



Introduction

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1.1 The dynamics of broadband markets

The importance of ubiquitous telecommunications services for economic development is widely recognized.¹ In the early days the objective was to have every home and enterprise connected to the public switched telephone network (PSTN). In the 1990s the introduction of GSM (originally Groupe Spéciale Mobile, later standing for Global System for Mobile Communications) allowed every person to be connected to the network – at any time and at any place – and within a decade mobile penetration exceeded fixed line penetration. In the mid-1990s the attention shifted to the emerging Internet. Today, the focus is on the availability, accessibility and affordability of broadband – fixed as well as mobile – at ever-increasing data rates in support of electronically mediated economic and social activity.

1.1.1 The Digital Agenda for Europe

The realization of a ubiquitous broadband infrastructure has become part of the economic and social policy agenda agreed between the European Commission and the European Union (EU) member states in 2000, as part of the so-called

¹ Early publications on the relationship between telecommunications and economic growth include Hardy (1980) and Saunders, Warford and Wellenius (1994). More recent studies on the role of ICTs and growth include Röller and Waverman (2001) and Gruber and Koutroumpis (2011). The link between investment in broadband and economic growth is the subject of papers by, for instance, Crandall and Singer, 2009 and Czernich, Falck, Kretschmer and Woessmann (2009); see also Van Gorp *et al.* (2011).

‘Lisbon Agenda’ (EC, 2000).² These plans evolved through eEurope2002, eEurope 2005 and i2010. Today, the broadband objectives are part of the ‘Digital Agenda for Europe’ (EC, 2010)³, and can be summarized as follows:

By 2013:

- Bringing basic broadband⁴ to all Europeans;

By 2020:

- Ensuring that all Europeans will have access to the Internet with data rates above 30 Mbit/s, and
- 50% or more of European households will have subscribed to Internet access with data rates above 100 Mbit/s.

However, meeting these ambitious policy goals requires willing participation of two key intermediating actors: suppliers of broadband services and buyers of broadband services.

² The EU ambition formulated in the ‘Lisbon Agenda’ was: “to become the most competitive and dynamic knowledge-based economy in the world by 2010.” The major policy goals were: (1) to establish an inclusive, dynamic and knowledge-based economy; (2) to produce accelerated and sustained economic growth; (3) to restore full employment as the key objective of economic and social policy; and (4) to modernize our social protection systems. The eEurope Action Plan included establishing an ubiquitous broadband infrastructure. (EC, 2000)

At that time other countries and regions had plans addressing similar issues: e!Japan launched in 2001; eKorea Vision in 2002; Hong Kong: Digital 21 Strategy; USA: Information Super Highway in 2000.

³ The Digital Agenda includes six pillars: Pillar I: Digital Single Market; Pillar II: Interoperability and Standards; Pillar III: Trust and Security; Pillar IV: Fast and ultra-fast Internet access; Pillar V: Research and innovation; Pillar VI: Enhancing digital literacy, skills and inclusion. The broadband targets are related to Pillar IV. (EC, 2010)

⁴ Basic broadband is generally understood as 2 Mbit/s downstream.

2 Wolter Lemstra and William H. Melody

Following the telecommunications⁵ reform initiated in Europe in 1987 (EC, 1987), telecom markets have been liberalized and the degree to which broadband is made available to the public and enterprises is largely the result of the decisions taken by the private sector, by the service providers. These service providers exploit their legacy infrastructure and explore new technologies in the pursuit of new market opportunities while being subject to national policies and regulations.

As such, the availability of broadband is the aggregate outcome of investment decisions made by private firms operating in competitive markets and some additional contributions from the public sector, mostly to complete basic universal service. Expectations regarding end-user demand and willingness and ability to pay drive the income side of the business case. On the cost side, population density, equipment costs and the costs of deployment are the main factors. As such, entrepreneurs take calculated business decisions aimed at making future profits. Uncertainties regarding future policies and regulation are an important risk factor in the decision-making process.

Ultimately, it is the end-user's response to the various broadband offerings – infrastructure access and content – that determines the uptake of broadband and its use. In this setting, broad, intense and innovative forms of competition are important to increase end-user choices, improve service quality and reduce prices.

In such an environment, government policies and regulation are not realized through their enactment but through the actions of the market players,

⁵ In this book we use telecommunications to denote the communication services having been provided over the PSTN for many years, such as telephony, facsimile, and in-band data communication. The term e-communications is used to denote all communication and distribution services provided over today's converged digital infrastructures.

The term 'telecommunications/e-communications sector' is used to denote the services side of the industry. The industry is understood to include the services sector as well as the infrastructure equipment with the related software and services, and the terminal equipment. The e-communication industry includes in addition the media and content services sectors and the related equipment, software platforms and services.

the telecom entrepreneurs at large. It is through the individual and collective actions of these entrepreneurs that policies and regulations are effectuated. Generally, effectiveness or ineffectiveness of policies and regulations becomes apparent through the results of the actions or inactions of the market actors.

This implies that a quest for understanding broadband performance – or an assessment of the achievement of the Digital Agenda targets – and any attempt to improve the level of performance require a deep understanding of broadband market dynamics. This is the core topic of this book.

With markets at its centre, this study is foremost an industry analysis. But, as markets are conditioned by policy and regulation, it includes policy analysis.

While broadband markets are largely national in scope⁶, within the EU we share common institutional arrangements as to the development of e-communications infrastructure and services. We share a common regulatory framework for electronic communications.⁷

Implementation of the directives constituting the regulatory framework and shared objectives is delegated to the EU member states.⁸ Each member state has the responsibility to transpose the EU-level directives into national laws, to be enforced by the national regulatory authorities.⁹ Moreover,

⁶ On the one hand, fixed broadband evolved from narrowband, which was provided using the national PSTN infrastructure. On the other hand, it evolved from local and regional RTV-networks being upgraded to provide two-way communication services. Mobile broadband, 3G and 4G, evolved from narrowband 2G cellular networks; they are all operated based on radio spectrum licenses which are national in scope.

⁷ EU regulatory framework for electronic communications, available at http://europa.eu/legislation_summaries/information_society/legislative_framework/124216a_en.htm.

⁸ Subsidiarity is an organizing principle of decentralization, which implies that a matter ought to be handled by the smallest, lowest, or least centralized authority capable of addressing that matter effectively.

⁹ Market analysis is subject to common practice and remedies are reviewed at the EU level to assure harmonization. For more details, see Chapter 3 'The influence of European Union policies and regulation'. In this process the Body of European Regulators for Electronic Communications (BEREC, <http://berec.europa.eu/>) plays an important role.

the Digital Agenda for Europe must be translated into national plans for achieving the EU objectives at the national level.

Recognizing that each member state is different, for instance in terms of historical developments, institutional arrangements, time of joining the EU, market structure and political realities, the approach towards achieving the broadband objectives differs among member states and thus the market outcomes vary. As of January 2013, in the EU league table of fixed broadband subscriptions per hundred inhabitants, the Netherlands occupies first place with 40.2 per cent, while Romania is twenty-seventh with 16.6 per cent (EC, 2013). Even member states with similar rankings, such as the Netherlands (first) and Denmark (second) have distinctly different market structures and market dynamics.

So, should we conclude that every broadband market is unique and very little can be learned and shared across member states in pursuing our common objectives?

To the contrary, the contributors to this book believe that understanding the strategic behaviour of the principle actors – the e-communication services providers – will provide deep insights into the dynamics of broadband markets on both national and European levels, which in turn will provide valuable inputs into the policy and regulatory debate on how to stimulate broadband developments leading to achievement of the Digital Agenda targets. These insights may allow for a more ready acceptance of differences among member states and, hence, support for different developmental trajectories to reach a shared objective.

As the research was aimed at capturing the dynamics of broadband markets in Europe, and given that the situation in each member state has unique features, the research was performed through the development of a set of twelve longitudinal country case studies.

Through application of a common structure and a common framework of analysis, comparisons can be made and deep strategic insights can be obtained from these case studies. The purpose is to use these insights into the dynamics of broadband markets to complement the current policy and regulatory debate and to contribute to an accelerated development of

these individual markets towards achieving the shared broadband objectives and beyond.

Through the use of country-level case studies, the research presented in this book fills a void in the analysis of broadband developments in Europe, which for the most part remained generic – non country specific. The research provides the empirical and analytical basis for formulation of policies and regulations enabling the next stage of broadband and Internet developments. It provides the basis for response to the broader policy question of whether different programmes are needed for different circumstances: e.g., more generally, between developed and developing countries and, more specifically, within Europe between member states that joined early and those that joined more recently. Moreover, the research provides wide-ranging evidence on how broadband may be deployed in rural areas to close the digital divide.

Of particular interest in the development of broadband markets is the transition toward a new generation of access infrastructure that requires major investments. The need for these investments may run counter to the (short-run) business imperatives of private firms operating in competitive markets. One may also assert that the current regulatory regime is best suited for stable markets, not markets that are facing a major transition in the underlying technologies. In observing the current outcome of the forces operating in broadband markets, the league table of broadband penetration appears to be led by countries with a high degree of competition between infrastructures, PSTN-copper with (V)DSL on the one hand and RTV-cable with DOCSIS modems on the other. At the same time it appears that this competition hinders the transition towards fibre-based next-generation access networks, as the incumbent operators continue to exploit their installed bases through evolutionary upgrades of their legacy networks. So, will today's leaders become tomorrow's laggards? We respond to this question in the chapters that follow.

In member states with a lower degree of competition or no competition at all between PSTN and the RTV-cable network, the broadband development trajectories are different, as are the transitions to next-generation broadband networks. Moreover, in new member states the development

of mobile and fibre access has become a substitute for the development of the PSTN, while RTV-cable penetration is relatively low. Hence, broadband development again follows a different trajectory, as will the transition to next-generation broadband networks. As the case studies show, operators in the new member states have the opportunity to leapfrog in technology.

The development of different broadband trajectories and the implications for the transition to next-generation access are the focus for the research reported in this book. Hence, two sets of related issues or research questions are of prime interest: the first set looks at the past to explain the current situation; the second looks at the current situation to explore the future of broadband.

- *Set 1:* What were the trajectories for broadband development (fixed and/or mobile)? Which actors have been instrumental in these broadband developments and how? To what degree have competition in and regulation of broadband markets played a role in the provision and uptake of broadband?
- *Set 2:* What are the (anticipated) trajectories toward the next generation of broadband networking (fixed and/or mobile) and achievement of the Digital Agenda targets? Which actors are instrumental in the transition and how will they act? To what degree should competition between infrastructures and the regulation of infrastructures play a role in the provision and uptake of next generation broadband?¹⁰

¹⁰ In the case descriptions and the subsequent analysis we should recognize that the PSTN and the RTV-Cable networks are not only different in the technological dimension but also with respect to content and content regulation. For the PSTN the core value was the reliable transfer of information with protection of the integrity of the content. In relation to the RTV-Cable networks, governments have been concerned with pluriformity of information supply, must-carry obligations, the role of advertizing, etc. As the telecom markets are converging, the tradition of linking content regulation to dedicated networks cannot be continued. In broadband and in the transition towards FttH open access, content is expected to play an important role which extends beyond the 'network neutrality' debate. Where the content dimension intersects with the infrastructure transition, this dimension is captured in the country case studies.

In this context, trajectories are considered to be the cumulative outcomes of strategies that were or are being pursued by the actors in the markets considered.

1.2 The case study approach

The broadband developments and market dynamics in twelve EU member states are captured in twelve longitudinal¹¹ case studies. The case study period starts with the introduction of broadband, around the year 2000, and runs until the year 2013. Overall benchmarks are provided at the beginning and at the end of the case study period, covering general country statistics, communication statistics and major events in relation to joining the EU and implementation of market liberalization. See Tables 1.2 and 1.3 at the end of this chapter.

As the case study period represents a 'snapshot' in the development of e-communication services, and as broadband follows from narrowband, which is an evolution based on the (existing) PSTN and CATV cable networks, a summary of historical developments is provided as part of each case study. The extent to which the history is captured has been the choice of the case author and depends on its relevance for explaining the developments of today.

1.2.1 Structure of the case studies

To facilitate cross-case comparison and analysis, each of the country case studies follows a common framing:

- *Introduction:* providing the historical highlights of telecommunications sector developments leading up to the period of broadband service provision, including information on the legacy market structure, role of the government,

¹¹ A longitudinal study is defined as a correlational research study that involves repeated observations of the same variables over long periods of time, often many decades. It is a type of observational study. In our context, the term longitudinal case study is used to denote the developments over time of the same variables in qualitative terms.

introduction of Internet into the country and development of narrowband service provision;¹²

- *Case description*: providing the case description of the broadband market dynamics over time, with a focus on the strategies and execution thereof by the key actors: firms, regulators, and policy makers;
- *Case focus (where applicable; either embedded in the case description or as a separate section)*: providing specific information on the relevant actors, their strategies and the outcomes that have influenced the course of events in an important way;
- *Within-case analysis*: explaining the market outcomes over time with reference to the case description, indicating the alignment with prevailing theories and concepts, exploring and explaining the ‘surprising events’;
- *Conclusions*: summarizing the case; highlighting those insights that are of particular relevance for the key actors in the broadband market: in particular, those that will affect the achievement of the Digital Agenda targets and those that are considered worth recommending to others (do’s and don’ts); the special features of the country case;
- *Reflections*: on the limitations of the case study and recommendations for follow-up research.

While the case studies are all longitudinal and cover common aspects, the case authors have been invited to focus on the salient developments. Hence, each case shows a different emphasis. Some cases focus on competition between incumbents and entrants; others emphasize broadband development from a public policy perspective, or the role of regulation to foster competition and investment. Still others place more emphasis on the role of non-traditional telecom actors, such as construction companies and housing corporations, while in some cases the role of municipalities appears to be important to broadband development.

All case studies include a reflection on the achievement of the Digital Agenda targets;

¹² Narrowband is defined in the context of this book as data rates below 2 Mbit/s, which includes dial-up Internet access using 56 kbit/s modems and ISDN at 144 kbit/s, basic broadband starts at 2 Mbit/s, with the application of ADSL and DOCSIS 1.0.

broadband performance at the end of the study period is presented in detail. Moreover, the case authors have been challenged to move beyond 2020 in their assessments of future developments. In the concluding sections the authors analyse the country case studies and highlight the lessons learned.

1.2.2 Selection of the case studies

The selection of the case studies is the result of a pragmatic approach by the editors, the goal being to have a representative set of cases across the EU, including: large, medium and small countries in terms of landmass and population; coverage of countries in Northern, Mid- and Southern Europe; longtime member states and those that recently joined the Union; diversity in infrastructure endowments, with different emphasis on the role of fixed versus mobile broadband; and diversity in perception of the role of government: i.e., the regulatory versus the developmental state.¹³ The final selection has been determined by the availability of expert authors and their willingness to put a significant amount of time and effort into this project. The case study countries are Belgium, Denmark, France, Germany, Greece, Spain, Italy, Latvia, the Netherlands, Poland, Sweden and the UK. Table 1.1. provides an overview of the broad characteristics of the country case studies.

1.2.3 Sequence of the case studies

As this research project was triggered by broadband developments in the Netherlands, this case study opens the series of twelve studies. In this case the academic network plays an important role in the development of the Internet and broadband. In addition to intense infrastructure-based competition, this case shows an important role for municipalities and a ‘third actor’ in fibre deployments. It is followed by the case study on Belgium, more specifically on Flanders, which provided for a first cross-case analysis.¹⁴ Flanders shows an important

¹³ See Chapter 2 Research context and perspective for a discussion.

¹⁴ The initial explorations as part of the development of the case on the Netherlands led to a collaborative effort with

Table 1.1 Overview of country case studies

Cty	Cty/pop size S/M/L	Europe N/M/S	Member State E/R	Industry profile	Government/third actor role
BE	S/S	M	E	PSTN⇔RTV	Federal state, two regions
DE	L/L	M	E	PSTN(+RTV)	Federal; industry policy; <i>Stadtwerke</i>
DK	S/M	N	E	PSTN+RTV+FIBRE	Private equity case
EL	M/M	S	E	PSTN+MOBILE	Government programs
ES	L/L	S	E	PSTN(+RTV)	Autonomous regions
FR	L/L	M	E	PSTN(+RTV)	Visible hand, industrial policy, detailed fibre regulation
IT	L/L	S	E	PSTN(+FIBRE)	Visible hand, industry policy/functional separation
LV	S/S	N	R	PSTN+MOBILE +FIBRE	Regulatory intervention, bottom-up initiatives by alternative providers,
NL	S/M	M	E	PSTN⇔RTV	Municipalities, housing corporations, third actor
PL	L/L	M	R	PSTN(+RTV)+ MOBILE	Regulatory intervention, catch-up
SE	L/M	N	E	PSTN+RTV+FIBRE	Municipalities in fibre
UK	L/L	M	E	PSTN(+RTV)	Invisible hand; functional separation

Legend: Cty: country; Pop: population; S: small; M: medium; L: large; N: north; M: middle; S: south; E: early; R: recent. Source: Author.

role for the regional government in orchestrating consolidation of the CATV networks into Telenet, an important competitor to the PSTN incumbent Belgacom.

Denmark follows as another small EU country with similar circumstances and similar level of broadband performance but a totally different market structure and a different role of the regulator. Sweden follows next, with special emphasis on the role of municipalities in ‘fibre to the home’ (FttH) development.

Subsequently we turn to the large countries, with Germany examined next. This case emphasizes the role of government in broadband development, at both the federal and the *Länder* levels. The case on the United Kingdom is next, with the

researchers at Ghent University, Belgium, to compare more structurally the case of the Netherlands with that of Flanders. These efforts have proven to be a great lead into the larger broadband-research-book project. The results have been presented at ITS, Vienna (Van der Wee, Verbrugge and Lemstra, 2012).

emphasis on functional separation of BT as the incumbent operator to improve access conditions for alternative operators.

The case of Italy addresses functional separation as an obligation imposed on Telecom Italia. Its salient features are the lack of CATV networks and the very early deployment of fibre to the home.

The case of France reflects a deep understanding of the challenges operators face in deploying ultra-fast broadband outside the major cities. The case features a strong role of government, including guidance on coordination and collaboration between public and private actors at the local level.

The case of Spain reflects the differences in challenges between urban and rural areas: i.e., the difficulties of achieving universal broadband. The case of Greece shows the challenges associated with the highlands and islands, as well as the impact of the financial crisis. The case of Poland reflects the importance of mobile in closing the ‘digital divide’, as well as the importance of the personality of the regulator in creating a level playing field. Finally, the case of Latvia concludes

Table 1.2. Key statistics at the beginning of the case study period, ~2000

Year	Belgium BE	Denmark DK	France FR	Germany DE	Greece EL	Italy IT	Latvia LV	Netherlands NL	Poland PL	Spain ES	Sweden SE	United Kingdom UK
Country statistics												
Population	2000 ^B 10,239,085	5,330,020	60,545,022	82,163,475	10,903,757	56,923,524	2,381,715	15,863,950	38,263,303	40,049,708	8,861,426	58,785,246
Area (km ²)	2012 ^C 30,528	42,915	551,695	357,021	131,940	301,338	64,569	37,357	312,679	505,968	449,964	243,610
Population density (p/km ²)	2000 ^C 339.0	123.9	96.0	230.3	83.5	193.0	38.1	470.2	122.4	79.6	21.6	241.5
Members per household	1999 ^C 2.49	2.14	2.42	2.16	2.82	2.62	3	2.26	3.17	3.24	2.17	2.31
GDP (€ mln)	2000 ^C 252,543	173,597	1,439,603	2,047,500	137,930	1,198,291	8,433	417,960	185,713	629,907	268,252	1,619,641
Per capita (€)	2000 ^C 24,600	32,500	23,700	24,900	12,600	21,000	3,600	26,300	4,900	15,600	30,200	27,500
Communications statistics:												
Fixed telephone access paths ³	2000 ^B 4,475,000	3,202,000	29,597,000	39,666,000	5,760,000	24,494,000	735,000	8,174,000	9,615,000	17,748,000	6,053,000	31,823,000
Per capita (%)	2000 ^B 43.7	60.0	48.9	48.3	52.8	43.0	30.8	51.5	25.1	44.3	68.3	54.1
ISDN channels (64 kbit/s)	2000 ^B 1,017,000	958,084	4,300,000	17,300,000	312,324	5,666,100	19,600	3,288,778	2,235,780	1,674,100	944,700	3,170,000
Mobile phone subscribers	2000 ^B 5,629,000	3,3636,552	29,613,764	48,202,000	5,932,403	42,200,000	401,000	11,000,000	6,747,000	23,938,970	6,369,000	43,452,000
Per capita (%)	2000 ^B 54.9	63.0	50.3	58.6	56.0	73.8	16.8	69.1	17.5	60.0	71.8	72.7
TV households	2000 ^B 4,026,000	2,349,000	22,724,000	35,887,000	3,500,000	20,660,000	1,027,000	6,600,000	12,113,000	13,200,000	4,045,000	23,400,000
Cable TV HH passed (%)	2001 ^A 112	65	39	70	0	1	50	94	32	71	63	60
Cable TV per HH (%)	2001 ^A 85	58	11	53	0	0	10.5	94	32	15	54	13
Satellite TV per HH (%)	2001 ^A 2	22	18	32	0	9	8.8	5	19	13	19	20
Internet users percent pop. ¹	2000 ^A 26	58	19	23	6	18	6.3	40	9	11	58	32

Table 1.2 (cont.)

	Year	Belgium BE	Denmark DK	France FR	Germany DE	Greece EL	Italy IT	Latvia LV	Netherlands NL	Poland PL	Spain ES	Sweden SE	United Kingdom UK
Broadband lines, DSL	2000 ^B	43,000	26,399	64,000	162,000	72	114,900	0	10,000	0	44,956	49,000	38,000
Broadband lines, Cable	2000 ^B	102,013	41,000	121,911	25,000	0	0	0	320,000	0	13,459	56,300	19,693
Broadband per capita (%)	2000 ^B	1.4	1.3	0.3	0.2	0	0.2	0	2.1	0	0.1	1.2	0.1
Services revenues (€ bht)	2000 ^A	5.1	3.4	29.5	41.9	4.3	29.0	0.25	9.2	7.2	18.7	5.0	30.4
Major events:													
Date of joining EEC/EU	1957	1957	1973	1957	1957	1981	1957	2004	1951	2004	1986	1995	1973
Introduction of €	2002	2002	na	1999	1999	2002	1999	2014	1999	na	1999	na	na
NRA established	BIPT: 1991	1991	Tele- styrelsen: 1990	ART: 1997	RegTP: 1998	EETT: 1995	AGCOM: 1998	PUC: 2001	OPTA: 1997	URT: 2001	CMT: 1996	PTS: 1994	Ofitel: 1984
Telecom services market liberalization (full)	1998	1998	1996	1998	1998	2001	1998	2003	1998	2003	1998	1993	1984

Legend: ^A EC Sixth and Seventh Implementation Report COM(2000)814 and COM(2001)706, respectively; ^B OECD Communications Outlook 2003/2013; ^C Eurostat 2013-12; ^D Wikipedia country data;

¹ User is a person having Internet access at home, workplace or school (indicative estimate); ² Source authors; ³ Analogue plus ISDN lines.

Table 1.3 Key statistics at the end of the case study period, ~2013

	Year	Belgium BE	Denmark DK	France FR	Germany DE	Greece EL	Italy IT	Latvia LV	Netherlands NL	Poland PL	Spain ES	Sweden SE	United Kingdom UK
Country statistics													
Population	2013-01 ^C	11,161,642	5,602,628	65,633,194	80,523,746	11,062,508	59,685,227	2,023,825	16,779,575	38,533,299	46,704,308	9,555,893	63,887,988
Population density (p/km ²)	2011 ^C	364.3	129.7	103.0	229.0	86.4	201.5	33.1	494.5	123.2	92.0	23.0	256.8 ^d
Members per household	2005 ^C	2.44	2.1	2.39	2.11	2.73	2.5	2.55	2.27	2.83	2.94	2.15	2.36
GDP (€ mln)	2012 ^C	375,881	245,252	2,032,296	2,666,400	193,749	1,567,010	22,256	599,338	381,204	1,029,002	407,820	1,929,580
Per capita (€)	2012 ^C	34,000	43,900	31,100	32,600	17,200	25,700	10,900	35,800	9,900	22,300	42,800	30,500
Purchasing power standard	2012 ^C	120	126	109	123	75	101	64	128	67	96	126	106
Communications statistics:													
Fixed telephone access paths ^e	2011 ^B	3,787,000	1,227,000	15,900,000	28,629,000	5,076,000	22,023,000	516,000 ³	3,556,000	6,853,000	19,867,000	3,167,000	30,225,000
Per capita (%)	2011 ^B	34.5	22.0	24.4	35.0	44.9	36.3	25.4 ³	21.3	17.8	43.1	33.5	48.2
Mobile phone subscribers	2012-10 ^A	13,104,323	8,459,636	69,209,505	101,657,000	13,342,500	97,539,960	3,880,779	20,622,284	50,519,353	57,137,919	13,694,000	87,021,613
Per capita (%)	2012-10 ^A	118.7	151.6	105.8	124.2	118.2	160.4	190.1	123.3	131.1	123.7	144.4	138.2
TV households	2011 ^B	4,568,000	2,847,000	26,790,000	39,311,000	3,920,000	24,525,000	1,003,000 ³	7,270,000	12,959,000	16,377,000	4,900,000	26,109,000
Cable TV per HH (%)	2012-07 ^A	69.6	76.8	9.4	42.6	0.0	0.0	38.5	69.0	28.0	7.6	758.8	13.5
Satellite TV per HH (%)	2012-07 ^A	.	8.9	24.0	44.1	8.3	19.5	12.2	9.9 ³	47.6	10.0	14.2	34.6
IPTV per HH (%)	2012-07 ^A	21.4	3.7	42.5	3.5	1.6	1.2	13.5	13.9 ³	1.4	5.0	13.1	2.8
Fixed broadband lines	2013-01 ^A	3,692,009	2,218,719	24,032,000	27,960,396	2,689,428	13,675,231	472,039	6,730,985	7,240,401	11,460,342	3,104,757	21,179,609
Per capita (%)	2013-01 ^A	33.4	39.8	36.7	34.2	23.8	22.5	23.1	40.2	18.8	24.8	32.7	33.6

Table 1.3 (cont.)

Year	Belgium BE	Denmark DK	France FR	Germany DE	Greece EL	Italy IT	Latvia LV	Netherlands NL	Poland PL	Spain ES	Sweden SE	United Kingdom UK
Data rates 30-99 Mbit/s (%)	2013-01 ^A 46.2	13.5	2.9	10.9	0.1	0.1	22.9	30.9	10.2	8.3	4.0	14.5
Data rates ≥100 ⁺ Mbit/s (%)	2013-01 ^A 12.2	1.1	4.0	1.2	0.0	0.0	20.5	4.1	1.3	1.9	24.6	0.9
Broadband lines DSL	2011-06 ^B 1,857,523	1,190,954	21,481,000	23,476,720	2,554,689	13,145,926	152,000 ³	3,347,000	3,158,944	9,023,365	1,470,000	16,297,666
Broadband lines Cable	2011-06 ^B 1,723,796	592,816	1,440,000	3,952,000	0	0	19,000 ³	2,924,000	1,653,339	2,103,880	593,000	4,168,129
Broadband lines Fibre	2011-06 ^B 3,271	335,908	246,000	178,800	3,902	290,039	225,000 ³	302,000	162,953	245,062	977,000	582,829
Mobile broadband	2013-01 ^A 3,638,434	5,427,417	28,400,000	33,617,141	5,079,260	31,556,471	891,387	10,248,800	28,287,157	24,974,417	9,973,000	52,436,585
Per capita (%)	2013-01 ^A 33.3	97.6	43.6	41.1	44.8	52.1	40.0	61.5	74.1	54.1	105.9	84.0
Services revenues (€ bln) ¹	2011 ^A 8,684	4,233	52,074	57,900	6,436	43,623	0.581	13,475	10,175	35,732	8,063	46,731
Major events:												
Date of joining EEC/EU	1957	1973	1957	1957	1981	1957	2004	1951	2004	1986	1995	1973
Introduction of €	2002	na	1999	1999	2002	1999	2014	1999	na	1999	na	na
NRA established	BIPT: 1991	Telestyrelsen: 1990	ART: 1997	RegTP: 1998	EETT: 1995	AGCOM: 1998	PUC: 2001	OPTA: 1997	URT: 2001	CMT: 1996	PTS: 1994	OfTel: 1984
			ARCEP: 2005	BNetzA: 2005				1997 ACM: 2013	URTIIP: 2002			Ofcom: 2004
Market liberalization (full)	1998	1996	1998	1998	2001	1998	2003	1998	2003	1998	1993	1984

Legend: ^A EC Digital Agenda Scoreboard 2013; ^B OECD Communications Outlook 2013; ^C Eurostat 2013-12; ^D Wikipedia country data; ¹ Electronic communications sector revenues, including mobile, fixed, pay TV, other; ² Estimate based on KPN information Oct. 2013; ³ Source authors; ⁴ 2010; Plus 627,044 other technologies; ⁵ Analogue plus ISDN lines.