The role of government in broadband access

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Abstract

This paper discusses the role of governments in broadband. It is divided into five sections. Following an introduction in section one, section two discusses the diffusion of broadband Internet. Section three deals with competition-based and public-goods views on regulation and the corresponding roles and issues for governments. To gain deeper insights into the role of government in broadband, section four analyses market regulation and public activities in furthering broadband deployment in the US, Korea and Europe. These insights are evaluated in relation to the theoretical considerations established in section three. Section five closes with a discussion of our results and some conclusions. It becomes obvious that national broadband strategies benefit from considering both public good and competition-related aspects.

Keywords: Broadband; Government; Public policy; Universal service; Regulation; Penetration; Diffusion; Europe; USA; Korea; Asia; High-speed Internet access

1. Introduction

The societal importance and economic relevance of broadband is becoming increasingly clear. Access to broadband networks and to high-speed Internet with its next generation of information services is considered a necessary precondition for economic growth and competitiveness. According to the OECD, one-third of the increase in productivity in Germany, France and the UK from 2001 to 2011 will be due to the introduction of broadband technologies and related services (OECD, 2002). The diffusion of the broadband Internet infrastructure is shaping the nature of traditional ICT sectors such as information, entertainment, communication and media as well as other sectors and society as a whole. The growing availability of high bandwidth is likely to enhance business growth opportunities in the field of triple play (broadband as a platform for voice services (VoIP), Internet services and video/TV services). In addition to these economic opportunities, broadband is also seen to bring about various kinds of social benefits.

However, on closer examination it seems striking that despite this widely held view, policies and regulations concerning broadband vary among the world’s leading ICT countries. Dealing with that issue, the paper is divided into five sections. Section 2 discusses the diffusion of broadband Internet. Section 3 deals with two
different and important perspectives on the role and the issues that government and regulatory authorities have to deal with in telecommunications regulation, i.e. the public-goods and the competition-based view. The latter is reflected in the terms and design of market regulation, especially with regard to inter- and intra-platform competition, whereas the theory of public-goods is connected to government’s involvement in furthering broadband diffusion and demand, e.g. by universal service obligations (USOs) and the use of public funds. Section 4 thus deals in particular with the role of government in the European, the US and the Korean broadband markets. These insights are evaluated in relation to the theoretical considerations established in Section 3. Section 5 closes with a discussion of the results provided and draws some conclusions. It becomes obvious that national broadband strategies might benefit from considering both public-goods and competition-related aspects.

2. The diffusion of broadband

An analysis of existing studies and literature about broadband brings to light first of all that there are different definitions of broadband (see Table 1).

Furthermore, a distinction is sometimes also drawn between little broadband based on copper access (bandwidth in the order of Megabits) and big broadband based on fibre access (bandwidth in the order of Gigabits) (Hundt, 2003; McAdams, 2004). Overall, these definitions stress that broadband ought to be significantly faster than ISDN and, on the basis of the characteristics of packet transmission, should have the potential to be “always on.” A definition based only on bandwidth seems insufficient. Instead, the service properties of broadband should be included. Broadband is therefore defined as enabling fast and uninterrupted access to manifold services using different platforms and end-user devices.

Among the different platforms for broadband access it is possible to distinguish between wired, wireless and fixed wireless. Wired access platforms include digital subscriber line (DSL)/copper line, fibre optics, powerline and cable. Wireless platforms comprise 3G cellular and satellite transmission, while fixed wireless encompasses WiFi and WiMax. This paper concentrates on DSL and cable modem, which are currently the most important and prominent platforms throughout the world (see Fig. 1). Nevertheless, the emerging roll-out of fibre will also fall within our scope, as the role of government and regulation in this context is under intense discussion.

The distinction between different technology platforms is important for several reasons. First of all, in many countries regulation distinguishes between technology platforms. Hence, there may be differences in the regulatory obligations imposed on operators who have similar market power within one country but use different transmission technology. Secondly, cable and DSL networks as well as other broadband platforms show different technological properties. Designed for broadcasting, all participants in a coaxial cable share the bandwidth, which leads to variations in the capacity available to the user. In comparison to copper DSL, however, cable offers the potential for higher transmission capacities. DSL based on copper telephone lines offers steady bandwidth due to the fact that each participant has his or her own connecting line. Third, countries with both DSL and cable infrastructures for broadband service benefit significantly from infrastructure competition as shown in Fig. 1.

Thus, requirements for regulatory policy in broadband may also be influenced by the availability of different technology platforms. In the case of a lack of alternative networks, the costs associated with their duplication shape regulatory decisions. This leads to one of the key issues in infrastructure industries: the relation between service competition and platform competition. Regulators have to evaluate their decisions in the light of whether they promote the rolling out of parallel, competing infrastructure (infrastructure competition) or whether they further competition in a single network with regulated access (service competition). Experiences from telecommunications deregulation and regulation show that up to now regulators have often tried to establish frameworks enabling both forms of competition. Nevertheless, especially in the US the positive aspects of service competition are put to the test. On the other hand, one should bear in mind that platform competition may also lead to negative results if gains from the reduced...

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2For a detailed description of the technological properties of DSL, cable and other transmission technologies, see, e.g., Tanenbaum (2003).
deadweight loss due to higher competition are outweighed by the inefficient duplication of an existing infrastructure (Laffont & Tirole, 2000).

3. The role of government in regulation

Starting from a short description of prominent theories of regulation, this section discusses two perspectives on the role of government in broadband, broadband as a public good and broadband as a competition-related issue.

3.1. Theories of regulation

Essentially, the theory of regulation distinguishes between three approaches: public-interest theory, capture theory and the economic theory of regulation (Viscusi, Vernon, & Harrington, 2000). Public-interest theory uses a normative analysis to produce a positive theory, for which reason this approach is also known as the normative theory of regulation. Under this perspective regulation is seen as a response to the public’s demand for the correction of market failure and for the prevention of discriminatory practices.

On the basis of historical empirical observations in the US and elsewhere, capture theory states that regulation is either provided in response to the industry’s demand for regulation or regulatory agencies come to be controlled by the regulated industry over time. In other words, regulatory policy is “captured” by the relevant industry. Similar in its conclusions, economic theory can be interpreted as an enhancement of the capture theory on account of its ability to describe the causes that give rise to regulation. It puts forth a set of assumptions and general predictions about which industries would be regulated and what form of regulation would result as a logical implication of these assumptions (Posner, 1974; Stigler, 1971). By influencing the
state, firms pursue four different goals: namely, direct financial subsidy, control over entry by new competitors, control over substitutes and complementary products, and fixed prices. These theories of regulation have been criticised for several reasons: Public-interest and capture theory both provide insufficient theoretical underpinning, which could explain the mechanisms that give rise to regulation; all three of them suffer from certain inconsistencies with respect to empirical regularities (Viscusi et al., 2000). Nevertheless, for two reasons it seems necessary to keep them in mind while observing the regulation of broadband. First, juxtaposing the two perspectives represented by public-interest and capture/economic theory brings to light the area of conflict that characterises governmental activities in regulation. Second, capture/economic theory and public-interest theory offer two different views on governmental activities: simplified public-interest theory assumes that the government (as the representative of the public) plays an active role by deliberately influencing markets for public welfare, while capture and economic theory are based on the assumption that politics plays a more passive role, reacting to external effects (e.g., the exertion of influences from related companies). This is closely related to two different perspectives on the broadband market: government as an “enabler” vs. government as the “rule maker” in emerging markets, corresponding to the public-good and the competition-based perspective.

3.2. Broadband as a public good

In most countries, telecommunication was organised in state-run agencies or in public utilities until the final decades of the 20th century. Among other reasons, this was done to protect and guarantee aspects of telecommunications that are of high interest for the public. Although many telecommunication markets have been privatised, liberalised and become (at least partly) competitive, regulatory agencies are still responsible for guaranteeing a set of public-good issues, including aspects of safety, security, the prevention of unwanted interference in radio communication and, last but not least, universal service obligations. The latter even enjoy constitutional status (for example in the German Grundgesetz, Art. 87) and therefore remain beyond question. Although broadband has not yet become formal part of USOs in most countries, some national governments practise attempts in furthering demand for and diffusion of broadband especially with regard to digital divide issues (between metropolitan and rural areas or between certain segments of users and non-users) thereby underlining the societal and economic relevance of broadband. It therefore seems necessary to discuss the characteristics of public-goods and universal service in more detail.

Public-goods differ from other goods in two characteristics. The first is that any member of a group consuming a public good cannot be denied consumption by other members in this group, i.e. non-excludability applies (Olson Jr., 1965). Second, public-goods are characterised by non-rivalry in consumption (Musgrave, 1969). Public-goods can be provided by government (which can also contract out the production) as well as by private initiatives and firms. Some public-goods such as national defence or jurisdiction are both provided and managed by the government in question. However, in most countries, the provision of basic communication services such as telephony is governed by regulatory frameworks, controlled by regulatory authorities, but at least partially provided by private firms. For the task of ensuring basic, generally accessible communication services the term universal service has been established.

Although not labelled as USOs, the potential benefits of broadband and the common concerns about the digital divide between those connected to high-speed networks and those unable to access them characterises the public good character of broadband networks. This has prompted politicians to take various actions. As will be shown, these actions range from the granting of subsidies for operators investing in infrastructure upgrade to the construction of public networks.

3.3. Competition regulation in broadband

Competition in former monopolised network industries and in telecommunication markets in particular has been the subject of a wide range of literature. Generally, due to the vulnerability of consumers to exploitation

\[3\text{In this respect, Switzerland has been the forerunner in order to include broadband in USOs starting from January 2008 with transmission rates of 600/100 kbit/s (BAKOM, 2006).}\]
and price discrimination, it is a common view that regulation should be applied to each natural monopoly (Shepherd, 1997). Indeed, because of technology shifts and the emergence of new parallel industries, identification of monopolised structures is difficult and changing. In telecommunication markets, monopolistic bottlenecks and the concept of contestable markets have been very influential on regulation (Baumol, 1982; Baumol, Panzar, & Willig, 1982). In contrast to traditional monopoly theory, this concept establishes another criterion for the evaluation of whether regulation should be applied or not. In the case of easy market entry, small numbers of competitors may not lead to monopoly pricing and such markets can thus be deregulated. By contrast, the more sunk costs are involved and barriers to market entry are built up, the more an incumbent can exert market power, making public interventions necessary.

With regard to broadband, some scholars question the former widely shared view on the bottleneck character of the copper loop due to competition exercised by cable networks (Crandall, 2005). However, lacking area-wide alternative infrastructure in many countries gives reason to speak of a remaining bottleneck in telecommunication networks (Ofcom, 2004).

The question about the bottleneck character of the local loop is strongly related to the different types of competition in broadband markets: platform competition between different access technologies and service competition predominantly building on access requirements such as local loop unbundling (LLU). Access requirements can thereby be applied on telecommunication networks as well as on cable networks (Wu, 2004). The benefits of LLU are emphasised for countries with a lack of alternative infrastructure and less broadband penetration (Klotz & Grewe, 2005). On the other hand, it is claimed that regulation reduces incentives for both incumbents and new entrants to invest in infrastructure and broadband content (Crandall, Hahn, & Tardiff, 2002). Scholars holding this view thus estimate that, among others, one reason for the success of broadband Internet services could be the lack of government regulation (Hausman, 2002). However, since competitors entering the market by using LLU are allowed to build market share and reputation gradually, incentives to invest in alternate infrastructure may increase over time (de Bijl & Peitz, 2004). With regard to broadband diffusion, empirical research emphasises that inter-platform competition drives broadband adoption, while intra-platform competition in DSL is estimated to play no significant role (Distaso, Lupi, & Manenti, 2006).

These contrary points of view are also reflected in terms of national broadband policies, which are analysed in the following section.

4. The role of governments in selected countries

Generally, governments are able to influence markets either on the demand or on the supply-side. The latter can be classified into two broad subcategories, namely policies aiming at assisting the build-up of broadband networks on the one hand and policies aimed at enhancing competition through the imposition of regulatory obligations on the other hand. Especially in a field with a high economic and socio-political impact such as broadband, governments use the whole variety of such measures to increase market penetration and promote competitiveness.

4.1. Broadband policy in the European union

In comparison to the US and Korea, the launch of broadband Internet service started quite late in Europe. For example, Deutsche Telekom launched T-DSL broadband in spring 2000. Nevertheless, as shown in Fig. 1, with Denmark and the Netherlands two European Member States are leading in recent OECD broadband subscription statistics.

The situation in Europe is characterised by big inter-country differences as illustrated in Fig. 2. This figure highlights the heterogeneity of the European supplier structure. Although leading broadband economies such as the Netherlands, Denmark or Finland benefit from strong platform competition, all of them are also characterised by significant market shares of operators competing on the base of shared lines or LLU. France even succeeded in enhancing broadband penetration despite a lack in alternative infrastructure. In this respect, it can be argued that penetration rates in the European market seem to benefit from a combination of both infrastructure and service competition. Moreover, strategies chosen to increase
broadband diffusion in single member states seem to play important roles in the European Union as well (EU-
Commission, 2006b).

4.1.1. Government activities with regard to broadband as a public good

The European Commission early recognised the importance of broadband on the way to a knowledge-based
society and started to develop policy measures in order to accelerate the diffusion of broadband in Europe. In
its 2000 Lisbon Strategy, the target of becoming the most dynamic and important knowledge-based economic
region by the year 2010 was formulated. One important element of this strategy is the promotion of
broadband penetration due to its economic, environmental and quality-enriching benefits. The eEurope 2005
Action Plan sets “widespread availability and use by 2005” as an important objective for the development of
broadband, which was expected to materialise in at least half of Internet connections being broadband by the
end of 2005. With the closure of the eEurope 2005 Action Plan and the results of the mid-term review of the
Lisbon Agenda in the Kok Report, the European Commission announced an European information society
strategy up to 2010, the “i2010” (EU-Commission, 2005b), to foster growth and jobs in the information
society and media industries. In its i2010 initiative, the Commission outlines three policy priorities: to create
an open and competitive single market; to increase EU investments in research in ICT by 80%; and to
promote an inclusive European Information Society (EU-Commission, 2005a). To achieve these ambitious
goals, the Commission suggests the use of both supply- and demand-side policies.

On the supply-side, the use of Structural Funds or regional support to increase infrastructure availability
has been proposed and realized in the Member States. Overall, throughout the EU different national
broadband strategies are being put into practice to increase coverage, especially in under-served areas. Among
these strategies are:

- the construction of high-speed fibre-optic rings within partnerships with local and regional government
  organisations (Ireland);
- long-term reimbursable loans to operators for the deployment of infrastructure in selected areas (Spain);
- subsidies to network-builders operating in the private sector (Sweden);
- funding of innovative pilot projects (UK); and
- public–private partnerships (Austria and Greece).

Fig. 2. Penetration rates and access technologies in European broadband. Own figure building on data of EU-Commission (2006a).
Demand-side measures focus on the development of e-government, e-health, e-learning and e-business, aiming at encouraging the development of new broadband applications and their use and stimulating demand for broadband connections. A detailed overview of the different strategies is provided in EU-Commission (2004).

Overall, EU-member states are using this arsenal of public policy instruments for improving broadband availability and adoption in astonishingly different ways as there is no unique European policy to promote broadband (Cava-Ferreruela & Alabau-Munoz, 2005).

These measures are a little surprising as usually USOs which have not yet been achieved for broadband in the EU, are used to diminish the digital divide between rural and metropolitan areas. Generally, Universal service in Europe is governed by the Universal Directive 2002/22/EG. In its considerations preceding the Directive, the European Commission states that “(T)he concept of universal service should evolve to reflect advances in technology, market developments and changes in user demand.” Universal service is thus seen as a dynamic issue. Consideration eight deals with the data rates required by USOs at fixed locations. It is explicitly said that this does not extend to the Integrated Services Digital Network (ISDN), which provides two or more connections capable of being used simultaneously. Therefore, an universal service obligation involving broadband services is still excluded from the regulatory framework established in the Universal Directive. Nevertheless, in Article 15 of the directive, the European Commission determines that a review shall be undertaken in the light of social, economic and technological developments, taking into account mobility and data rates in the light of the prevailing technologies used by the majority of subscribers. Given broadband penetration rates of around 25% of the population in countries like the Netherlands or Denmark, an extension of universal service obligations does not seem out of reach. Even so, an extension of USOs on broadband has been discussed by the European Commission. In conclusion, it was argued that according to a market analysis only a small, although rapidly growing, number of European consumers make use of broadband services. Thus, the EU as a whole does not meet the criterion stipulating that the service is used by a majority of consumers (yet) (EU-Commission, 2005c). However, this does not prevent member states from supporting the rollout of broadband infrastructures in conformity with the applicable state aid rules (EU-Commission, 2006c). Nevertheless, Switzerland is the only country in Europe, which has enhanced USOs on broadband as of yet.

4.1.2. Competition-related issues

The core of European market and competition regulation in telecommunications is established in the Framework Directive 2002/21, Articles 14–16. As European regulatory philosophy in telecommunications is explicitly technologically neutral, no distinction is drawn between different technology platforms. Due to the consequences of convergence, the aim is not to impose, nor to discriminate in favour of, the use of a particular type of technology, but to ensure that the same service is regulated in an equivalent manner, irrespective of the means by which it is delivered, if regulation is required at all.

Market regulation takes place in a two-stage process (Picot & Wernick, 2005). Effective competition is defined by the absence of significant market power (Article 14). At the same time, articles 14–16 contain the changeover to the clauses of competition law (Klotz, 2003).

In the first step, market definitions are made by the EU-Commission (Article 15). In the second step, national regulatory authorities (NRAs) carry out an analysis of the relevant markets (Article 16), taking into account at least the Commission’s recommendations on relevant product and service markets. These recommendations currently apply to 18 markets, both retail and wholesale. If a market is not effectively competitive, sector-specific regulatory obligations have to be imposed by the regulatory authority, which has the discretion to choose between measures such as transparency, non-discrimination, accounting separation, access and access price control, cost accounting, and retail price regulation.

Wholesale markets for broadband are also targeted by the Commission’s recommendations. Therefore, NRAs have to analyse whether significant market power exists in these markets and on the basis of this they will impose appropriate measures or withdraw them in the case of effective competition.

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5For a discussion of the economic impact of these remedies, see Cave (2004).
6The recommendation distinguishes two markets relevant for broadband: the wholesale broadband access (No. 12) as well as the market for wholesale unbundled and shared access (No. 11).
As facility-based competition is not very widespread throughout Europe, access competition is seen as highly important in enhancing competition (EU-Commission, 2004). LLU and shared access have been obliged by Regulation 2887/2000. Moreover, other types of wholesale products such as Bitstream access and DSL-resale have been introduced in many member states.

This strategy is influenced by the investment ladder (Cave, 2006; Cave & Vogelsang, 2003). The investment ladder deals with the investment behaviour of firms entering a new market. When the market is initially opened, the regulator should enable market entry with limited sunk costs on the basis of service competition. As soon as new entrants consolidate their market positions and start to earn, NRAs should increase access prices, starting from network elements easier to duplicate. This is estimated to increase incentives for competitors to invest more, enabling them to offer differentiated products and thus eventually participate in infrastructure-based competition. The advantage of this lies in the development of clues that may help to reach a changeover from service to infrastructure without suppressing new market participants. Although some scholars argue that the workability of the investment ladder has not yet been empirically proven (Hoeffler, 2005), European regulators have as yet only established the first part of the concept enabling easy market entry for competitors, while access prices have been characterised by steady decreases throughout Europe in recent years (EU-Commission, 2006a). In this respect, it seems too early to assess the workability of the ladder concept.

4.1.3. Contributions

As became obvious, both perspectives play a significant role in European broadband. Although USOs on broadband have not yet been implemented, the majority of member states have introduced different measures to increase broadband diffusion, demand for broadband services and to further alternative technology platforms. At the same time, LLU and wholesale regulation play important roles in Europe, especially with regard to the lack of alternative cable infrastructure in some Member States. Looking at broadband diffusion, with Denmark and the Netherlands two European countries are the leaders in the OECD comparison of broadband subscription. This may be due to the combination of inter- and intra-platform competition linked to an active role of the government in furthering broadband diffusion and adoption.

4.2. Broadband policy in Korea

Given its demography and economy, it seems quite miraculous that South Korea has been the world leader in broadband penetration in the entire world for many years (ITU, 2003b). As of January 1, 2006 competition structure in South Korea’s broadband market looked as shown in Fig. 3. Among the big players, the DSL operator Korea Telecom held a market share of 51%, followed by Hanaro with 29% and VAN Service Providers holding 10%, while the other players held a total of 11%.

4.2.1. Government activities with regard to broadband as a public good

The Korea Information Infrastructure (KII) project might have been the most prominent example worldwide for governmental activities in furthering broadband deployment. Since the mid-1990s, Korean policy has been to build a “knowledge-based society” based on a high-speed telecommunications infrastructure. The “Framework Act on Informatisation Promotion” was passed in 1995 to drive the KII project. Specifically, the KII plan involves government, public and scholarly research, and is running in three phases as shown in Table 2.

The main objective of the Korea Information Infrastructure-Government (KII-G) was to construct a backbone network. From 1995 to 2000, a nationwide backbone and ATM switch networks were constructed. An optical transmission network comprising a 155 Mbp–40 Gbp backbone network was established in 144 cities with the objective of upgrading this to Terabps (Lee & Chan-Olmsted, 2004).

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7Cable coverage is relatively limited, especially in the large countries (with the exception of the UK). New platforms bringing fibre-to-the-home have been built in Sweden and Italy, although mainly in urban areas. Wireless technologies are expected to change the market in the medium term, but currently provide a viable alternative through local trials only (EU-Commission, 2004).

Recognising that the high costs of deploying new local access networks may also hinder broadband roll-out, the government provided pump-priming funding to facility-based service providers through the provision of loans at preferential rates worth US$77 million in 1999 and a further US$77 million in 2000. Until 2005 additional investments amounting to US$926 million were spent to build-up the infrastructure in rural areas and small cities (Choudrie & Lee, 2004). Another form of provision was the granting of public money in the form of prepayment for public services.

The KII-G was accompanied by the Korea Information Infrastructure-Public (KII-P) and the Korea Information Infrastructure-Testbed (KII-T). KII-P is intended for home and business and aims to offer users interactive broadband multimedia information services, while KII-T is utilised by research institutes and universities and jointly invested in by the government and private carriers.

Another measure in promoting broadband access platforms in apartments and other buildings was the Cyber Building Certificate system introduced in May 1997. Certificates were issued to buildings with high-speed telecommunications networks, and rankings were given according to their capacity to handle high-speed Internet. Due to the housing structures in Korea, with high percentages of big apartment buildings, this system was especially effective in promoting the deployment of broadband Internet connections in densely populated urban regions.

In addition, the government also deployed a variety of promotional policies to encourage demand for Internet use among the population. These programmes target groups that are not usually involved in Internet and include IT literacy and particularly Internet literacy programmes (Lee, O’Keefe, & Yun, 2003). The most prominent example within this context is the “ten million people Internet Education” project started in June 2000.
4.2.2. Competition-related issues

Competition-related broadband regulation in South Korea distinguishes between cable and telecommunications operators. Telecommunications providers are classified into three groups: facility-based service providers such as wire-line operators, specialised service providers such as providers of Internet telephony, and value added service providers such as those offering broadband internet connection. Regulatory obligations depend greatly on these classifications.

In contrast to the European Union, the Korean Ministry of Information and Communications (MIC) also acts as regulator of the telecommunications industry. In March 1997, the MIC announced the application procedures for selecting a new local telecom service provider to challenge the monopolist incumbent, KT. In June 1997 Hanaro was chosen, which launched its broadband and local phone services in April 1999 and thus became the second market entry in broadband after Thrunet had entered the market in July 1998 offering broadband over cable. Also KT started offering broadband in April 1999.

As for the regulation of the cable industry, the Korean Broadcasting Commission (KBC) is the current regulatory agency. While the KBC is responsible for cable system licence permission, it is the Ministry for Information and Communication that issues the licence and sets technological standards. It is important to note that in the Korean cable industry cable system operators as well as cable ISP do not own their own networks but lease them (Lee & Chan-Olmsted, 2004). Cable programmers, system operators, and communication network/infrastructure are treated differently, which may have aided the deployment of broadband by providing the leading infrastructure/network providers with incentives to branch out and invest in the broadband industry (Lee & Chan-Olmsted, 2004).

Platform competition between KT offering broadband by DSL and Thrunet and Hanaro being dependant on leasing Cable TV networks at least in the early phase after market entry, contributed significantly to the launch of broadband markets in Korea (Fransman, 2006). However, although LLU was only introduced in 2002 Thrunet and Hanaro have benefited from the separation of ownership, operation, and programming functions in the Korean cable business (Wu, 2004). While KT and Powercomm, the owners of cable television infrastructure were not permitted to provide services over these networks, Thrunet and Hanaro were able to lease cable network from Powercomm. Nevertheless, both operators also invested in the roll-out of own infrastructure.

The platform competition in the Korean market led to rapidly decreasing price levels of broadband, which furthered broadband adoption, although it is not clear, whether this was intended or the result of the competition with KT, which was able to provide such services at low prices without worrying too much about its cost, especially due to the hands-off policy practised by the MIC (Chung, 2006). When LLU was introduced in 2002, the MCI forced KT not only to provide all kinds of LLU to competitors, but also to do so at prices arguably below costs. This was mainly due to two reasons, namely to discourage the facilities construction competition which might result in having too much capacity and to intensify competition in rural areas with a lack of cable TV networks (Chung, 2006).

However, this measure did not stop the serious financial problems of Hanaro and Thrunet, which came to a head in 2003 with Thrunet going bankrupt and Hanaro becoming partly sold to foreign investors (Fransman, 2006).

4.2.3. Contributions

The deployment of Korean broadband was strongly influenced by the active role of government in promoting the construction of a high-speed broadband network. Furthermore, Korea benefited from geographical advantages and the user behaviour, e.g. by the high demand for online gaming (Chung, 2006). With regard to competition-related aspects, platform competition between different providers and the hands-off politics in terms of retail prices, led to a relatively low price level also furthering broadband adoption. However, this policy also showed some negative consequences with regard to the fate of Thrunet and Hanaro, which was not counterbalanced by the late introduction of LLU.

4.3. Broadband policy in the US

In the US the provision of broadband services started as early as 1997. Unlike in South Korea, the US did not initiate any specific broadband support projects beyond the usual cheerleading role in encouraging the private sector to build an information superhighway.
Actual market data reveal strong duopoly tendencies between incumbent telecommunications providers and cable network operators. As by end of December 2005, telecommunication operators held 45.1% of high-speed lines (39.3% held by RBOCs and 5.9% other ILECs), while non-ILECs held 54.8% of high-speed lines, 50.8% based on cable modem (FCC, 2006a).

4.3.1. Government activities with regard to broadband as a public good

Contrary to South Korea, the US government does not grant subsidies to providers that offer broadband in rural or less developed regions on a national level. Moreover, the Bush administration and the FCC argue for a passive role of government in furthering broadband. Instead the administration relies on competitive activities of telecommunications and cable network operators in promoting broadband diffusion.

However, contrary to the national policy, one can find different forms of co-operation between local authorities and private firms as well as subsidies for the construction of infrastructure on the local level (Gillet, Lehr, & Osorio, 2004). In addition, the issue of “municipal broadband” has become prominent when cities like Philadelphia and San Francisco announced plans to spend huge amounts of public money on installing broadband networks, which, however, caused problems with established operators lobbying against those plans.

Nevertheless, USOs play an important role in US telecommunications policy. Under section 254 of the US Telecommunications Act of 1996, universal service is defined as “an evolving level of telecommunications services that the Commission shall establish periodically... taking into account advances in telecommunications and information technologies and services.” Policies for the preservation and advancement of universal service are to be adopted by the Federal Communications Commission (FCC) and the states on the basis of predefined principles. Carriers contribute to universal service support mechanisms on the basis of interstate and international end-user revenues (FCC, 2005b). In 2005, the greatest part of the universal service payments were spent on high-cost support for traditional telecommunication services especially in rural areas (USAC, 2006).

Expenditure of more than 6 billion dollars in 2005 show the importance and significance of universal service, which is projected to grow even further in the coming years (FCC, 2006b). By using a wide definition of universal service objectives the Telecommunications Act of 1996 offers windows of opportunities for a universal service obligation for broadband. Indeed, expenditures of 1.86 billion dollars for the provision of schools and libraries with advanced telecommunication services in 2005 represent an important contribution (USAC, 2006).

4.3.2. Competition-related issues

The 1996 Telecommunications Act sought to overcome the obstacles created by the lack of competition in the local loop by imposing a series of obligations on telecommunications carriers involved in local exchange. Section 251 of the Telecommunications Act imposes a series of such duties, among them a requirement for the interconnection of all telecommunications carriers with each other. While imposing ex-ante regulation on wired telecommunication providers, these obligations are not applicable to wireless broadcasters or cable operators except to the extent that they offer telecommunications services via their facilities (Marcus, 2002). Generally, US telecommunications regulation distinguishes three main categories: cable services, telecommunications services and information services.

The asymmetrical regulation between cable, telecommunications and information services led to what has been called the “open access” debate. The open access debate concentrates on Internet service providers’ access to the broadband infrastructure of cable operators. Usually, cable operators provided Internet access through wholly or partially owned affiliated Internet service providers. After some decisions by local authorities, the open access issue became subject to regulatory decisions that approved the merger between Time Warner and America Online (Rosenthal, 2001).

Among these principles are quality and rates, access to advanced services, access in rural and high-cost areas, equitable and non-discriminatory contributions, specific and predictable support mechanisms and access to advanced telecommunications services for schools, health care and libraries.
In a series of rulings over the past few years, the FCC has systematically deregulated wired facilities, especially those used in support of broadband Internet services. In 2002 access to the Internet sold bundled with cable modem access was declared to be an information service, making it by default exempt from common carrier regulation (FCC, 2002). The same happened for access to the Internet sold bundled with DSL access in 2005 (FCC, 2005a).

Furthermore, in 2003 the obligation for incumbents to provide shared DSL access to competitors were eliminated (FCC, 2003) in the same way as non-discrimination obligations and obligations to offer DSL at wholesale in 2005 as the wholesale market for DSL and cable modem Internet access services were assessed effective and to remain so even in the absence of regulation (Marcus, 2005).

On June 26, 2005, the US Supreme Court affirmed the FCC’s decision to refrain from regulating cable companies’ provision of broadband services. As a consequence, cable providers offering broadband services are able to continue rejecting “open access” to competitors. The question of applying this judgement to telecom providers offering broadband via DSL has not yet become legally binding. Nevertheless, recent developments show that this decision by the Supreme Court could simultaneously become a starting signal for even more deregulatory efforts in the future. However, the FCC did not completely exempt US incumbents from regulation for fibre networks in its Triennial Review Order and the Reconsideration Order (Spies & Lipman, 2005). Nevertheless, in contrast to the European “ladder of investment”, whereby new entrants would seek to progressively grow their businesses, in the US, the only rung that solidly remains is the unbundling of copper loops. Thus, the US is moving in an entirely different direction than Europe, and also in comparison to US regulatory policy prior to about 2002 (Marcus, 2005).

4.3.3. Contributions

Relying solely on the benefits of platform competition, the US pursue a different path than Korea and Europe. Despite attempts in spurring broadband development by public initiatives on the local level, the role of the US government in furthering broadband deployment can be interpreted as rather passive. However, with regard to broadband diffusion and especially in terms of its leading role in ICT, one might criticise this policy for neglecting benefits of combining of public and private initiatives (Frieden, 2005).

5. Discussion and conclusions

As regards government involvement, Europe, Korea and the US differ to some extent. The importance of broadband has become common ground, but the methods of encouraging its development are quite different. Given its political and economic premises, South Korea seems to owe its leading position in broadband to the active role of government in fostering broadband on both the supply- and demand-side. With the establishment of a high-speed backbone network on the one and the promotion of demand through public programmes on the other hand, South Korea has emphasised the public good character of broadband. From a competition-related perspective, the leading position of Korea has been furthered by platform competition between DSL and cable modem. While LLU played a negligible role, open access obligations for cable owners were important for new entries to compete on a level playing field.

The US broadband market is characterised by a strong emphasis on competition aspects of regulation. Although a great deal of money is spent on universal service, public good characteristics of broadband do not play an important role in the national regulatory policy; however, there are significant local initiatives on the community level promoting and supporting W-LAN-based broadband access in the public space. With regard to its future development, there is much that indicates that the US will concentrate on its deregulatory efforts and thus head for a duopoly of incumbent telecommunications and cable network operators. However, while new entrants face large difficulties due to the abolition of wholesale obligations, at least in metropolitan areas incumbent providers have invested large sums in next generation networks (NGN).

Due to large differences in the underlying characteristics driving broadband adoption (e.g. competing technology platforms and geography) and the actual broadband diffusion within the member states, the

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10Specifically, hybrid loops (copper connections linked with fibre) are to be regulated if the distance between the consumer and the linked fibre copper connection is more than 500 feet or if the existing copper connection is overbuilt by the incumbent.
situation in Europe seems to be an ambiguous one. With regard to public good-related aspects, member states have stressed different measures to support broadband on the supply as well as the demand-side. However, most of these measures yield at increasing demand for broadband or the deployment in rural areas and can therefore be described as soft or medium interventions (Cava-Ferreruela & Alabau-Munoz, 2006). From a competition-related perspective, the most striking aspect of Europe’s regulatory framework is the concept of neutrality concerning different technological platforms, which leads to the view of a single broadband market. LLU and access obligations play important roles throughout Europe and have contributed to high deployment rates in countries lacking alternative infrastructure as well as in countries with competing platforms. However, as the debate on regulatory holidays in the German market shows (Dietlein & Brandenberg, 2006a, 2006b), strong obligations in wholesale regulation might reduce incumbents’ incentives to invest in the deployment of faster big broadband networks.

This leads to the question of what lessons might be learned from this comparison. First of all, in South Korea, measures on both the supply and the demand-side in combination with an initial hands-off competition regulation in DSL, but open access obligations on cable networks have been very successful in gaining a lead in broadband penetration. However, among other factors, Korean supply-side measures were able to succeed so impressively because of the geographical situation and the housing structure of its population and thus it seems doubtful whether similarly extensive infrastructure plans might produce the same cost-benefit ratio in Europe or the US.

The passive role of US regulation with regard to supply- and demand-side activities linked with deregulatory efforts in market regulation have furthered massive investments by incumbent operators in NGN, but not yet succeeded in bridging the lack in relation to penetration rates in leading broadband economies.

Finally, with regard to broadband diffusion, those European Member States with competing cable infrastructure show the highest deployment rates. However, this performance should be interpreted in connection with the rather active role in public good-related issues practised in Europe and the strong-handed market regulation focusing on LLU and wholesale regulation.

Overall, it can thus be concluded that successful governmental strategies should consider both, public good and competition-related aspects of broadband. While platform competition seems to have much impact on a high deployment rate, especially in metropolitan areas, LLU can contribute to broadband diffusion in regions and countries lacking of alternative infrastructure.

These findings also show some similarities with empirical research results. Existing research highlights benefits provided by soft and medium intervention strategies exercised by governmental departments (Cava-Ferreruela & Alabau-Munoz, 2006) Also, the general preparedness to use advanced technologies is emphasised, which is closely linked to activities on the demand-side (Kim, Bauer, & Wildman, 2003).

In analysing the role of government, concentration was focused on some aspects without ignoring the fact that other factors might also significantly influence broadband deployment and penetration. These factors include the pricing of broadband access, content offerings and distribution, online activities, the role of e-commerce, as well as demographic and educational factors. However, as these aspects are also related to governmental policies in different terms, national broadband strategies should take them into account. In this respect the formulation of long-term goals and accompanying projects such as the KII and the Lisbon Strategy can be helpful in increasing awareness and coordinating efforts on various governmental levels.

Future research should study the impact of pricing, user behaviour, content as well as demographic and educational factors on broadband diffusion in combination with competition and public-good-oriented governmental strategies in an empirical and comprehensive way. However, this is a challenging task since large n-bases are not available yet. Such research efforts should therefore be aimed at collecting and evaluating corresponding data of a large number of countries in order to recognise patterns of governmental impact on broadband diffusion and to distinguish them from other variables. Case studies like the ones presented here are able to support such efforts by contributing to a differentiated understanding of broadband access, which currently and for some time to come is displaying high priority in telecommunications policy.
References


