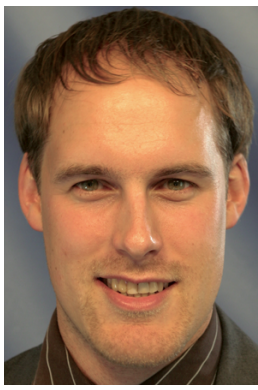
The Telecommunication Markets in Selected OECD Countries: Market Characteristics and Regulatory Institutions

Thomas Kiessl,
Andreas Kuhlmann and
Hans Schedl*



Telecommunications has been one of the most dynamic economic sectors in recent years. The former public utility sector with natural monopoly characteristics, which was typically under state ownership, has experienced dramatic changes with regards to technical innovations as well as changing market environments. Most countries have privatised their state-owned companies and opened up the market for competition. Due to bottlenecks in the local loop which is the remaining portion of the network with natural monopoly characteristics, access to this infrastructure component has been set under sector-specific regulation in most countries. However, this has been done under differing framework conditions in the respective countries. This article gives a brief introduction to the various new technologies that have emerged recently and that are now competing with the traditional infrastructure. The resulting consequences for market characteristics in selected countries in combination with the differing regulatory frameworks are subsequently described and analysed.

The integration of telecommunication systems

The improved and standardised treatment of digital media and their transmission has led to extensive changes in business models in various industries within a few years. Due to this, the utility from accessibility and capacity of broadband internet has steadily and simultaneously increased for suppliers and consumers in many markets. The growing importance of the distinct provision of the intermediary service of digital transmission was also fostered by a tighter integration of the telecommunication industry itself, as internet service providers started to "triple play", offering integrated video, voice and data product in one service offering. Especially the growth of Voice over Internet Protocol (VoIP) and of television via Digital Subscriber Line (DSL) has accelerated the convergence process in the telecommunication and broadcasting market, leading to a deep integration of the traditional public switched telecommunication network (PSTN)[1] with broadband internet. The origin of this dynamic development during the last decade lies in the digitalisation of media in the course of the rapid diffusion of information technologies. This in turn involved a process of digitalising all telecommunication networks, wire-based and wireless, across OECD countries. Hence, the transformation of all media, whether data, voice or picture, into data packages before sending them over the digital infrastructure to the receiver made it technically possible to interchange information between networks and platforms without any restrictions.

Thus from the consumers perspective the range of services offered in telecommunication markets today and the choice of accessibility to them has become very complex. In addition, recent developments in information technologies make these services attainable independently of the chosen access technology. The key differentiation in the market for internet access therefore remains in the technology-specific bandwidth that determines the variety and quality of consumed services. Consequently, the complexity for the consumers arises particularly from the choice of access technologies, such as DSL

* The authors are economists at the Ifo Institute for Economic Research, Munich. kiessl@ifo.de; kuhlmann@ifo.de; schedl@ifo.de.

[1] The Public Switched Telephone Network is the classical circuit switched network, where for each telephone call an end-to-end physical circuit between the calling party and the called party is reserved. For the duration of the call this circuit is not available to other users of the network.

and cable in the fixed line segment or UMTS, Wi-Fi, satellite or WiMAX in the wireless or fixed wireless segment. This complexity also extends to the heart of broadband internet architecture, the internet backbone.

Moreover, the market structure itself has gone through fundamental changes in all OECD countries since the liberalisation of the telecommunication sector. The principle of sending information "packaged switched" over digital networks as in the case of broadband internet fostered the liberalisation of parts of the telecommunication network architecture. While the internet backbone is predominantly in possession of business, educational and governmental institutions or offered by the incumbent telecommunication operators, in the access or internet service provision entry and competition have fundamentally changed the traditional market structure. Thus, besides the direct competition between service providers using one specific or a selection of their own or leased access facilities, the variety of new access facilities as described above and their partial substitutability has led to a growing facility-based competition.

As new digital platforms and the services provided on them compete more and more with traditional services provided over broadcasting networks or the PSTN, these changes in technology and strategy can be expected to have implications for policy and regulation in the future. The main task for regulatory and competition authorities will be to monitor the rapid and extensive changes in telecommunication technologies and market structures in order to ensure durable competition and the emergence of new innovations. It also calls into question the existing logic in the regulatory framework for the traditional telecommunication and broadcasting market. For example, entering the market for fixed broadband internet access always requires an agreement on the bottleneck, the local loop, which is the "last mile" from the consumer's residence to the phone company's hub/central office, between the entrant and the incumbent telecommunication (DSL) or cable television (cable) operator.

In this context it has been hotly debated whether a vertically integrated incumbent service and broadband infrastructure provider has to grant access to all levels of bandwidth within its network architecture to potential entrants, thus opening up the whole market for competition, or only up to a certain level. As the accessibility of basic broadband internet service can be granted via innovative transmitting technologies to nearly all households in OECD countries today, the range of the provided bandwidth varies greatly between urban, rural and remote regions due to high investment cost of the high-speed, next generation networks like vDSL. This is of particular importance for the market as the range and quality of services offered over the broadband internet strongly depends on the bandwidth provided to the individual subscriber, which in turn depends on the technology used. The most prominent application that requires a high speed infrastructure is the provision of high definition television in the video-on-demand, free and pay TV segments. This again is a source for further convergence and innovations, such as interactive television in the broadcasting sector.

In addition, the growing interest in VoIP services in recent years has induced regulators to examine if these new voice services based on packed-switched networks should be put under the regulatory umbrella or not. As VoIP services are successfully expanding today, they are already having positive effects on competition in the voice market, thus lowering prices for consumers. The classification of VoIP and its regulatory treatment is thus a key issue for regulators today. In this context, it is apparent that in order to give the consumers the choice to change telecommunication operators, which is the basis for competition, the regulatory framework has to consider number portability and carrier selection for VoIP services as well.

Beside this, traditional policy issues like fixed-to-mobile interconnection, interconnection charges in general, foreign ownership restrictions and the general service obligations may be called into question in the course of the growing integration of the telecommunication industry.

The primary objective behind the policy reforms of the European Commission was to open up the telecommunication market to competition. In line with that, the Commission issued a series of new directives for telecommunication aimed at a harmonisation of the policy framework within the member states (see Afonso, 2006). However, comparing the processes of liberalization and privatisation in telecommunication markets across the EU during the last decade both similarities and substantial differences can be detected. Owing to technological developments and the growing complexity of the

Table 1

Employment and labour productivity in the telecommunications sector

		Australia	Canada	France	Germany	Sweden	United Kingdom	USA
Employment in telecommunications	1999	74,471	101,402	155,297	221,000	29,289	206,500	1,219,300
	2000	76,000	103,692	154,522	241,000	30,340	230,300	1,323,400
	2001	77,275	104,879	151,191	241,000	28,256	231,500	1,255,900
	2002	77,000	105,096	145,487	231,000	20,529	255,000	1,126,800
	2003	67,750	110,834	137,414	226,000	18,825	242,000	1,060,000
Access paths per employee	1999	235	269	351	324	399	281	226
	2000	265	290	413	408	431	326	228
	2001	296	311	471	451	492	348	255
	2002	321	319	500	489	708	334	292
	2003	393	309	551	527	810	362	321
Telecommunication services revenue per employee (in current US$)	1999	189,309	172,084	181,786	231,539	253,370	274,270	247,394
	2000	192,840	187,054	175,938	213,940	226,321	276,514	253,153
	2001	173,179	193,157	193,659	221,918	226,545	284,319	278,553
	2002	146,824	190,302	218,933	250,347	372,944	279,248	313,052
	2003	207,179	204,940	285,089	313,215	495,350	344,157	336,792

Source: OECD (2005).

market, it is difficult to evaluate the progress of member states in transposing the directives set by the Commission. Thus even between, on the one hand, countries where liberalisation of telecommunication took place around the same time and, on the other hand, countries which do not exhibit fundamental differences in political, economic or geographic structure, the logic behind the regulatory framework may still vary in some categories. In order to provide a basis for discussions about the attitudes towards the regulations of telecoms across the EU and the levels of competition in the respective member states archived so far, we try to highlight some key aspects in market characteristics and regulatory institutions of selected states. Other OECD countries outside the EU are also taken into account to provide some useful benchmarks for the process of liberalisation and harmonisation within the EU.

Market characteristics

This section gives an overview of the market characteristics with a focus on employment trends, productivity development, the competitive situation, and current access conditions. For this purpose we used a country sample including Australia, Canada, France, Germany, Sweden, the United Kingdom, and the United States.

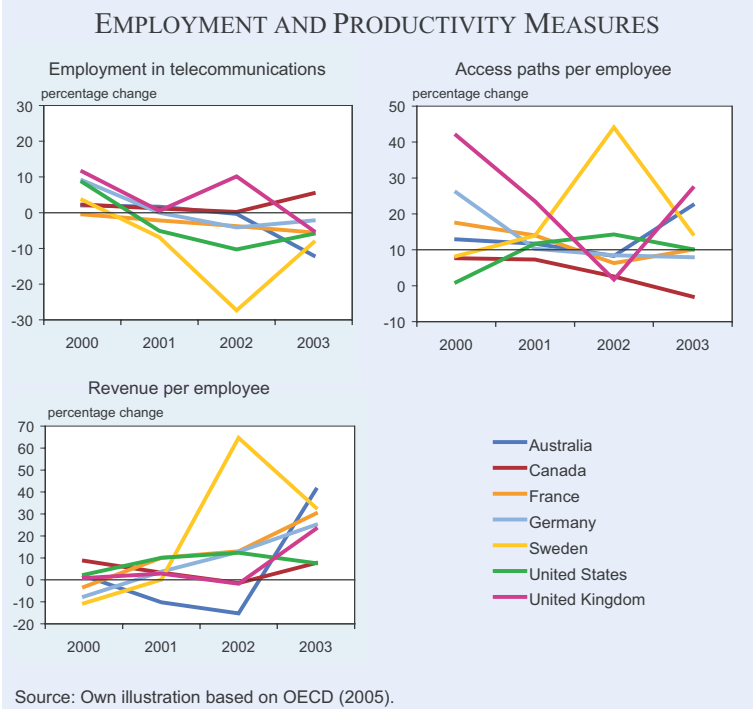
Employment and productivity

In general, employment in telecommunication services in OECD countries has fallen from the levels reached during the late 1990s with the exception of mobile communications. Along the lines of this employment decline, there have been rapid increases in access paths and revenue per employee, which are both measures of partial labour productivity. An overview of this development is presented in Table 1. Most countries under consideration, except Canada and the UK, have experienced a significant decline in employment, in particular after the New Economy hype.

The most dramatic decline in employment has been suffered by the Swedish telecommunications industry. In most countries, this consolidation has been accompanied by an almost constant increase in total revenues, which resulted in strong (labour) productivity gains in the period 1999 to 2003. Productivity gains can also be measured in terms of access paths per employee. The number of fixed (or access) lines is a quite common indicator of partial labour productivity. Due to recent developments of new access technologies, the broader notion of "access paths" is used here.[2] While the uses and capabilities of different access paths obviously vary, their provision by the carriers is indicative of the provider's productivity. The rise in access paths per employee occurs despite a fall in traditional fixed line PSTN connections in several countries, but ISDN and mobile access paths as well as new means of broadband access have experienced a rapid growth in the last decade. Figure 1 depicts the percentage change of

[2] An access path is the sum of all forms of access – including traditional fixed lines, mobile subscribers, ISDN channels (64 kbit/s voice equivalents) and DSL broadband subscribers.

Figure 1



Source: Own illustration based on OECD (2005).

employment and both partial labour productivity measures (access paths and revenues per employee), where Sweden is a striking outlier.

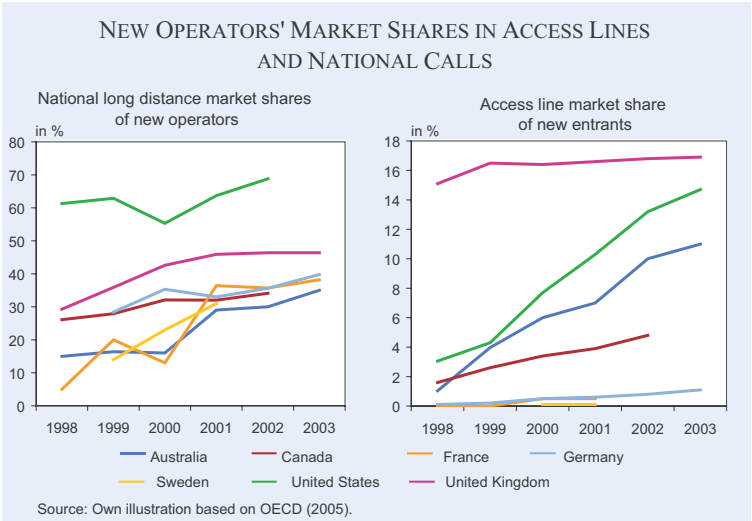
Substantial reductions in incumbent-carrier employee headcounts have been common in many countries, usually accompanied by outsourcing activities (transferring non-core activities such as equipment maintenance, operations and repairs to other companies). In several cases employees were dismissed and re-employed by the outsourcing companies at wage levels consistent with those of the specific localities and businesses. This has been a major driving force of productivity improvements. Outsourcing activities also affect productivity measures, such as revenue per employee, which should be kept in mind while comparing countries.

The major driving force of these developments can be seen in the liberalization of the respective telecommunications markets. However, even if productivity improvements are an intended result of the liberalization, one of the main objectives of liberalising a network industry is to introduce competition and thereby to alleviate the market power of the incumbent carriers. This is necessary from a welfare perspective in order to impede monopoly pricing, which implies (beside the excessive price and a suboptimal small quantity) several inefficiencies. For assessing the success of the liberalization, it is therefore essential to review the level and development of competition and of service prices.

Competition and market power

It is primarily due to technical innovations and improvements that the natural monopoly characteristics in the telecommunications markets have lost their importance (except for the local loop). Therefore facilities-based competition can be seen as a major driver of durable and effective competition in the overall telecommunications market. Despite the number of operators in the fixed telecommunications market, competition in some of these markets has been relatively slow to develop. This is particularly the case because of the lack of facilities-based competition that can be measured by the share of access lines by new entrants. Even if Australia and the US exhibit relatively high growth rates, the overall market share persists at a moderate level, below 17 percent (see Figure 2). Both the UK and the US were early starters in opening their markets to competition, which is reflected in the new

Figure 2



Source: Own illustration based on OECD (2005).

entrants' share of access lines in 2003 of 17 and 15 percent respectively. By contrast, the entrants' market share in national long distance calls has risen to a noticeable level above 30 percent in all countries under consideration. In this case the new operators are mainly service providers that offer services primarily through third-party networks by leasing capacity. Carrier selection and preselection have played an important role in stimulating competition in these markets.

A more qualitative evaluation of the competitive situation in the EU has been conducted by Dassler and Parker (2004). They have questioned several regulatory agencies in the EU, amongst others on the market segments that were effectively competitive in the respective countries as of December 2001. The French authority responded that international and mobile calls are competitive, the German authority referred to only mobile calls and the Swedish authority answered that no segments were effectively competitive at that date (the British authority did not answer this question). When asked whether the number of operators (displayed in parentheses) is actually high enough to achieve effective competition, the French (107 licensed, non-licensed not published) and the German (432) regulator agreed, the Swedish regulator (145) was uncertain and the British regulator (95 licensed, non-licensed unknown) negated the question and expressed favour for further market entry. Besides this ambiguous picture, all regulators considered that competition had actually led to lower charges, from which consumers benefited. However, several regulators mentioned the concern that consumers may not necessarily benefit from more choice, as end users are not always aware of the best deal. This problem of incomplete information could even be exacerbated by additional market entry.

Another question in the survey dealt with the interrelation of competition between the quality of transmission and customer service. The results show that transmission quality only improved in the UK and in the German mobile sector. Customer service quality improved in all countries apart from France, where new entrants failed to meet the quality expectations of subscribers. Concerning the separation of services from the provision of networks (also known as "unbundling"), most regulators were sceptical or at least unsure about the advantages that this might imply. Irrespective of this qualitative evaluation, Wallsten (2006) tested the interrelation of local loop unbundling on broadband penetration empirically in a cross-country panel dataset and found no robustly significant impact.

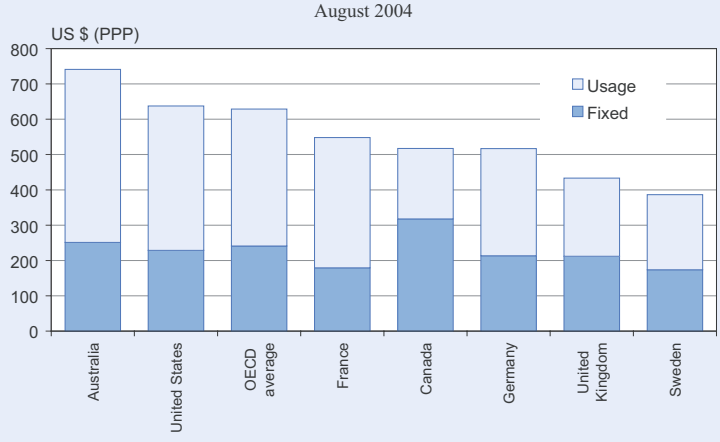
Prices

A major task of competition – which is supposed to be achieved or stimulated (or at least simulated) by the regulation of network industries – is to provide allocative efficiency and a maximum of social welfare. Beside the market shares in different sub-markets, prices are also indicative of whether regulation has succeeded in achieving this goal. The pricing of telecommunication services in the current country sample (and in the whole OECD area) has proven to be very dynamic. Prices for most telecommunication services have continued to fall, benefiting consumers. Many operators have moved towards flat-rate or unlimited calling and data plans. In addition, competition from newer technologies such as VoIP has contributed significantly to more competitive rates for businesses and consumers.

The OECD (2005) has created several baskets to compare residential telecommunication prices. The so-called composite basket includes domestic services, international services and calls from the fixed network to mobile communication networks and provides a comprehensive picture of the overall telecommunication prices and country differences. Figure 3 illustrates the country-specific baskets

Figure 3

COMPOSITE BASKET OF RESIDENTIAL TELEPHONE CHARGES
August 2004



Source: Own illustration based on OECD (2005).

Table 2

DSL-internet access in OECD member countries, November 2004

	Monthly charge (US$ PPP)	Mbytes included	Additional cost per mbyte (US$ PPP)	Speed of connection down-stream (kbit/s)	Speed of connec-tion up-stream (kbit/s)
Australia	44.5	Unlimited	-	256	64
Canada	40.6	Unlimited	-	3,000	320
France	27.5	Unlimited	-	512	128
Germany	28.5	1,500	0.020	1,024	128
Sweden	35.2	Unlimited	-	512	400
United Kingdom	27.2	1,000	0.002	512	256
USA	30.0	Unlimited	-	1,500	384

Source: OECD (2005).

France and the UK provide only low connection speeds. In Germany and the UK, only limited data volume is included. Australia performs worst in both price and connection speed.

More recent developments show that the dynamism of this market segment is enormous and that prices have fallen significantly, with a simultaneous increase of connection speed and much more unlimited calling and data-plan offerings.

divided in fixed and usage price components. Sweden and the UK have the least expensive domestic residential telecommunication services, when measured in US dollars (using purchasing power parity). Germany, Canada, and France are in the midfield of this sample, but still significantly below the OECD average.

VoIP has contributed significantly to more competitive rates. In the US internet telephony companies such as Vonage have emerged to compete with the traditional PSTN network. Other companies such as Skype, a peer-to-peer VoIP provider, compete even in a multitude of countries. Skype provides a service to any user with a broadband internet connection. Across the OECD, Skype's tariffs are on average 80 percent lower than the international tariffs for the PSTN. The response from telecommunication carriers is likely to be to offer competitive rates on their own internet telephony service or additional discounts on their PSTN service to users with any significant volume of calls.

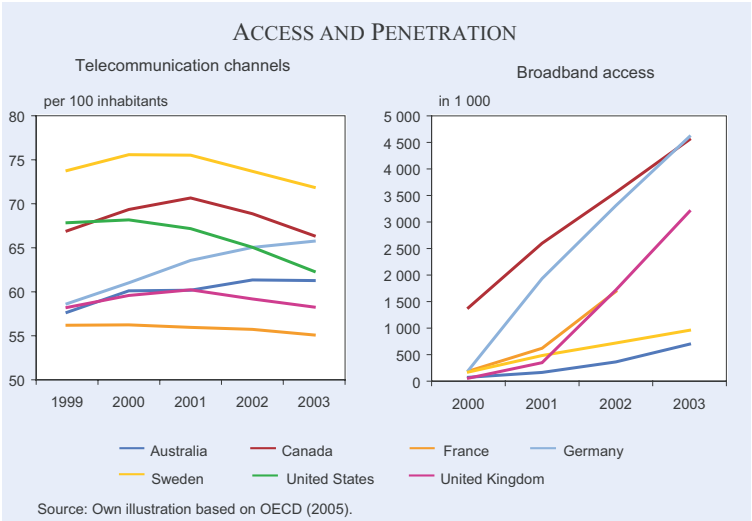
In combination with VoIP, prices for broadband access has become a relevant measure for country comparisons. Table 2 displays the monthly charges for DSL-internet access of the respective incumbent providers as of November 2004, with included volume, additional costs and connection speeds. Several factors influence the respective price/performance ratio. Seemingly least expensive countries like

Access conditions and penetration

Another important component to look at is the penetration rate and access provision in several parts of the telecommunications market. Figure 4 illustrates the development of telecommunication channels and of broadband access until 2003.

Along with the remarkable growth rates of broadband access, the absolute access numbers should be seen in connection to the population. As a ratio of 100 inhabitants, Canada had the best broadband coverage (14.4) in 2003 followed by Sweden (10.7) and the US (9.7). France (5.9), Germany (5.6), and the UK (5.4) are in the midfield followed by Australia (3.5). In terms of fixed network penetration, as measured by channels, most countries experienced a decline in 2003. On the other hand, if mobile cellular subscribers are includ-

Figure 4



Source: Own illustration based on OECD (2005).

ed, then access continues to expand across the OECD.

Regulatory institutions and their tasks

The development of sector-specific regulation

In the past, telecommunications was regarded as natural monopolies. Their control and regulation was mostly performed by ministries. The US was the only exception, which in 1934 had created an independent institution – the Federal Communications Commission (FCC) – for the oversight of interstate and international communications.[3] In the other countries considered in this article, sector-specific regulation and the foundation of national regulatory authorities (NRAs) were closely linked to the opening of the telecommunication markets to competition. Canada established the Canadian Radio-television and Telecommunications Commission (CRTC) in 1976, the UK established Oftel in 1984, Austel was founded in Australia in 1991, Post och Telestyrelsen (PTS) was set up in Sweden in 1992, the Autorité de Régulation des Télécommunications (ART) was established 1997 in France, and Germany followed in 1998 with the foundation of the *Regulierungsbehörde für Telekommunikation und Post* (RegTP).

Sector-specific regulation is often seen as a temporary exemption from general competition law so long as no effective competition in the sector exists. With the development of competition the need for sector-specific regulation is regarded as unnecessary and competition control in the sector is transferred to competition authorities. Competition authorities have varying responsibilities in the regulatory process of the selected countries. In some cases, regulatory powers stayed within the ministries. Since their establishment, several of the selected NRAs have changed their names and their fields of responsibility: Austel changed to ACA and then to ACMA, Oftel became OfCom, ART changed to ARCEP and RegTP to *Bundesnetzagentur*.

This brief overview of different country models will first describe the differences in the institutionalisation of sector-specific regulation regarding reporting obligations, financing, the appointment of members and the possibility to overturn decisions of the NRA. Then we will outline the other institutions formally or informally implied in the process and their co-operation with the NRA against the background of selected regulatory tasks: market entry, interconnection of networks, spectrum management, numbering and pricing. The breadth of tasks and competences regarding administration and examination, decision, enforcement and arbitration will then be summarised.

Institutional structures of NRAs

In all selected countries, NRAs were established as independent institutions to foster the development of expertise, free regulation from short-term political pressure and provide stability for market participants. In nearly all selected countries, a clear distinction between the policy maker – in all cases a ministry – and the regulatory body exists. The only exception is the FCC in the US, which also has policy-making powers.

An independent regulator needs reliable financial sources, should not be accountable to the policy-maker but to another "neutral" group which should also receive the regulator's reports. In the selected countries, several types of NRA budget financing can be observed: appropriation, fees and contributions from operators or a mix of these financing forms. Appropriation might be influenced by political change and could be less reliable than fees or operator contributions. The independence of regulators with fees or a mixed financing base may thus be stronger than that of regulators relying only on appropriation. Only two of the NRAs – in Australia and France – rely only on appropriation (see Table 3). Financing in Canada is exclusively fee-based, whereas the other four selected countries show mixed financing of their budget.

Accountability and reporting are not always addressed to the same institution. In four of the countries – France, Germany, the UK and the US – they address the parliament; in France also the ministry and the government. In Canada reports have to be addressed to ministries; accountability information also to the parliament. Australia and Sweden have reporting obligations to the ministry and accountability to the government.

Political influence on the regulator might be exercised through the staffing of the boards of regulators. Here, too, a close relationship to the policy-maker

[3] On the state level these functions are performed by public utility commissions (PUC).

Table 3

Reporting obligations, budget financing and accountability of national regulation authorities (NRA)

	Regulator	Policy maker	Reports to	Budget financing	Accountability
Australia	ACMA	Department of Communications, Information and the Arts	Legislature and Ministry	Appropriation	Government
Canada	CRTC	Industry Canada	Ministries	Fees	Ministry (Canadian Heritage), Parliament
France	ARCEP	Ministry of Economy, Finance and Industry	Government and parliament	Appropriation	Ministry, Parliament
Germany	Bundesnetzagentur	Ministry of Economics	Parliament	Fees, appropriation and contributions from operators	Parliament
Sweden	PTS	Ministry of Industry, Employment and Communications	Ministry	contributions from operators, fees and appropriation	Government
United Kingdom	Ofcom	Department of Trade and Industry	Parliament	Fees, appropriation and contributions from operators	Parliament
USA	FCC	FCC; Department of Commerce	Legislature	Fees and appropriation	Congress

Sources: OECD, (2006); Dassler and Parker, (2004); König, Kühling, Pieper, Schedl (2000).

might reduce independence, as long as no qualified group has a right to recommendations for staffing decisions.

As shown in Table 4, the nomination procedures in Australia, France and Germany would seem to offer the least possibilities of direct political influence, whereas Sweden and the UK might have the highest. This view is challenged by Dassler (2006). He distinguishes between substantive and proceduralist orientations of European NRAs, where "substantive" describes an approach favouring expertise and policy consistency in staffing decisions and "proceduralist" stands for an approach more oriented towards democratic control and accountability than expertise.

Based on these categories, he sees regulatory appointment, accountability and decision-making as predom-

Table 4

Staffing and terms of NRA boards

	Regulator	Appointed by	Recommendation of	Term of office in years	Renewable	Number of appointed members
Australia	ACMA	The Governor General	Ministry and self regulation bodies	5	once	3–9
Canada	CRTC	The Governor in Council	Government	5	Yes	13 full time, 6 part time
France	ARCEP	The President, the President of the National Assembly (1) and the President of the Senate (1)	Staff of NRA, Ministry	6	No	7
Germany	Bundesnetzagentur	The President	Federal Government, Advisory Council of the NRA	5	Yes	1
Sweden	PTS	The Government	Ministry	6	Yes	9
United Kingdom	Ofcom	The Secretaries of State	Ministry	3–5	Yes	9
USA	FCC	The President with Senate confirmation		5	Yes	5

Sources: OECD, (2006); Dassler and Parker (2004).

inantly "proceduralist" in France and Germany. In Sweden, appointment and accountability follow a mixed approach with proceduralist and substantive elements; decision-making is rated as expertise oriented. The UK – according to Dassler – follows substantive notions in appointment and decision-making and proceduralist notions in accountability.

With the exception of Canada, where the Governor in Council can overturn an NRA decision, the decisions cannot be overturned by the political level in the other selected countries. Canada also allows for ministerial guidance.

The division of regulatory responsibilities

Typically, the regulator is responsible for questions of market entry, interconnection and pricing. The task of competition control is either exclusively the domain of competition authorities or a shared task between competition authorities and regulators. Spectrum allocation quite often implies ministries. A closer look, though, shows quite different procedures.

Australia displays the strongest deviation from the standard regulatory model in our sample. From the beginning, the Australian model placed a strong emphasis on industry self-regulation. Several bodies – the Australian Communications Industry Forum (ACIF), the Australian Communications Access Forum (ACAF) and the Telecommunications Industry Ombudsman (TIO), to name the three most important – were created to resolve problems without the intervention of a regulator or competition authority. The latter act only if self-regulation is not able to solve a problem. Compared to the other countries, the regulatory authority ACMA has only very limited responsibilities in market entry (together with the Australian Competition and Consumer Commission, ACCC) and spectrum allocation. The ACCC is responsible for competition control, interconnection and pricing. Thus, Australia has reduced sector-specific regulation much more strongly than other countries.

In Canada the industry ministry is responsible for market entry in the mobile segment and spectrum allocation. The regulator CRTC covers fixed entry[4], interconnection and pricing. Competition problems are in the domain of the Competition Bureau.

[4] For fixed entry, usually only registration is necessary; licenses are only necessary for international communications and overseas cables.

In France, several consulting bodies may influence regulation. Among the most important are the Commission Supérieure du Service Public des Postes et Télécommunications (CSSPPT), the Conseil National des Postes et Télécommunications and the Conseil Général des Technologies de l'Information. The Conseil de la Concurrence (CC) is responsible for questions regarding competition.

In Germany practically all decisions are made by the NRA. The competition authority *(Bundeskartellamt)* has consulting functions in competition control. The German NRA has the broadest responsibilities in our sample.

The tasks of regulation in Sweden are, as in France, allotted to the regulator PTS and the competition authority Konkurrentcestyrelsen (KS). The regulation of market entry in Sweden is quite liberalised, as in Australia and Canada.

As in the US, the UK has concurring responsibilities in competition control. In the UK, Ofcom and the Office of Fair Trading (OFT) share the authority to identify dominant positions and to impose fines on anticompetitive behaviour. The Competition Commission has administrative and judicative functions as an appeal tribunal in competition control. In the US, competition control functions are shared between FCC, the Department of Justice (DoJ, Antitrust Division) and the Federal Trade Commission (FTC). The three agencies operate on different legal bases: the FCC bases decisions on the 1996 Telecommunications Act, the DoJ on the Sherman and Clayton Acts, the FTC on the FTC and Clayton acts. The FCC and the PUCs can only decide in cases where exemptions from antitrust clauses exist, namely if prices are regulated or Section 271 of the Telecommunications Act is applicable.

Regarding the intensity of regulation, Australia, Canada, and Sweden can be counted among the countries with low intensity. The UK and the US are examples for a trend towards reduced regulation. Germany and France can be seen as examples of higher regulation intensity.

Summary

This article reports on recent developments in telecommunication markets in selected OECD countries with respect to technology, competition

and regulatory institution. Facilities-based competition can be seen as a major driver of durable and effective competition in the total telecommunications market today, especially owing to technological innovation. We describe the migration of subscribers from the traditional public switched telecommunication network (PSTN) to new platforms, such as broadband internet or mobile communication networks, offering substitutes for voice telecommunication services. The number of new access lines – or facility-based entry – in the traditional access market has only developed very slowly in the considered countries. By contrast, competition in service provision, on the basis of carrier selection and pre-selection, has played an important role in the de-monopolisation of telecommunication markets, causing the telephony prices to fall considerably in recent years.

Furthermore, the development of new technologies such as Voice over Internet Protocol (VoIP) has contributed significantly to lower rates for businesses and consumers. Nevertheless, using the development of productivity, market shares, pricing and penetration as indicators for the level of competition to compare the national markets with each other, some substantial differences in market characteristics could be demonstrated.

In this context, it proved necessary to take a closer look at the regulatory framework of the respective countries, which varies not only across OECD countries, but also within the common regulatory framework across the EU. Australia, on the one hand, is an example where loose regulation or even partial self-regulation of the industry has not produced favorable market conditions for competitors and consumers. On the other hand, one cannot simply conclude that high regulation leads to the best market results. Germany and France, as examples of high regulatory intensity, are mostly in the midfield concerning the general market characteristics. Countries like Sweden or the UK, however, have succeeded in providing a good competitive market environment without excessive (and hence costly) regulation.

References

Afonso, A. and C. Scaglioni (2006), "An Assessment of Telecommunications Regulation Performance in the European Union", *ISEG Economics Working Paper* No. 07/2006/DE/UECE.

Dassler, T. and D. Parker (2004), "Harmony or Disharmony in the Regulation and the Promotion of Competition in EU Telecommunications? A Survey of the Regulatory Offices", *Utilities Policy,* 12(1), March, pp. 9–28.

Dassler, T. (2006), "Combining Theories of Regulation – Proposing a Framework for Analysing Regulatory Systems Worldwide", *Utilities Policy,* 14(1), March , pp. 31–43.

Koenig, Ch., J. Kühling, B. Pieper and H. Schedl (2000), *Liberalisierung der Telekommuni-kationsordnungen,* Heidelberg.

OECD (2005), "OECD Communications Outlook", *Science & Information Technology*, vol. 2005, no. 11.

OECD (2006), "Telecommunication Regulatory Institutional Structures and Responsibilities", *Working Party on Telecommunication and Information Services Policies.*

Wallsten, S. J. (2006), "Broadband and Unbundling Regulations in OECD Countries", *AEI-Brookings Joint Center Working Paper* no. 06-16.