation of a new market does not call for active regulation. An

initial investment creates a new monopolistic market, the rents realized by the innovator attract imitators, and the resulting catch-up competition brings the market back to static efficiency. However, if the new market emerges in an environment where active regulation tries to improve static efficiency it is natural to ask how the regulator should behave when a new market emerges. We argue as follows:

- Established markets should not pose serious obstacles to new developments, neither in the form of monopolistic profits, which an incumbent might be afraid of losing in the case of a successful innovation, nor in the form of limited access to legacy network elements. If competition does not provide such a level-playing field, it has to be created by the regulatory authority. This implies that access to legacy network elements should be guaranteed at cost based tariffs (for example, unbundled access to the local loop).

- After a significant investment has established new networks and infrastructures, tests should be conducted to determine whether a new market has indeed been created. If this is not the case, then the market should be treated as the already existing "old" market.

- Regulatory agencies are usually not good at evaluating ongoing economic developments. To provide sufficient market-based incentives for infrastructure investments and commercial innovations, new markets should therefore not be subject to *ex ante* regulation for a few years.

- In a newly created market the regulatory authority should check regularly (approximately every two years) whether effective competitive structures are emerging. If this is not the case – meaning that persistent market dominance will prevail in the future –, then the new market should come under sector-specific regulation. If, however, effective competition evolves, the market should be governed by general competition rules in an *ex post* manner.

As we will argue in this paper, this procedure takes care of several trade-offs and incentive problems present in telecommunications markets.

The following section of the paper summarizes the open questions raised by the new regulatory environment in the EU and focuses on the concept of new and emerging markets. Then we provide a short summary of the insights gained from the economic theory of innovation and the particular investment problems in the telecommunications business. Based on our analysis of dynamic competition in telecommunications, the section after lays out a regulatory framework for dealing with new and emerging markets.

■ The new regulatory framework in the European Union

The question of how to react to the rapidly changing technological environment in telecommunications, and accordingly whether and how to phase out regulatory supervision, has gained new momentum with the implementation of the new regulatory framework in the EU¹. The new regulatory framework accounts for the rapid pace of technological progress by providing a uniform legal framework that covers the convergence of telecommunications, media and information technologies (see EU Framework Directive 2002/21/EC, Recital 5). Moreover, it aims at bringing the regulation of electronic markets into line with the principles of European competition law².

A critical aspect of the new framework is that telecommunications markets are no longer lumped together under the supervision of the regulatory authority. Instead, specified criteria must first be applied to define markets, which may become candidates for *ex ante* regulation in a further procedural step. Accordingly, the European Commission's Recommendation on relevant product and service markets (C(2003) 497) requires identification of those markets that cannot be expected to generate effective competition and should, therefore, come under some sort of sector-specific regulation³.

The recommendation specifies three criteria, which must all be satisfied before a certain market can be included in the list:

¹ The new regulatory framework mainly consists of EU Directives 2002/19/EC to 2002/21/EC: Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (OJ L 108 of April 24th 2002, p. 33), also known as the "Framework Directive"; Directive 2002/20/EC on the authorisation of electronic communications networks and services (OJ L 108 of April 24th 2002, p. 21), known as the "Authorisation Directive"; and Directive 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities (OJ L 108 of April 24th 2002, p. 7), known as the "Access Directive". The new legal framework also includes two further Directives, the so-called "Universal Service Directive" and the "Data Protection Directive"; however, the latter are of subordinate importance to our study.

² See "Commission guidelines on market analysis and the assessment of significant market power under the Community regulatory framework for electronic communications networks and services" (2002/C 165/03) published in the Official Journal of the European Communities C 165/6, July 11th 2002.

³ See "Commission Recommendation of February 11th 2003 on relevant product and service markets within the electronic communications sector susceptible to *ex ante* regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services" (2003/311/EC), published in the Official Journal of the European Union L 114/45, May 8th 2003.

- "high and non-transitory" structural or legal barriers to entry;
- no tendency towards effective competition within a certain time horizon;
- market failure cannot be addressed by competition law alone.

It is worth noting that the recommendation explicitly refers to the dynamic character of markets and requires an assessment of their tendency towards competition⁴. The recommendation also specifies a list of markets that are most likely not to develop towards effective competition.

In view of the highly dynamic technological environment of the telecommunications industry, an important issue determining the effectiveness of the new legal framework is the adjustment of the list of relevant markets over time and the associated problem of how new markets should be treated. Recital 15 to the recommendation on relevant product and service markets states:

"Furthermore, new and emerging markets, in which market power may be found to exist because of 'first-mover' advantages, should not in principle be subject to ex-ante regulation".

The protection of "first-mover" advantages as a reason to exclude new markets from the list of relevant product and service markets is closely related to the objective of the framework directive to encourage "efficient investment in infrastructure, and promoting innovation" (see Art. 8 (2c) of the framework directive)⁵.

The concept of "new and emerging markets" introduced by the new regulatory framework explicitly recognizes the need to guarantee "first-mover" advantages so as to protect innovation incentives, and hence, the development of new infrastructures. While this approach intends to rule out any *ex ante* regulation for new markets, there is still ample scope for discretion. Moreover, a coherent regulatory framework is still missing, which makes the concepts of a "new market" and "tendency to effective competition" operational. It also remains open as to what degree of "first-

⁴ Referring to Germany, the Telekommunikationsgesetz (TKG) amended in 2003 states in a similar way in Article 10 that markets should only be subject to *ex ante* regulation where they do not display any longer-term tendency towards competition.

⁵ A similar argument is used to explain Art. 14 (Review of market definition and analysis) of Germany's new TKG, p. 87, which states: "New markets are not therefore automatically subject to supervision by the Bundeskartellamt [the Federal Cartel Office], but should first be reviewed by the RegTP - in conjunction with the Bundeskartellamt - for their need for regulation under the TKG."

mover" advantage is desirable in terms of efficient investment and innovation.

Answers to these open issues will be presented below. Before presenting a regulatory procedure we will briefly summarize some lessons from the theory of economic dynamics that are important for structuring an appropriate regulatory mechanism that takes account of the fundamental trade-off between static efficiency and dynamic efficiency in network-based industries.

■ Lessons from dynamic competition theory

The starting point of virtually all theories of dynamic competition are the ideas developed by Joseph A. SCHUMPETER (1918, 1950, 1964), who pioneered research into the economic principles that govern technological change and economic development. His thoughts start with the observation that capitalism has led to an unusually long period of constant economic growth, and that economists have been unable to offer any explanations for this phenomenon.

Schumpeter's thoughts provide us with three key insights into the nature of economic dynamics:

Firstly, he established that investigating the economic principles governing economic development and technological change are of paramount importance for identifying the best economic systems. According to Schumpeter, technological progress and the creation of new markets are the main sources of competitiveness and general prosperity, while problems of static efficiency are more or less irrelevant⁶.

Secondly, Schumpeter formulated the theory of stepwise economic development, with small businesses exploiting their freedom within the competitive equilibrium to give a decisive impetus to this development. While

⁶ Thus SCHUMPETER writes (1950) that the reality of a capitalist economy is essentially different from the static price-theory model of economic theory. As a result, the most important form of competition is not competition within a market with established technologies, production processes and industry structures, but competition for new products, technologies, sources of supply and organizational models.

this will lead to "creative destruction", effective catch-up competition should ensure that monopolies remain a temporary phenomenon.

Thirdly, Schumpeter also developed the counter hypothesis that innovations by larger and more powerful companies gain ever greater importance for economic development. In this scenario, small companies and catch-up competition would become of minor importance for economic development, while large firms would be the decisive forces for technological progress. In that case markets become increasingly concentrated and regulatory intervention will be inevitable in order to control permanent monopoly power. Overall, we can extract several insights from Schumpeter's work on the desirable properties of dynamic competition. The development begins with a drastic innovation. The incentives for such innovations are optimal if many firms compete on a "level playing field". Even if a dominant firm has a natural advantage in generating the next innovation, such a level playing field generally does not harm investment incentives. Instead, innovation incentives for a (permanent) monopolist are typically too low as market power creates hold-up problems, X-inefficiencies and rent-seeking activities. If the regulatory authority protects society against permanent monopolization in this market phase, it therefore eliminates both static and dynamic inefficiencies. In the case of telecommunications this can – in principle – be accomplished by cost-based access regulations. Every drastic innovation involves some larger sunk investment. An optimal dynamic process must therefore reward innovators for their efforts by allowing them to charge more than the competitive price. This incentive is provided by a temporary monopoly phase, in which investors are rewarded for their risk-taking efforts. Of course, this exploitation leads to static inefficiencies, but it generates incentives to undertake risky investments that are desirable from a dynamic perspective.

As standard R&D theory has demonstrated, market-based innovation incentives are typically too low, as innovators cannot reap the entire social gains associated with an increase in the generally available knowledge coming from an innovation (see, for example, AGHION & HOWITT, 1998). Government intervention can influence the dynamic process through many different policy instruments. Patent law guarantees a state-protected monopoly position, and cartel laws specify the extent to which dominant companies can "abuse" their market power. An effective regulatory authority can help to ensure that markets return to a state of "symmetric" competition after a phase of monopolization, or even implement a competition-like market solution through regulation, if such a process does not start on its own.

This problem is even bigger when it comes to upgrading or building new infrastructure in telecommunications. Here major uncertainties concerning the expected revenue stream tend to be larger than in other markets, as investments in network infrastructure do not create any additional utility on the consumer side, and hence revenues. The expected return on investment depends more on the commercialisation of new complementary services and applications which make use of the improved performance of the new network (such as higher bandwidth). Only in cases where new services are introduced that function purely on the older infrastructures (for example, high download times) it follows that infrastructure investments pay because of an increased derived demand, which cannot substitute away the older infrastructures. In addition, network effects typically involve selling a product cheaply in an early market phase in order to achieve critical mass and to stimulate further growth in demand. There is consequently a natural conflict between the optimal marketing of the new product and the reward for the innovation effort.

It is, therefore, not surprising that traditional cost-based access regulation of new infrastructures must substantially lower investment incentives, as access charges cannot account for the substantial *ex ante* uncertainties. Further problems arise when we take a closer look at the consequences of active regulation in this market phase.

Firstly, standard cost-based access regulation grants competitors the risk-free option of using new networks when they have made no investment⁷. As a result, cost-based regulation reduces the investment incentives of competitors⁸. Secondly, as competition for investments generally increases investment incentives, access regulation to older networks is essential to provide a "level-playing field" in this regard. Thirdly, the possibility of investing in infrastructure may give rise to leap-frogging competition, which is another source of dynamic efficiency. Fourthly, as there is also a motive for preempting rivals in the absence of access regulation (see RIORDAN, 1992), the regulatory framework should

⁷ Similar conclusions are reached by HAUSMAN (1997), HAUSMAN & SIDAK (1999) and HAZLETT & HAVENNER (2003). For new networks, the dynamic regulation of access prices proposed by CAVE & VOGELSANG (2003) and CAVE (2003) following the "ladder of investment" theory results in a one-sided distribution of risk to the detriment of the regulated company: progressive increases in access prices mean that competitors – who have not been forced to invest – have a risk-free exit option.

⁸ Recent research by ALLEMAN & RAPOPPORT (forthcoming) suggests that in a dynamic context, this problem can be overcome by considering the exercise of the incumbent's option as an additional opportunity cost in the access costs.

"threaten" to impose standard *ex ante* regulation whenever no effective competition emerges. This may counter the preemptive motive, and hence, further promotes the emergence of effective competitive structures.

Overall, cost-based regulation of entry not only aggravates the appropriability problem, but also runs counter to the objective of achieving infrastructure-based competition in telecommunications markets. As we have argued in this section, such a regulatory philosophy neither takes accounts for investment risks nor does it cover the incentives for "leap-frogging" competition, and hence, the dynamics of infrastructure based competition.

■ Contingent *ex ante* regulation of new markets

We have seen that immediate cost-based access regulation cannot be optimal in new and emerging markets. Below we outline a regulatory framework for new markets, which takes account of investment incentives and the promotion of infrastructure-based competition.

Several departures from the existing regulatory philosophy are necessary to achieve this goal. Most importantly, new markets should only become subject to *ex ante* price or access regulation whenever there is no tendency to effective competition. In terms of market tests and market analysis, this implies that regulation should not be based solely on the standard SMP-test or a similar short-term test of effective competition⁹, but on a tendency test which examines whether effective competition is likely to develop over some time.

Although it is generally extremely difficult to give a precise definition of a new market, we may take as a necessary condition for a new market the existence of an innovation, i.e. an increase in general knowledge of the possibilities of manufacturing or distributing goods or services. The innovation does not necessarily have to be backed up by a patent or other protected rights; the essential feature is that the innovation should have a "certain significance", so that new services and applications can be envisioned for the improved infrastructure.

⁹ The SMP test is used to establish whether one or more companies hold significant market power.

Figure 6 - Regulation of new markets

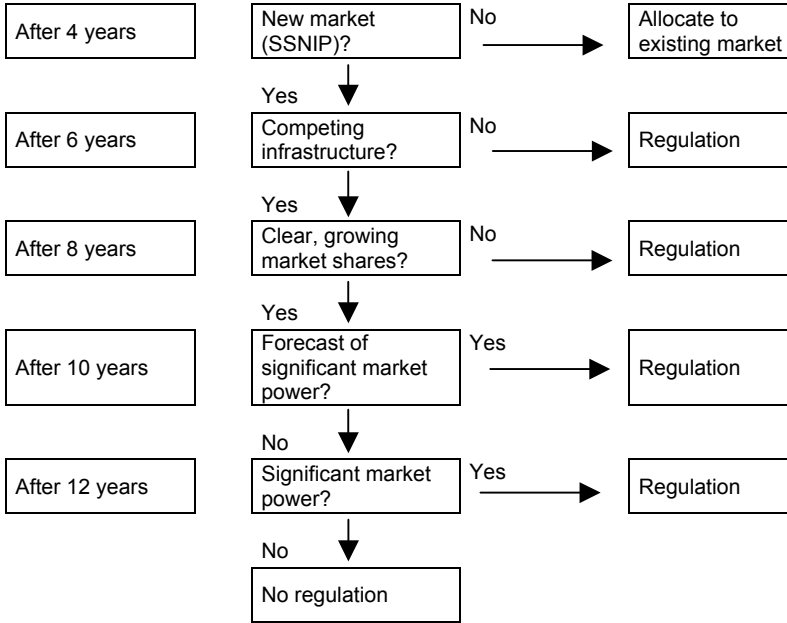


Figure 1 depicts the contingent regulatory approach for new markets. Like the "access holiday" proposal by GANS & KING (2003), the framework grants an unconditional access holiday in, say, the first four years to allow the new market to develop. After four years a modified SSNIP test¹⁰ is applied to examine whether the needs satisfied in the new market were also adequately satisfied before. This means looking at an "old" market, in which the needs in question were satisfied at a certain time (for example four years) ago, and answering the question taken from the SSNIP test: What percentage of consumers in the new market would revert to the products of the old market if the prices of the products available four years ago fell in real terms (i.e. adjusted for inflation) by 20% (= 4x 5%)? In a new market, this value should be small, and we can surely talk of a new market if less than 20% of customers would revert to the old products¹¹. On the other hand, if over 80% of customers would revert to the old products in the event of such a price decrease, we can be quite sure that no new market has

¹⁰ The SSNIP test measures the change in demand caused by a "small but significant and non-temporary increase in price". It is generally used to capture the price-elasticity of demand.

¹¹ This will also apply where relatively close substitutes have been developed for the new market. For example, alternative options for broadband access have no bearing on how many DSL customers would return to ISDN if the price dropped by 20%.

emerged. In between these extremes, the answer depends on other aspects, for example, market segmentation such that a considerable proportion of consumers would never substitute to the old product.

If a new market has been identified, then no regulatory intervention occurs. Otherwise a reversion to *ex post* regulation according to the "old" market takes place.

In subsequent years, the new market should be examined with regard to its tendency towards effective competition, which crucially depends on catch-up competition.

Assuming that the "normal" course in an unregulated market would be that an innovator loses its dominant market position within, say, twelve years, the regulator should investigate in the period between the emergence of a new market and the transition to static regulation, whether effective competition evolves. To evaluate the tendency towards effective competition, the market test must not be based on the current market structure, but on the projected structure twelve years after the emergence of the new market. Consequently, using a short-run market test as the SMP test yields false results and should not be used to determine whether regulatory intervention is warranted.

The successive tendency test can then be formulated as follows:

- Six years after the innovation, it should be possible to observe the development of competing infrastructures<
- Eight years after innovation, competitors should have gained significant and growing market share. This process of increasing market share, if sustained at the same rate for the next four years, should result in a market share of over 30%.
- Ten years after innovation, the current market structure should permit a fairly reliable forecast of whether the next two years will see a situation in which regulation according to the SMP test is no longer necessary.

If the tendency test establishes at any of these investigations that the tendency towards competition defined according to the relevant criteria does not exist, the market should become subject to the existing regulation. Finally, after twelve years a definitive review should be carried out to determine whether the market satisfies the standard SMP test.

We conclude with a brief examination of the incentive effects of the proposed framework.

Firstly, in the first six years, in which there is no regulation of new markets, investments by all companies, including competitors, are protected. This provides market based incentives for investments by improving the ability to appropriate the investment rents.

Secondly, investment incentives are increased by the fact that regulation will only be applied in those cases where no tendency towards competition has emerged; i.e., regulation is contingent on the evolving market structure. Assuming that viable competitors are also better off when no *ex ante* regulation occurs, their incentives to free-ride on the investing firms' investments becomes less likely which, in turn, stimulates competitors' investments.

Thirdly, a similar argument also shows that strategies to prevent competition for potential market-dominant companies may actually lose value. If the investing firm tries to preempt rivals then it must expect to come under regulatory control, and hence, cost-based price and access regulation. Under the proposed regulatory framework the investing firm now faces the option of avoiding future regulation by not engaging in such anti-competitive practices. Hence, the threat of regulation promotes the emergence of effective competition by making entry-deterring practices less attractive.

■ Conclusion

Overall, the regulatory framework for new markets should take care of the vertical structure (and associated complementarities between services and infrastructure) and the associated risks for innovating firms. A standard, cost-based regulatory system, which may be optimal in a static environment, necessarily reduces firms' investment incentives, because it does not properly take into account the risks the investor has to bear; or, more precisely, the need for high rewards in successful countries where the probability of *ex ante* is fairly low. Cost-based access regulation unfolds an additional negative effect on rival firms' investment incentives, and therefore, tends to hinder catch-up competition, which is essential for generating market structures in the telecommunications industry based on a dispersed ownership of infrastructure.

A regulatory system should, therefore, take into account incentives to develop (new) competing infrastructures in order to achieve dynamic efficiency. If new networks are exempted from any regulation for a certain period of time, this will secure potentially high profits for the first innovator. In addition, it also increases the investment incentives of potential competitors. The decisive point is consequently to determine how new markets should be defined. As it is not possible *ex ante* to predict how, for example, the provision of new services and applications, and hence access to new networks, will develop, we propose to impose restrictions on new markets only after four to six years after the market emerges.

The development of the new market should then be monitored every two years with a view to the emergence of effective competition, and with an ever-increasing emphasis on structural competition. This series of successive development tests should conclude, after no more than twelve years, with the existing SMP test. If, however, there is no discernable trend towards significant competitive structures, the market should be subjected to sector-specific control at an earlier stage.

This approach not only takes into account the risk-laden innovation problem of the investing company; it also generates positive incentives for competitors to invest into competing infrastructures. The reason for this is that competitors investing on their own behalf may generate effective competition and so avoid the need for any future regulation of the market. Moreover, the incentive to free-ride on innovators' investments is also mitigated by the overly long review process. Finally, the threat of regulation if no effective competition emerges, counters possible incentives for innovators to protect their monopoly with entry-deterring tactics.

These incentive effects depend crucially on a strict adherence by the regulatory authority to the proposed regulation scheme. In order to implement the proposed regulatory system, it is therefore also necessary for the European Commission to define potentially new markets, which can then be subjected by the national regulatory authorities to the proposed development tests – and not to a short-term test of projected market power like the SMP test.

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Annex – U.S. and EU Telecom Statistics

Prepared by IDATE

It is difficult to discuss the merits of regulatory frameworks without examining market dynamics and trends in industrial organisations. For this reason, we have selected a set of data that would reflect the characteristics of the sector on both sides of the Atlantic. As we can see from the figures presented, the European and U.S. sectors share many common features, including the falling number of analogue telephony subscribers and a drop in fixed telephony revenues, market growth driven primarily by mobiles (with a time lag that is now mainly in favour of U.S. operators), rapid growth in the number of broadband subscribers, fixed-mobile convergence strategies, etc. Even the special feature of the U.S. sector to-date, namely the existence of a long distance market created by decree in 1982, has disappeared with AT&T and MCI taken over by SBC and Verizon. Against this background, the question of growth and innovation is becoming crucial to operators right across the industry in both the USA and Europe.

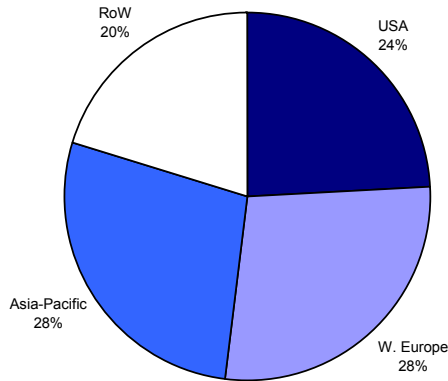
However, major disparities remain between Europe and the USA. We would like to highlight at least two of these differences. The first is the dominant role played by cable in the USA in the broadband access market. This situation led the judicial authorities, and subsequently the FCC, to call into question the unbundling obligations that applied to RBOCs, creating a trend towards heavy investment by the latter in deploying optical access networks and even in offering IPTV (as well as innovative services that are yet to be clearly defined). The second difference lies in the higher level of concentration in the U.S. sector versus the European Union, the largest single market on this side of the Atlantic. In the mobile sector specifically, balkanisation is not to be found in the USA, but in Europe. It remains to be seen whether Europe, which has seen many deals signalling national consolidation in recent months, is going to see a new phase of consolidation that can produce pan-European players of a similar size to the U.S. giants SBC and Verizon.

Yves GASSOT

Telecom service markets by region

(2005 revenues in billion USD)

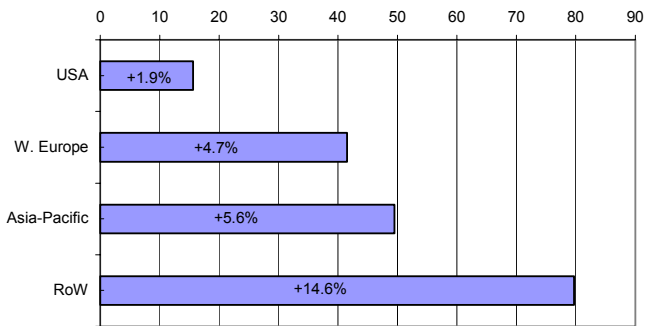
2005 worldwide market = 1 178 billion USD



Source: IDATE

Contribution to growth

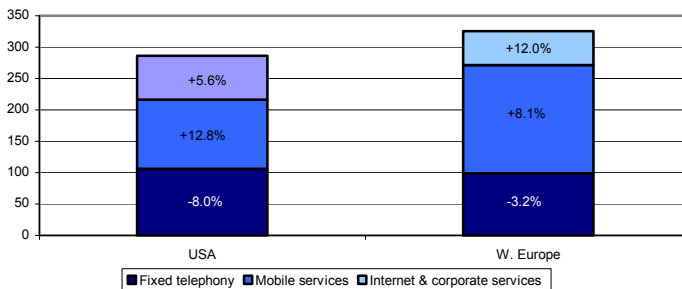
(2002-2005 in billion USD and CAGR)



Source: IDATE

Telecom service revenues broken down by segment

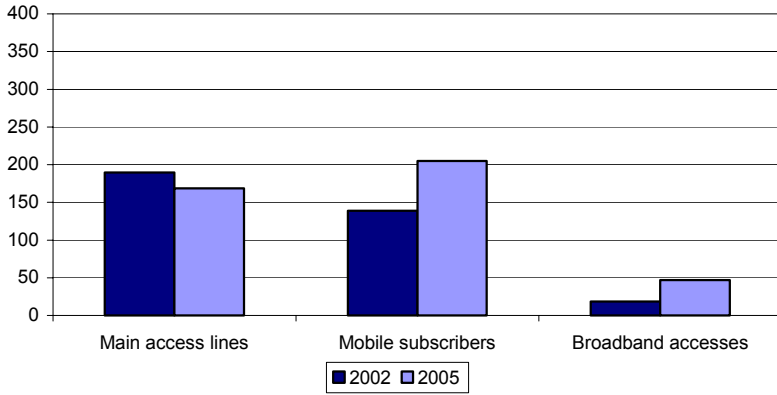
(2005 revenues in billion USD, CAGR 2002-2005 in the blocks)



Source: IDATE

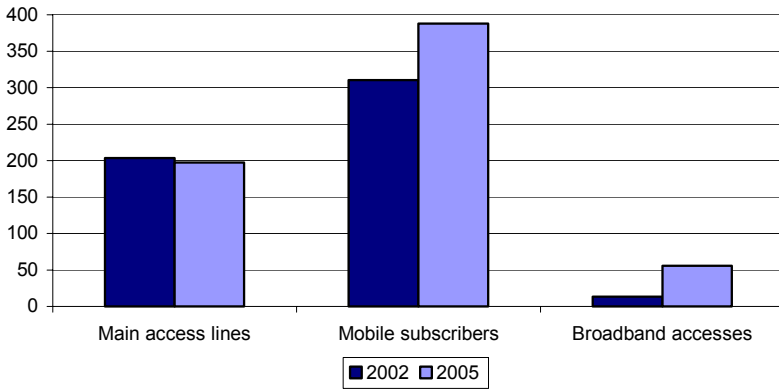
Recent trends in subscriber bases
(million lines or subscribers)

In the USA



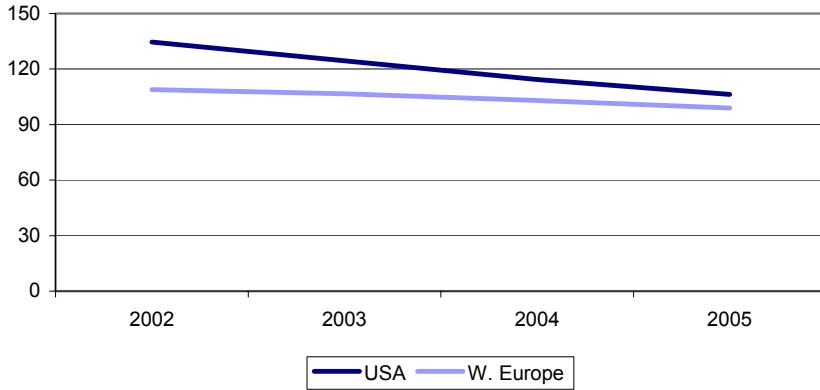
Source: IDATE

In Western Europe



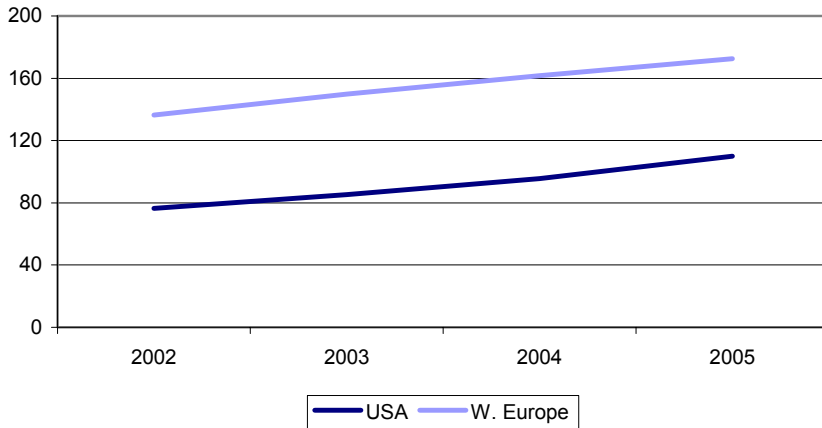
Source: IDATE

Decline of fixed telephony revenues
(billion USD)



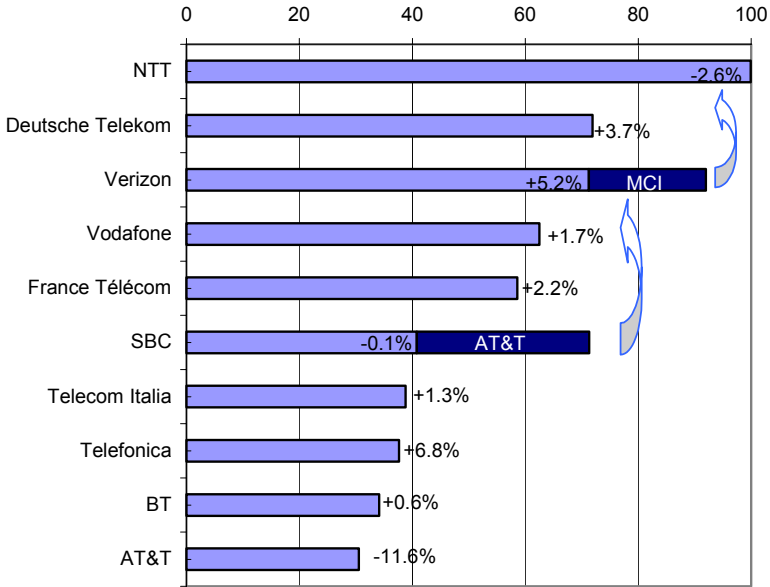
Source : IDATE

Increase of mobile service revenues
(billion USD)



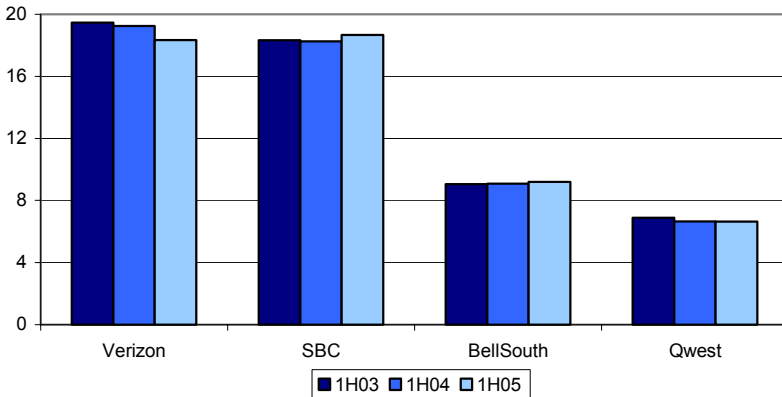
Source : IDATE

The world top 10 telecom operators
(2004 revenues, billion USD)



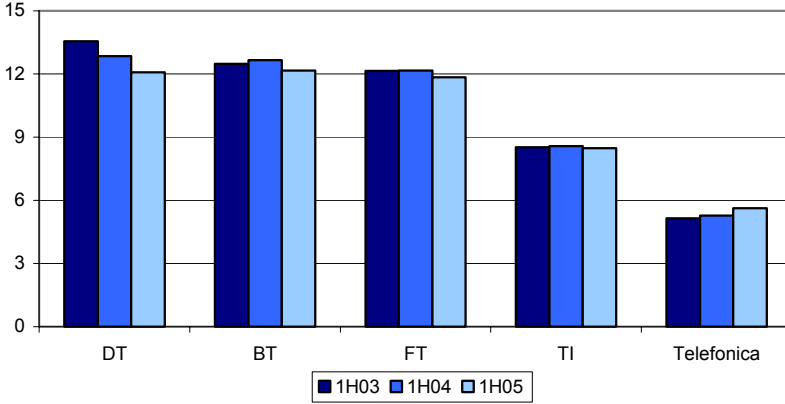
Source : IDATE, from annual reports

RBOCs' domestic wireline revenues
(current data, billion USD)



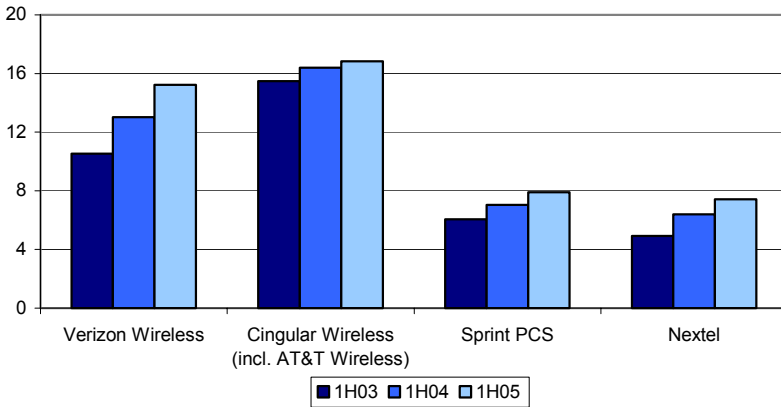
Source : IDATE, from annual reports

Major european telcos' fixed revenues
(current data, billion EUR)



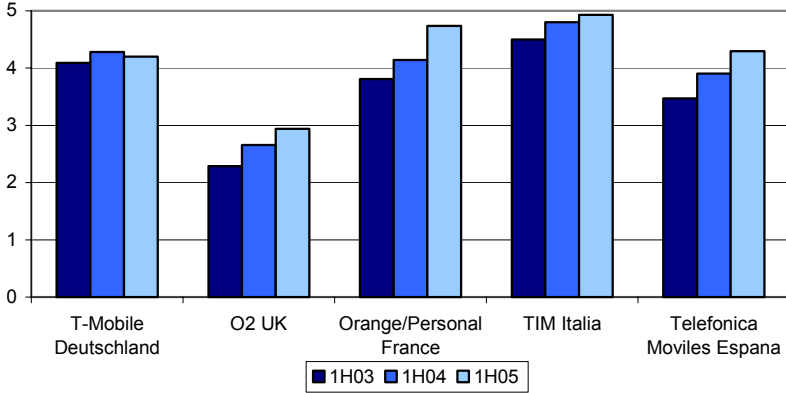
Source : IDATE, from annual reports

US telcos' domestic wireless revenues
(current data, billion USD)



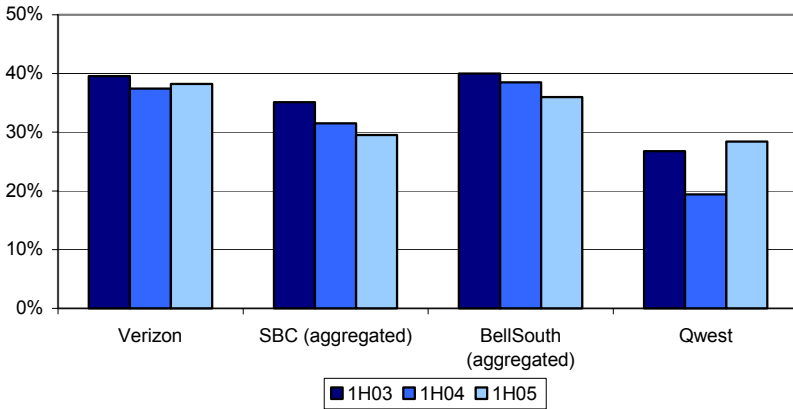
Source : IDATE, from annual reports

Major european telcos' domestic wireless revenues
(current data, billion EUR)



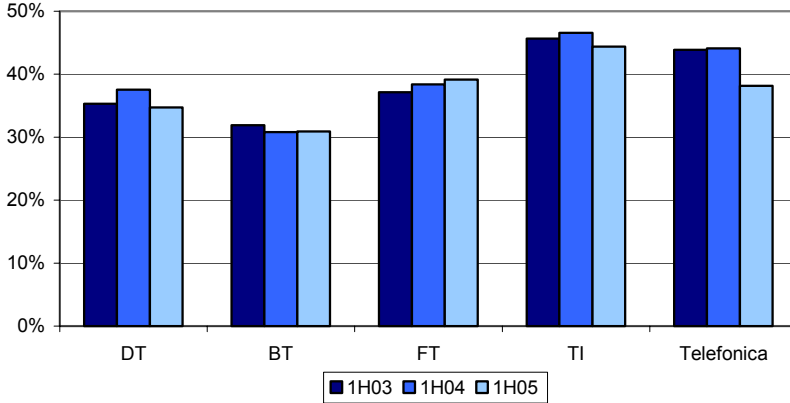
Source : IDATE, from annual reports

US RBOCs' EBITDA as a % of revenues



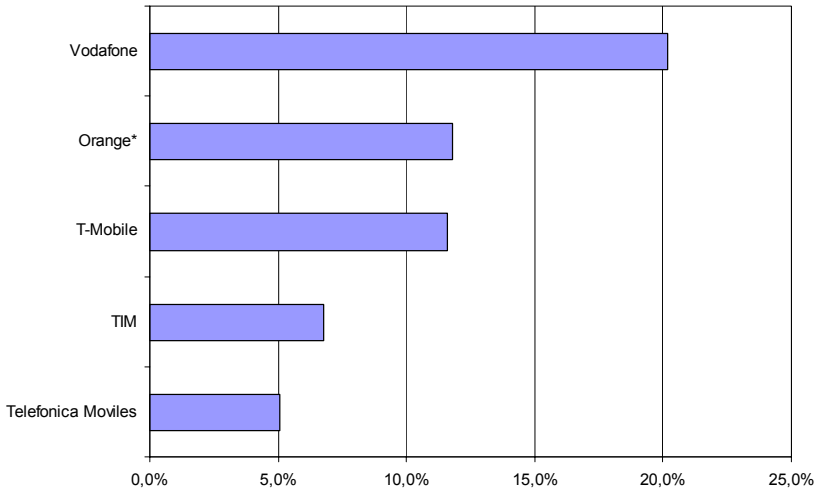
Source : IDATE, from annual reports

Major European telcos' EBITDA as a % of revenues



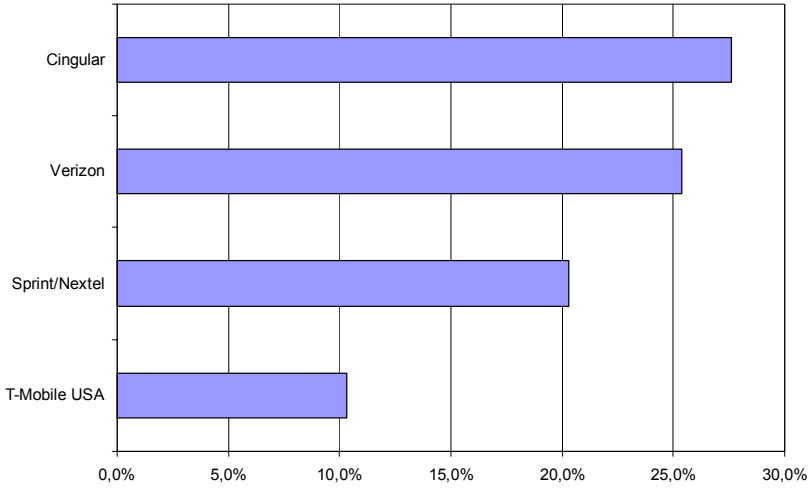
Source : IDATE, from annual reports

Major European mobile telcos' subscriber market share as a % of total mobile subscriber base in Western Europe (June 2005)



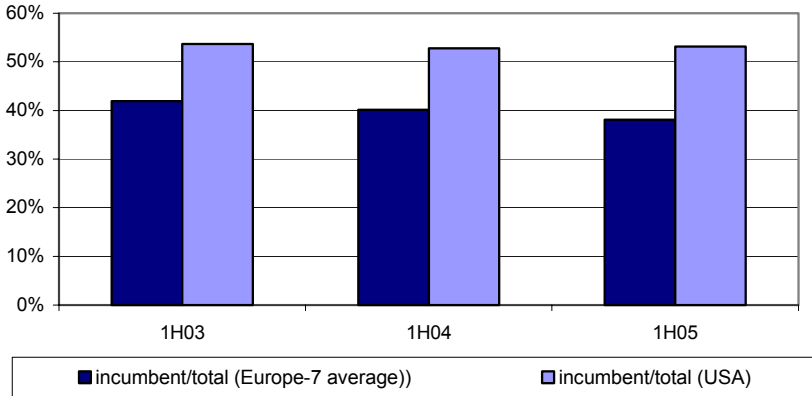
* including Amena subscriber base.

Major US mobile telcos' subscriber market share as a % of total mobile subscriber base in US
(June 2005)



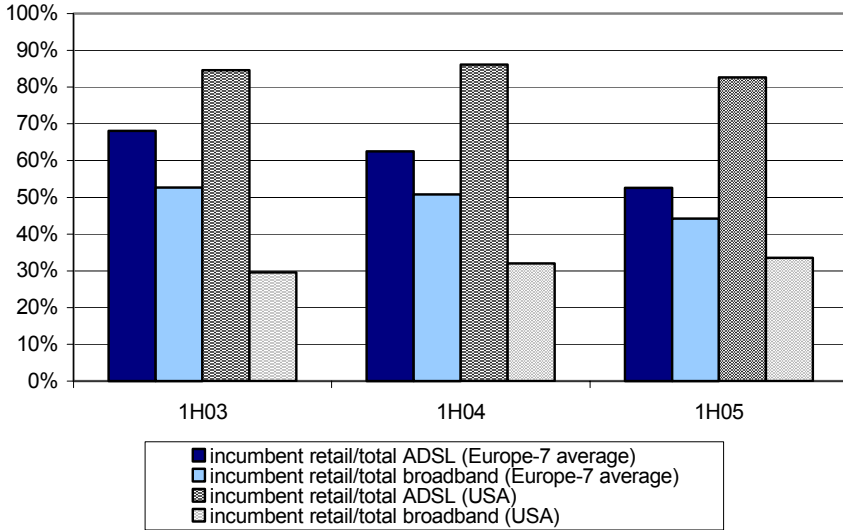
Source : IDATE

Market share of incumbent operators in domestic cellular operations
(% of subscriber base)



Source: IDATE

Market share of incumbent operators in domestic broadband operations
(% of subscriber base)



Source: IDATE