Information and Communications Technologies

OECD Communications Outlook 2007

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Foreword

This report, the ninth in a series of biennial Communications Outlooks, *was prepared in the context of the OECD's work on the analysis of communication policy in member countries.*

The report was drafted by the staff working in the OECD Directorate for Science, Technology and Industry, including Dimitri Ypsilanti, Taylor Reynolds and Frédéric Bourassa as well as John Houghton from Victoria University. Andra Leurdijk, Gabriela Bodea and Jop Esmeijer from TNO (the Netherlands) drafted Chapter 6 on broadcasting. The authors are grateful for the contribution of information by telecommunication carriers and to national delegations that responded in 2006 to an OECD questionnaire relating to industry regulation and data.

The authors also would like to gratefully acknowledge the assistance of Tom Vest and Netcraft for providing data. The pricing comparisons are undertaken in co-operation with Teligen Ltd., from which quarterly updates of some pricing indicators using the OECD methodology are directly available. Many of the other indicators in this report are available in electronic format from the OECD Telecommunication Database 2007, *covering the period 1980-2006.*

The draft of this report was presented to the OECD Working Party on Communication Infrastructure and Services Policy at its meeting of 12-13 December 2006. The Committee for Information, Computer and Communications Policy subsequently recommended that the report be made available to the general public.

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Table of Contents

List of boxes

List of tables

List of figures

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OECD Communications Outlook 2007

Executive Summary

Growth through transformation

After emerging from the crisis of 2000, the telecommunication industry is being transformed. Technological changes and the development of new services are affecting the core businesses of telecommunication operators.

Voice continues to be the key driver in OECD telecommunication markets which have now attained revenues of USD 1 trillion. However, voice services, and the structure of telecommunication revenues, are evolving. Mobile services now make up 40% of all OECD-area telecommunication revenues, and mobile subscribers outnumber fixed subscribers by a ratio of 3 to 1. At the same time, technologies such as Voice over Internet Protocol (VoIP) are exerting strong downward pressure on prices for voice services. The impact of VoIP is apparent in prices for international fixed-line calls, which many VoIP operators now bundle into flat-rate subscription plans. As a result, the future of voice revenue streams is unclear.

The number of high-speed Internet connections is one of the main reasons why technologies such as VoIP have had such an impact on the market. Broadband is quickly becoming the dominant technology for Internet access throughout the OECD area; 60% of the area's 256 million Internet subscribers now have a broadband connection. New broadband revenues have helped operators offset declines in voice revenues.

Operators now commonly market multiple-play offers of video, voice and data to hold on to subscribers as well as to introduce new revenue-generating services. Users can now subscribe to multiple-play offers over a variety of platforms, as operators in previously distinct markets have begun to compete. Thus, cable providers commonly offer data and voice while mobile companies complement their offerings with data and video packages and traditional telecommunication providers offer similar multiple-play offers over their networks.

Consumers are benefiting from the dismantling of barriers between markets as they can now choose similar and substitutable services from a number of providers. At the same time, the removal of these barriers is forcing regulators to re-examine how specific markets are regulated. These issues can be sensitive if network-specific regulations are closely tied to social or cultural policy.

Transformation led by competition

The current transformation of telecommunication markets is a product of increased competition. Markets with healthy levels of competition have led the introduction of innovative services and appealing pricing packages. In a number of OECD member countries, local loop unbundling changed the competitive landscape by allowing multiple providers to sell communication services over the same line. Infrastructure-based competition, typically between cable and telecommunication networks, also spurred operators to enter their rivals' traditional business areas and has reduced prices for consumers.

The past two years have seen municipal networks enter the competitive telecommunication landscape. Various cities and towns have built or put forward plans for wireless or fibre access networks as a way to improve connectivity for residents. Some of these networks have been built under "open-access" rules which require the network operator to offer capacity to any service provider under equal terms. In other areas, lower-cost Wi-Fi networks are being promoted as a way to improve public services and solve digital divide problems.

Signs of change

The rise in broadband Internet access has signalled a change in the way that telecommunication services are delivered and priced. Trends show a distinct shift away from paying for voice to paying for data, which can also be used to transport voice. Some operators now offer flat-rate packages for domestic and international voice calls to fixed lines. Others have introduced flat-rate, unlimited calling for mobile subscribers to a group of pre-selected numbers. Flat-rate pricing is also the dominant structure for broadband access across the OECD area.

Flat-rate pricing is typically applied to a specific service. However, the past two years have also witnessed the introduction of fixed/mobile convergence. Various operators now offer phones that function as a mobile phone outside the home but switch to a Bluetooth or Wi-Fi-enabled landline at home. Such offers are in their early stages but show how the distinction between fixed and mobile telephony is diminishing.

Converged services are marketed as a way to eliminate the need for two phone subscriptions (fixed and mobile) and to reduce the costs of telephony for consumers. Over the past two years, in fact, prices for all types of telecommunication have generally fallen while services have improved. For example, consumers typically pay less for broadband than they did two years ago, while their connection speeds have generally increased.

Price decreases and improved services have been the most marked in markets characterised by intense competition. Competition may be the product of regulatory intervention, as in the case of local loop unbundling, or may be the result of new infrastructure-based competition. In particular, competition between traditional wireline and wireless access providers is increasing in telecommunication markets. The two technologies may not be perfect substitutes but flat-rate data offers on mobile networks are beginning to compete with broadband connections to individual homes. The ultimate extent of such substitutability is unclear, as individual demands for bandwidth may outstrip capacity on wireless networks. However, certain data services may clearly be as competitive on mobile networks as fixed.

Competition in telecommunication markets used to be limited to other domestic operators but users can now receive services from anywhere in the world over a broadband connection. Broadband subscribers in one country can easily sign up for local phone service in another country that is delivered to them over the Internet. Domestic broadcasting markets are also undergoing changes both as countries begin to switch to digital broadcasting and as a result of increasing competition from Internet-based content. These developments are drawing attention to regulatory changes that may be needed in the future.

The growth and development of communication markets is also reflected in trade of communication equipment. Telecommunication trade continues to grow in the OECD area and now accounts for 2.2% of all trade. The growth is most notable between the member and non-member countries, and increasing imports from countries such as China are having a substantial impact on trade balances. Exports to non-member countries are up 66% since 1996 while imports from these countries are up 112%.

China is one of the five emerging countries in the group known as the BRICS (Brazil, Russia, India, China and South Africa). They are among the world's fast-growing ICT markets and developments in these five countries have spillover effects in the OECD area. Between 2000 and 2005, ICT spending in the BRICS economies increased by more than 19% a year from USD 114 billion to USD 277 billion, while worldwide ICT spending increased by just 5.6% a year and OECD country spending by 4.2% a year.

Recent developments in OECD communication markets have been beneficial for consumers and they continue to increase the proportion of household expenditures for communication goods and services. These markets will continue to evolve over the next two years as operators diversify away from voice and provide a wider range of services. This will require policy makers to constantly monitor markets and re-evaluate policies that may no longer be optimal. There will be more interest in extending fibre-based technologies closer to end users and regulators will be faced with decisions regarding the role of regulation in relation to these networks. Finally, the next two years will likely see closer integration of broadcasting and telecommunication markets as more video services are provided over telecommunication networks. Regulators will thus be under pressure to harmonise content policies across platforms.

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Chapter 1

Policy Issues and Market Structure

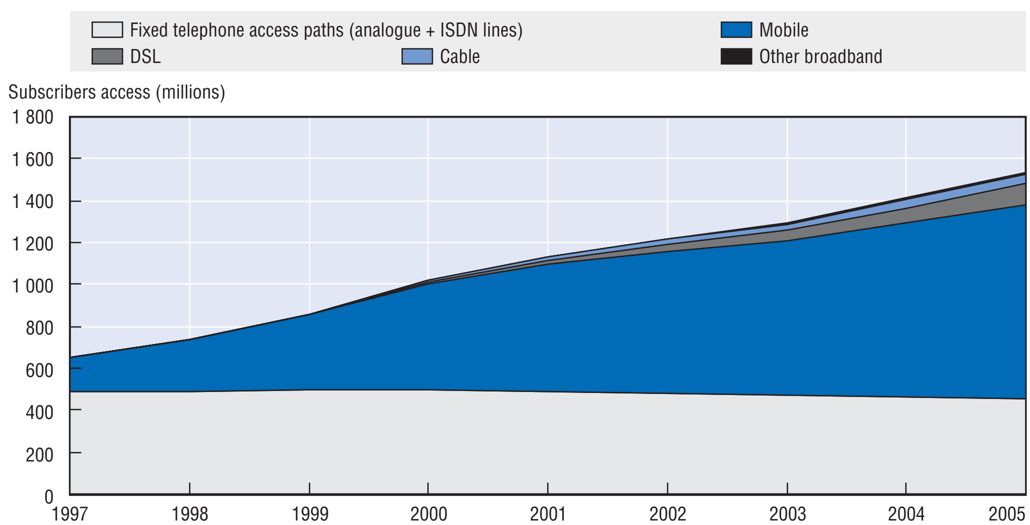
The telecommunication industry is being transformed. This chapter shows that voice has been, and continues to be, the key driver in OECD telecommunication markets. However, voice services are evolving. Voice over Internet Protocol (VoIP) and the growth of mobile telephony are changing voice markets significantly, causing shifts in the structure of telecommunication revenues. Broadband is quickly becoming a dominant technology and multiple-play offers of video, voice and data are now available over a variety of platforms. The chapter also highlights several emerging policy issues including the future of unbundling, investment in new networks, traffic prioritisation, universal service, and the need to reconcile broadcast and telecommunication regulation.

The telecommunication industry is in a state of transformation. Rapid changes in the communication landscape, resulting from technological change and the development of new services, are affecting the core business of telecommunication operators. The challenge for the industry is to refocus on emerging higher value-added services, which often require significant investment in new network technologies, and balancing this against shareholders' focus on shorter-term performance.

Voice has been, and still is, the key driver for the telecommunication business. Data services are increasingly important but voice is still by far the largest component of OECD countries' telecommunication revenues – a market worth USD 1 trillion (Table 1.1). Any changes to how voice services are delivered or charged will have a significant impact on the industry. This is precisely why the Internet has become such a threat to traditional voice revenue streams and why telecommunication firms are working to salvage the core elements of their businesses. Voice over Internet technologies are helping to push the price of voice communication towards zero, and with it, the largest portion of traditional telecommunication operators' revenues.

Voice continues to dominate in telecommunication firms' overall revenues and an increasing percentage of these revenues is derived from the mobile sector. Mobile subscriptions make up the largest portion of access paths in the OECD area at 59% and the market is growing (Figure 1.1). Traditional voice paths over fixed networks account for 31% but the percentage has declined 5% over the past two years. Broadband connections only account for 10% of total access paths but the proportion is rising very rapidly with growth of 88% over the past two years.

Figure 1.1. **Access growth in the OECD**



StatLink http://dx.doi.org/10.1787/000488336313

Voice minutes are shifting from the fixed to mobile networks in almost all OECD markets. The growth in total minutes is good for mobile operators but vigorous competition in many OECD markets is pushing down prices for mobile voice calls and mobile operators are also searching for ways to increase revenues. Traditional fixed-line and mobile operators are increasingly looking to broadband data as a way to increase revenue per access path.

Broadband is on its way to becoming the dominant telecommunication medium

Broadband is quickly becoming the basic medium for service delivery on both fixed and wireless networks. This has been made possible though the dismantling of service-specific network architectures. The telecommunication industry has long been segmented, with different networks delivering different services. The transition from circuit-switched telecommunications to packet-based networking on the Internet has broken down these segment barriers. What is left is a broadband data platform that is able to carry a wide range of telecommunication services.

The term "broadband" is typically associated with wired, high-speed Internet connections. However, within the past two years mobile providers have started offering broadband-speed services (faster than 256 kbit/s downstream) over their wireless networks. An OECD study in 2006 found that nearly 30% of mobile operators offered a flat-rate third-generation (3G) data connection. This shift to broadband-based services is good for fixed, wireless and cable operators since they typically own the wires and rights to frequencies that are used to supply these broadband connections. These firms now are looking for ways to best exploit their wired and wireless data networks in the future. There is considerable debate, however, as to the best business strategy for operating these networks.

Many large telecommunication firms see sustained value in offering a wide array of value-added services over their last-mile connections or wireless networks and focusing less on the revenues from the connections themselves. They see voice becoming a commodity and recognise the need to find new revenue streams to replace it. This business trend sees value in providing the pipe and the content running through it.

By contrast, there has been discussion that some telecommunication operators may decide to structure their business assets in a way that allows one side to focus on revenues derived simply from offering data connectivity over fixed-line or wireless infrastructure. These businesses see parts of the firm more as a utility than a media company. This vision holds to the belief that there is immense value in developing high capacity networks that will carry a vast amount of content for third parties and focusing the company's energy on providing the most effective data services at the lowest cost.

These different views on the future of the telecommunication market will lead firms down very different investment and managerial paths. It is too early to say which of the two visions will prove dominant in the industry. However, the era of identical telephone services and public telecommunication operators (PTOs) with very similar structures across OECD countries may be nearing an end.

Multiple play

For the time being, the majority of telecommunication operators have moved closer to becoming all-in-one shops for voice, video and data. In the two years since the previous *Communications Outlook* was published there has been a large increase in the number of multiple play subscriptions (triple play or quadruple play) packaging video, voice and data together. These offers attract consumers because they offer a simple, consolidated bill and are typically less expensive as a bundled package than if the consumer bought all the services separately.

In most jurisdictions, cable Internet providers have moved into triple play more easily than ADSL providers owing to their existing content relationships for video. Traditional telecommunication firms in some markets have struggled to obtain content for their television offerings, and as such, have been slower to launch and gain market share. In other cases, telecommunication operators such as Belgacom and Telenor have managed to acquire rights to highly valued sporting content in an effort to boost their service offerings.

Mobile providers are also offering multiple-play services as a way to compensate for decreasing voice revenues. Television services over mobile are available in some markets but take-up has been subdued given the high price of subscription and data transmission on many of the networks.

There is also a move in some countries to offer "quadruple play" services where mobile service is included in the package alongside fixed voice, data and video. These triple and quadruple play offers are the first step towards converged services. The next logical step then becomes unifying the network platforms for their delivery.

Convergence

One of the difficulties of creating a unified network platform has been to ensure continuous network coverage for users. The past two years have seen some important developments towards filling in these coverage, bandwidth and mobility gaps. Operators are expanding their 3G networks across the OECD and this will provide higher data speeds to users. In 2005, 11% of all OECD mobile subscribers were on a 3G network. These networks offer the broadest "blanket" data coverage to users but technological limitations mean they cannot support very high bandwidth or extensive concurrent usage.

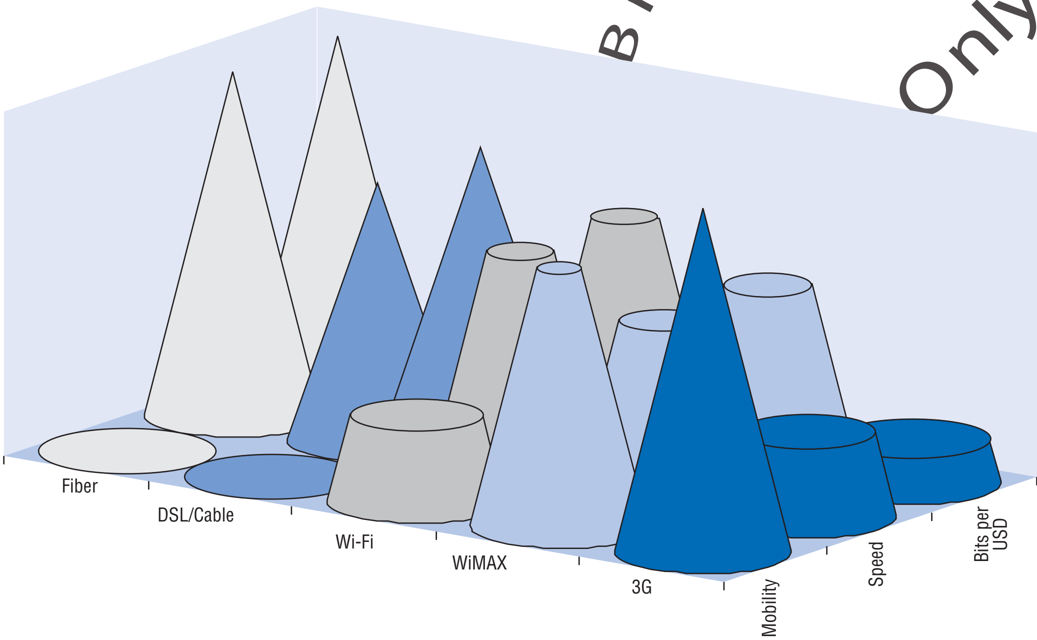
Users wishing to access the Internet via a wireless connection had few options other than 3G networks and Wi-Fi (in a small radius from a wired broadband connection). Over the past two years there have been interesting developments with new technologies that could fill this mobility gap between the two technologies.

Several technologies are vying to offer higher speeds than traditional 3G but with more mobility than Wi-Fi. Many of these technologies are add-ons to existing 3G networks that promise much higher speeds. However, WiMAX is probably the wireless technology discussed most in policy and technology circles.

WiMAX reached an important milestone since the previous *Communications Outlook*. Korean operators launched an extensive WiMAX-based network in Seoul. The technology, called WiBro in Korea, offers high-speed, mobile data to users. The development of these stop-gap technologies is seen as a crucial and complementary element for the widespread deployment of next generation networks. Figure 1.2 shows how WiMAX-based technologies fit into the wider category of Internet services based on mobility, speed and price.

Wired networks have also evolved since the previous *Communications Outlook*. ADSL or cable Internet services are available to an increasing number of households in the OECD area (Chapter 4) but some operators have begun upgrading their copper networks to fibre. Large operators in Japan, Korea and the United States have taken the lead in bringing fibre

Figure 1.2. **Components of a seamless telecommunication network**



Note: Higher cones represent better performance in a given area.

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connectivity to homes as a way to offer much higher bandwidth and new services. Operators will likely upgrade both their wired and wireless networks as a way to offer the enhanced connectivity needed for next generation networks.

Market structure

The move towards broadband Internet service as the delivery network for a wide range of communications services creates a schism in many traditional market definitions. In the past, telecommunication firms only offered fixed-line voice and policy makers could easily define the specific market and make policy decisions. Now the convergence of video, voice and data on broadband networks could, in one way, signal more competition in individual markets for each of these services. At the same time, there may be relatively few firms in a country that could provide a combined video, voice and data offering and this may imply a reduction in competition for the communications sector as a whole.

One example of this dilemma is the Internet access market. There may be a range of providers in a country offering some sort of Internet access. These include dial-up providers, ADSL, cable, fibre, 3G and Wi-Fi hotspot operators. The market for 24 kbit/s data access could include all six categories of broadband providers. However, the market for 24 Mbit/s (1 000 times faster) would include fibre and possibly ADSL and cable depending on the status of upgrades to the networks. In the future, it may be necessary to break down telecommunication markets by access speeds or mobility requirements, particularly if all services move to IP.

Others have suggested that it may make more sense to look at markets for individual services. For example, the market for voice would include any operator able to carry a voice signal from a certain type of device. These market definitions will become more important as operators move closer to the making their next generation networks operational.

Emerging policy issues

There are several policy issues which have either emerged or become more pressing since the previous *Communications Outlook*. They could have a profound effect on telecommunication markets and regulatory policy.

The future of unbundling

The emergence of fibre-based connections to homes has revitalised arguments around unbundling. The debate is increasingly important as reliance on copper-based networks is set to diminish. Some of the key decisions will involve unbundling requirements for street cabinets or fibre connections running directly to homes. Other questions will involve whether certain markets are sufficiently competitive to warrant lifting unbundling requirements. In addition, the unbundling debates will begin to include network topography, which will determine, to a large part, what types of unbundling may be possible on the line.

Investment in new networks

Another key policy issue ahead in telecommunication markets will be how to promote investment in telecommunication networks. Policy makers want to find the most effective and efficient way to promote the development of fibre and converged broadband networks. These investment debates will likely include discussions of the role of government participation in facilitating, providing or funding Internet access services (Wi-Fi, fibre). Spectrum policy reform is also likely to be an important element in future infrastructure development decisions.

Traffic prioritisation

Another key issue to appear in the past two years regards the prioritisation of data traffic on IP-based networks. Debates over the issue have appeared in several OECD countries but will likely touch all OECD countries in the coming years.

Universal service

Universal service obligations (USO) were typically written with the provision of voice in mind. However, as the following chapters in this *Communications Outlook* highlight, the importance of voice services as a proportion of total telecommunication usage is decreasing. Some policy makers and even the OECD have examined whether broadband access should be included as part of universal access requirements. As the telecommunication market evolves, particularly with regard to next generation networks, policy makers will face some critical decisions regarding the continuation of USO requirements. Debates will likely revolve around whether these obligations are still necessary or, if determined to be so, what services and connectivity would be mandated.

Reconciling broadcasting and telecommunication regulation

Over the past two years cable operators moved increasingly into the telephony business while telecommunication operators introduced video services over IP. Satellite providers have also begun offering broadband services through the acquisition of fixed-line assets. Digitalisation of terrestrial television and radio also holds out the possibility of interactive services as has been seen in countries such as Korea.

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These various types of providers (fixed line, cable, satellite, terrestrial television and radio) now offer very similar packages of services in many OECD countries but regulations across the three types of firms are still not harmonised in many jurisdictions. The next few years will likely see a consolidation of broadcast and telecommunication regulation in many OECD countries.

Sustained growth through transformation

Two years ago, the *Communications Outlook* theme was broadly summarised by the phrase, "a return to growth". The last two years have indeed been characterised by growth, but not from the traditional business segments. Fixed-line markets are in decline while the mobile and broadband segments are propelling the industry. The current status of the communications market in the OECD could be summarised by the new phrase, "sustained growth through transformation".

As highlighted above, communications companies have had to adjust their business models in order to survive. Television broadcasters are looking at ways to bolster revenues in an era of personal video recorders that give viewers the ability to schedule their television viewing and fast-forward through advertisements. Broadcasters are also struggling with declining viewership and increased competition from telecommunication firms and online content in general. As a result, broadcasters are transforming the way they sell advertising by putting more emphasis on product placement and on-demand video provision. These and similar transformations are likely the best path to sustaining revenues.

Telecommunication firms are also evolving from voice providers into data and media companies in an effort to stem the losses from their fixed-line or traditional voice businesses. Several operators have announced an intention to separate elements of their businesses structurally, essentially dividing the company into one firm providing fixed-line connectivity and another providing content and other value-added services. BT in the United Kingdom and KPN in the Netherlands have been the leaders in this type of transformation.

The final transformation is by Internet companies. Large Internet-based firms such as Google and Yahoo have started moving into telecommunication and broadcast markets by offering voice and video services. Many of these services have been tethered to a computer and have yet to make their foray into traditional telephones and televisions in OECD households. This important leap is not far away however and will signal another big change in the communications landscape.

These transformations are ultimately to the benefit of consumers and business. Increased competition for voice and video services will reduce prices and likely expand the amount of content available to consumers. Television without borders will emerge, opening vast new streams of content to users. Voice communication and online collaboration will also become less expensive.

This transformation has been thrust on traditional broadcasters and telecommunication operators unwillingly but both types of firms are quickly modifying their business strategies to remain relevant and profitable. Growth will likely continue over the next two years but the firms that are actively reinventing themselves are likely to have the best chance of benefiting from society's evolving communications demands.

Table 1.1. **Major public telecommunication operators and Internet service providers in the OECD area (fiscal year 2005)**

			USD millions						Units		
Name of PTO	Country		Revenue	Net income	Debt	Capital expenditure	Mobile revenue	R&D Spending	Total access lines	Mobile subscribers	Employees (units)
NTT	Japan	1	98 039	6 442	50 134	18 666	43 549	2 886	..	48 825 000	201 000
Vodafone (Group)	United Kingdom	3	75 125	- 41 965	131 004	7 273	73 122	375	170 600 000	170 600 000	60 000
Verizon	United States		75 112	7 397	39 010	15 324	3 230	..	105 000 000	51 300 000	250 000
Deutsche Telekom	Germany		74 505	6 625	97 873	11 586	36 815	250	49 700 000	96 800 000	243 695
France Telecom	France		50 048	7 136	37 501	7 500	..	751	145 200 000	84 315 000	203 008
Telefonica	Spain		47 353	5 557	27 361	6 698	20 642	666	153 300 000	99 100 000	207 000
AT&T	United States		43 862	4 786	26 115	5 576	34 433	..	86 900 000	54 000 000	189 950
Telecom Italia	Italy		37 399	3 925	49 823	6 466	16 204	121	99 747 000	48 747 000	85 484
Sprint	United States		35 689	3 826	25 679	5 057	22 328	47	55 000 000	47 600 000	79 900
BT	United Kingdom	3	35 480	1 933	13 698	5 713	280	1 322	36 532 000	341 000	104 400
Bell South	United States		33 984	3 294	17 188	3 457	6	..	20 037 000	54 144 000	63 066
KDDI	Japan	3	25 822	1 062	10 704	2 298	22 539	139	25 439 000	25 439 000	14 021
Telstra	Australia	4	17 383	1 888	17 819	3 285	217	18	..	8 488 000	..
America Movil	Mexico		16 711	2 903	13 242	3 500	..	..	95 000 000	93 000 000	34 574
Telmex	Mexico		14 949	2 660	8 345	2 109	..	..	18 375 000	..	..
KPN Telecom	Netherlands		14 764	1 696	12 358	468	7 216	25	..	..	29 286
Qwest	United States		13 903	- 779	15 480	1 613	527	..	..	..	39 000
MMo2 (Group)	United Kingdom	1	12 151	620	6 367	2 573	..	..	..	..	..
TeliaSonera	Sweden		11 735	1 833	9 114	1 551	2 183	385	80 000 000	2 507 000	28 175
Korea Telecom	Korea		11 598	539	12 369	1 776	1 128	251	21 091 000	..	37 957
Telenor	Norway		10 703	1 418	19 316	29	6 349	62	43 473 000	41 400 000	27 600
SK Telecom	Korea		9 867	..	..	..	..	74	..	19 530 117	4 294
AllTEL	United States		9 487	1 331	5 988	1 349	2 379	..	13 945 700	10 662 300	..
Portugal Telecom	Portugal		7 982	17 576	4 590	1 179	4 365	35	42 007 000	35 117 000	32 389
Swisscom	Switzerland		7 786	1 877	5 428	870	832	31	6 141 000	4 281 000 000	16 088
TDC	Denmark		7 760	1 242	8 288	937	2 673	4	15 353 000	9 022 000	20 225
Belgacom	Belgium		7 120	1 199	4 996	870	2 726	..	9 504 000	4 253 000	16 335
OTE	Greece		6 844	- 21	4 300	850	2 248	..	9 555 000	9 300 000	17 782
Telus Corp.	Canada		6 730	579	479	1 090	2 727	..	9 200 000	4 521 000	29 819
Tele2 AB	Sweden		6 686	313	1 584	487	1 965	..	2 750 000	11 527 000	3 909
Rogers	Canada		6 537	1 772	8	965	2 986	..	8 460 000	6 200 000	25 000
Wind (Infostrada)	Italy		6 021	- 405	8 660	6	3 766	8	16 603 000	13 700 000	7 666
Cable & Wireless	United Kingdom	3	5 873	155	1 425	309	655	..	4 636 000	2 746 000	8 150
Bouygues Telecom	France		5 656	440	5 389	..	5 656	33	5 563 000	5 563 000	7 300
Türk Telekom	Turkey		5 582	1 277	..	351	..	..	21 152 845	..	51 737
Telekom Austria	Austria		5 472	521	3 853	785	3 125	54	12 396 800	8 963 100	15 595
Liberty Global	United States		5 151	- 80	10 115	1 195	..	..	14 755 000	..	21 600
Turkcell	Turkey		4 479	799	..	778	4 479	..	..	32 100 000	3 064
Telecom NZ	New Zealand	2	4 056	645	2 479	495	592	6	3 018 000	1 601 000	8 110
Telephone and Data Systems (TDS)	United States		3 960	223	1 056	721	3 036	..	6 700 000	5 482 000	7 300
Level3	United States		3 613	- 638	1 435	305	..	..	..	..	44 200
NTL	United Kingdom		3 541	765	4 144	524	..	..	3 325 900	..	9 820
LG Telecom	Korea		3 427	242	1 249	326	3 427	..	6 510 000	6 510 000	2 044
BCE Inc.	Canada		3 345	1 571	10 997	2 833	3 017	..	27 911 000	5 441 000	60 000
Magyar	Hungary		3 110	217	2 269	498	1 451	..	7 774 559	6 947 494	8 009
Czech Telecom	Czech Republic		2 600	261	1 220	253	1 253	..	7 802 051	4 676 000	10 014
CenturyTel	United States		2 479	334	2 376	415	..	..	2 214 149	..	..
Cegetel	France		2 283	- 86	1 054	748	..	..	3 000 000	..	..
Colt	United Kingdom		2 265	- 611	2 431	227	..	..	..	..	4 070
Citizens Communications	United States		2 162	202	4 408	268	..	..	2 529 900	..	6 103
ONO	Spain		2 158	- 582	1 539	978	..	..	1 922 000	..	4 301
eircom	Ireland	1	2 003	89	2 403	261	..	1	2 110 000	..	7 275
Global Crossing	US (Bemuda)		1 968	- 354	3 299	16	..	..	..	..	..
Hanaro Telecom	Korea		1 552	- 204	1 427	333	..	4	4 294 276	..	1 461
Aliant Inc.	Canada		1 456	..	743	289	363	..	1 500 000	..	..
Earthlink	United States		1 290	29	..	..	..	..	5 315 000	..	..
Cincinnati Bell	United States		1 210	- 65	2 085	143	238	..	931 000	496 000	2 900
Elisa	Finland		935	308	366	255	925	10	2 648 566	2 228 101	4 989

Notes: (1) Fiscal year ending March 2005; (2) Fiscal year ending June 2005; (3) Fiscal year ending March 2006; (4) Fiscal year ending June 2006.

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Chapter 2

Recent Communication Policy Developments

New technological developments have continued to generate growth opportunities in the communication service sector. They are creating new markets and services but also new challenges to policy and regulation. The chapter examines key developments in competition and regulation in OECD markets during this period of change. It explains how local loop unbundling and broadband competition in general have changed the competitive landscape in many OECD countries. It also covers issues of state ownership of telecommunication firms and restrictions on foreign investment, the regulatory treatment of VoIP and fixed-to-mobile interconnection. Finally, it examines the increasing importance of communication in overall household expenditures in the OECD area.

New technological developments have continued to create growth opportunities in the communication service sector. However, these developments, by creating new markets and services, are also creating new challenges to policy and regulation. The new technologies are also reducing revenue streams in the traditional telecommunication service areas; this is having an impact especially on the former monopoly fixed-line telecommunication operators. Voice telephony, the main revenue source for incumbents, is changing significantly and revenues are eroding rapidly as a result of the rapid deployment of a range of Voice over Internet Protocol (VoIP) services and their low per minute charges or flat rate pricing. In addition, substitution is leading to a loss of subscribers as many customers choose to have only a mobile telephone. The mobile telecommunication service sector, after many years of rapid growth, is also facing a slowdown as a result of market saturation in the second generation mobile market. The promise of future growth in the mobile sector will depend on how quickly mobile operators can persuade customers to migrate to third generation mobile offers and, in particular, use mobile data access services including new services such as mobile television.

Broadband penetration continues to grow apace in the OECD area (see Chapter 5). Higher broadband speeds and lower prices have also stimulated the provision of a range of new services. However, the main impact of broadband deployment over the last few years has been the rapid emergence of multiple play offers and, in particular, the provision of IPTV by a number of telecommunication operators either using their own facilities or through local loop unbundling.

Incumbent operators, which have been losing subscribers in the fixed-line market, have been placing increasing pressure on regulators to begin streamlining regulatory frameworks and, where possible, to forbear from regulation. Such pressure has been most evident in the context of unbundling, in particular for new fibre-to-the-home investment. Although competition is increasing in some markets, the development of new services is also resulting in new and complex regulatory issues. This is the case for convergence and the offer of television services on digital subscriber line platforms, for fixed-mobile convergence, where new regulatory models may be necessary, and for rapidly changing broadcast markets.

A number of facility-based telecommunication operators have started to gear up and begun to invest in the next generation of networks which will provide an all Internet Protocol network and provide a digital transport layer capable of supporting a range of existing and new applications. Over the longer term, such investment will certainly accelerate the convergence of services, but it is difficult to gauge at present its impact on competition in the market.

Trends in competition

Two significant changes in the terms of competition have affected the communications sector over the last two years in most OECD countries. The first is local loop unbundling which was earlier adopted as policy but only began to be effective in the last several years, having stuttered along because regulators had not adequately put in place various requirements, such as the wholesale price for unbundled loops, collocation frameworks and service level agreements to be respected by incumbents in terms of delivery times and other technical requirements. The second change, linked in many countries to the process of unbundling, has been the rapid rollout of broadband access in many OECD countries which has allowed new entrants to offer voice over IP and begin to bundle services together into multiple play offers. These developments have been reflected in a significant lowering of prices for residential broadband access in a number of OECD countries, often linked with increases in the speed of broadband offers. The diffusion of broadband has also accelerated the availability of voice over IP which has put competitive pressure on the voice market, the core business of incumbent telecommunication operators.

Competition in broadband markets is expected to continue, given the scope for growth in broadband markets; as of June 2006, the average level of penetration across the OECD area was only 15.5 subscriptions per 100 inhabitants. At the same time, in several countries that have attained relatively high levels of broadband penetration, market growth has continued as DSL broadband lines are replaced by higher capacity lines, including fibre.

The recent trends in competition are expected to strengthen, and new areas of competition are developing. One new market area, which is expected to develop rapidly, is in the fixed-mobile convergence market, with fixed operators beginning to compete with the mobile sector by providing an integrated service using a single telephone terminal and sometimes a single telephone number. This has been facilitated by the development of mobile virtual network operators (MVNOs) in a number of countries which has allowed fixed operators that traditionally did not have access to spectrum to begin to integrate mobile services with their fixed offers. Regulators are helping the development of MVNOs by indicating their willingness to step in if MVNOs cannot negotiate fair terms with mobile licence holders. In turn, a number of mobile operators are beginning to enter the fixed market to provide multiple play offers, including access to broadband, and to provide an incentive for customers to use their mobile terminals at home by offering reduced call prices in the customer's home zone.

In the early days of liberalisation of telecommunication markets, the number of fixed and mobile operators active in the market was an important measure of the development of competition. Now, many OECD countries have moved from a licensing framework for fixed operators towards much simpler market entry procedures based on authorisation. In many cases regulators no longer track the number of operators, but the data show that, with few exceptions, the number of fixed operators is quite large (Table 2.1). At the same time an increasing number of Internet service providers (ISPs) are now providing service competition through VoIP but are not counted in the data on the number of operators. In the mobile sector, because access to spectrum usually requires a licence, it is easy to track operators as numbers are limited. However, as noted above, the development of MVNOs is increasing the number of operators that provide access to mobile cellular services. As convergence progresses, the ability to differentiate operators according to type of network will be more difficult and will also be less useful as a metric, in particular because fixed and mobile operators are expected to migrate to similar technologies based on IP multimedia subsystems.

Telecommunication regulators have viewed service competition as an important step towards facilities-based competition. Service competition, through carrier preselection, unbundling, etc., has been viewed as the initial step on the ladder of investment that would lead to investment in infrastructure by new entrants. For countries for which data are available, there has been some progress in facilities-based competition (Table 2.2). The United Kingdom, which opened its market to competition early, has made steady progress in developing facilities-based competition, as has Denmark; in these countries, the share of new entrants in the access line market is 24% et 19%, respectively. Countries in which the market structure was not based on a single national monopoly offering all telecommunication services (Finland, Hungary and the United States) but on two or more regional operators also have relatively well developed facilities-based competition. In recent years progress in developing facilities-based competition has also taken place in Germany, Iceland, Norway and Portugal. As highlighted in the previous *Communications Outlook* an increasing number of cable companies have entered the telecommunication service market using cable modem technology. As this market expands and as entry into the fixed telephony market by mobile service providers develops, it will become less relevant to examine facility-based competition by looking at the market share of access lines alone.

Service competition, mainly through carrier call-by-call selection and preselection (where the customer has opted for certain classes of calls to be carried by an operator selected in advance without the need to dial a routing prefix), has played an important part in stimulating market competition. Table 2.3 shows the development in preselection in a number of OECD countries for which data are available and relevant. The use of preselection peaked in 2003 and has since started to decline in a number of countries. As subscribers shift towards broadband offers of new entrants, usually based on local loop unbundling, carrier preselection is expected to become less important. The use of carrier preselection has already declined significantly in Japan and Denmark.

Mobile cellular markets continue to grow (see Chapter 3). In a number of countries revenue from mobile cellular services has surpassed revenue from fixed PSTN services. Table 2.4 shows the distribution of market shares in cellular mobile services across OECD countries. Compared to previous years the relative market share of the leading mobile operator has remained fairly static in most OECD countries. The distribution of market shares in some countries is unbalanced, as noted in previous *Communications Outlooks*, usually in countries where the incumbent fixed line operator also is dominant.

Broadcasting markets are changing significantly (see Chapter 6). An important change in recent years has been the development of IPTV for subscribers on broadband networks. These services are challenging the cable industry as well as the terrestrial broadcasting market. It remains to be seen whether the transition to digital terrestrial television and the broadcast of high definition television will rejuvenate the terrestrial broadcast market or whether the introduction of high speed fibre networks will be consumers' preferred means of access to television services.

Regulatory issues

State ownership

Communications Outlooks have in the past tracked progress in reducing government ownership of public telecommunication operators (Table 2.5). In the last two years, there has been some progress in reducing state ownership of public telecommunication operators; notably, the Czech and Icelandic incumbent operators have been completely privatised and the Australian government has relinquished its shareholding in the Australian incumbent (its 17% residual shareholding at the time of writing is to be transferred to an independent investment fund early in 2007). In addition, important reductions in the share of state

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ownership have taken place in Austria and Turkey. A number of countries that had made commitments to completely privatise their incumbent operators have still not done so, although in many cases the share of government ownership has declined somewhat.

Increasing emphasis is being placed on broadband as an important infrastructure for economic growth and social development. As a result, both in large metropolitan areas (Amsterdam, Paris, Vienna) and in areas where it is considered that investment in upgrading infrastructures to provide adequate broadband speeds are insufficient, municipalities have been investing directly or through joint ventures in municipal fibre networks. It is important to ensure that these networks are open to third party service providers and that they do not impinge on private investment in network infrastructure, for example, by limiting access to rights of way.

Foreign ownership

In spite of close to a decade of supporting competition in telecommunication markets, a number of OECD countries still maintain some form of foreign ownership restrictions in this market and little progress has been made to reduce and eventually eliminate these restrictions (Table 2.6). At present three OECD countries have generalised foreign ownership restrictions applying to all players in the market and five countries have foreign ownership restrictions on their incumbent public switched telecommunication provider. Several countries also maintain a "golden share" in the incumbent or have applied some form of regulation which limits ownership of the incumbent carrier so that it does not come under the control of a single investor irrespective of whether the investor is a national or a foreigner. As argued in previous editions of the *Communications Outlook*, there is little justification in maintaining ownership of an incumbent telecommunication operator, especially because during emergencies or crises governments have sufficient power to ensure that such operators act in the public interest. There is even less justification in having blanket foreign investment restrictions which covers the whole telecommunication industry. With the proliferation of voice services on competing platforms and the ability to place limitations on the control of telecommunication operators by limiting the ability of a single investor, irrespective of nationality, to control a carrier, there is little reason to maintain any foreign ownership restrictions in the telecommunication market.

Voice over Internet Protocol

The last several years have seen a number of decisions by regulators on the treatment of Voice over Internet Protocol (VoIP), the use of which both by operators and consumers has proliferated. Many of these decisions have differentiated between VoIP as a technology used to transmit voice calls and VoIP as a nomadic service available on the Internet.

Table 2.7 summarises initiatives taken by OECD countries over the last several years with respect to the treatment of voice over the Internet. In a number of cases a decision was made to subject VoIP services to the same regulatory framework as PSTN voice services, often depending on how VoIP is defined. For example, in Canada VoIP is defined as services using the PSTN numbering plan and providing access to and from the PSTN. On the other hand, in the United States, although the regulatory treatment of IP-enabled services is still under consideration, providers of interconnected VoIP services (which allow an end-user to, among other things, place calls to and receive calls from the PSTN) are required to meet certain obligations with regard to the provision of emergency access service, facilitating lawful surveillance activities and contributing to the federal Universal

Service Fund. Many countries have tried to ensure that VoIP, as a service provided to the public at large, will provide location information for emergency purposes. A number of regulators have taken a cautious approach, noting that decisions they make would be subject to review depending on the evolution of the VoIP market. Nevertheless, the trend is to impose regulations and a number of obligations on VoIP where it tends to be viewed as a substitute to voice services offered over the PSTN.

A number of regulatory decisions have also been taken regarding telephone numbering for VoIP providers (Table 2.8). In a number of cases, VoIP providers have access to geographic numbers or may choose to use non-geographic numbers. In certain countries, if the VoIP service provider is considered as a substitute service for PSTN voice it may be required to use a geographic number. In Belgium, for example, nomadic VoIP service providers can obtain geographic numbers but must inform users of the limitations on nomadic services in that emergency services cannot obtain location information on calls and they must also ensure that emergency services are aware that a specific number is being used by a nomadic VoIP user.

Issues regarding the treatment of VoIP services are likely to continue to be subject to regulatory review in the years to come. These issues may become more complex as next generation networks develop and as there is a wider range of applications that support voice. In addition, use of the numbering system as a criterion for definitions will become less valid as new numbering systems such as ENUM emerge.

Local loop unbundling

Regulatory decisions across most OECD countries to allow the fixed PSTN's incumbents local loop to be unbundled has been a major factor in the development of OECD communications markets and in stimulating the development and competitive provision of broadband offers and multiple play. With the exception of Mexico, New Zealand and Switzerland, all OECD countries require some form of unbundling (Table 2.9). Both New Zealand and Switzerland are expected to introduce local loop unbundling (LLU) in the course of 2007. Regulatory determinations to require unbundling led in many cases to rapid upgrading of local exchanges so that all, or a large percentage of, exchanges can support LLU, although in some countries further progress is required. Some regulators have specifically allowed unbundling for a fixed period of time after which they will review the market to determine whether unbundling should continue to be required. Recent regulatory debates have focused on whether unbundling is a disincentive to investment by the incumbent and whether unbundling should also apply to new fibre networks.

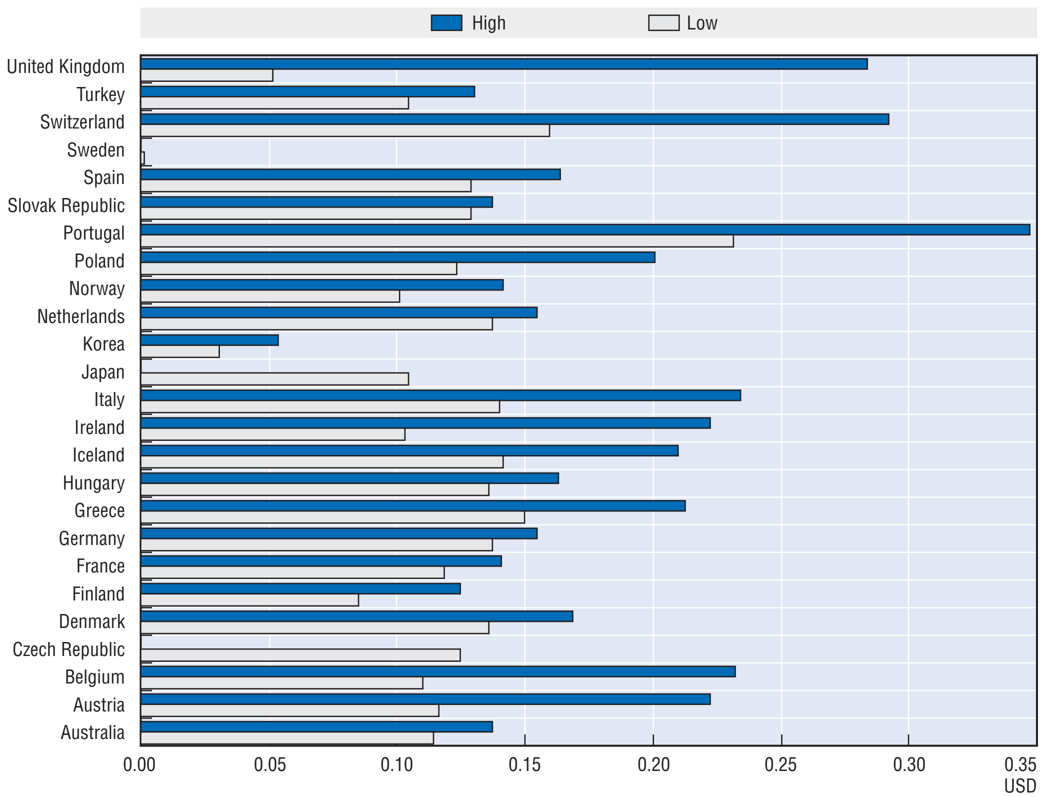
Most of the recent discussions on unbundling have concerned the appropriate pricing methodology for unbundled loop, and changes in unbundling policies have focused on the determination of prices. In addition to unbundling, "naked DSL" has been introduced in some countries, such as Canada where wholesale rates for "naked DSL", set in April 2005, were reduced by half at the end of 2005.

Data, where available, on the possibilities of accessing unbundled lines shows quite significant growth in many countries and in a number of countries all local exchanges can now offer unbundled lines (Table 2.9). Table 2.10 provides some country data on local loop unbundling pricing. There are some important differences in prices among countries. The monthly charge in France for an unbundled loop from the incumbent is EUR 9.29 a month compared to EUR 15.68 in Ireland.

Fixed to mobile interconnection (termination rates)

Figure 2.1 shows that there is a wide variation in fixed to mobile termination. Fixed to mobile call charges (at the retail level) have been a bone of contention among users; however, it is only recently that regulators have acted to reduce the retail rates by bringing down wholesale fixed to mobile termination rates. Some key elements of the different regulations pertaining to fixed to mobile termination rates are described in Table 2.11. There has been an increasing tendency to subject mobile termination rates to regulation, particularly in European countries. In a number of countries, mobile operators have been designated as having market power and fixed to mobile termination rates are subjected to regulation which requires these rates to be cost-oriented. In many cases, the determination of fixed to mobile termination rates is left to commercial negotiations and if the parties cannot agree they may ask the regulator for arbitration.

Figure 2.1. **Fixed to mobile termination rates (price per minute): range in rates, USD, 2006**



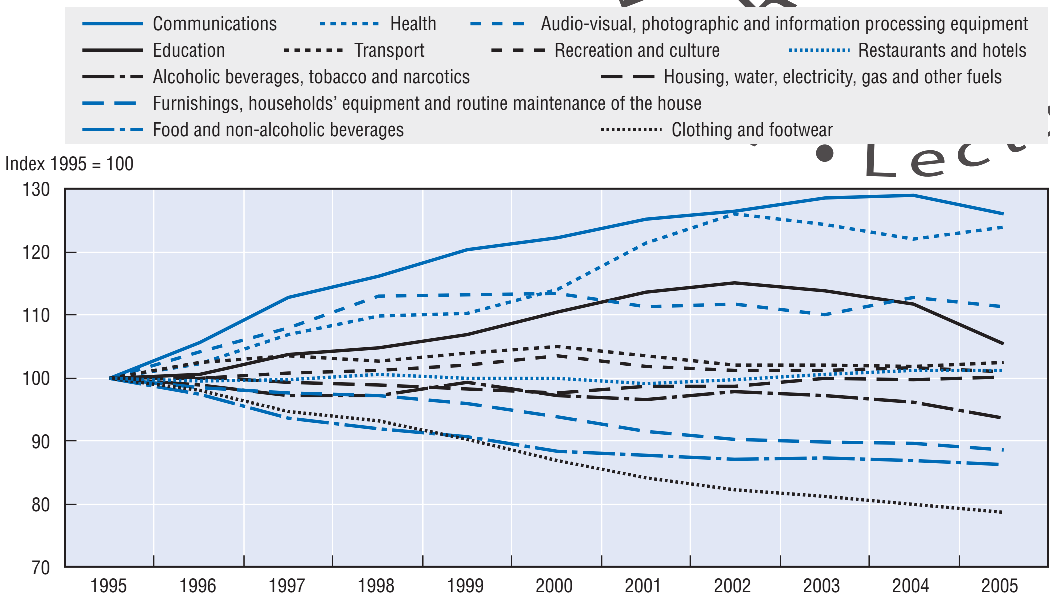
StatLink http://dx.doi.org/10.1787/000563510854

Household expenditures on communications

There has been significant growth in communications access across the OECD area, driven in recent years by broadband Internet penetration, as well as continued growth of the mobile sector. Consumer demand has been a significant factor in the growth for communication products and services. Continuing service and product innovation, declining prices and a wide range of competitive offers continue to attract consumers and, as a result, the relative share of communications expenditures in the monthly expenditures of consumers across the OECD has increased.

The proportion of disposable consumer income allocated to communications has increased significantly since the mid-1990s (Figure 2.2). The financial crisis which disrupted the telecommunication sector during 2001-03 flattened growth in consumer expenditure on communications somewhat, but nevertheless communications, along with health, retains the lead in terms of growth in the major categories of household expenditure on final consumption.

Figure 2.2. **Changes in the proportion of households' expenditure by category**



Note: "Communications" includes Telecommunication equipment and services and Postal services. New Zealand and Turkey are not included in the calculations.

Source: OECD, SNA database.

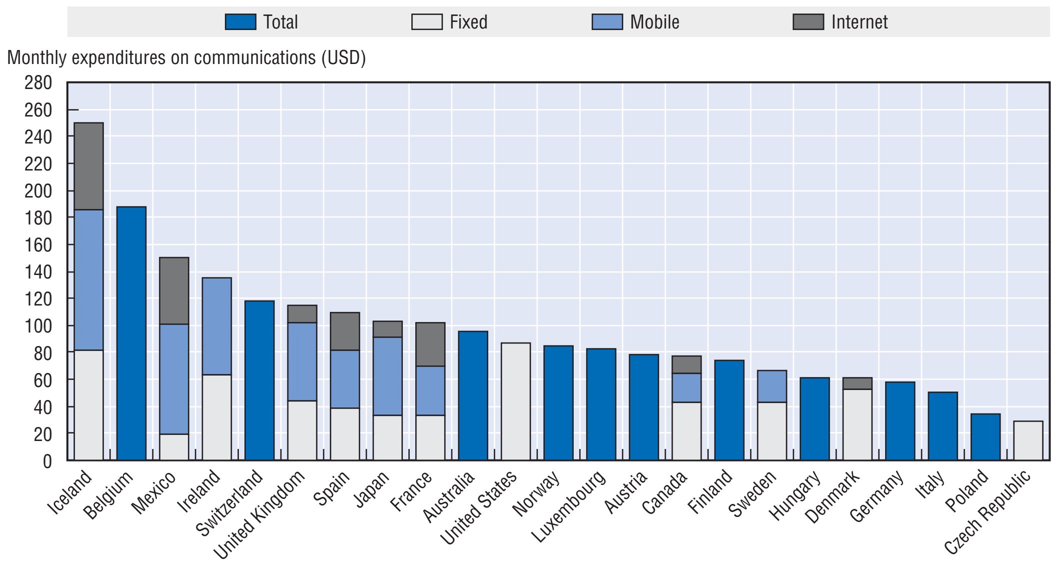
StatLink http://dx.doi.org/10.1787/000646421681

Figure 2.2 shows broad trends in households' spending patterns over the last decade. The time series "Household expenditures on communication" from the OECD's System of National Accounts (SNA) database is the best available source for evaluating overall trends in expenditure on communication in OECD member countries in comparison to other consumption sectors. However, there are two disadvantages. First, the "communication" indicator of the SNA database consists of telecommunication equipment and services as well as postal services. It is not possible to disaggregate these data. A second is the fact that the source of data is national surveys of household expenditure. These cannot be fully harmonised because they often use a different methodology, have different time coverage, and are aggregated in different ways. The data in Figure 2.2 were obtained by creating an index based on the variation of the proportion of every consumption sector compared to the disposable income of households.

In spite of the growth in expenditure on communication products and services, this category accounts for a relatively small percentage of consumer expenditure (Table 2.12). The percentage of final consumption expenditures that households allocate to communications increased from an average of 1.8% in 1991 to 2.3% in 2004. This represents a supplementary annual spending of USD 490 per household from 1991 to 2004. The annual expenditure on communications increased from USD 563 in 1991 to USD 1 054 in 2004.

Figure 2.3, based on national surveys of expenditure, indicates the range in monthly household expenditure on communications in a selection of OECD countries. For the selected countries monthly expenditure ranged from USD 220 a month to under USD 20 a month. Among the factors accounting for differences among countries in monthly expenditure (other than the completeness and the comparability of the survey data), is the availability of new services, such as broadband access, and the level of competition. Countries in which competition has helped to drive prices for communications services to relatively low levels have also often found that consumers use this consumer surplus to purchase more and different communication products and services. At the same time it should be recognised that where prices remain high in a particular country, monthly expenditures in that country may be much higher than expenditures in other countries for the same basket of services.

Figure 2.3. **Monthly household expenditure on communications in selected OECD countries**



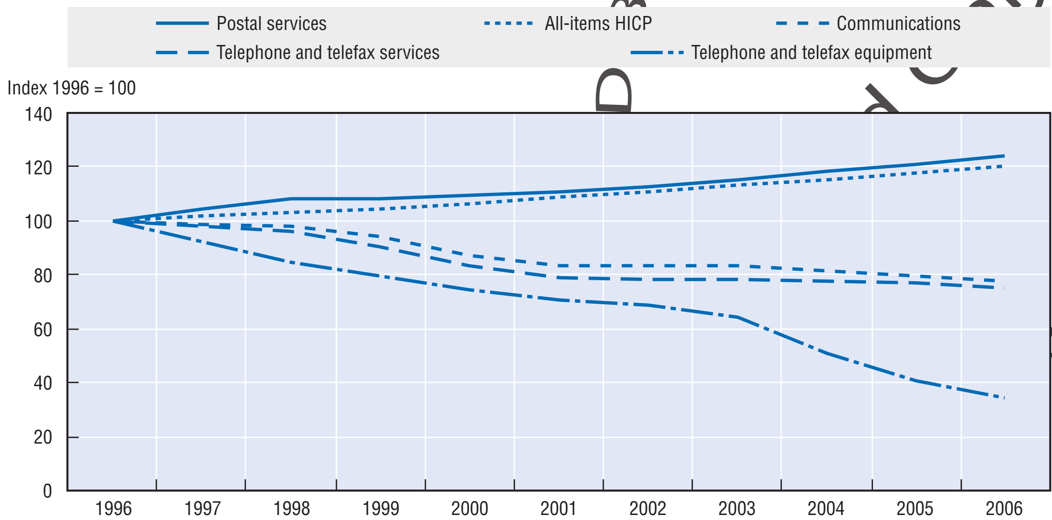
Note: Australia: Data for 2004. Austria: Data for 2005. Belgium: Data for 2005, includes cable TV. Canada: Data for 2004. Czech Republic: Data for 2004. Denmark: Data for 2003. Finland: Data for 2002, expenditure in communications. France: Data for 2005. Germany: Data for 2003. Hungary: Data for 2005. Iceland: Data for 2005. Ireland: Data for 1st quarter 2006. Italy: Data for 2005, do not include Internet. Japan: Data for 2005. Luxembourg: Data for 2001. Mexico: Data for 2004, do not include international communications. Norway: Data for 2004, telephone and telefax services. Poland: Data for 2005. Spain: Data for 2005. Sweden: Data for 2005. Switzerland: Data for 2004, do not include mobile. United Kingdom: Data for 2005. United States: Data for 2003.

Source: OECD, National household surveys.

StatLink http://dx.doi.org/10.1787/000660281315

The communications sector in OECD countries has benefited from a reduction in nominal and real prices as a result of the development of competition, improvement in technology and quality of service and the introduction of new technologies allowing existing services to be offered at much lower prices. Competition has helped drive prices down to reflect costs, and costs have also been reduced through digitalisation and technological improvements. Figure 2.4 shows the annual harmonised index of consumer prices for 15 countries of the European Union. It can be observed that prices for telecommunication equipment followed by telecommunication services declined significantly over the last nine

Figure 2.4. **Trend in harmonised indices of consumer prices (HICP) for communications for EU15**



Note: "Communications" includes Telephone and Telefax equipment and services and Postal services.

Source: Eurostat.

StatLink http://dx.doi.org/10.1787/000664876551

years. In comparison, the index for "all items" increased for the same period. This would indicate that telecommunications tend to become more affordable for consumers and that the increase in consumption is due in part to decreasing prices for some services or the substitution of new services with lower prices for traditional services.

Table 2.1. **Number of operators in service[1], June 2006**

	Fixed PSTN (local, national and international)	Network infrastructure capacity (includes only companies not providing voice services)	Cellular mobile	Wireless local loop (fixed wireless)	IMT-2000 operators[2] (i.e. UMTS / 3rd generation)	MVNOs[3]	Cable TV operators
Australia	132	-	4	61	4	2+	CATV operators do not require a licence
Austria	102	159	4	7	4	1	80
Belgium	33	23	3	3	3	15	12
Canada	64		17		2	Permitted	52
Czech Republic	70	7	3	90	3	0	52
Denmark	32	No registration	4	4	4	1	2 major cable TV operators and a large number of smaller operators. There are approximately 7000 cable or community antenna networks.
Finland	45	-	15	2	3	1	29
France[4]	257	46	25	179	3	6 active	257
Germany[5]	164	4	4	7	4	1	465
Greece	24	15	4	7	3	No	0
Hungary	55	0	3	-	3	0	526
Iceland	2	1	3	6	0	1	0
Ireland	46	51	4	13	3	1	20
Italy	89	41	3	15	4	No	
Japan	30	271	17	22	12	Permitted	696
Korea	5	19	3	1	3	No	107
Luxembourg	10	2	3	2	3	Permitted	74
Mexico	79	3	18	12	1	No	895
Netherlands	12		4		4	1	+/- 60
New Zealand						Permitted	
Norway	8	40	3	56	3	1	7 (large number providing cable TV in small local networks)
Poland	98	68	3	112	4	78	518
Portugal	12	10	3	7	3	0	9
Slovak Republic	9	106	2	6	2	0	193
Spain	36		3	4	4	23	347
Sweden	55		4		4	1	
Switzerland	136		5	6	4	0	500
Turkey	42	4	3			No	4
United Kingdom	122	22	5	2	5	6	1
United States[6, 7]	1181		155		5+	Permitted	33 507

1. Authorisation regimes (licensing, notification and registration) differ across OECD countries so it is difficult to compare the number of operators. For a number of countries no differentiation between local, national and international PSTN or the provision of infrastructure is made. Some authorisations may be regional. Some countries authorise services rather than networks so that an individual firm offering a range of services has multiple licences. Some countries have included companies providing PSTN via carrier selection in data on fixed PSTN. Resellers are not included where they can be identified. In a number of countries there are small community cable TV companies.

2. The column indicates the number of UMTS licences - some of these were not operational in mid-2006.

3. Mobile virtual network operators.

4. Only Metropolitan France included.

5. In Germany there are 2 180 notified undertakings (the authorisation regime is in accordance with the European Commission's Directive 2002/20/EC).

6. Data for fixed PSTN are only for local fixed PSTN in the US.

7. US mobile operators have the flexibility to upgrade their networks to 3G technologies on their existing 2G (PCS/cellular/SMR) spectrum.

StatLink http://dx.doi.org/10.1787/010725304214

Table 2.2. **Access line market share of new entrants (% of access lines)**

	1999	2000	2001	2002	2003	2004	2005
Australia	3.97	6	7	10	15	18	19
Austria				5	6	7	8
Belgium	0	0.1	0.1	..	..	..	..
Canada							
Czech Republic							0.3
Denmark							19
Finland							66
France		0.5	0.5			2.3	1.3
Germany	0	0	1	1	3	5	8
Greece				0	0	1	
Hungary		20	20	21	21	21	22
Iceland					8	13	15
Ireland							
Italy			0	.0.0	1	1	1
Japan						5	6
Korea		10	12	13	14		
Luxembourg					1		1.2
Mexico							
Netherlands							
New Zealand							
Norway	1	0	1	1	7.7	13.8	16.2
Poland		8	9	9	9		11
Portugal			2	5	6	7	11
Slovak Republic			0	0	0		
Spain							
Sweden							
Switzerland				0	0	0	0
Turkey	0	0	0	0	0	0	0
United Kingdom	16	16	17	17	18	20	24
United States	4	8	10	13	16.3	18.5	18

Note: The share of access lines is defined as direct access provision using own network.

StatLink http://dx.doi.org/10.1787/010753655606

Table 2.3. **Number of preselected lines**

	1999	2000	2001	2002	2003	2004	2005
Australia	..	..	..	..	..	..	..
Austria	..			870 000	976 041	961 037	935 200
Belgium	..	114 735	381 566	595 627	850 384	1 115 761	1 048 672
Canada	..	..	..	..	..	..	..
Czech Republic	..	..	..	..	..	..	..
Denmark	..	..	0	905 161	918 018	564 009	398 903
Finland	..	..	..	..	..	..	..
France	..	1 499 460	2 770 717	6 420 482	7 514 000	7 676 000	8 199 000
Germany	2 287 000	3 642 000	3 899 000	4 141 000	4 900 000	6 000 000	6 300 000
Greece	..	..	..	..	274 021	635 867	..
Hungary	..	..	..	..	..	..	778 890
Iceland	..	..	..	..	27 061	18 805	16 371
Ireland	..	..	..	..	225 000	..	207 000
Italy	..			3 370 000	3 600 000	4 017 000	4 085 000
Japan	..		12 059 000	12 294 000	12 966 000	12 128 000	9 566 000
Korea	..	20 790 000	21 206 000	21 674 000	22 085 000	21 792 000	21 774 000
Luxembourg	..	..	..	..	43 900	..	57 800
Mexico	..	..	..	..	..	..	..
Netherlands	..	..	..	..	..	..	..
New Zealand	..	..	..	..	..	..	..
Norway	238 146	412 000	413 539	395 168	321 719	164 618	101 324
Poland	..	..	..	1 825 068	2 193 000	1 340 375	1 344 449
Portugal	..	..	..	..	..	602 895	703 154
Slovak Republic	..	..	..	..	..	..	..
Spain	..	..	..	1 806 999	2 311 009	..	..
Sweden	866 000	1 135 100	1 557 500	1 926 400	2 101 000	1 956 600	969 100
Switzerland	649 624	1 091 919	1 265 801	1 369 252	1 247 631	1 196 146	1 134 542
Turkey	..	..	..	..	..	..	..
United Kingdom	..	..	11 000	638 000	2 598 000	4 571 000	5 781 000
United States	..	..	..	..	..	..	..
OECD (total of the above)	4 040 770	28 685 214	43 564 123	58 231 157	65 151 784	64 740 113	63 400 405

StatLink http://dx.doi.org/10.1787/010766416013

Table 2.4. **Cellular mobile competition in the OECD, 2005**

Mobile operator market share according to number of subscribers (%)

Number of operators	1	2	3	4	5	Other
Australia	45.1	32.5	17.2	5.2		
Austria	39.6	24.4	20.7	12	3.3	
Belgium	48.3	33.4	18.3			
Canada	36.4	26.9	36.7			
Czech Republic	41	40	19			
Denmark	41.2	23.5	21	5	9.3	
Finland	65.7	4.3	18.5	11.5		
France	46.8	35.9	17.3			
Germany	37.3	36.8	13.6	12.3		
Greece	37.4	35.6	19.4	7.6		
Hungary	45	33.2	21.8			
Iceland	63.6	34.3	2.1			
Ireland	48.6	38	13.4			
Italy	40	33.1	19.1	7.8		
Japan	53	23.5	15.8	2.8		4.9
Korea	50.9	32.1	17			
Luxembourg	53	40	7			
Mexico	78.9	14	4	3.1		
Netherlands	51.2	23	11.3	14.5		
New Zealand	52.8	47.1				
Norway	59.5	24.4	8	6.3	1.8	
Poland	35	31	34			
Portugal[1]	46.4	38.3	15.3			
Slovakia	55.5	44.5				
Spain	46.1	30	23.9			
Sweden	52	27.9	17	3.1		
Switzerland	62.5	18.5	18.3	0.7		
Turkey	63	22	15			
United Kingdom	26	23.3	22.7	22.6	5.4	
United States	25.4	24.1	21	10.2	5	14.3

1. Secretariat estimates.

StatLink http://dx.doi.org/10.1787/010775466571

Table 2.5. **Government ownership of public telecommunication network operators (as of end 2006)**

	Operator	Status	Control of PSTN
Australia	Telstra	After the sale (19/11/06) and transfer (24/11/06) of Telstra shares in November 2006 the government's residual shareholding was approximately 17%. In early 2007 the residual government shareholding is to be transferred to an independent investment fund (the "Future Fund") managed at arm's length from the government in the taxpayers' interests	Once the remaining government shares are transferred to the Future Fund, government power of direction over Telstra, and Telstra's special reporting obligations, cease.
Austria	Telekom Austria AG	28.68%	
Belgium	Belgacom	50% + 1	
	Belgacom Mobile	Belgacom owns 75% of Belgacom Mobile	
	B-Telecom	100%	
	MET	100%	
	IRISNET	100%	
	ALE	100%	
	IGEHO	2/3 government ownership	
	SEDITEL	2/3 government ownership	
	INATEL	2/3 government ownership	
	SIMOGEL	2/3 government ownership	
	TELELUX	2/3 government ownership	
Canada	Saskatchewan Telecommunications	State owned: 100% Province of Saskatchewan	
Czech Republic	O2 (Cesky Telecom)	Private ownership: 100%	
Denmark		Private ownership	
Finland	TeliaSonera Ltd	State ownership: 13.7% by Finnish government and 45.3% by Swedish government.	
	Elisa Ltd	0.65%	

Table 2.5. **Government ownership of public telecommunication network operators (continued)**

	Operator	Status	Control of PSTN
France	France Télécom	State ownership: 32.5% of the capital.	
Germany	Deutsche Telekom AG	State ownership: 38.02% As of 9 June 2006 the federal government holds 14.62% directly and 16.63% indirectly via the KfW (Kreditanstalt für Wiederaufbau, 100% owned by the Bund).	Neither German law nor the Memorandum and Articles of Association of Deutsche Telekom restrict the right of non-resident or foreign owners of shares to hold or vote the shares. The German government has indicated its intention to substantially reduce its shareholding of DT.
Greece	OTE S.A.	State ownership: 33.76%	
	TELLAS S.A.	The Greek state owns 50% - 1 share through PPC Telecommunications Services S.A., a subsidiary of the Public Power Corporation (PPC S.A.)	
	FORTHnet S.A.	Greek state owns 23.1%, through the Public Foundation of Technological Research	
	COSMOTE S.A.	COSMOTE is the whole subsidiary of OTE, in which OTE holds 64.37%	
	VOICENET S.A.	VOICENET is a subsidiary of OTENET S.A. (84%) which in turn, is a wholly owned subsidiary of OTE	
Hungary	Magyar Telekom	1 golden share	
Iceland	Siminn	Private ownership: 100%	
Ireland	eircom	Private ownership: 100%	
Italy	Agestel S.r.L.	100% municipalities/local authorities	
	Alpikom S.p.A.	60% municipalities/local authorities and national public utilities	
	Brennercom S.p.A.	80% municipalities/local authorities	
	Infracom Italia S.p.A.	40% municipalities/local authorities	

Table 2.5. **Government ownership of public telecommunication network operators (as of end 2006) (continued)**

	Operator	Status	Control of PSTN
Japan	NTT Corp. NTT East Corp. and NTT West Corp (indirect government ownership)	The government holds 33.7% of the issued shares of NTT Corp as of March 2006. The NTT Law stipulates that the government shall always hold one-third or more of the total number of the outstanding shares of NTT Corp. (holding company), and the law also stipulates that NTT Corp. shall always hold all the shares of NTT East Corp. and NTT West Corp. Therefore, the government's ownership in NTT East Corp. and NTT West Corp. is indirect.	The NTT Law stipulates that the government shall always hold one-third or more of the total number of the outstanding shares of NTT Corp. (holding company), and the Law also stipulates that NTT Corp. shall always hold all the shares of NTT East Corp. and NTT West Corp. Therefore, the government does not have any direct ownership shares in NTT East Corp. and NTT West Corp.
Korea		Private ownership	
Luxembourg	P&T Luxembourg	State ownership: 100%	
Mexico	Telefonos de Mexico	Private ownership	The Foreign Investment Law and Regulations and the Concession require that Mexican shareholders retain the power to determine the administrative control and the management of Telmex. Non-Mexican investors are not permitted to own more than 49% of the capital stock of a public telecommunication operator. Mexican corporation engaged in the telephone business. Foreign investment in cellular telephony may be authorised up to 100%.
Netherlands	KPN Novec bv (Company that owns the locations for the construction of antennas for ether communications)	7.8% 100%	
New Zealand	Telecom New Zealand	Private ownership. A convertible preference share in Telecom ("the Kiwi Share") is held by the Kiwi Shareholder (the Minister of Finance). The New Zealand Government purchased the Kiwi Share for $1 when Telecom was privatised in 1990.	The Kiwi Share Obligation imposes universal service obligations on the incumbent.

Table 2.5. **Government ownership of public telecommunication network operators (as of end 2006) (continued)**

	Operator	Status	Control of PSTN
Norway	Telenor	State ownership: 54%	
	Bane Tele AS	State ownership: 100%	
Poland	Telekomunikacja Polska S.A.	3.87% (December 2005)	
Portugal	OniTelecom Infocomunicações, S.A	15.68% (2005)	Government has golden share in incumbent.
	PT Comunicações, S.A.	6.92%	
	PT PRIME - Soluções Empresariais de Telecomunicações e Sistemas, S.A.	6.92%	
	TMN - Telecomunicações Móveis S.A	6.92%	
	Novis Telecom S.A..	1.56%	
	Refer Telecom – Serviços de Telecomunicações S.A.	100%	
Slovak Republic	Slovak Telekom, a.s.	49% controlled by state	15% owned by The Fund of National Property, 34% state holding
Spain		Private ownership	
Sweden	TeliaSonera	State ownership: 45.3% by Swedish government and 13.7% by Finnish government.	Requirement for minimum state ownership of 51% abolished in June 2001.
Switzerland	Swisscom	State ownership: 58.41%	The state is required to retain its majority shareholding in Swisscom.
Turkey	Türk Telekom	State ownership: 45% of the shares	
United Kingdom	BT	Private ownership: 100%	
	Kingston Communications	Kingston-upon-Hull City Council: 30.6%	
United States	All major carriers	Private ownership: 100%	

Table 2.6. **Foreign ownership restrictions in telecommunications**

Australia	Under the Telstra Corporation Act 1991 (the Act) Telstra is subject to ownership restrictions that limit foreign groups to 35% of Telstra's listed capital and a maximum holding of 5% for individual foreign entities. The Act also contains provisions that require Telstra's head office, its base of operations and place of incorporation to remain in Australia, and the Chairperson and the majority of directors to be Australian citizens. There are no foreign ownership restrictions regarding the Australian telecommunications industry as a whole. Currently the 3 largest players by revenue in the Australian market after Telstra (Optus, Vodafone and Hutchison) are majority foreign-owned.
Austria	No foreign ownership restrictions.
Belgium	No foreign ownership restrictions.
Canada	Legislated Canadian ownership and control requirements applicable to the telecommunications service industry were established in 1993, in the Telecommunications Act. Pursuant to section 16 of the Act, Canadian carriers (i.e. companies owning or operating telecommunications transmission facilities used to offer service to the public for compensation) must have at least 80% of their voting shares owned by Canadians and not less than 80% of the members of their board of directors must be Canadians. In addition, these Canadian carriers must be controlled in fact by Canadians at all times. The Governor in Council subsequently issued The Canadian Telecommunications Common Carrier Ownership and Control Regulations which establish that investor companies in such Canadian carriers will be treated as Canadian if at least 66 2/3% of their voting shares are held by Canadians. The Radiocommunication Regulations, made pursuant to the Radiocommunication Act, adopt the same Canadian ownership and control requirements for radiocommunication carrier licensees. Resellers are not subject to Canadian ownership and control requirements, nor do they apply to satellite earth stations or international submarine cables.
Czech Republic	No foreign ownership restrictions except as regards land ownership.
Denmark	No foreign ownership restrictions.
Finland	No foreign ownership restrictions.
France	No foreign ownership restrictions.
Germany	No foreign ownership restrictions.
Greece	No foreign ownership restrictions
Hungary	No foreign ownership restrictions
Iceland	No foreign ownership restrictions
Ireland	No foreign ownership restrictions.
Italy	No restrictions. The "golden share" formerly owned by the government over Telecom Italia has been sold. WTO rules apply with respect to reciprocity.
Japan	There are no restrictions on individuals and corporations investing in the incumbent PTO(s) in Japan. However, foreign capital participation, direct and/or indirect, in NTT Corp., which holds all the shares of NTT East Corp. and NTT West Corp., is restricted to less than one-third. Board members in NTT and the regional companies are required to have Japanese nationality.

Table 2.6. **Foreign ownership restrictions in telecommunications (continued)**

Korea	Where foreign governments or foreigners are the largest shareholder, and also holding more than 15% of all shares issues, the corporation is designated as a foreign entity. In the case of facilities-based operators, foreign government or foreigners together cannot hold more than 49% of all shares issued.
Luxembourg	No foreign ownership restrictions.
Mexico	According to article 12 of the Telecommunications Federal Law, and pursuant to article 7 of the Foreign Investment Law, public telecommunication concessions may only be granted to Mexican citizens or enterprises. Foreign investors or their investments may only own, up to 49% of the ownership interest in an enterprise, established or to be established in the territory of Mexico, to own or operate a public telecommunications network. Foreign investment may participate in excess of 49% in concessionaire enterprises authorized to provide cellular telephony services, in which case the enterprises will require the favourable ruling of the National Foreign Investment Commission.
Netherlands	No foreign ownership restrictions.
New Zealand	According to the Constitution of Telecom Corporation of New Zealand Limited (Clause 6) shareholdings no person shall have a relevant interest in 10% or more of the total voting shares for the time being without, and except in accordance with the terms of, the prior written approvals of each of the Kiwi Shareholder and the Board given and no person who is not a New Zealand national shall have a relevant interest in more than 49.9% of the total voting shares for the time being without, and except in accordance with the terms of, the prior written approval of the Kiwi Shareholder. There are no restrictions on other operators.
Norway	According to White Paper No 22 2001-02 ("Reduced and Improved State Ownership") by the former Norwegian government (Bondevik II), a minimum of 34% of the shares in the incumbent telecommunication operator (Telenor ASA) are to be kept by the Government in case of reduced state ownership. Per 26.06.2006, the Government held 53.7 % of the shares in Telenor ASA.
Poland	No foreign ownership restrictions. The majority of the members of the Supervisory Board of a telecommunications company must be resident Polish citizens.
Portugal	No foreign ownership restrictions.
Slovak Republic	No foreign ownership restrictions.
Spain	Article 6 of Spanish General Telecommunications Act 32/2003, of 3 November, provides that networks or electronic communications services can be provided to third parties only by national natural or legal persons of a member state of the European Union, and by those of other nationality when, in the latter case, it has been established in the international agreements binding the Kingdom of Spain. For any other natural or legal persons, general or particular exceptions to the former rule can be authorised by the Government.
Sweden	No foreign ownership restrictions.
Switzerland	No foreign ownership restrictions. The federal government is required to retain majority shareholding (capital and voting shares) in Swisscom.
Turkey	There are no foreign ownership, size of shareholding or other ownership restrictions on individuals and corporations investing in the incumbent telecommunication operator(s) in Turkey. 55% of Türk Telekom has been sold to Oger Telecom which is a foreign investor. A golden share applies to Türk Telekom.
United Kingdom	No foreign ownership restrictions. Article 119 of the Articles of Association of Cable and Wireless ensures that the Executive Chairman or Chief Executive is British and Article 125 of the Articles of association of British Telecom ensure that the Executive Chairman or Chief Executive is British.
United States	When a corporation is directly or indirectly controlled by another corporation, the Federal Communications Commission may refuse to approve a licence if more than a 25% interest in the controlling company is foreign and if the Commission finds it in the public interest to do so. There are additional restrictions on the nationality of management that apply in the case telephone companies having a common carrier radio licence. No licence has been denied on the basis of foreign investment. Wireline common carriers are not subject to these restrictions.

Table 2.7. **Treatment of national and international voice services provided over Internet protocol**

Australia	A review of VOIP found that the current policy and regulatory framework presents no significant barriers to the deployment of VOIP services but concluded there would be merit in the government providing clarity and flexibility for investors and consumers. Currently VOIP services that are essentially replacements for fixed standard telephone service are subject to the same regulatory framework as PSTN services. Other types of VoIP services may also be provided and are subject to fewer requirements. For example, the Customer Service Guarantee (CSG) is to be relaxed on many types of VoIP services. The review placed a heavy emphasis on public information activities to raise consumer awareness and understanding of VoIP. The Australian government is monitoring the development and growth of VOIP and the appropriateness of the regulatory arrangements, and will act if the need becomes apparent.
Austria	The New Regulatory Framework (NRF) generally is based on technological neutrality, i.e. allowing providers to offer services based on IP technology without any specific regulation necessary. In October 2005 the Austrian regulatory authority issued “Guidelines for Providers of VoIP Services” that aimed to provide regulatory clarity to operators offering public VoIP services in Austria. One of the fundamental conclusions of the guidelines document is the definition of 2 distinct classes of VoIP services: • Class A VoIP Services: Publicly offered VoIP services providing access to and/or from the Public Switched Telephone Network (PSTN) are defined as being a Publicly Available Telephone Service (PATS) and an Electronic Communication Service (ECS) • Class B VoIP Services: Publicly offered VoIP Services for voice communication between Internet users without providing access to the PSTN are defined as being neither PATS nor ECS The guidelines document further provides information regarding access to emergency services, general authorization procedures as well as numbering issues. Short chapters on legal interception, interconnection and competition conclude the document. VoIP has been classified in two categories, independently from the class A / class B distinction above: • Voice over Broadband (VoB): VoB is defined as service offered in combination with (broadband) Internet access where VoIP technology is used for voice transport within the VoB provider’s access network. Examples are Voice-over-DSL or Voice-over-CATV. In general, VoB services offer full connectivity to the PSTN, offer controlled quality in the access network and are deemed to be largely equivalent to traditional voice telephony services. • Voice over Internet (VoI): VoI is defined as service offered on the basis of the Public Internet. In general, VoI services are not bundled with the subscriber’s Internet access. The access to the customer is realized using an existing (broadband) Internet access provided by a third party access provider; therefore the Internet is used as access network to the customer. VoI is offered in various flavours ranging from Internet-only services to full PSTN connectivity. As stated in the current draft market definition, VoB services are to be included in the relevant retail markets (fixed networks voice telephony access markets for residential and no-residential customers, fixed networks minutes markets for residential and non-residential customers, national and international calls) as well as the relevant wholesale markets (termination and origination). VoI is to be included in neither of these markets.
Belgium	The VoIP element is not a key figure in the decision between PATS/ECS (public available telephone service or electronic communication service). The service is checked against the PATS conditions (in- and outgoing voice communication, national and international, with access to emergency services and using a national and international number plan), and if the service complies, it is classified as PATS, otherwise as ECS.
Canada	The CRTC decided to regulate Internet telephone services i.e. voice communication services which use Internet Protocol, in the same manner as it regulates traditional wireline local telephone service. The CRTC concluded that these services were not materially different from traditional telephone services in that they use telephone numbers and connect to anyone on the traditional telephone network. Thus, the Incumbent Local Exchange Carriers (ILECs) will be required to obtain CRTC approval for prices, features, terms and conditions for local Voice over Internet Protocol (VoIP) services before offering them in their incumbent territories. Also, if an ILEC wants to offer VoIP as part of a bundle with another service, it must get prior CRTC approval. The CRTC will not be regulating private computer-to-computer voice services over the Internet also called peer-to-peer (P2P) as these do not connect to the public telephone network.

Table 2.7. **Treatment of national and international voice services provided over Internet protocol (continued)**

Czech Republic	These services are considered as telecommunication services and providers have only to be registered according to the General Licence obligations. No licence is required. VoIP is not considered as public telephone service, but as data transmission – no regulatory approach has been undertaken.
Denmark	In 2004 NITA publicly consulted relevant parties in Denmark on the question of whether there were barriers (also regulatory barriers) preventing widespread use of VoIP in Denmark. The review and consultation was concluded in March 2005 The consultation and analysis resulted in a number of information initiatives and minor legislative adjustments primarily related to provision of location information in relation to emergency services.
Finland	
France	ARCEP has differentiated between the various services using the Internet Protocol: voice over IP, which designates the technology using Internet Protocol for the transport of the voice, is also used for voice services on broad band (or VoB) on an Internet access network with speeds higher than 128 kbit/s, and where quality is controlled by the operator who provides the service. These services cannot be compared with the offers of voice over Internet (VoIP), which use the public Internet, because their quality of service is not controlled by the service supplier. The question of separation between voice over broadband services and voice on the PSTN was examined by the competition Council and then by the European Commission. The former wanted to include VoB in the relevant markets covering fixed telephony services. The latter agreed with ARCEP's modification to include services using VoIP technology in the pertinent market in the case that they are substitutable with traditional services, imposing obligations on the "mainly telephony" access services, as well as on the telephony services associated with them. Thus, it was considered that the relevant markets for interpersonal communications from a fixed telephone is conditional with the use of access to the PSTN. ARCEP has indicated that it would keep under review the market segment associated with multiservice access and would be ready to modify its decision not to impose obligation on this market segment.
Germany	In September 2005 BNetzA published key elements of the regulatory treatment of Voice over IP. These key elements take account of the fact that VoIP services are only at the start of their development in the marketplace and that it is too early to say how viable existing and future business models will prove to be. In BNetzA's view, therefore, it is not helpful, and ultimately not even possible, to draw up a definitive and extensive body of rules for VoIP today covering all the regulatory issues that are bound to arise. In general providers of VoIP services are treated just like any other service provider. Their rights and obligations depend on how the respective service is classified according to its features under regulatory aspects especially telecommunications services, publicly available telephone service, operation of telecommunications networks or telecommunications systems. BNetzA considers however transitional arrangements for technical reasons a suitable means by which to encourage existing innovation potential and by which to respond to public interest in the fulfilment of legal obligations. Yet it is important that, at the end of the development process of VoIP services, different services (PSTN, VoIP etc.) can co-exist with equal status. In the medium term, VoIP services will have to satisfy the same criteria as traditional services. BNetzA will keep a close watch on the further development of VoIP and take regulatory decisions if necessary, like it has proceeded in the past. For example BNetzA decided in its market analysis that national calls via VoIP services are part of the relevant retail market for national calls at fixed locations. So national calls (VoIP and PSTN) of the SMP provider are subject to the same regulation.
Greece	There is no specific regulation for VoIP at this point in time. EETT issued a public consultation for VoIP services on 19 May 2006. This consultation, among other issues, seeks the views of the market players regarding authorisation for VoIP services providers, numbering, access to emergency numbers, QoS, interconnection, etc. Based on the results of the public consultation and the analysis of the relevant markets, EETT will take decision on regulation of VoIP services.
Hungary	From regulatory point of view, VoIP is only an alternative technology to PSTN. Therefore the treatment of VoIP service is similar to fixed telephone services.
Iceland	VoIP is split into two categories, VoIP – nomadic and VoIP – non nomadic.

Table 2.7. **Treatment of national and international voice services provided over Internet protocol (continued)**

Ireland	All service providers intending to offer an electronic communication service to the public must provide a notification to ComReg of this intention. This notification entitles the service provider to a General Authorisation, which is subject to a set of conditions. Further to these conditions, all services which qualify as Electronic Communications Services (ECS) must comply with a basic set of legislative obligations. If the service further satisfies the criteria to be categorised as a Publicly Available Telephone Service (PATS), then further legislative obligations apply. Perhaps the most crucial difference between the provision of an ECS or PATS is that when providing a PATS VoIP service, access to the emergency services must be ensured. Other PATS-related obligations include user rights such as access to directory inquiry and operator assistance services, the right to have an entry in a directory, and various network related obligations.
Italy	VoIP services have been recently regulated by AGCOM. VoIP service can be provided using any IP identification system (e.g. SIP or H.323 URIs) or E.164 numbers. VoIP providers can use geographic E.164 numbers already used for PATS services using TDM technology. Nomadism with geographic numbers is only allowed within the district identified by the district code of the numbers used by the operator.
Japan	VoIP service providers should comply with the Telecommunications Business Law as telecommunications service providers1. There are two kinds of telecommunication numbers for VoIP services (numbers starting with "050" and numbers that are the same as those allocated for fixed telephony services) which are based on ITU-T E.164 in Japan. Especially, VoIP services using these E.164 numbers should be consistent with conditions for numbering allocation as specified in the Regulation on Telecommunications Numbers.
Korea	In order to promote IP telephony (telephone service through internet network regardless of local and long-distance) a separate VoIP Service was newly established, and assuming certain degree of call quality, authorized facilities-based operator or registered special-service operator are granted a 070 called number. Where the VoIP operator uses the Internet local loop and backbone network of other telecommunication companies, under agreement of both operators the network usage fee is shared.
Luxembourg	Following the recommendations of the European Commission to special provisions are foreseen other than for public telecommunication operators. For interconnection to the public network a licence is required from the regulator.
Mexico	National or international voice telephony services over the Internet would require a concession as any other voice telephony service provider, and they would have to comply with the voice telephony regulatory framework which would have to be adapted to this new technology.
Netherlands	OPTA's market analysis shows that VoB services are part of the same relevant access and conveyance markets at the retail level as traditional fixed telephony (PSTN) services. OPTA applies a price squeeze test for both PSTN and VoB services. However, the price floor on VoB services is more relaxed than on PSTN services, in the sense that KPN is allowed to use lower VoB tariffs than PSTN tariffs without ex-ante approval by OPTA. This price floor for VoB services only apply to the incumbent (KPN). Other obligations which apply to the VoB services of the incumbent: transparency and non-discrimination.
New Zealand	Under New Zealand law, national and international voice telephony services provided over the Internet by entities other than a PTO, are defined and treated the same as such services provided by a PTO.

Table 2.7. **Treatment of national and international voice services provided over Internet protocol (continued)**

Norway	Three main categories of VoB offerings have been identified by the regulator: *Category 1*: VoB offerings which are not any-to-any communication enabled. Within this category no gateway to the PSTN/ISDN or mobile networks exists, and hence no possibility to call or receive calls from traditional telephone services (POTS). Examples of category 1 VoB offerings are the plain versions of Skype and MSN messenger. *Category 2:* VoB offerings which are partly any-to-any communication enabled. Within this category a gateway to the PSTN/ISDN or mobile networks exists which gives the possibility to *either* call or receive calls from POTS, but not to *both* call and receive calls to/from such services. Examples of category 2 VoB offerings are SkypeOut and SkypeIn. *Category 3:* VoB offerings which are any-to-any communication enabled. Within this category a gateway to the PSTN/ISDN or mobile networks exists giving the possibility to both call and receive calls from POTS. NPT has not been able to make a generally valid decision concerning category 1 services. Whether these services fall within the scope of the Electronic Communications Act or not must be decided in each individual case. NPT has concluded that category 2 services fall within the scope of the Electronic Communications Act. If available to the public, these services are deemed a public electronic communications service. Moreover, NPT has concluded that when used together two category 2 services are regulated as a category 3 service. NPT has concluded that category 3 services fall within the scope of the Electronic Communications Act. If available to the public, the services are deemed as a public telephone service (PATS).
Poland	The Polish Telecommunications Law reflects the EU Directives and thus there is no separate regulatory approach towards Voice over IP. UKE is holding a consultation in order to identify barriers to the nomadic use of VoIP services.
Portugal	ANACOM launched during November 2005 a public consultation on the regulatory approach to voice services based on IP technology (VoIP) which led to a Decision in February 2006 which distinguished between two types of services: (a) services provided at a single fixed location and under conditions perceived by the user as equivalent to those of traditional PSTN, which will be treated as a regular PSTN service; (b) services of typically nomadic use i.e. able to be used on several locations. The "30"numbering range was opened to accommodate the provision of nomadic VoIP services. The providers of nomadic VoIP services with numbers of the national Numbering Plan, when on national territory, must ensure the routing of VoIP calls to 112. All VoIP providers, including those of nomadic use, will be able to negotiate the terms of interconnection contracts with other service providers, keeping the same basic principles of the current interconnection agreements.
Slovak Republic	According to national legislation, VoIP service is considered as an electronic communications service (ECS). There are some general obligations for providers of ECS. Problems concerning VoIP versus PATS (Publicly Available Telephony Service) in context with data location to provide for Emergency Calls (112). (Location data shall be any data processed in the network indicating the geographic location of terminal equipment of the user of publicly available service. The location data, other than traffic data may be processed only if they are made anonymous or with the consent of the user of public network or service, and in the scope and time necessary for provision of the value added service).
Spain	Public numbering resources are allocated to fixed telephone services available to the public and to VoIP, and certain area codes are granted. The principle of technological neutrality is applied so that the conditions established for telephone service available to the public are applied to VoIP services which, due to their functional characteristics, can be considered as telephone service. and applying the generic regulatory framework defined throughout Europe for the electronic communications services to the VoIP modalities.
Sweden	The same regulations apply to all undertakings that provide fixed telephony services.
Switzerland	Voice telephony over the Internet is regarded as a telecommunication services and consequently subject to telecommunication legislation. It is not considered as forming part of the universal service provision and is therefore not subject to the legal requirements applicable to that service and to its providers. Service providers offering national and international voice telephony services on Internet would be subject to a number of legal obligations which are applicable to service providers using the PSTN such as interconnection, secrecy of communications, etc.

Table 2.7. **Treatment of national and international voice services provided over Internet protocol (continued)**

Turkey	VoIP is not treated separately in terms of authorisation. With regard to the principle of technological neutrality, in the context of the authorisation of Long Distance Telephony Services, operators are authorised to provide service regardless of the technology used for the provision of the long distance telephony service where usage of VoIP technology is quite common.
United Kingdom	For VoIP service, OFTEL considers this should be regulated as a publicly available telephone service if any of the following apply: the service is marketed as a substitute for traditional PSTN services, or the service appears to customers as a substitute for public voice telephony, or the service provides the customer's sole means of access to the traditional circuit switched PSTN.
United States	The FCC's consideration of issues surrounding VoIP and other IP-enabled services and applications takes place within a legal framework comprised of statutory provisions and judicial precedent, prior FCC orders, ongoing FCC proceedings, and state actions relating to IP-enabled services. The FCC has not yet determined the appropriate classification for all VoIP services in that context. The FCC has, however, clarified that certain social and public safety obligations apply to "interconnected" VoIP services – VoIP services which, *inter alia*, allow an end user to place calls to, and receive calls from, the public switched telephone network. In the last two years, the FCC has required interconnected VoIP providers to provide 911 emergency access, comply with the Communications Assistance for Law Enforcement Act (CALEA), and contribute to the federal universal service fund, and has open proceedings to address additional, related issues.

Table 2.8. **Telephone numbering system for VoIP providers**

Australia	The Australian Communications and Media Authority (ACMA) released a range of geographic numbers to VOIP service providers. The Australian government's VoIP report recommended that VOIP services supplied for use on a fixed basis continue to have access to geographical numbers. ACMA is consulting on the introduction of a new 0550 number range for VOIP to provide added flexibility for VOIP services, particularly nomadic services.
Austria	Any number range can be used by VoIP providers. The usage conditions of assigned numbers depend on the number range they belong to (e.g. geographic numbers are only assigned for usage with a telephone service). The well-defined terms and conditions for the use of numbers apply regardless if the voice service offered is based on VoIP or not. The numbering authority has allocated numbers on a geographic as well as on a non-geographic basis.
Belgium	A BIPT communication of 08/09/05 permits the use of geographical numbers for nomadic VoIP services as a temporarily regulation. The BIPT informed the market that for those operators who want to offer VoIP services with nomadic use based on a geographical number the Minister will be advised by the BIPT to grant a deviation from the standard regulatory obligation linked with geographical numbers, if they comply with the following two obligations: 1) they must flag after a certain date the nomadic use linked to a geographic number in the emergency services database so that emergency centres are aware that the location of the caller may be different from its geographical number; 2) they must inform the user formally and at least 3 times a year about the difference between a regular telephony service and a VoIP service with nomadic use. In particular, the user must be informed about the limited possibility to physically locate the caller for emergency services purposes. Geographical numbers of operators of public telephone services fall outside the temporarily regulation. End-users of operators of public telephone services which have geographical numbers cannot use in other words these numbers for VoIP services with a nomadic character.
Canada	Telephone numbers from the North American Numbering Plan are available to VoIP service providers as a competitive local exchange carrier (facilities-based) or through a local exchange carrier (resale-based).
Czech Republic	There are two systems: 1) for geographical numbers PATS; 2) for non-geographical numbers ECS.
Denmark	VoIP providers can use numbers in the National Numbering Plan. The plan is based on international standards and regulation for numbering in the telecommunications networks, particularly ITU Recommendation E.164. Denmark does not have a geographic numbering plan. Numbers for VoIP are mainly allocated from the number series preferably used for fixed telephony.
Finland	
France	An operator declared with ARCEP can ask for geographical and non-geographic numbers, if they offer voice services on the Internet or classic telephone services. In the case of geographic numbers, the operators are required to respect a certain number of conditions relating to the geographic location of the subscriber. Following the reform of the numbering plan, fixed and geographic numbers start with 01, 02, 03, 04 or 05, and non-geographic numbers, which are not specifically mobile, with 09 (before these were 087B)
Germany	The numbering system is technology-neutral, i.e. the rules for number allocation are not based on traditional or IP-based transmission protocols. VoIP providers can use the same numbering resources as providers of traditional services, if the service is in line with the specific provisions of the numbering resource. Numbers for VoIP are allocated by *BNetzA*. In May 2006 a revised version of the Rules for the Allocation of Local Numbers was published. Under the revised rules not only network operators but also service providers, including VoIP providers, are entitled to apply for the allocation of blocks of geographic numbers. However, there is also the possibility to use numbers without any geographic reference. According to the Rules for the Allocation of the (0)32 national subscriber numbers of December 2004 there is no linkage to any geographic location. Due to technologic neutrality these numbers may be used for VoIP services andt also for traditional telephone services notwithstanding that VoIP services are the main area of application.
Greece	Numbering is one of the major issues that a public consultation for VoIP services is dealing with.
Hungary	ITU-T E.164 numbering system is used also by VoIP providers on geographic basis. The numbering authority has not allocated numbers especially for VoIP. Number portability remains possible between VoIP and PSTN providers.
Iceland	Nomadic VoIP has specified numbers. Non-nomadic uses the fixed numbers (there are no geographic numbers in Iceland).

Table 2.8. **Telephone numbering system for VoIP providers (continued)**

Ireland	Both geographic and non-geographic numbers can be used by VoIP providers. A specified range of numbers has been designated for use with IP based services. Normal geographic numbers are also available for use with these services, subject to some conditions.
Italy	VoIP providers can use geographic E.164 numbers. A new numbering range for full nomadic VoIP services has been introduced. To provide VoIP services without requiring right of use of E.164 numbers an ECS general authorization is required. To provide VoIP services using geographic numbers a PATS general authorization is required. To provide VoIP services using non geographic numbers (code 55) an ECS authorization title is required. All VoIP providers that use E.164 numbers have to implement service number portability within the same numbering code (number portability between 0 and 55 numbers is not allowed). All VoIP providers that allow VoIP users to call PSTN users have to provide access to emergency services. PATS VoIP providers have to guarantee user localization. ECS nomadic VoIP providers have to guarantee user localization on a best effort base. All VoIP providers have to allow legal interception, inclusion of user in the numbering directories. All VoIP providers have the obligation to negotiate IP interconnection (a specific proceeding has been started to define the relevant technical and operative conditions) in order to allow interoperability of VoIP services.
Japan	VoIP providers can use either 11-digit specific VoIP numbers or 10-digit numbers the same as existing fixed telephony. Minimum voice quality for telephones is required for the use of specific numbers. While, for the use of numbers the same as fixed telephone numbers, several conditions (such as high voice quality, location correspondence and availability of emergency calls) are required as a service equivalent to existing fixed telephony service.
Korea	VoIP has been allocated a specific numbering system which are granted to all operators nationwide, with no geographic distinctions
Luxembourg	VoIP has been allocated a specific numbering system. The numbers, which are allocated by the regulator, are non-geographic.
Mexico	A license (concession) is required to provide voice services. Only those concessionaires officially authorized to provide local voice services are subject to number assignation (independently of what technology they use). Therefore, those companies willing to get geographical numbers from COFETEL require a concession.
Netherlands	VoIP operators are allowed to use geographic numbers as long as the connection point of the telephone line remains in the geographic area. This means that those numbers are no option for providers of nomadic VoIP. These providers can use personal numbers, but the interconnection tariffs of personal numbers vary greatly and the numbers therefore are not always reachable. A number of changes have been made recently including, where geographic numbers used by *any* network (fixed, VoIP, mobile, etc,) the user has to reside in the geographic area and the interconnection fee is limited to the level of the other geographic numbers. This alternative definition opens the geographic number ranges for providers of nomadic and mobile networks. In addition, a new non-geographic number range was introduced.
New Zealand	
Norway	NPT has allocated numbers for VOIP. Geographic numbers can be used for a service that is marketed and appears as a fixed line telephony substitute. A non-geographic number range is available for nomadic services.
Poland	Under consideration. Numbering should be technologically neutral and assigned in line with its designation specified by the National Numbering Plan and requirements on the numbering management. In addition, there exists non-geographic numbering for packet data transmission over IP from the range AB=39
Portugal	In accordance with ANACOM's decision on the regulatory approach to voice services based on IP technology (VoIP), two kind of numbers may be allocated to VoIP service providers: ▪ Geographic numbers for VoIP services provided at a fixed location; ▪ Non-geographic numbers for nomadic use of VoIP services.
Slovak Republic	There are two ways for VoIP providers to provide VoIP services: subscriber numbers or unified access code. The regulator has allocated a special non-geographic number blocks for both ways. Until now, geographic numbers have not been allocated for VoIP services.
Spain	For VoIP two kinds of numbering ranges are allocated (geographical and non-geographical) which respectively correspond to two different service-rendering models, according to whether the point from where the service access is offered has a specific geographical connection or not. There is an obligation of providers to handle calls to the unique emergency call number 112, being it mandatory to channel said calls to the emergency call centre corresponding to the address declared by the user when hiring the service.
Sweden	The NRA has not allocated a specific numbering range for just VoIP services. However, the NRA has allocated a specific numbering range for geographical independent services, which can be used for e.g. nomadic VoIP services. Any provider (including VoIP providers) that offers a service to the public that requires geographic numbers, or non-geographic numbers, can apply for these kinds of numbers. Some VoIP providers have been assigned geographic numbers and some have been assigned non-geographic numbers.

Table 2.8. **Telephone numbering system for VoIP providers (continued)**

Switzerland	Operators of voice telephony services on the Internet can use numbers in the E.164 classificationpaln to allow their customers to access the public telephony service (incoming calls and outgoing calls). The numbers of the E.164 classification plan are allotted by OFCOM. Any operator of voice telephony services on the Internet can request an attribution of a block of 10 000 numbers as can the other suppliers of telephony services (PSTN, ISDN, cable), in so far as they are recognized as suppliers of telecommunication services by OFCOM. The numbers allotted today for VoIP services are those used for traditional fixed telephony, namely the numbers known as "geographic". In Switzerland however, the geographic portability of numbers is authorized across the country. These "geographic" numbers, thus do not contain necessarily information on the geographic location of the holder.
Turkey	There is no special numbering plan for VoIP services, but in 2006 it is planned to finalise a regulation covering VoIP numbering. Geographic or non-geographic allocation will be considered in this regulation.
United Kingdom	056 allocated for VoIP. Other geographic and non-geographic available for VoIP.
United States	The US has not required VoIP providers to use any specific numbering scheme. The FCC requires that, in order to obtain North American Numbering Plan (NANP) numbering resources, a company must provide evidence (e.g., a state commission order or a state certificate to operate as a carrier) demonstrating that it is authorized to provide telecommunications service in the area in which it seeks numbering resources. VoIP providers that wish to obtain NANP numbering resources may request a waiver of the FCC's numbering rules or may enter into partnering relationships with carriers that have obtained such numbers directly from the NANP Administrator (NANPA).

Table 2.9. **Local loop unbundling**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Australia	Unbundled local loop and line sharing (or spectrum sharing) services have both been declared since before 2004. There have not been any changes in the underlying unbundling policy since 2004, although there has been debate about appropriate pricing methodologies for the services. In June 2006 the ACCC has also released a draft decision to continue the regulation of the ULLS for a further three years, at which time the ACCC expects there will be more certainty about the ability of emerging technologies to compete with Telstra's fixed local loop infrastructure.	As of June 2006, there are 5070 exchange serviced areas. All exchanges support ULLs.	The regulator has not specified a timeframe for exchanges to be upgraded to support unbundling as all exchanges support ULLs.
Austria	Proceedings between an Austrian alternative operator and the incumbent concluded with a decision by the NRA on January 23, 2006. The amounts for the monthly line rentals were reduced to EUR 10.70 for a full unbundled line and EUR 8.29 for sub-loop between Greenfield distribution frame and network termination point on user´s premises.	1 400 100% can offer unbundled lines	No, as all MDFs can support unbundling in principle. Collocation is erected when requested by beneficiaries.
Belgium	Full unbundling, shared access and sub-loop unbundling in place since 1 March 2001. No real changes.	1107 100% can offer unbundled lines	Not applicable, all LEX provide DSL services
Canada	Wholesale rates for "naked DSL" were approved by the CRTC in April 2005 and reduced by 50% in December 2005.	Although unbundled local loop rates have been set for all areas of the large incumbents operating territories, entrants competing on the basis of unbundled local loops tend to be present in only the major centres. There have not been complaints from competitors that unbundled loops are unavailable in specific areas.	No. Incumbents are required to furnish unbundled loops in local exchanges upon request.
Czech Republic	In the first half of 2005 the CTO started to apply price regulation for metallic subscriber line accessing. After relevant market analysis and after determination of SMP the CTO applied price regulation and issued a Price Decision for Czech Telecom by which means it determined ceiling lump-sum and monthly fees for LLU including collocation.	Local exchanges – 140 Local exchanges incl. RSU – 2 522	No timetable is specified. An SMP operator is obliged to allow unbundling when a request occurs.

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Denmark	With the market decision from January 2006 on" local loop and shared local loop" which entered into force March 2006 the incumbent (TDC) is obliged to provide "administrative local loop". This means that they have to provide a shared local loop connection or a sub-distance, where the end user does no longer have a "narrow band service" e.g. PSTN or ISDN attached.	1200 100% can offer unbundled lines.	All local exchanges support unbundling.
Finland	Amendment 28.1.2005/47 to Communications Market Act, section 37 empowered FICORA to set a price ceiling on LLU products	All exchanges are able to offer LLU.	
France	The end of the process of market analyses process and implementation of the new regulatory framework did not change significantly regulations on unbundling. The national regulator has the power to impose modifications of the reference offer published by the incumbent for unbundled access to the local loop and to related resources, as well as on prices. In 2005, work was undertaken on: lifting operational constraints on total unbundling; adapting to new problems (intervention by local authorities, saturation of distribution frames, etc.); the offer of FT to connect to distribution frames (new commercial offer of FT for dark fibre); the publication of quality of service indicators by FT; changes in the reference offer of FT; the evolution of certain unbundling prices: recurring tariffs, non-recurring tariffs, etc.		
Germany	In Germany unbundled access to the local loop has been offered since 1998. Around 4 550 000 unbundled lines have been leased at the end of 2006 by alternative operators from the incumbent. Local loop unbundling can be required from an SMP operator; under the TKG bit-stream access can also be imposed. BNetzA has imposed IP-based bit-stream access upon the incumbent by regulatory order in September 2006.	There are 7900 MDFs in Germany. Alternative operators have installed equipment in about 2000 MDFs	As the MDFs support unbundling by now there is no need for further upgrading.

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Hungary	Although the price of reference offers have decreased, there is no perceivable demand for local loop unbundling yet. Instead there is demand on bit-stream access; so it will be included in the reference offer.	Not available	The regulator has not specified a timetable.
Iceland	New reference unbundling offer.	223 118 or 52.91% can offer unbundled lines.	N/A
Ireland	eircom was designated as having SMP in the wholesale market. Focus has been placed on improving LLU processes and on processes to facilitate migrations between LLU and other wholesale products. There have been reductions across a range of LLU charges including connection charges. In addition an unescorted access product has also been introduced.	1140 local exchanges 75 exchanges are unbundled.	No timetable has been specified. Operators can request access to unbundle any exchange, which subject to survey, should be made available in a reasonable timeframe. This is typically managed on a project basis.
Italy	AGCOM has introduced a network cap for ULL pricing, to be applied for years 2005-2006-2007. Additionally, an industry group has been launched, under AGCOM control, to review migration processes among operators. In the broader framework of wholesale access regulation, it is worth recalling that AGCOM has introduced an obligation for T.I. to provide wholesale line rental services to Altnets.	About 10 600 MDF, of which some 1 200 (as at end May 2006) are able to provide interconnection.	The timetable was fixed during the start-up phase in 2000. Currently the timings for entering in a new site are fixed in the RUO (15 working days for the study on the feasibility, 90 working days for set-up of the site).
Japan	Ministry issued an interpretative document in August 1999 which clarified that the incumbent was required to provide interconnection to the MDF and line sharing. Unbundling of optical fibre implemented in April 2000 and full unbundling and line sharing implemented in September 2000.	There is an obligation to offer unbundled lines for all local exchanges, 100% of PSTN local exchanges, in response to numerous requests.	Not scheduled as of now.

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Korea	Full unbundling and line sharing available Revised LLU Criteria in 2004. - Increased the usage of LLU by reducing line reservation rate from 25% to 8% - Increased obligatory space-providing period necessary for LLU from one year to three years - Reduced usage fee: 12 200 Won->9,070 Won	826 100% can offer unbundled lines. Local exchanges : KT- 793, Hanaro - 33 All KT local exchanges offer unbundled lines.	
Luxembourg	EC Directive applied.		
Mexico	Not available.		
Netherlands	Unbundled access to the local loop available since December 1997. OPTA laid down guidelines indicating the way in which it would settle any disputes over unbundled access in March 1999. Implementation of EC Directive came into effect in January 2001.	1 361, all of them are able to offer fully unbundled lines, but other operators are present in at most 30% of the local exchanges.	At the end of 2005 KPN presented its next generation network plan ("all IP"). Part of this plan is to gradually phase out the local exchanges in the coming years and replace the copper between the local exchange and the street cabins by fibre. This makes it possible to offer services based on subloop unbundling.
New Zealand	New Zealand is expected to introduce local loop unbundling in the course of 2007.		
Norway	NPT issued a decision on the regulation of local loop unbundling. According to the decision, the monthly rental price (fully unbundled loop) can be maximum NOK 105 after 1 June 2006, and maximum NOK 95 after 1 January 2007.	Approx. 4 000 local exchanges in total. Currently, about 40 % of these exchanges have been equipped with broadband and co-location facilities for local loop unbundling (LLU). This covers about 90% of the total number of subscribers. LLU may also be available in many of the remaining exchanges, but the commercial interest is low due to few subscribers.	Requirements for local loop unbundling were introduced in the Norwegian legislation in February 2001. The regulator has not specified a timetable for upgrading local exchanges in specific areas, but disputes between the incumbent and other service providers can be referred to the regulator for settlement.

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Poland	The President of UKE imposed a reference offer on local loop unbundling on TP S.A. The decision was issued in 2005 and defined framework conditions for contracts regarding LLU in terms of full and shared access. An fixed telecommunications service operator with SMP operator is obliged to prepare an offer which defines framework conditions for access to the local loop and related facilities. After such an offer is accepted by the regulatory office, an SMP operator is prohibited from signing contracts with alternative operators, containing worse conditions than the ones defined in the reference offer. The decision obliging TP S.A. to change the Reference Unbundling Offer is currently being prepared.	7582 (data from 20 major operators). Currently none of the MDFs is used for unbundled line services.	No
Portugal	The EC regulation on unbundling came into force in January 2001. Modifications to the RUO resulted in a 60% fall in the installation price and an 18.7% reduction in monthly fees for local loops and altered the signal transfer service, reducing prices. On 13 April 2006, ICP-ANACOM set out at €8.99 and €2.51 ceiling prices for the monthly local loop payment (full access and shared access). The regulator determined, in 2005, shorter time limits for the provision of loops and an increase in the value of the compensations that PT Comunicações has to pay to the new operators for non-compliance vis-a-vis loop provision, and also introduced procedures that simplify and streamline the process. A new statistical data collection system was also defined for better market monitoring.	According with the information related with the RUO, there are ~1600 MDF in Portugal. Theoretically, all local exchanges and MDFs are eventually able to offer fully unbundled lines, but the operators are mostly co-located in urban areas: currently (1T2006), in 187 local exchanges.	Yes, from 20 days to make available and deliver the space for co-mingling (MDF room) to a maximum of 80 days to prepare a dedicated room for collocation. Some issues occurred, related with availability of space for co-mingling, but are being solved without explicit intervention by ICP-ANACOM.
Slovak Republic	The Telecommunication Act will be amended to allow for unbundling. The incumbent published Reference Offer in Local Loop Unbundling has been provided.		The regulator does not monitor such data.

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
Spain	Since 2001 the dominant carrier has been required to provide full unbundled access, shared access and bitstream access. Continuity has been the main trend since 2004 in the local loop unbundling policy, with some specific action taken by CMT to improve transparency. Furthermore, a significant effort has been done in the enforcement of the policy so far. This has been imperative provided the massive deployment of the local loop unbundling since 2004. This enforcement has allowed CMT to mediate in the many conflicts arisen in connection to the mentioned deployment.	There are 6 900 MDFs. All of them are potentially ready to offer fully unbundled lines.	No
Sweden	No major changes.	Approximately 8 200 MDFs whereof currently 62% of these MDFs have equipment installed in order to provide broadband to end customers.	There is no timetable.
Switzerland	The Ordinance on telecommunication services introduced in April 2003 obliged service providers with a dominant position in the market to provide a fully unbundled line (full access) as well as shared access to the local loop, as well as bitstream access. As a result of legal action by Swisscom unbundling was not implemented. The Federal Council introduced an obligation for unbundling in a draft amendment to the law on telecommunications. This amendment to the law was adopted in March 2006 . consequently unbundling is not yet operational. The changes to the law are expected to enter into force in the Spring of 2007.	None	None
Turkey	The Communiqué on Procedures and Principles Regarding Unbundled Access to the Local Loop was published in July 2004 and came into force by July 2005. The draft reference unbundling offer has been prepared by Türk Telekom and will be effective after the approval of the Authority.		
United Kingdom	No changes	5587 – All are available to LLU.	All upgraded

Table 2.9. **Local loop unbundling (continued)**

Country	Local loop unbundling policy since 2004	Number of local exchanges (MDF) and proportion of these exchanges that are unbundled (number and percentage)	Timetable to upgrade local exchange
United States	The FCC found that requesting carriers are impaired without access to certain high-capacity loops based upon certain triggers. Specifically, incumbent LECs must unbundle DS1 and DS3 loops within the service area of a wire center that contains fewer than a certain number of business lines or fiber-based collocators. However, requesting carriers are not entitled to access unbundled dark fiber loops as network elements in any instance. Pursuant to the terms of the Triennial Review Order, line sharing has been completely phased out in the US as of September 2006.	23177 central offices as of June 2005.	

Table 2.10. **Local loop unbundling prices**

Country	Price for the one-off connection charge and per month for an unbundled local loop (end of 2005)	Price for the one-off connection charge and per month charge for a shared line (end of 2005)
Australia	The prices for unbundled local loop services are negotiated between access seekers and access providers – the ACCC does not set prices unless called on to resolve a dispute between access seeker and access provider. The following prices were charged by the main access provider at the end of 2005 in the different geographic regions: - CBD – monthly price USD 9.9, connection price USD 71 - Metropolitan - monthly price USD 16.8, connection price USD 74.8 - Regional – monthly price USD 30.5, connection price USD 74.8 - Remote – monthly price USD 76.3, connection price USD 82.4	The ACCC has issued guidance on an appropriate monthly charge for line sharing service at USD5.3 to USD6.9 in 2005, with a connection charge of USD75.6. The Australian Competition Tribunal (ACT) has rejected Telstra's undertaking to provide a line sharing service at $9 following a similar assessment from the ACCC.
Austria	One-off price: USD 136.3 (with works on the subscriber premises) One-off price: USD 68.6 (without works on the subscriber premises) Monthly price: USD 13.6 (fully unbundled loop) Monthly rental for sub-loop between Greenfield distribution frame and network termination point on user's premises: USD 10.5 Monthly rental for sub-loop between in-house distribution point and network termination point on user's premises: Reimbursement of costs.	One-off price: USD 136.3 Monthly price: USD 6.8
Belgium	All prices are valid from 1/1/2006. One-off price: USD59.3 (active loop) / USD 64.2 (non active loop) Monthly price: Type 1 (Tf usage + LF data) : USD 13.2 Type 2 (type 1 usage + HF data : ADSL,SDSL, xDSL) : USD 14.1	All prices are valid from 1/1/2005. Monthly price: one: USD 69.5 Monthly price : USD 2.01
Canada		
Czech Republic	One-off price: USD 192.7 Monthly price: USD 16.8	One-off price: USD 196.4 Monthly price: USD 6.6
Denmark	One-off price: USD 55.8* Monthly price: USD 11.2 (excl. VAT) * Additional fee USD 85.7 if no existing connection point can be used.	One-off price: USD 46.7* Monthly price: USD 5.6 (excl. VAT) * Additional fee USD 85.7 if no existing connection point can be used.

Table 2.10. **Local loop unbundling prices (continued)**

Country	Price for the one-off connection charge and per month for an unbundled local loop (end of 2005)	Price for the one-off connection charge and per month charge for a shared line (end of 2005)
Finland	One-off price: USD 121.6 (weighted average of 40 SMP-operators providing ULL) (Prices vary between USD 75 and USD 252.3) Monthly price: USD 7.0 (weighted average of 40 SMP-operators providing ULL) (Prices vary between USD 5.4 and USD 13.1)	
France	Charge for access to service : USD 62.5 Cancellation charge: USD 37.5 Price for full unbundling : USD 11.6//month	Charge for access to service : USD 68.8 Cancellation charge: USD 43.8 Price for shared access : USD 3.6/month
Germany	In August 2005 BNetzA approved: One-off price: USD 53.9 for the basic set-up of the line without any additional work at the customer's premises; Monthly price: USD 13.3 for the most common variant of access to the customer, i.e. the unbundled twisted copper pair.	In April 2005 BNetzA approved: One-off price: USD 64.3 Monthly price: USD 2.9
Greece	One-off price: USD 68.6. Monthly price: USD 10.1.	One-off price: USD 81.3 Monthly price: USD 6.3
Hungary	For the main incumbent (Magyar Telekom) One-off price: USD 188.6 Monthly price: USD 12.1	For the main incumbent (Magyar Telekom) One-off price: USD 188.6 Monthly price: USD 5.0
Iceland	One-off price: USD 46.8 Unbundled local loop per month if only PSTN(lower frequency): USD 13.7 Both PSTN and shared access per month = USD 0.02	One-off price: USD 46.8 Monthly price: USD 4.5
Ireland	ULMP connection charge with successful completion (existing metallic path): USD 68.8 ULMP monthly rental: USD 19.6	LS connection charge with successful completion (existing metallic path, access seeker provides exchange splitter): USD 68.8 LS monthly rental: USD 10.0
Italy	One-off price: USD 46.3 (active line); USD 69.0 (non active line) Monthly price: USD 10.4 (the actual price is USD 9.4/month due to T.I. self-commitment)	USD 48.6 (POTS splitter provided by Telecom Italia)
Japan	Charges for full unbundling; USD 9.4 (NTT East) or USD 12.4 (NTT West) per month for a line. The one-off connection charge is not set in Japan.	Charge for line sharing: USD 1.09 (NTT East) or USD 1.03 (NTT West) per month for a line.

Table 2.10. **Local loop unbundling prices (continued)**

Country	Price for the one-off connection charge and per month for an unbundled local loop (end of 2005)	Price for the one-off connection charge and per month charge for a shared line (end of 2005)
Korea	One-off connection charge per month for full unbundling is USD 8.9 (as of 2005)	One-off connection charge per month for a shared line is USD 4.4 (as of 2005)
Luxembourg		
Mexico		
Netherlands	USD 12.0.	USD 2.4.
New Zealand		
Norway	One-off price: USD 164 (full access) Monthly price: USD 21 (full access)	One-off price: USD 86.4 Monthly price: USD 11.5
Poland	One-off price: USD 49.7 Monthly price: USD 17.9	One-off price: USD 94.4 Monthly price: USD 9.0
Portugal	One-off price: USD 47.5 Monthly price: USD 11.2	One-off price: USD 47.5 Monthly price: USD 3.1.
Slovak Republic	One-off price: USD 203.6 Monthly price: USD 17.7 Reference offer of Slovak Telekom	One-off price: USD 214.0 Monthly price: USD 12.4 Reference offer of Slovak Telekom
Spain	One-off price: USD 28.0 Monthly price: USD 14.2	One-off price: USD 37.7 Monthly price: USD 3.8
Sweden	One-off price: USD 19.9 Monthly price: USD 1.5	One-off price: USD 11.2 Monthly price: USD 0.73
Switzerland	.	
Turkey		
United Kingdom		
United States	The national average unbundled local loop price is USD 13.7	

Table 2.11. **Fixed to mobile interconnection (termination rates)**

	Publication of fixed to mobile termination rates	Determination of fixed to mobile termination rates	Regulation of fixed to mobile termination rates
Australia	Not generally but some regulatory processes from time to time provide details about these rates. There is no obligation for mobile network operators to publish termination rates. However, Division 5 of Part XIC of the Trade Practices Act 1974 enables access providers to voluntarily lodge written access undertakings with the Australian Competition and Consumer Commission (ACCC) specifying the terms and conditions upon which they agree to supply a specified service. The ACCC can accept or reject the undertaking. The access provider can seek to vary an undertaking that is in force or it can withdraw the undertaking. Under section 152 CRA of the Trade Practices Act 1974 the regulator may publish arbitration determinations.	In the first instance, terms and conditions of supply, including price, are commercially negotiated. If negotiations fail, the ACCC may determine terms and conditions through arbitration with commercial parties. Should an undertaking, given by the access provider as to the terms and conditions it will supply the service on, have been accepted by the ACCC, the ACCC may not make an arbitration determination inconsistent with that undertaking.	All mobile termination rates of all providers are subject to regulation. Mobile terminating access services (MTAS) on all digital mobile telephony networks have been declared by the ACCC to make them subject to the telecommunications access regime in Part XIC of the Trade Practices Act 1974. Therefore, the ACCC has the power to regulate the charges payable for such services. The ACCC does not directly set access prices. However, by publishing pricing principles that it would use if it were to arbitrate on an access dispute the ACCC provides guidance for the industry. In June 2004, the ACCC published pricing principles. The MTAS pricing principles state that there should be a closer association of the price of the service and the underlying (TSLRIC+) cost of the service. The ACCC also published price-related terms and conditions which specified indicative prices for the MTAS.
Austria	As the NRA had to decide the termination rates to mobile (as well as to fixed) networks, the termination rates are published on the website.	In Austria the interconnection rates (also) for fixed to mobile are primary a matter for commercial agreements between operators. If an agreement on interconnection cannot be reached between an operator of a (tele)communications network who offers (tele)communications services for the public and another operator of a public (tele)communications network within a period of six weeks from the receipt of the request, either party involved in the interconnection may call in the regulatory authority. After the parties have been heard, the regulatory authority shall decide on the interconnection arrangements. The arrangement replaces any agreement. According to the dispute settlement procedure in the Austrian Telecommunications Act, the NRA (the Telekom-Control-Kommission) has the competence to rule the interconnection-prices of SMP-operators as well as of non-SMP operators (mobile and fixed).	

Table 2.11. **Fixed to mobile interconnection (termination rates) (continued)**

	Publication of fixed to mobile termination rates	Determination of fixed to mobile termination rates	Regulation of fixed to mobile termination rates
Austria ***(continued)***		According to the outcome of the last market analysis concerning the markets for mobile termination (decisions dated Oct. 27, 2004), all MNOs were designated as having significant market power on their respective markets; consequently the NRA imposed (amongst others) the specific obligation to charge cost-orientated mobile-termination rates following the concept of Long Run Average Incremental Cost (LRAIC). This obligation was set in place by decisions of the NRA dated Dec. 19, 2005, by mandating a "glidepath" for mobile termination rates (see http://www.rtr.at/web.nsf/deutsch/Telekommunikation_Regulierung_Entscheidungen_Entscheidungen_Mobilterminierung2005?OpenDocument). In the case of non SMP-operators there is no legal basis for the amount of the interconnection charge; therefore the NRA rules in its practice, that the interconnection fee of a non-SMP-operator (mobile) has to be reasonable. In Austria there is no differentiation for the termination rates, whether the call originates in a mobile or a fixed network.	
Belgium	Up-to-the-minute publication of these tariffs doesn't exist on a systematic basis. The tariffs are however not confidential as they are mentioned in decisions of the BIPT.	The termination rates of the two SMP-operators, Belgacom Mobile (Proximus) and Mobistar, are subject to cost orientation.	The non SMP operator base is in principle free to define his termination rates (this remains valid until the notification of the remedies of market 16 to the European Commission).
Canada	No	Termination rates for fixed-to-mobile calls are not imposed.	Not applicable.
Czech Republic	Yes, till 1 May 2006 ceiling price 3.11 CZK/min, valid for all three mobile operators, from 2 May 2006 ceiling price 2.99 CZK/min for all SMP mobile operators.	Commercial agreement. If there is no agreement the method of calculation and prices can be set by the regulator. The termination rates for fixed-to-mobile calls are the same as for mobile to mobile termination. The price should be commercially negotiated between operators. In the frame of solving the price disputes the Czech Telecommunication Office is entitled to determine the rates. The Czech Telecommunication Office will set the method of price calculation by a price decision. From 2 May 2006 the regulator set termination prices for operators with significant market power after completing an analysis of the relevant market.	Yes, the mobile termination rates are regulated. The price is cost oriented – average cost of all mobile operators.

Table 2.11. **Fixed to mobile interconnection (termination rates) (continued)**

	Publication of fixed to mobile termination rates	Determination of fixed to mobile termination rates	Regulation of fixed to mobile termination rates
Denmark	Yes. All mobile operators are obliged to publish their RIO.	Some are commercially negotiated and some are regulated.	Yes. Benchmarking methods have been used to regulate the termination tariffs
Finland	Yes, for operators with significant market power (all GSM network operators).	They are commercially negotiated, but the network operators have an obligation to have non-discriminatory and cost oriented tariffs. Mobile termination charge is used when carrier pre-selection is placed; otherwise only retail charges are used.	Yes. Rates of SMP operators must be cost-oriented.
France	Yes for operators that have been designated as having significant market power in the interconnection market. Yes. Interconnection and access offers for mobile calls are notified by the three mobile operators in metropolitan France to ARCEP and are then published on their respective sites (this does not constitute validation by ARCEP) and are freely available in electronic form.	Determined by the mobile operators. The three mobile operators in metropolitan France are subject to a price cap set by decision of ARCEP on the basis of cost and revenue information at its disposal.	Operators with significant market power in the interconnection market are required to have non-discriminatory termination charges which are cost oriented. The regulator has already imposed two reductions of 20% between 1999 and 2000 and has put in place a proposal for a further reduction of 40% between 2002 and 2004. Yes, they are subject to a price cap as part of a multi-annual reduction of wholesale rates for the three metropolitan mobile operators with SMP.
Germany	Mobile termination rates are published.	The termination rates are regulated.	The termination rates are subject to prior approval by BNetzA in accordance with the principles of ex ante regulation i.e. strict cost orientation (cost of efficient service provision, LRIC approach).
Greece	Yes	From July 2006, termination rates on mobile networks are determined by EETT, using a LRAIC bottom up model.	All mobile operators have been designated as having SMP in the respective mobile termination market. The regulatory obligation among others is the provision of cost oriented termination rates for each mobile operator.
Hungary	Yes	Termination rate is determined by mobile operator on the base of cost orientation. This rate is to be approved by the national regulatory authority. If the NRA does not approved the rate determined by the operator, the rate will be determined by the NRA.	As all the three MNOs are SMP operators, they must apply cost-based fees.
Iceland	Yes	Set by companies with restriction control from the domestic operator (Siminn and Og Vodafone) wich have both been declared SMP on the mobile market.	They must be cost orientated if operators have significant market power and both Siminn and Og Vodafone have been declared SMP on the interconnection market.

Table 2.11. **Fixed to mobile interconnection (termination rates) (continued)**

	Publication of fixed to mobile termination rates	Determination of fixed to mobile termination rates	Regulation of fixed to mobile termination rates
Ireland	Yes These are published in the "Switched Transit Routing and Price List" on eircom's wholesale website.	Commercial negotiation ComReg imposed a glide path to cost orientation and the mobile operators have voluntarily reduced their rates as part of this glide path approach.	If the operator has been designated as having significant market power then charges must be cost-justified. Yes, the obligations of Cost Orientation, Transparency, Non Discrimination was imposed on all mobile operators. (Note: 1) Vodafone & o2 were also imposed with the Accounting Separation obligation 2)Hutchinson successfully challenged their designation of SMP in the courts and ComReg is currently reviewing the issue)
Italy	Yes for the two operators notified as having significant market power. Tim, Vodafone and Wind termination rates are published within AGCOM Decision 3/06/CONS.	The regulator has set a price ceiling on the two notified operators.' For mobile operators having SMP and subject to the price control (Tim, Vodafone and Wind) termination rates for fixed-to-mobile calls are regulated. Regarding H3G, mobile operators having SMP but not subject to the price control obligation, termination rates for fixed-to-mobile calls are determined by the mobile operator and made available to other operators within a reference offer. AGCOM has recently started a review of decision 3/06/CONS, in order to verify if the price control obligation has to be extended also to H3G.	Yes. Non-discriminatory rules apply to operators with significant market power. Tim, Vodafone and Wind mobile termination rates are subject to the price control and cost account regulation. H3G mobile termination rates are not regulated.
Japan	Telecommunications carriers with Category II designated telecommunications facilities are obliged to publicize their interconnection tariffs including termination rates.	The termination rates are principally determined through negotiations between carriers.	The termination rates of carriers with Category II-designated telecommunications facilities are required to be below the sum of reasonable costs under efficient management and reasonable profit (refer to "Telecommunications Business Law 34(3)-4").
Korea	Yes	The government sets the conditions for rate determination and these are published. Government sets the conditions for rate determination and publicly notify the conditions. The termination rates for fixed network (KT) and mobile network (SKT, KTF, LGT) are determined according to the criteria for interconnection.	The government makes public the criteria for calculating the interconnection fee and calculates mobile termination rates accordingly. Government make public the criteria for calculating interconnection fee and calculate the mobile termination rate accordingly (except 3G).
Luxembourg	No	Commercial negotiation	Tariffs of operators with significant market power are regulated.
Mexico	No		

Table 2.11. **Fixed to mobile interconnection (termination rates) (continued)**

	Publication of fixed to mobile termination rates	Determination of fixed to mobile termination rates	Regulation of fixed to mobile termination rates
Netherlands	Yes	They are regulated by OPTA.	Yes, they must be cost oriented as of 1 July 2008. OPTA has designed a glide path, with downward steps on 1 July 2006, 1 July 2007 and 1 July 2008. The cost oriented level will be determined on the basis of a BULRIC model.
New Zealand	No	Commercial negotiation	No
Norway	Yes, they should be publicly available (according to a decision from NPT).	The termination rates of Telenor and NetCom, the two major network operators, are regulated. These two operators have about 93-94 % of the market. The two small operators Teletopia and Tele2 (MVNO) are free to determine their own charges.	Yes, c.f. the answer above. The mobile termination rates of Telenor and NetCom are subject to price cap regulation.
Poland	No, although the operator with significant market power is obliged to inform the President of the Office of the Electronic Communications about the terms of contracts (including the rates) that it concluded with other operators.	They are commercially negotiated between operators, although in case of disputes between operators the President of the Office of Electronic Communications may determine the rates.	No
Portugal	Yes. On the 25th of February 2005, ANACOM published the market analysis for voice call termination in which fixed to mobile termination rates was published.	The termination rates were determined through regulation.	Yes The termination rates imposed by ANACOM were a result of market analysis, according to the EC regulatory framework. The concrete figures were determined by international benchmarking for the period between March 2005 and October 2006.
Slovak Republic	Yes	Commercial negotiations.	No
Spain			
Sweden	An operator with significant market power must declare rates to the regulator and these are available to other operators.	The termination rates are determined through regulation.	Operators with significant market power are price regulated. TeliaSonera, Tele2 and Telenor are required to offer cost oriented termination rates according to a LRIC-based cost model. Hi3G shall offer fair and reasonable rates. All operators are required to offer termination on a non-discriminatory basis including charges.

Table 2.11. **Fixed to mobile interconnection (termination rates) (continued)**

	Publication of fixed to mobile termination rates	**Determination of fixed to mobile termination rates**	**Regulation of fixed to mobile termination rates**
Switzerland	Providers with a dominant position in the market must publish every year a basic offer. The interconnection services included in the basic offer are listed in the Ordinance on telecommunication services (art. 43 OST). Swisscom publishes its termination tariffs to mobile networks in its standard offer.	Commercial negotiations between operators.	The legal provisions provide that the prices charged by the operator occupying a dominant position on the market are aligned to costs (cf. art. 45 OST). It should be noted that the national regulator, which in this context is the Commission for Communications (ComCom), can only take a decision on prices in the event of litigation between operators (i.e. ex post). Within the framework of this procedure, ComCom consults the Competition Commission (ComCo) before concluding on possible dominance.
Turkey	The rate for Turkcell is given place in the reference interconnection offer. The reference interconnection offers of Vodafone and Avea have not been published yet. But Standard Reference Interconnection Rates for the operators having SMP are published (Turk Telekom, Turkcell, Vodafone and Avea).	The termination rates are commercially negotiated between operators, however, according to the Article 21 of Ordinance on Access and Interconnection, in case that the related operators cannot reach an agreement within utmost three months, any one of the parties may apply to the Authority for dispute settlement procedure to be actuated. The Authority, by evaluating the information and documents submitted by the parties, determines the terms, conditions and prices appropriate for the access agreements including interconnection within four months and notifies the parties.	The mobile termination rates are subject to regulation and they must be cost oriented for the operators having SMP. The Authority may request from the notified operators to prove that their access and/or interconnection tariffs are set according to cost-orientation. In the case that the rates are not set on a cost basis, the Authority determines the rates according to cost orientation or sets a ceiling.
United Kingdom	Mobile operators with significant market power must publish interconnect agreements.	Termination rates for two mobile operators are subject to a charge control of RPI-9. The regulator has proposed that the control be extended to the other two mobile operators.	Charges are regulated and the control is designed to reflect cost.
United States	Most mobile networks operate under a mobile-party pays regime. In general interconnection rates for mobile networks are not regulated. The intercarrier rates for such calls are commercially negotiated, and *callers* from fixed networks do not pay extra to call a mobile network. Often in the US the negotiated termination rate is zero - that is, firms opt not to charge each other.	In general, interconnection rates for mobile networks are not regulated. However, interconnection rates between dominant carriers, the incumbent local exchange carriers (ILECs), and other carriers – including mobile operators – are regulated. ILECs and mobile operators interconnection rates fall under the FCC's "reciprocal compensation" rules which require that the rate the ILEC charges the mobile operator for termination equal the rate that the mobile operator charges the ILEC for termination, unless the mobile operator can prove that its costs are higher than the costs of the ILEC.	Termination rates for fixed to mobile calls are initially commercially negotiated. If operators cannot reach agreement, they are generally arbitrated by local public utilities commissions.

Table 2.12. **Percentage of final consumption expenditure of households per categories in the OECD[1] area**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	200	2001	2002	2003	2004
Communications[2]	1.79	1.67	1.68	1.74	1.77	1.84	1.94	2.08	2.15	2.22	2.29	2.30	2.29	2.30	2.27
Health	8.04	7.77	7.89	8.18	8.14	8.20	8.40	8.80	9.06	9.09	9.56	10.01	10.40	10.29	10.18
Education	1.68	1.62	1.65	1.73	1.74	1.71	1.72	1.78	1.80	1.85	1.94	1.97	1.99	1.95	1.92
Housing, water, electricity, gas and other fuels	18.83	19.27	19.35	19.80	19.95	20.36	20.32	20.13	19.97	19.92	20.11	19.97	19.98	20.20	20.18
Recreation and culture	9.00	8.97	8.91	9.01	9.03	9.32	9.32	9.39	9.44	9.51	9.62	9.31	9.27	9.27	9.30
Transport	12.30	11.94	12.00	11.72	11.96	11.98	12.30	12.40	12.31	12.45	12.83	12.48	12.28	12.29	12.32
Restaurants and hotels	7.59	7.43	7.44	7.37	7.37	7.25	7.22	7.25	7.31	7.28	7.42	7.22	7.27	7.31	7.40
Alcoholic beverages, tobacco and narcotics	3.05	3.15	3.11	3.03	2.99	3.04	3.01	2.96	2.95	3.00	2.97	2.91	2.95	2.94	2.91
Furnishings, household equipment and routine home maintenance	6.28	6.32	6.27	6.12	6.09	6.05	5.95	5.92	5.89	5.83	5.78	5.57	5.51	5.47	5.49
Food and non-alcoholic beverages	13.29	13.23	12.95	12.61	12.43	12.36	12.02	11.57	11.31	11.12	10.93	10.70	10.64	10.70	10.70
Clothing and footwear	6.88	6.88	6.78	6.54	6.36	6.23	6.10	5.93	5.86	5.72	5.60	5.33	5.21	5.12	5.08

1. New Zealand and Turkey are not included in the calculations.

2. Communications includes Telecommunication equipment and services and Postal services.

Source: OECD, SNA database.

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Chapter 3

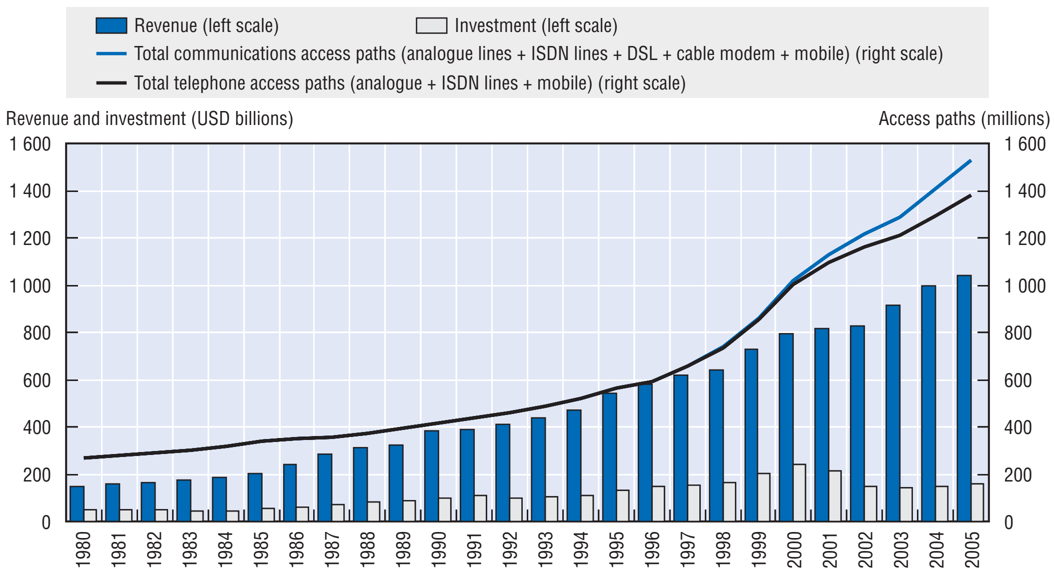
Telecommunication Market Size

The telecommunication sector continued to grow, with revenues reaching USD 1 trillion for the first time in 2005. Users typically paid less for individual services but bought more of them. The introduction of these new telecommunication services has helped increase the percentage of telecommunication revenue in overall GDP to 3%. The chapter examines the size of the telecommunications market and highlights the sectors with the most impressive growth. Mobile revenues are increasingly important and now account for roughly 40% of total telecommunication revenues. Broadband revenues are also beginning to compensate some of the loss of voice revenues. The chapter also explores trends in research and development.

Introduction

Telecommunication revenues in the OECD surpassed USD 1 trillion for the first time in 2005. Despite fluctuations in market conditions over the past ten years, telecommunication markets expanded and revenues increased each year (in current terms) since 1980 (Table 3.1 and Figure 3.1).

Figure 3.1. **Trends in public telecommunication revenue, investment and access paths, 1980-2005**



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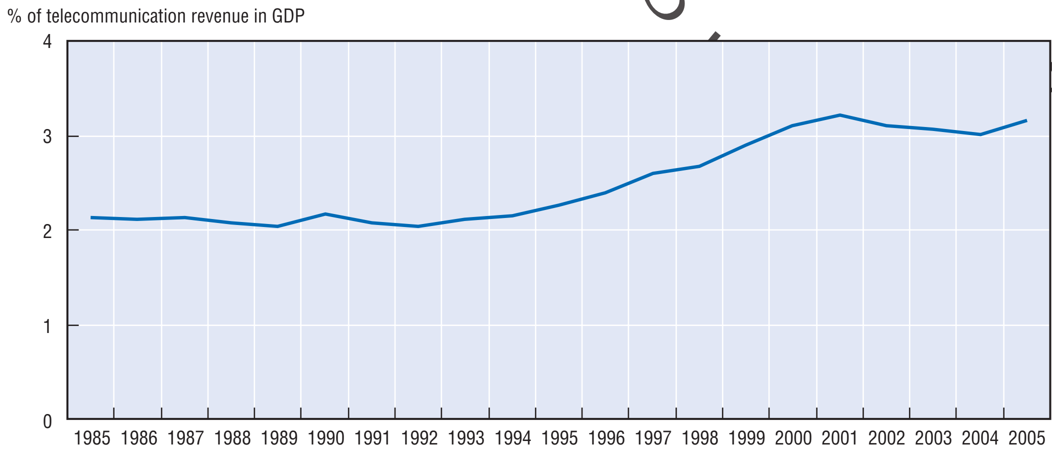
While total telecommunication revenues increased, users paid less for individual services each year in most markets (see Chapter 7). At first glance, record revenues and lower prices for consumers may seem inconsistent. However, the net gains are the result of competition reducing prices for individual services but operators increasing the number of services they offer.

Figure 3.1 illustrates this phenomenon. The number of "total communication access paths" grew quickly from 1998 with the addition of new mobile access paths (mobile phones) and broadband connections. The growth rate for fixed lines over the past 25 years was a 2% compound annual growth rate (CAGR). Without the introduction of new services (in this case mobile and broadband), revenues would likely have fallen.

Revenues have grown at roughly 8% CAGR over the past 25 years in current dollar terms. Using a deflator to account for inflation, revenues grew at just under 3% a year over the same period, even as both nominal and real telecommunication prices fell.

Growth in the telecommunication sector reflects, to some extent, overall growth in the economy. Telecommunication's contribution to GDP has increased from 2% of GDP in 1985 to just over 3% 25 years later (Table 3.2). This is the result of liberalisation in the early 1990s, increased competition, efficiency gains and innovation among telecommunication firms. In 2000, the ratio of telecommunication revenue to GDP seemed to stabilise around 3%, although the ratio increased again in 2005 (see Figure 3.2).

Figure 3.2. **Telecommunication revenue as a percentage of GDP for total OECD, 1985-2005**



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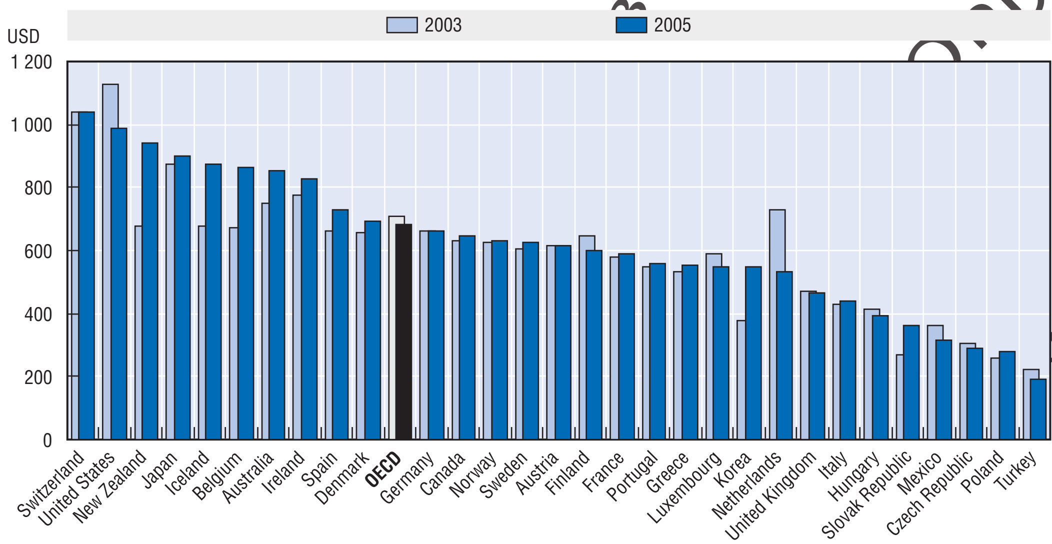
Assuming that current trends hold, telecommunication will likely become an even more important component of national GDP, in part because operators are branching out into previously distinct markets such as television.

Telecommunication revenues overall are increasing in the OECD area but the figures tell little about the amount of revenue from each communication path, often referred to as its "productivity". This information can be calculated by examining the average revenue for each communication access path (analogue telephone lines + ISDN channels + mobile subscribers + DSL + cable). The results vary widely across the OECD (see Table 3.3). The average access path earned revenue of USD 683 in 2005 or USD 57 per month, down 4% from 2003.

Switzerland and the United States had the highest revenue per access line in the OECD area (Figure 3.3). The average yearly revenue for an access line in Switzerland was USD 1 042. The amount was slightly lower in the United States at USD 986 per year. Turkey, Poland and the Czech Republic had the lowest revenue per access path in 2005.

Another common measure of telecommunication market size is the amount of telecommunication revenue per capita (Figure 3.4). Again, Switzerland leads the OECD in terms of telecommunication revenue per capita with an increase of 8% between 1996 and 2005. The largest growth in percentage terms was in Poland, the Slovak Republic and Korea. Revenue per capita increased by close to 50% over nine years in each of the countries.

Figure 3.3. **Public telecommunication revenue per communication access path, 2003 and 2005**



Note: Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers.

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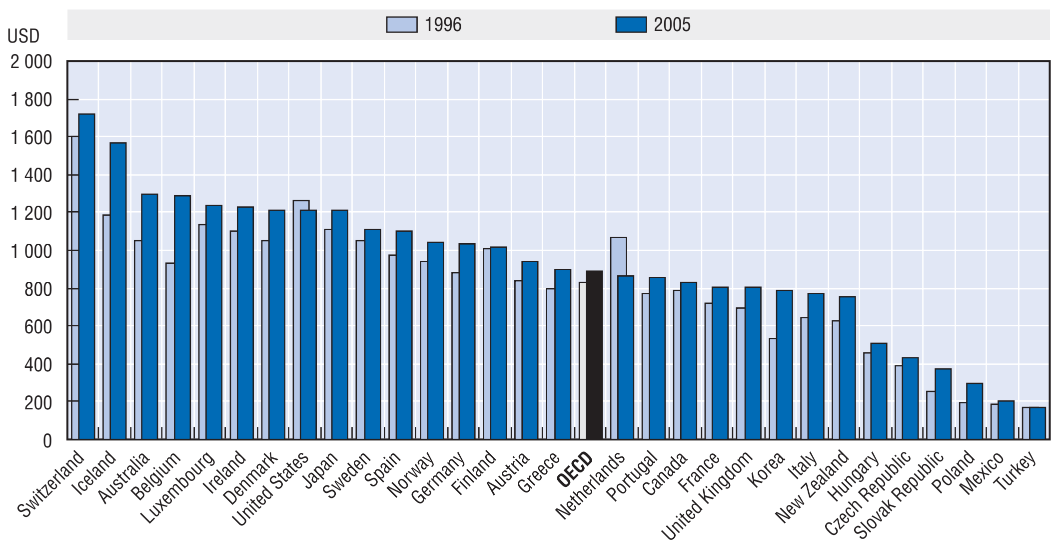
Figure 3.4. **Public telecommunication revenue per capita, 1996 and 2005**



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Mobile communications

Mobile revenues in 2005 were USD 408 billion and they continue to grow as a percentage of overall telecommunication revenues (see Figures 3.5 and 3.6 and Table 3.4). In 1995, mobile revenues accounted for only 13% of total revenues in the sector. Ten years later that percentage reached 39%, tripling over the decade.

By 2005, mobile revenues amounted to more than 50% of total revenues in 11 OECD countries (see Table 3.4). The lowest ratio of mobile to total revenue was in New Zealand where the mobile sector accounted for only 16% of revenue. The mobile sector has clearly become one of the most important revenue generators for telecommunication firms.

Figure 3.5. **OECD share of mobile and fixed telecommunication revenues (1998-2005)**

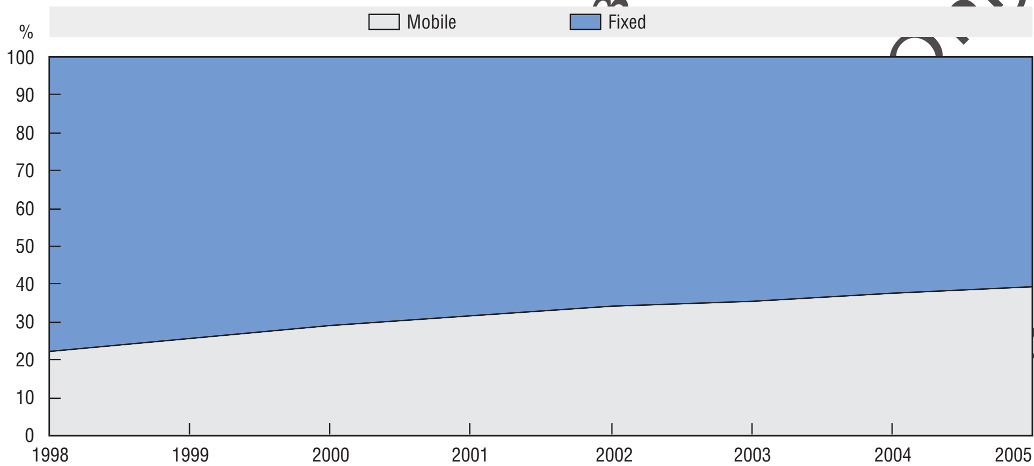

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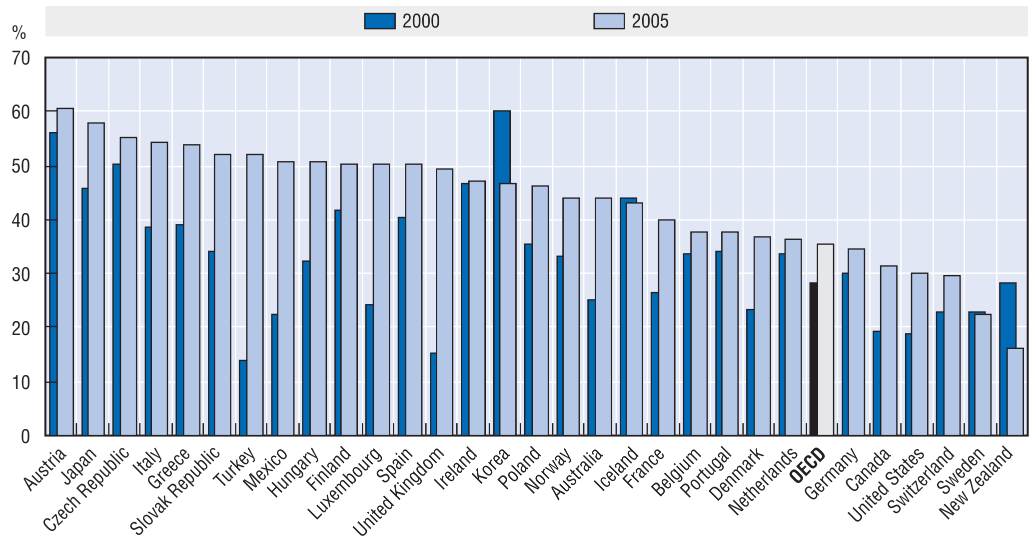
Figure 3.6. **Share of mobile revenue in total telecommunication revenue**



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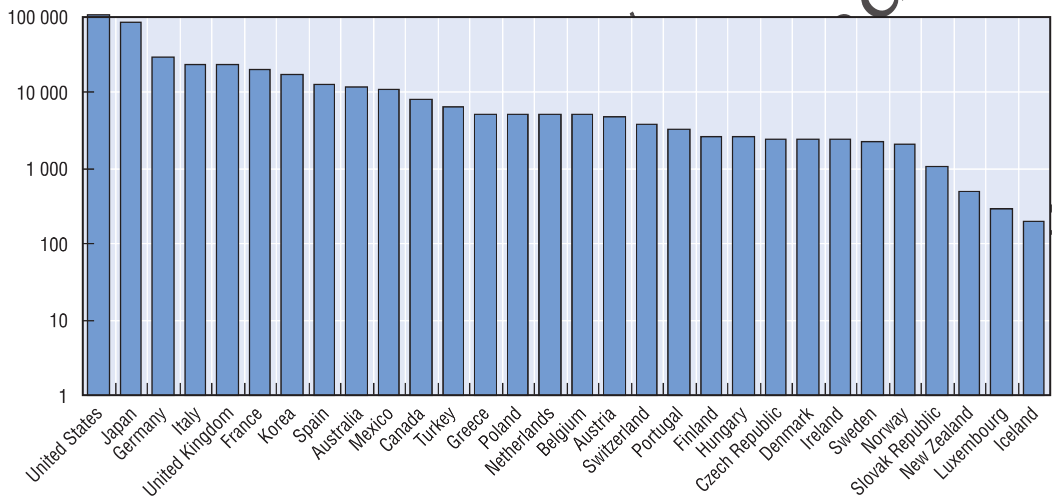
In Japan and the United States, the mobile sectors are among the largest in the world. The size of the mobile sector in the United States alone was USD 107 billion in 2005 (Figure 3.7). The mobile markets in Japan and the United States account for roughly 47% of all mobile revenues in the OECD area and 18% of *all telecommunication revenues*. To put the size of the mobile sectors in perspective, the mobile market in either Japan or the United States is larger than the 2005 GDP of 125 of the 213 economies for which the World Bank collects data.

Voice services continue to be the largest component of mobile revenues in the OECD. However, the proportion of revenue derived from data and other non-voice services is a considerable segment in many countries. Box 3.1 highlights the share of non-voice revenue for Vodafone's operations around the world in 2005. Voice revenues were at least 79% of all revenues in all countries. However, non-voice revenues such as SMS and Internet data transmission accounted for up to 20% of revenues in Germany and the United Kingdom. Non-voice revenues accounted for only 9% of total mobile revenues in the United States but 17% across Vodafone's global operations.

Figure 3.7. **Mobile telecommunication revenue in OECD countries, 2005**



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Box 3.1. **Vodafone non voice revenues as a percentage of total revenues, by country, 2005**

Vodafone (2005)

Germany	Italy	Spain	United Kingdom	United States	Other mobile operations	Total mobile
20.20%	16.70%	14.40%	20.30%	8.90%	14.30%	17.00%

Source: Vodafone Annual Report 2005.

Figure 3.8 gives the breakdown of mobile revenue per subscriber in 2003 and 2005. The results again give an indication of the "productivity" of the mobile access path for providers in the country (see Table 3.5). Higher revenues are the result of several factors including the operator's ability to charge more for calls and/or offer other value-added services over the mobile connection.

Fierce competition in mobile markets has led to a decline in the average revenue from mobile subscribers in the OECD. Between 2003 and 2005, the average revenue per mobile subscriber fell just over 0.3%. The largest drops in income per subscriber were in the Netherlands, Poland and the United States. Revenues tend to fall in areas with intense competition among operators, areas with an increasing proportion of pre-paid accounts, or areas that have historically had very high mobile prices and are now experiencing more competition. Japan leads the OECD in mobile revenue per subscriber at USD 860 per year. The lowest revenues per subscriber are in Turkey, Poland and the Czech Republic.

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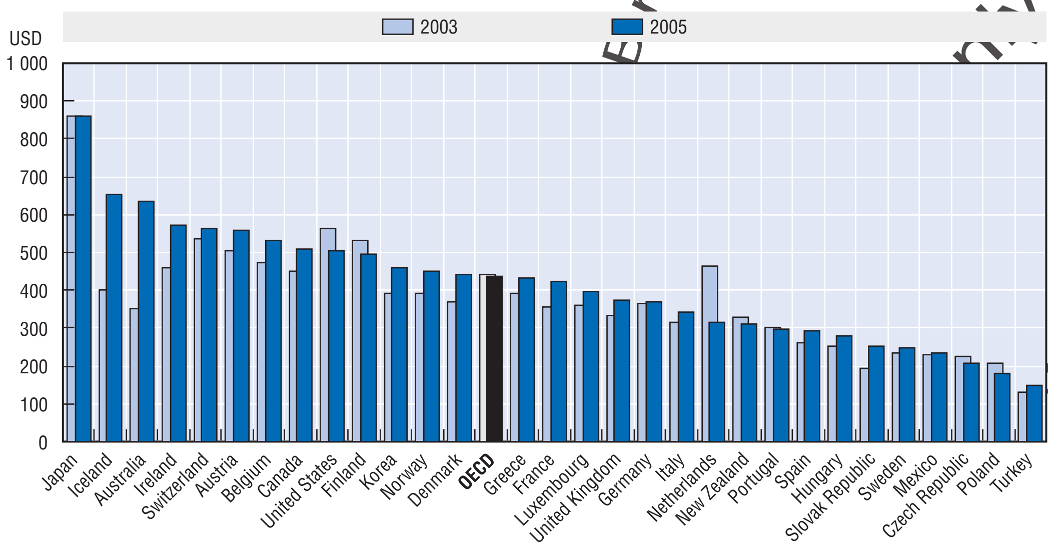
Figure 3.8. **Mobile revenue per subscriber, 2003 and 2005**



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Broadband

Clearly the introduction of broadband Internet services has helped operators boost revenues amid falling prices for mobile and fixed voice services. Operators often do not report separate revenue statistics for broadband in annual reports and data are not available on a cross-country basis. However, the study of several large global telecommunication providers can give an indication of how broadband services are helping expand telecommunication markets.

NTT is the largest telecommunication operator in the OECD area by revenue and reports revenue in a way that separates broadband as "data communication".[1] Total revenues fell in 2005 for NTT; the broadband segment was the only one to have an increase. Revenues for local calls were down 3%, long distance 2% and wireless 4% while data communications were up 1%. These data communications account for 7% of all of NTT's revenue for the year and the percentage is growing.

Verizon is the second largest fixed-line operator by revenue in the OECD and also separates out data revenue. Verizon's data revenue accounted for 14.1% of all service revenue in the third quarter 2006, up 5.7% from the year before.[2]

Deutsche Telekom (DT) offers fixed-line and broadband connectivity across Europe through its business units T-Com (fixed) and T-Online (ADSL). The breakdown of fixed-line revenue in 2005 was 92% for telephone lines and 8% for broadband. Revenues for the telephone segment fell 3.5%. At the same time, broadband revenues grew by 3.8%.[3]

In France, gains in broadband revenues have offset losses in the fixed-line voice market. In the third quarter of 2006, France Telecom reported a revenue decrease of EUR 85 million in France for PSTN traffic and tariffs but an increase of EUR 100 million for broadband Internet services.[4]

If the trends of these four large broadband providers can be extrapolated to the OECD as a whole, then broadband data tariffs will continue to help offset some of the losses in the traditional PSTN market segment. They will also become an increasingly important component of a company's overall revenue mix.

Voice traffic

Domestic

As the data from individual operators show, most telecommunication providers still rely on voice for the large majority of their revenue. However, the breakdown of voice revenue is shifting.

Statistics show users spending less time making PSTN calls in most OECD countries. The total number of voice minutes (traffic) on PSTN networks fell in 2005 for all reporting countries with the exception of Ireland, Mexico and Poland. The number of PSTN minutes in Iceland fell 44% between 2003 and 2005, the largest drop reported in the OECD area. Belgium and Austria had declines of greater than 20%. Among these minutes, there is also a shift in call termination. PSTN users are making more calls to mobiles in 2005 than 2003 in 10 of the 12 countries for which statistics are available.

Many of the lost voice minutes on the PSTN have shifted to mobile networks. Mobile voice minutes increased between 2003 and 2005 for all OECD countries where statistics were available. The largest growth in total cellular mobile traffic from 2003 to 2005 was in Turkey (67%), followed by the United States (43%), Greece (40%), Denmark (36%) and Canada (36%).

Mobile subscribers are not simply making more calls on mobile networks; they are also making more calls back to the PSTN. The number of minutes of mobile to PSTN calls grew an average of 2% among the 19 countries reporting data between 2003 and 2005.

Voice over IP has also created a shift in voice revenues, particularly those tied to traditional fixed-line telephony. Revenues for fixed-line domestic calling have fallen for many incumbent operators as VoIP operators continue to gain market share. One of the largest VoIP providers, Vonage, more than doubled revenue to USD 422 million during the first nine months of 2006 compared to the same period a year earlier.

Competition from mobile and VoIP providers will continue to shift revenues within the domestic voice market segment. Voice will likely remain the key revenue driver for some time but there will still be movement within the sector as PSTN operators focus more on broadband access and mobile and VoIP providers pull away more voice minutes.

International

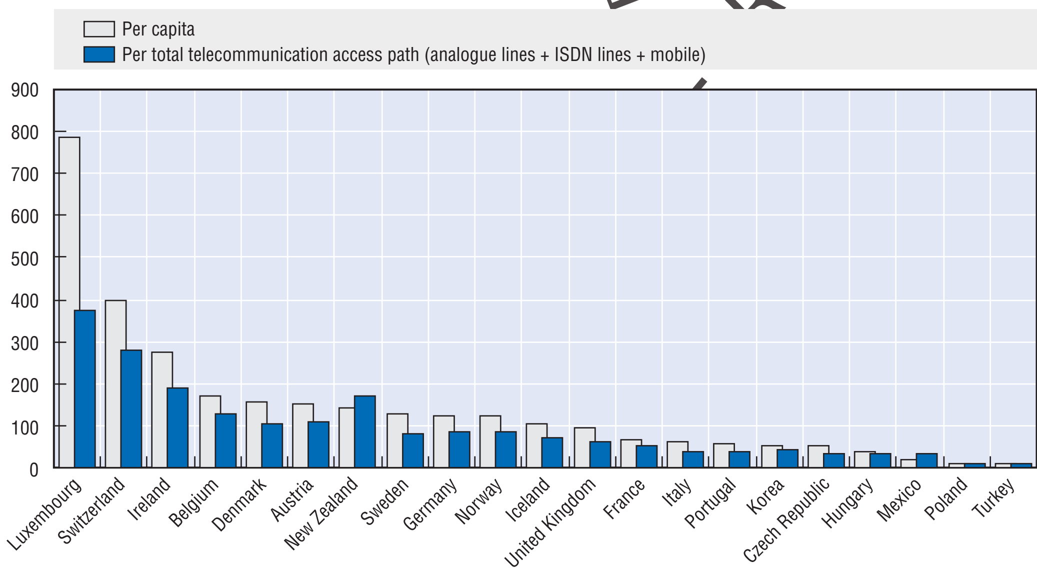
In addition to domestic traffic, the number of international minutes of voice traffic per telephone access path declined by an average of 12% between 2003 and 2005 among reporting countries (see Table 3.6). The trend will likely continue as more users move away from the PSTN to VoIP calling for international calls.

International calling was a large part of industry revenues before the liberalisation of telecommunication markets. Competition has effectively pushed prices down close to the actual costs of providing international services and revenues have declined as a result.

As will be discussed in Chapter 7, VoIP operators are putting more of their international traffic on the Internet backbone and then terminating calls locally to reduce costs. This drastically reduces costs and some VoIP providers have begun offering unlimited calling to international destinations. The dramatic increase in total international voice traffic due to VoIP does not appear in traditional PSTN measures for traffic (such as Table 3.6). In the future it may become more difficult to separate out international voice traffic on the Internet from any other data traffic.

The number of international PSTN minutes is still useful for examining patterns in international calling. Luxembourg continues to lead the OECD in the number of outbound international minutes per capita and per access path (Figure 3.9). Switzerland, Ireland, Belgium, Denmark and Austria are also among the countries with the highest amount of international voice traffic per capita and per access path carried over traditional telecommunication circuits.

Figure 3.9. **International telecommunication traffic, outgoing MiTT, 2005**



Note: MiTT = minutes of international telecommunications traffic. Total telecommunication access paths include: analogue + ISDN lines + mobile subscribers.

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Research and development

The size of the telecommunication market is partially determined by the amount of research and development conducted in the sector. Research and development expenditure among leading carriers in the OECD remains at nearly USD 7.5 billion for 2005, roughly the same aggregate amount as two years earlier. However, as revenues increase, the percentage of revenues dedicated to research has fallen. NTT of Japan remains the largest investor in research and development among sampled telecommunication firms (Table 3.7). NTT invested USD 2.9 billion in research and development during fiscal year 2005. This is comparable to the *total* revenue of a telecommunication provider such as Magyar Telecom (USD 3.1 billion in 2005). NTT is still under obligation by the Japanese telecommunication law to engage in research and development and disseminate the results to the industry.

BT and France Telecom also have very high levels of research and development. Like NTT, France Telecom is under legal obligation to invest in research and development. France Telecom is required to spend a minimum of 1% of revenue on research and development and research outlays were 1.5% for 2005. BT, on the other hand, is not required to do research and development but still had the second largest investment among surveyed firms at USD 1.3 billion in 2005. Large mobile operators also invested significant resources in research and development in 2005. Vodafone invested USD 375 million in 2005, an amount equivalent to 0.5% of revenue.

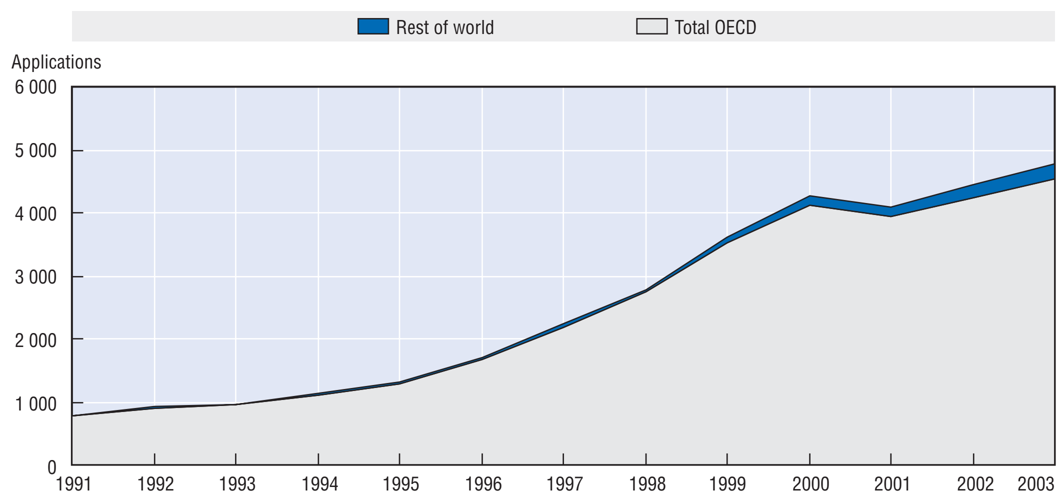
Another method for gauging the amount of research and development in the telecommunications industry is an analysis of patents either filed or granted in member countries. Patents are often considered "outputs" of the research process, although they are not a reliable proxy for overall investment. There will be a lag in the data since patents are typically not awarded in the year in which the investment is entered in the firm's balance sheet.

Comparable data are available from the United States and European patent offices (Table 3.8 to 3.10). Key communication patents are typically filed first in the inventor's home country and then across the world (or in major markets). This allows researchers to gather data that may broadly represent the industry as a whole in one location, such as the European Patent Office.

The number of patents (all types) awarded to a select group of telecommunication operators by the United States Patent and Trademark Office shows a reduction of 18% since 2003 and a reduction of 35% from 2001 (see Table 3.9). This does not necessarily imply a reduction in research expenditures on telecommunications but rather a shift of responsibility away from telecommunication operators to other firms such as equipment manufacturers for core research and development. Indeed, the number of patents granted to large equipment manufacturers was 11% higher through November 2006, than during the entire year 2005.

The OECD has an ever-decreasing percentage of the world's telecommunication users but nearly all the world's telecommunication patents are still awarded to inventors in OECD countries (Figure 3.10). Data from the European Patent Office show that 95% of all telecommunication patent applications filed with its office are from OECD countries (4 534 of 4 771) (see Table 3.10). Chinese applications account for 48% of all non-OECD telecommunication patent applications (115 out of 237). China has the tenth highest number of telecommunication patent applications of any country in the world, highlighting China's rise as a telecommunication leader.

Figure 3.10. **Telecommunication patent applications filed with the European Patent Office**



Source: OECD, Patent database, November 2006.

StatLink http://dx.doi.org/10.1787/000832467651

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Notes

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Table 3.1. **Telecommunication revenue in the OECD area**

USD millions

	1991	1993	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 2003-2005	CAGR 2000-2005	CAGR 1991-2005
Australia	*9 554*	*8 458*	*13 109*	*13 463*	*12 850*	16 385	*14 656*	15 454	*11 305*	19 391	*25 923*	26 614	17.2	12.7	7.6
Austria	2 934	3 332	4 010	3 721	4 118	4 991	4 423	5 043	5 307	6 662	7 509	7 731	7.7	11.8	7.2
Belgium	2 820	3 198	4 465	4 229	5 100	5 896	7 267	6 765	7 428	9 449	11 098	*13 511*	19.6	13.2	11.8
Canada	12 667	12 059	13 361	17 080	19 251	19 272	20 578	20 876	21 161	23 284	25 891	*26 927*	7.5	5.5	5.5
Czech Republic	485	602	1 130	1 452	1 833	2 110	2 316	2 558	3 270	4 000	4 439	*4 394*	4.8	13.7	17.0
Denmark	2 389	2 818	3 641	3 485	3 760	4 430	4 173	4 246	4 384	5 527	6 356	6 574	9.1	9.5	7.5
Finland	2 140	1 627	2 700	3 081	3 634	4 041	4 004	4 189	4 728	5 169	5 670	5 312	1.4	5.8	6.7
France	20 527	22 367	30 612	28 630	26 619	28 231	27 186	29 279	33 970	42 740	48 683	50 571	8.8	13.2	6.7
Germany	28 430	36 424	41 899	43 430	49 111	51 170	51 560	54 018	58 491	72 135	82 469	85 375	8.8	10.6	8.2
Greece	1 345	1 885	3 117	3 291	4 291	4 240	5 089	5 603	6 658	8 539	9 717	9 988	8.1	14.4	15.4
Hungary	466	1 014	1 841	2 138	2 513	3 071	3 210	3 440	3 869	4 686	4 810	5 099	4.3	9.7	18.6
Iceland	89	103	156	151	167	191	253	216	228	319	382	464	20.5	12.9	12.5
Ireland	997	1 012	1 977	2 126	1 910	1 927	2 249	2 478	3 197	3 983	5 048	5 094	13.1	17.8	12.4
Italy	18 155	17 028	24 094	23 868	26 370	26 657	24 486	27 061	30 148	36 517	42 716	45 125	11.2	13.0	6.7
Japan	52 115	74 593	118 336	116 505	113 184	143 183	163 253	156 796	129 352	139 225	147 120	*154 649*	5.4	-1.1	8.1
Korea	6 112	7 365	14 919	9 097	12 784	15 932	23 630	20 559	23 066	24 434	33 359	37 894	24.5	9.9	13.9
Luxembourg	154	225	317	305	341	363	340	372	394	473	528	567	9.5	10.8	9.8
Mexico	5 390	7 885	6 755	8 770	9 649	11 298	14 371	16 057	16 566	17 058	18 703	21 588	12.5	8.5	10.4
Netherlands	11 422	6 391	8 413	7 890	9 491	10 719	10 150	11 607	12 988	16 604	*13 979*	*14 056*	-8.0	6.7	1.5
New Zealand	1 484	1 350	2 142	2 249	2 041	2 173	2 224	2 117	2 465	3 282	5 056	5 914	34.2	21.6	10.4
Norway	2 204	2 456	3 437	3 609	2 466	2 603	2 711	2 894	3 469	4 129	4 542	4 829	8.1	12.2	5.8
Poland	1 160	1 508	2 535	2 593	3 620	4 592	5 427	6 583	6 905	7 650	9 589	11 443	22.3	16.1	17.8
Portugal	1 671	2 220	3 822	3 959	4 215	4 730	5 049	5 995	6 452	7 742	9 029	9 019	7.9	12.3	12.8
Slovak Republic	..	205	417	451	480	444	804	942	1 024	1 345	1 623	*2 029*	22.8	20.3	..
Spain	10 066	9 587	11 649	14 254	15 961	22 389	22 695	25 194	29 796	38 619	45 884	*47 949*	11.4	16.1	11.8
Sweden	5 717	4 543	7 577	6 910	7 393	7 421	6 867	6 401	7 656	9 308	10 128	10 015	3.7	7.8	4.1
Switzerland	5 173	6 056	7 687	6 794	7 699	8 729	8 244	8 745	9 516	11 368	12 909	12 917	6.6	9.4	6.8
Turkey	2 744	2 542	3 120	4 033	5 031	5 446	6 168	5 867	6 714	10 423	11 441	12 390	9.0	15.0	11.4
United Kingdom	26 031	24 083	30 539	*35 782*	25 350	28 308	30 376	31 893	34 642	40 334	46 876	48 445	9.6	9.8	4.5
United States	153 942	172 860	212 645	245 696	260 256	288 604	320 535	333 844	339 678	340 830	346 236	*359 588*	2.7	2.3	6.2
OECD	388 383	435 800	580 423	619 042	641 487	729 546	794 294	817 091	824 826	915 226	*997 713*	*1 046 071*	6.9	5.7	7.3

Notes: Values in italics are estimates. Data for Australia for 1991-1998, 2000, 2002 and 2004 are unofficial estimates.

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Table 3.2. **Telecommunication revenue as a percentage of GDP**

	1985	1990	1995	1997	1998	1999	2000	2001	2002	2003	2004	2005	GDP per capita 2005 (USD)
Australia	1.92	2.81	2.99	3.15	3.36	3.94	3.66	4.05	2.66	3.55	3.93	3.61	36 015
Austria	1.68	1.75	1.82	1.79	1.93	2.35	2.29	2.62	2.55	2.62	2.58	2.52	37 212
Belgium	1.27	1.37	1.56	1.70	2.00	2.33	3.15	2.93	2.94	3.06	3.12	3.63	35 586
Canada	2.21	2.12	2.09	2.67	3.11	2.92	2.85	2.92	2.88	2.69	2.61	2.38	35 122
Czech Republic	..	1.69	1.91	2.54	2.96	3.51	4.08	4.14	4.34	4.38	4.10	3.54	12 113
Denmark	1.49	1.77	2.07	2.04	2.17	2.55	2.61	2.64	2.52	2.60	2.61	2.54	47 732
Finland	1.50	1.62	1.95	2.49	2.79	3.09	3.30	3.35	3.48	3.15	3.01	2.70	37 454
France	1.65	1.55	1.94	2.01	1.81	1.94	2.06	2.19	2.33	2.39	2.38	2.37	34 090
Germany	1.60	2.91	1.87	2.02	2.25	2.39	2.72	2.86	2.89	2.97	3.03	3.05	33 969
Greece	1.33	1.55	2.38	2.11	2.74	2.63	3.48	3.74	3.90	3.87	3.70	3.50	25 684
Hungary	..	..	3.45	4.55	5.20	6.22	6.69	6.45	5.80	5.55	4.71	4.62	10 941
Iceland	1.29	1.35	1.92	2.03	2.02	2.20	2.93	2.75	2.60	2.95	2.93	2.89	54 322
Ireland	2.31	2.15	2.08	2.62	2.16	2.00	2.34	2.38	2.61	2.55	2.77	2.53	48 558
Italy	1.48	1.46	1.68	2.00	2.17	2.22	2.24	2.43	2.47	2.43	2.49	2.55	30 267
Japan	1.58	1.52	2.14	2.74	2.93	3.28	3.50	3.83	3.30	3.29	3.19	3.40	35 603
Korea	2.05	2.05	2.17	1.76	3.70	3.58	4.62	4.27	4.22	4.02	4.90	4.81	16 309
Luxembourg	1.03	1.33	1.66	1.65	1.76	1.72	1.68	1.85	1.74	1.64	1.58	1.54	80 352
Mexico	0.52	1.53	2.27	2.19	2.29	2.35	2.48	2.58	2.55	2.67	2.74	2.81	7 292
Netherlands	1.45	3.75	2.05	2.05	2.36	2.61	2.65	2.90	2.96	3.10	2.31	2.22	38 739
New Zealand	2.46	3.33	3.44	3.34	3.69	3.74	4.22	4.04	4.07	4.06	5.14	5.39	26 769
Norway	1.91	2.02	2.14	2.30	1.64	1.65	1.62	1.70	1.82	1.85	1.78	1.63	63 961
Poland	..	0.88	1.69	1.65	2.10	2.74	3.17	3.46	3.49	3.53	3.81	3.79	7 920
Portugal	2.66	1.93	2.83	3.52	3.57	3.89	4.50	5.19	5.05	5.01	5.10	4.88	17 511
Slovak Republic	..	..	1.72	2.09	2.14	2.16	3.93	4.46	4.17	4.08	3.86	4.28	8 803
Spain	1.44	1.69	1.89	2.49	2.66	3.63	3.93	4.15	4.33	4.39	4.42	4.24	26 080
Sweden	1.78	2.24	2.91	2.77	2.96	2.92	2.84	2.89	3.14	3.06	2.90	2.80	39 591
Switzerland	2.15	2.14	2.62	2.59	2.86	3.29	3.35	3.50	3.45	3.53	3.58	3.54	48 590
Turkey	1.03	1.37	1.08	2.10	2.50	2.95	3.12	4.04	3.65	4.35	3.80	3.41	5 045
United Kingdom	2.36	2.59	2.50	2.69	1.77	1.94	2.10	2.21	2.21	2.22	2.19	2.18	36 971
United States	2.67	2.54	2.71	2.98	2.99	3.13	3.28	3.31	3.26	3.12	2.97	2.90	41 789
OECD	2.13	2.16	2.28	2.65	2.82	3.02	3.25	3.39	3.24	3.19	3.01	2.99	29 881

Note: Data for Australia for 1991-1998, 2000, 2002 and 2004 are unofficial estimates.

StatLink http://dx.doi.org/10.1787/010831208541

Table 3.3. **Telecommunication revenue ratios**

USD

	2000		2001		2002		2003		2004		2005	
	Per total communication access path	Per capita	Per total communication access path	Per capita	Per total communication access path	Per capita	Per total communication access path	Per capita	Per total communication access path	Per capita	Per total communication access path	Per capita
Australia	788.2	760.6	709.9	791.4	474.8	572.4	748.8	970.5	913.4	1 283.1	851.7	1 299.9
Austria	459.4	552.1	497.3	627.1	511.5	656.4	613.6	820.6	630.3	918.5	616.9	939.0
Belgium	709.0	709.3	544.0	658.0	560.6	719.1	674.3	911.0	744.9	1 065.4	864.7	1 290.0
Canada	693.8	670.5	629.4	673.0	606.0	674.5	629.1	735.2	658.9	809.7	645.8	834.4
Czech Republic	280.6	225.5	240.7	250.2	272.1	320.5	306.9	392.1	316.9	434.9	291.1	429.3
Denmark	628.3	781.7	575.6	792.6	548.5	815.4	655.5	1 025.3	705.8	1 176.4	693.1	1 213.1
Finland	587.5	773.6	571.7	807.4	610.7	909.1	648.2	991.5	686.7	1 084.7	601.7	1 012.8
France	457.2	447.8	437.9	479.0	490.4	552.1	577.3	690.1	611.8	781.1	589.8	806.5
Germany	585.4	627.3	552.8	656.0	573.3	709.1	663.4	874.1	685.8	999.6	662.7	1 035.3
Greece	435.2	466.1	406.7	511.7	441.5	606.0	533.9	774.6	581.3	878.5	551.0	899.5
Hungary	481.3	314.4	407.3	337.6	377.4	380.8	411.3	462.6	391.9	475.9	393.9	505.5
Iceland	669.2	899.5	534.0	756.1	515.4	793.9	675.3	1 103.6	776.4	1 304.8	873.6	1 567.9
Ireland	614.9	591.9	559.2	642.1	668.3	814.3	774.3	998.0	902.6	1 243.6	826.6	1 227.8
Italy	366.0	430.0	354.9	474.9	382.9	527.5	430.3	633.9	461.6	734.3	440.3	771.0
Japan	1 261.9	1 287.2	1 128.3	1 233.2	865.3	1 015.0	872.2	1 090.1	879.5	1 151.5	897.7	1 210.3
Korea	444.6	502.7	342.8	434.2	355.2	484.4	378.6	510.7	493.2	693.8	548.8	784.7
Luxembourg	616.8	775.5	544.0	843.1	540.7	883.8	591.0	1 051.2	564.3	1 163.8	549.9	1 239.7
Mexico	544.0	145.7	451.0	160.5	403.0	163.4	364.3	166.1	325.1	179.8	313.2	205.0
Netherlands	518.0	637.5	577.6	723.5	624.8	804.3	731.8	1 023.5	528.9	858.9	533.5	861.5
New Zealand	563.7	576.3	502.3	544.8	560.3	625.3	676.3	818.4	917.6	1 244.3	941.3	1 442.1
Norway	479.9	603.6	483.4	641.2	553.5	764.2	624.9	904.6	619.1	989.2	633.1	1 044.8
Poland	306.7	141.9	296.9	172.1	266.9	180.6	259.3	200.3	269.2	251.2	279.5	299.9
Portugal	482.9	493.7	507.7	582.4	517.4	622.3	547.3	741.5	610.6	859.8	558.5	855.0
Slovak Republic	268.8	148.9	254.2	174.3	236.6	190.3	270.1	250.1	291.3	301.6	363.3	376.6
Spain	543.7	563.7	529.8	618.7	533.4	721.2	660.9	919.4	775.0	1 074.8	730.8	1 104.9
Sweden	547.4	774.0	474.0	719.6	532.8	857.8	606.9	1 039.1	653.8	1 126.1	624.6	1 109.0
Switzerland	936.0	1 143.5	918.8	1 200.4	932.1	1 295.9	1 037.8	1 535.1	1 122.8	1 731.8	1 041.9	1 722.0
Turkey	184.3	91.4	157.1	85.5	158.8	96.4	222.1	147.4	210.6	159.4	193.2	171.9
United Kingdom	451.6	515.8	413.9	539.5	425.5	584.0	470.6	677.3	492.3	783.4	466.6	804.5
United States	1 249.3	1 134.9	1 235.3	1 169.9	1 174.3	1 178.4	1 129.5	1 170.8	1 046.1	1 177.9	986.9	1 212.1
OECD	781.1	702.7	723.6	717.5	679.2	719.0	708.6	791.9	708.3	857.1	683.7	892.9

Notes: Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers. Data for Australia for 1991-1998, 2000, 2002 and 2004 are unofficial estimates.

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Table 3.4. **Mobile telecommunication revenue**

USD millions

	1995	% of total revenue	1998	% of total revenue	1999	% of total revenue	2000	% of total revenue	2001	% of total revenue	2002	% of total revenue	2003	% of total revenue	2004	% of total revenue	2005	% of total revenue
Australia	*1776.7*	*16.0*	*3564.1*	*27.7*	*3860.7*	*27.4*	*3686.0*	*25.2*	*3488.1*	*26.1*	2946.7	26.1	5054.2	*43.9*	*11368.9*	*43.9*	*11671.8*	*43.9*
Austria	..	..	1357.8	33.0	1736.2	34.8	2125.7	48.1	2438.4	48.3	2759.4	52.0	3574.2	53.7	4396.3	58.5	4677.5	60.5
Belgium	420.0	9.7	1166.8	22.9	1600.0	27.1	1581.4	21.8	2687.5	39.7	3121.1	42.0	4085.9	43.2	4835.0	43.6	5115.6	37.9
Canada	1662.8	13.7	2957.4	15.4	2954.8	15.3	3603.9	17.5	3851.7	18.5	4593.2	21.7	5932.0	25.5	7290.8	28.2	8455.3	31.4
Czech Republic	112.1	11.3	597.0	32.6	849.9	40.3	1161.7	50.2	1414.3	55.3	1650.8	50.5	2207.6	55.2	974.2	21.9	*2424.7*	*55.2*
Denmark	312.1	8.4	829.3	22.1	897.4	20.3	982.9	23.6	1037.0	24.4	1275.7	29.1	1768.0	32.0	2132.6	33.6	2418.2	36.8
Finland	3067.1	20.2	1295.0	35.6	1588.1	39.3	1666.0	41.6	1795.7	42.9	2137.1	45.2	2528.1	48.9	2948.3	52.0	2672.1	50.3
France	2140.7	7.1	4384.6	16.5	6393.2	22.6	7145.9	26.3	8953.6	30.6	11120.8	32.7	14879.8	34.8	18355.6	37.7	20258.8	40.1
Germany	6828.7	14.8	10555.6	21.5	13936.2	27.2	15963.3	31.0	17142.9	31.7	18773.6	32.1	23707.9	32.9	28148.1	34.1	29375.0	34.4
Greece	293.5	10.5	1126.8	26.3	1563.9	36.9	1818.7	35.7	2096.4	37.4	2924.5	43.9	4044.9	47.4	5061.7	52.1	5375.0	53.8
Hungary	286.4	18.6	712.0	28.3	764.4	24.9	1043.2	32.5	1312.1	38.1	1573.9	40.7	2015.7	43.0	2249.0	46.8	2582.2	50.6
Iceland	13.2	9.9	35.7	21.4	46.2	24.2	110.7	43.8	103.8	48.2	96.3	42.2	112.3	35.2	159.4	41.8	198.9	42.9
Ireland	..	..	385.1	20.2	777.2	40.3	1045.4	46.5	1251.8	50.5	1109.9	34.7	1566.5	39.3	2229.6	44.2	2402.5	47.2
Italy	2847.9	15.4	7706.4	29.2	8784.9	33.0	9403.7	38.4	12410.7	45.9	14386.3	47.7	17865.2	48.9	22469.1	52.6	24500.0	54.3
Japan	25292.4	22.4	45697.0	40.4	60028.1	41.9	74947.6	45.9	75383.0	48.1	74706.1	57.8	74706.1	53.7	*78942.5*	*53.7*	*82982.7*	*53.7*
Korea	2216.8	20.9	3797.7	29.7	7758.1	48.7	10735.1	45.4	10617.4	51.6	12171.8	52.8	13182.2	53.9	15039.2	45.1	17633.7	46.5
Luxembourg	15.3	5.1	25.8	7.6	80.7	22.2	82.1	24.1	111.6	30.0	123.0	31.2	193.3	40.9	242.0	45.9	284.4	50.2
Mexico	449.5	6.9	1025.4	10.6	1771.7	15.7	3510.7	24.4	4983.4	31.0	6226.1	37.6	6977.9	40.9	8657.0	46.3	10957.6	50.8
Netherlands	859.7	10.2	2164.4	22.8	2579.6	24.1	3411.9	33.6	4129.5	35.6	4434.0	34.1	6067.4	36.5	*5107.9*	*36.5*	*5136.2*	*36.5*
New Zealand	206.1	9.8	314.7	15.4	481.4	22.2	625.0	28.1	612.2	28.9	659.7	26.8	828.5	25.2	1120.5	22.2	1380.4	23.3
Norway	478.9	15.3	621.8	25.2	760.2	29.2	897.7	33.1	997.0	34.5	1319.2	38.0	1585.0	38.4	1912.9	42.1	2132.1	44.2
Poland	..	..	668.5	18.5	1415.6	30.8	1931.3	35.6	2621.1	39.8	2941.4	42.6	3616.9	47.3	4703.7	49.1	5281.7	46.2
Portugal	397.4	13.0	1154.9	27.4	1549.0	32.7	1721.2	34.1	2167.7	36.2	2285.5	35.4	3019.0	39.0	3129.9	34.7	3410.6	37.8
Slovak Republic	3.6	1.1	25.5	5.3	12.6	2.8	275.9	34.3	354.2	37.6	415.3	40.6	718.3	53.4	951.4	58.6	*1083.2*	*53.4*
Spain	613.5	5.6	4327.3	27.1	3638.3	16.3	4490.1	19.8	5639.1	22.4	7051.1	23.7	10060.4	26.1	12833.0	28.0	*12490.8*	*26.1*
Sweden	848.1	12.1	1351.1	18.3	1532.4	20.7	1571.2	22.9	1572.8	24.6	1719.7	22.5	2062.7	22.2	2210.5	21.8	2237.9	22.3
Switzerland	539.8	6.7	1237.2	16.1	1669.9	19.1	1868.1	22.7	2297.7	26.3	2702.6	28.4	3312.7	29.1	3819.7	29.6	3843.1	29.8
Turkey	55.2	3.0	336.5	6.7	668.5	12.3	854.3	13.9	755.6	12.9	2512.1	37.4	3658.2	35.1	4749.9	41.5	6436.0	51.9
United Kingdom	2501.6	8.8	6066.7	23.9	7862.9	27.8	9800.0	32.3	11478.3	36.0	13422.4	38.7	17101.6	42.4	21785.5	46.5	23907.3	49.3
United States	18627.0	9.4	36775.0	14.1	48495.0	16.8	62000.0	19.3	74687.0	22.4	81521.0	24.0	89718.0	26.3	98568.0	28.5	107861.0	30.0
OECD	72866.0	13.4	142262.7	22.2	186057.2	25.5	230060.7	29.0	258391.5	31.6	282680.4	34.3	326150.3	35.6	*376392.4*	*37.7*	409186.1	*39.1*

Note: Values in italics are estimates. Data for Australia are unofficial estimates.

StatLink http://dx.doi.org/10.1787/011000038336

Table 3.5. **Cellular mobile telecommunication revenue per cellular mobile subscriber**

USD

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	881	792	533	388	667	609	460	314	233	353	690	634
Austria	..	..	..	655	590	404	347	373	410	504	550	559
Belgium	1 932	1 787	..	676	664	502	281	349	385	475	529	533
Canada	703	642	610	499	553	428	413	362	387	448	490	507
Czech Republic	2 965	2 452	755	705	618	437	267	204	192	227	90	206
Denmark	462	380	581	528	429	341	292	262	285	371	413	442
Finland	2 995	2 952	2 765	2 533	455	485	447	430	473	533	590	496
France	875	1 487	1 329	818	391	310	241	242	288	357	412	421
Germany	1 129	1 829	1 571	1 234	759	594	331	305	318	366	379	371
Greece	215	1 075	915	839	548	402	307	263	314	392	458	432
Hungary	1 021	1 073	1 284	1 088	687	477	339	264	229	254	258	277
Iceland	428	426	434	413	337	267	515	441	369	402	549	654
Ireland	..	..	698	569	407	486	518	452	361	458	590	570
Italy	886	726	724	564	380	292	222	243	271	315	358	343
Japan	3 132	2 160	1 388	1 140	966	1 056	1 122	1 008	921	862	863	860
Korea	1 232	1 351	1 338	506	272	331	400	366	376	392	411	460
Luxembourg	960	571	465	335	199	387	271	258	260	359	375	395
Mexico	1 570	653	501	378	306	229	249	229	240	232	225	232
Netherlands	1 543	1 601	732	843	647	380	310	359	376	463	321	315
New Zealand	412	488	0	292	251	312	286	253	260	280	317	330
Norway	488	488	572	495	300	285	277	277	348	390	423	448
Poland	..	..	0	453	347	363	286	244	212	208	204	181
Portugal	1 176	1 166	1 023	653	376	332	258	272	268	301	302	298
Slovak Republic	..	290	0	0	55	19	213	165	142	195	223	253
Spain	842	660	767	735	614	244	188	190	189	260	332	293
Sweden	407	422	444	348	329	299	247	219	216	234	252	246
Switzerland	1 007	1 210	1 134	906	728	546	403	436	471	535	609	562
Turkey	353	126	345	357	96	86	57	41	108	131	137	148
United Kingdom	0	465	571	602	467	328	277	257	275	332	373	374
United States	630	593	532	596	531	564	566	605	552	565	534	506
OECD	917	978	882	771	579	518	455	428	415	440	451	439

StatLink http://dx.doi.org/10.1787/011025017853

Table 3.6. **International telecommunication traffic**

	Outgoing MiTT per capita								Outgoing MiTT per communication access path							
	1998	1999	2000	2001	2002	2003	2004	2005	1998	1999	2000	2001	2002	2003	2004	2005
Australia	89.8	111.1	..	..	..	..	..	..	107.9	121.0	..	..	..	..	..	..
Austria	139.5	147.4	158.8	129.8	135.8	148.7	144.5	149.4	193.4	150.9	132.1	102.9	105.8	111.2	99.2	98.1
Belgium	..	..	94.9	125.8	133.8	150.2	165.9	170.0	..	..	94.9	104.0	104.3	111.2	116.0	113.9
Canada	159.3	191.8	171.3	185.6	202.1	..	..	..	193.0	221.6	177.3	173.6	181.6	..	..	..
Czech Republic	33.0	44.2	42.3	47.1	52.3	50.0	50.6	50.5	72.2	78.9	52.7	45.3	44.4	39.1	36.9	34.3
Denmark	109.8	123.2	164.0	162.2	147.2	149.5	153.8	155.5	113.4	112.6	131.8	117.8	99.0	95.6	92.3	88.9
Finland	79.8	83.5	90.4	104.2	90.3	..	..	..	70.9	68.6	68.7	73.8	60.6	..	..	..
France	66.6	72.7	73.4	75.4	78.1	79.2	68.7	64.7	94.6	86.1	74.9	68.9	69.4	66.3	53.8	47.3
Germany	71.6	96.3	112.2	101.8	114.9	115.7	122.3	125.5	108.1	124.3	104.7	85.8	92.9	87.8	83.9	80.3
Greece	63.2	67.1	..	65.6	73.7	79.4	91.1	..	90.1	76.6	..	52.1	53.7	54.8	60.3	..
Hungary	28.9	31.9	32.3	30.5	29.4	30.0	35.9	39.2	65.4	62.3	49.4	36.8	29.1	26.6	29.5	30.5
Iceland	166.1	181.7	151.4	147.6	..	147.1	112.5	106.5	171.6	151.0	112.6	104.2	..	90.0	66.9	59.3
Ireland	238.5	270.6	..	..	289.6	291.7	282.4	272.5	349.7	311.2	..	..	237.6	226.3	205.0	183.5
Italy	40.2	44.7	49.0	53.9	64.5	64.0	62.4	61.4	50.3	46.2	41.7	40.3	46.8	43.4	39.3	35.1
Japan	14.4	14.1	17.2	20.3	20.5	20.9	26.8	..	16.5	15.0	16.8	18.5	17.5	16.7	20.5	..
Korea	19.5	20.6	13.7	40.4	41.3	41.9	49.5	51.2	25.9	20.9	12.1	31.9	30.3	31.0	35.2	35.8
Luxembourg	688.9	737.8	867.8	893.7	..	826.7	819.7	785.0	821.6	749.5	690.2	576.6	..	464.7	397.5	348.2
Mexico	13.7	16.1	19.1	20.4	19.7	20.6	22.1	21.1	99.1	83.8	71.3	57.2	48.6	45.3	39.9	32.3
Netherlands	114.9	136.0	..	132.6	..	..	..	..	162.4	141.9	..	105.8	..	..	..	..
New Zealand	124.0	148.8	162.7	156.7	..	140.1	140.5	140.0	156.7	173.0	159.1	144.5	..	115.8	103.6	91.4
Norway	104.2	127.1	120.7	126.7	126.0	121.8	114.8	123.8	101.6	110.9	95.9	95.5	91.3	84.1	71.8	75.0
Poland	15.6	16.1	17.7	11.2	11.7	9.5	11.7	11.1	57.9	46.5	38.2	19.3	17.3	12.3	12.5	10.4
Portugal	46.4	40.3	50.0	53.5	52.2	51.0	48.4	56.1	67.4	47.8	48.9	46.6	43.4	37.6	34.4	36.6
Slovak Republic	28.6	30.1	30.0	31.9	31.1	39.9	..	..	77.0	70.0	54.2	46.6	38.6	43.0	..	..
Spain	34.4	41.4	53.3	65.9	..	..	..	..	58.1	51.6	51.4	56.4	..	..	..	..
Sweden	143.0	171.1	142.7	152.1	142.5	130.5	131.6	128.6	124.2	134.9	100.9	100.2	88.5	76.2	76.4	72.4
Switzerland	285.2	336.8	390.6	416.5	435.4	398.1	426.6	400.2	343.4	334.8	319.7	318.7	313.2	269.1	276.6	242.1
Turkey	10.1	11.7	10.8	9.8	9.3	9.0	10.0	10.0	31.5	29.1	21.9	18.1	15.4	13.6	13.2	11.2
United Kingdom	93.6	110.9	114.7	119.0	105.8	105.1	103.8	95.4	123.1	117.1	100.4	91.3	77.1	73.0	65.2	55.3
United States	87.8	102.1	106.6	116.6	124.8	164.8	216.2	..	114.9	123.6	117.3	123.2	124.4	159.0	192.0	..
OECD[1]	172.2	201.8	205.2	228.1	226.7	242.3	285.4	68.2	87.7	88.5	76.3	76.7	71.2	72.0	78.2	52.5

1. OECD is a weighted average. Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers.

Note: MiTTs = minutes of international telecommunications traffic.

Source: OECD, ITU.

StatLink http://dx.doi.org/10.1787/011035173720

Table 3.7. **R&D expenditures for PTOs**

USD millions

PTO	1997		1999		2001		2003		2005	
	R&D expenditure	R&D as a % of total revenue	R&D expenditure	R&D as a % of total revenue	R&D expenditure	R&D as a % of total revenue	R&D expenditure	R&D as a % of total revenue	R&D expenditure	R&D as a % of total revenue
NTT	2 388.4	3.1	3 140.0	3.4	3 216.0	3.3	3 061.0	3.2	2 886.0	2.9
BT	502.5	2.0	556.5	1.6	525.0	1.7	548.0	1.8	1 321.8	3.7
France Telecom	917.6	3.5	632.0	2.2	506.0	1.3	507.0	1.0	750.7	1.5
Telefonica[1]	153.0	0.8	96.0	0.4	153.0	0.6	494.0	1.6	666.3	1.4
Telia	201.7	3.3	190.1	3.0	126.0	2.3	..	..	384.9	3.3
Vodafone	55.0	1.4	74.0	0.6	104.0	0.3	280.0	0.5	374.5	0.5
Korea Telecom	113.4	2.2	258.3	2.6	293.0	2.4	195.0	2.0	251.3	2.2
Deutsche Telekom	692.0	1.8	697.1	2.0	804.0	1.9	1 011.0	1.6	250.0	0.3
KDDI	..	..	..	..	..	..	115.0	0.5	139.1	0.5
Telecom Italia	..	..	352.1	1.2	123.0	0.4	166.0	0.5	121.3	0.3
SK Telecom	41.3	1.7	89.0	2.4	119.0	1.8	232.0	2.9	74.0	0.8
Telenor	112.7	3.1	67.7	1.6	102.0	2.0	65.0	0.9	62.3	0.6
Telekom Austria	..	..	20.0	0.6	19.0	0.5	48.0	1.1	53.8	1.0
Sprint	..	..	..	..	..	..	..	..	47.0	0.1
Swisscom	..	..	..	..	..	..	..	..	31.2	0.4
KPN Telecom	60.0	0.8	59.4	0.6	41.0	0.4	26.0	0.2	25.0	0.2
Telstra	43.0	0.3	18.7	0.1	..	..	17.0	0.1	17.6	0.1
Elisa	..	..	16.3	1.4	32.0	2.5	27.0	1.6	10.0	1.1
Telecom New Zealand	3.6	0.2	5.0	0.1	3.4	0.1	5.8	0.2	6.3	0.2
Hanaro Telecom	..	..	5.5	28.4	10.0	1.6	8.0	0.7	4.3	0.3
AT&T	829.0	1.6	550.0	0.9	325.0	0.6	277.0	0.8	..	..
Dacom	2.9	0.6	6.2	1.0	4.0	0.5	..	..	..	..
Qwest	..	..	36.3	0.9	..	..	..	..	..	..
OTE	..	..	11.0	0.3	..	..	3.0	0.1	..	..
Belgacom	18.5	0.4	7.2	0.1	..	..	..	..	..	..
TPSA	..	..	..	..	..	..	15.0	0.3	..	..
Portugal Telecom	..	..	..	..	..	..	30.0	0.5	..	..
MMO2	..	..	..	..	..	..	16.0	0.2	..	..
Cable & Wireless	168.6	1.2	17.7	0.1	..	..	..	..	..	..
Total/average of above	6 134.5	1.7	6 888.5	2.5	6 505.4	1.3	7 130.8	1.0	7 477.4	1.1

1. Telefonica used a different methodology to calculate R&D prior to 2001.

StatLink http://dx.doi.org/10.1787/011045858785

Table 3.8. **US Patent Office: Telecom patents aquired by selected equipment manufacturers**

Manufacturer	2000	2001	2002	2003	2004	2005	Nov. 2006
Ericsson	80	73	63	62	49	34	41
Motorola	52	18	38	19	21	15	28
Cisco	11	9	17	34	46	53	56
Lucent	106	84	68	60	67	35	52
Nortel	69	64	45	53	74	36	30
Fujitsu	25	32	24	26	37	21	16
NEC	36	39	38	38	42	31	40
Nokia	36	39	51	51	68	41	52
Alcatel	44	50	35	39	38	25	29
Siemens	48	36	52	51	65	47	56
Samsung Electronics	34	26	31	19	21	29	21
Matsushita	14	22	26	23	25	25	21
LG Electronics	1	0	0	4	11	17	19
Corning	0	0	1	3	2	2	2
Qualcom	7	8	14	8	8	9	8
3Com	11	18	18	19	30	8	5
Total	574.0	518	521	509	604	428	476
Average	35.9	32.4	32.6	31.8	37.8	26.8	29.8

Notes: Number of patents filed with the USPTO in the classification 379 (telephonic communications), with the manufacturer as the primary assignee.

Source: USPTO [http://patft.uspto.gov/netahtml/PTO/search-adv.htm] and [http://www.uspto.gov/web/patents/classification/uspc379/sched379.htm]

StatLink http://dx.doi.org/10.1787/011071874747

Table 3.9. **US Patent Office: number of patents granted to selected telecommunication operators**

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Nov. 2006	Total (1995-2005)
ATT[1]	..	..	46	150	278	294	239	230	179	172	151	..	1 739
BT	55	48	35	70	77	70	94	56	48	30	31	33	647
NTT (including mobile)	3	12	25	49	32	67	78	60	70	81	61	71	609
France Telecom	35	47	36	63	47	39	35	24	29	45	26	35	461
Deutsche Telekom	0	0	2	8	9	6	25	19	26	17	15	14	141
Telecom Italia (SIP and CSELT)	7	15	16	11	7	7	11	5	10	9	2	10	110
TeliaSonera	..	..	0	0	2	2	1	11	9	7	3	3	38
KPN	0	0	0	0	13	16	1	6	8	9	8	12	73
Qwest Communications International	..	..	..	..	..	..	40	37	39	35	27	36	214
SK Corportation	..	..	0	0	1	6	5	9	5	6	4	7	43
Korea Telecom	0	1	0	0	4	0	6	8	5	14	11	4	53
Telstra	1	3	3	5	5	0	3	0	0	2	2	1	25
Bell Canada	2	0	1	1	2	2	2	4	2	0	0	2	18
Telefonica	0	2	1	8	1	2	0	0	0	0	0	0	14
Swisscom	..	..	..	..	..	1	2	4	3	12	13	10	45
Total	103	128	165	365	478	512	542	473	433	439	354	238	3 332

1. Data for ATT prior to 1997 include Lucent.

Notes: Data include all patents, not simply telecommunication related.

Source: USPTO.

www.uspto.gov/web/offices/ac/ido/oeip/taf/asgstc/regions.htm

StatLink http://dx.doi.org/10.1787/011088446556

Table 3.10. **Telecommunications patent applications filed at the European Patent Office (EPO)**

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Australia	3	8	2	3	6	6	11	17	22	20	26	23	23
Austria	2	4	1	10	9	11	8	10	20	9	24	33	31
Belgium	12	15	11	9	11	12	27	22	31	56	50	60	58
Canada	11	9	15	31	45	40	58	96	117	115	139	194	158
Czech Republic	0	0	0	0	0	0	2	0	0	0	1	1	0
Denmark	0	1	0	2	2	12	12	21	24	24	21	23	37
Finland	12	23	23	39	51	68	92	116	188	218	197	205	192
France	74	68	91	101	96	121	168	214	277	313	335	358	391
Germany	104	133	115	131	165	198	299	451	530	653	684	626	582
Greece	0	0	0	1	0	0	1	1	3	3	3	3	6
Hungary	0	0	0	2	0	1	0	3	7	10	5	6	12
Iceland	0	0	1	2	0	3	2	5	6	2	1	0	0
Ireland	0	3	1	2	1	2	7	8	10	9	20	13	4
Italy	11	16	18	9	19	17	21	26	29	47	54	65	63
Japan	185	148	137	173	169	252	315	388	472	661	570	627	664
Korea	2	3	2	4	5	2	18	30	46	81	125	161	335
Luxembourg	0	0	0	0	0	1	0	0	0	1	0	0	0
Mexico	0	0	0	0	0	0	0	1	0	1	0	0	0
Netherlands	21	26	33	26	46	67	68	77	90	149	184	134	101
New Zealand	0	0	1	1	0	1	1	0	0	4	5	3	3
Norway	0	0	1	1	2	8	10	11	9	7	9	8	12
Poland	0	0	0	0	0	0	0	0	0	1	0	2	1
Portugal	0	1	1	0	0	0	0	1	0	0	1	0	2
Slovak Republic	0	0	0	0	0	0	0	0	0	0	1	0	0
Spain	6	4	6	10	3	4	8	9	10	18	19	21	24
Sweden	10	31	25	42	57	76	106	106	167	141	103	114	124
Switzerland	19	15	22	23	10	19	14	28	39	45	43	40	43
Turkey	0	0	0	0	0	0	0	0	0	1	0	1	1
United Kingdom	56	54	67	80	94	115	126	166	197	281	236	232	216
United States	237	337	379	412	502	635	818	929	1228	1240	1101	1298	1452
EU15	309	380	392	461	553	704	943	1228	1577	1922	1929	1889	1832
EU25	309	380	392	463	553	705	946	1230	1584	1935	1938	1899	1851
Total OECD	767	901	951	1113	1291	1671	2194	2735	3522	4112	3955	4253	4534
World Total	777	913	961	1131	1310	1704	2253	2791	3615	4260	4102	4434	4771
Argentina	0	0	0	0	0	0	0	0	2	0	0	0	0
Brazil	0	0	0	0	0	0	0	2	0	0	2	1	2
China	0	1	0	0	0	2	0	2	5	13	29	66	115
Chinese Taipei	1	1	1	0	2	2	4	2	7	8	11	22	8
Cyprus	0	0	0	0	0	0	0	0	0	1	1	0	0
Estonia	0	0	0	0	0	0	0	0	0	0	0	0	2
Hong Kong, China	0	0	0	1	1	2	1	0	2	6	0	0	1
India	1	1	0	0	0	2	1	0	2	7	5	8	13
Israel	6	7	7	12	12	18	33	38	50	77	47	40	49
Romania	0	0	0	0	0	0	1	0	0	0	1	1	0
Russian Federation	0	0	0	0	1	2	3	4	1	7	5	1	12
Singapore	0	1	0	2	0	2	4	2	10	3	14	14	14
Slovenia	0	0	0	0	0	0	0	0	0	1	1	1	4
South Africa	2	0	1	2	1	0	6	2	5	1	1	7	3

Note: International Patent Classifications (IPC) : H04M and H04L.

Source: OECD, Patent Database, November 2006.

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Chapter 4

Network Dimensions and Development

In the past ten years there has been a significant shift in the way users access telecommunication networks. Mobile subscribers now outnumber fixed-line subscribers by a ratio of more than three to one. Several new access platforms have emerged during the past decade. In particular, users continue to move from dial-up Internet connections to broadband. This chapter examines network changes in the industry as fixed-line connections decline but DSL, cable Internet connections and mobile subscriptions increase. In addition, the chapter examines how the lines between fixed and mobile telephony are blurring. There is also discussion of prepaid mobile, the growth of 3G and the shift towards fibre networks. Finally, the chapter tracks investment trends that show a return to growth.

Introduction

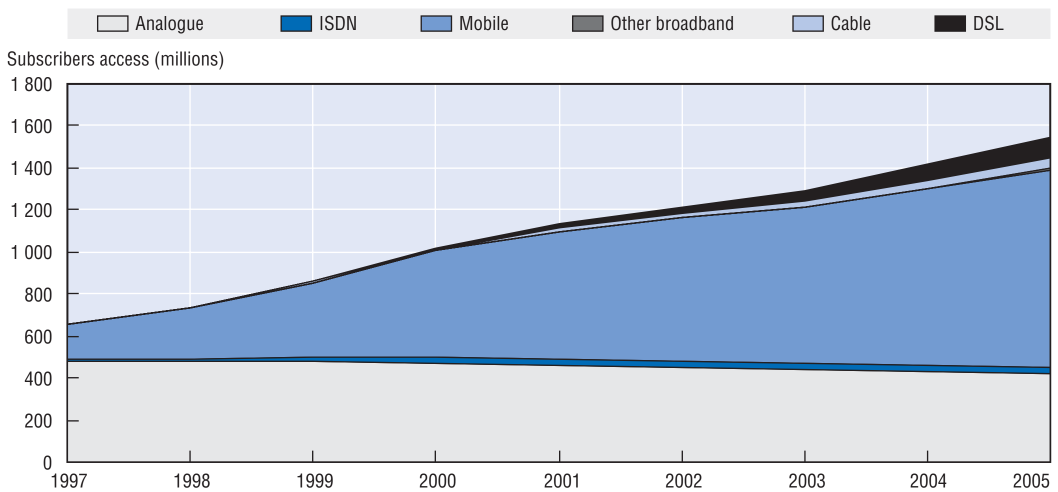
In the past ten years, there has been a significant shift in the way users access telecommunication networks. Fixed lines were the most prevalent access method until 2000 when the number of mobile phones overtook fixed lines in the OECD area. Now, mobile subscribers outnumber fixed-line subscribers by a ratio of more than three to one.

Several new access platforms have emerged during the past decade. In particular, users continue to move from dial-up Internet connections to broadband. Among other telecommunication services, fixed-line connections have started to fall while the numbers of DSL, cable Internet connections and mobile subscriptions are increasing (see Tables 4.1 and 4.2).

The number of total telephone access paths (analogue + ISDN lines + mobile subscribers) in the OECD area has risen drastically since 1997, from 655 million to over 1.38 billion in 2005 (Figure 4.1). The number of fixed telephone access paths (analogue + ISDN lines) is currently decreasing year on year and is down 4% in 2005 from two years earlier. By contrast, some of the most spectacular growth has been in the mobile sector where, in 2005, the number of OECD mobile telephone subscribers reached nearly 933 million, an increase of 26% from 2003.

Figure 4.1. **Total fixed and mobile telecommunication paths, 1997-2005**

Millions



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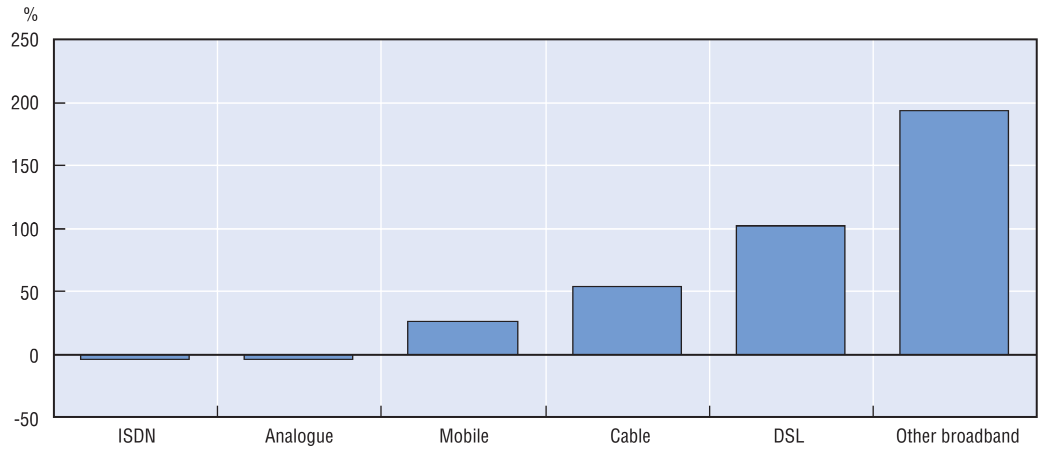
One clear trend in network development is subscribers switching from older copper technologies such as analogue lines and ISDN to higher-speed wireless and broadband technologies for communication. ISDN lines had the largest drop in subscribers in the OECD area, falling by just over 4% from 2003 to 2005 as subscribers abandoned ISDN for higher-speed DSL connections. Analogue access lines (standard telephone lines) also fell by 4% from 2003 to 2005.

Several technology sectors such as broadband and mobile experienced strong growth during the two years since the previous *Communications Outlook* (Figure 4.2). In just two years, the number of DSL subscribers in the OECD area more than doubled to nearly 99 million in December 2005. Cable modem connections have also increased by 54% to 48 million during the same period. The largest growth rate among all sectors was "other broadband" which includes fibre broadband connections, satellite broadband and broadband wireless access. The 193% growth rate is high although the total number of lines remains relatively small. Other broadband technologies make up only 6% of all broadband lines in the OECD area, although the percentage is growing steadily. The number of cellular mobile subscribers grew by 26% between 2003 and 2005. Growth remains strong overall but is slowing in some high-penetration countries.

Figure 4.2. **Growth in communication access paths, by technology, 2003-2005**



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Fixed lines

The number of fixed telephone access paths (analogue + ISDN lines) in the OECD area fell by 4% over the previous two years and has fallen in most OECD countries since 2000 (Table 4.3). Only Ireland, Mexico, Spain and Turkey saw an increase during the period. Mexico had the largest gain in fixed telephone access paths, realising 19% growth over two years. The increases were very low, at less than 2% over two years, in the other three countries with fixed-line growth (see Figure 4.3).

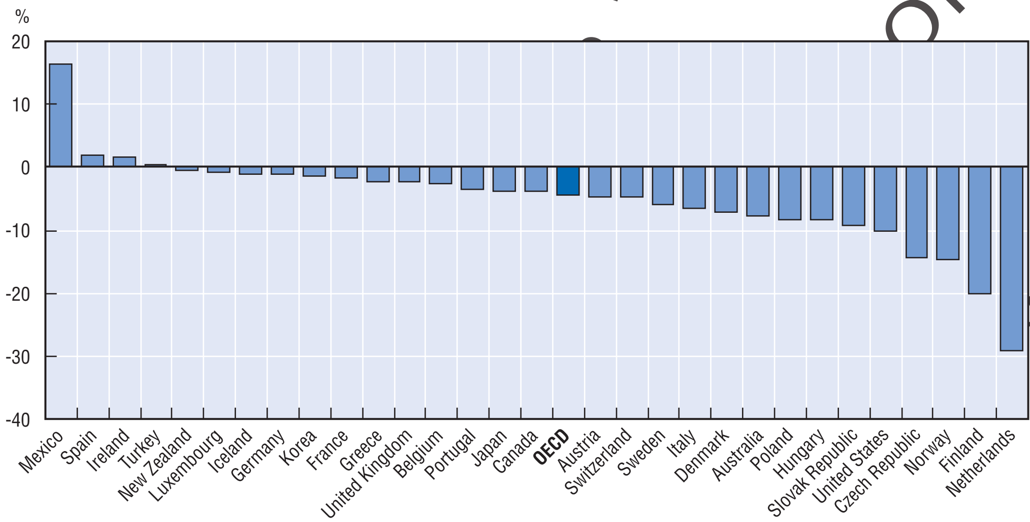
Most countries saw a decrease in the number of analogue fixed lines, with the most dramatic reductions in the Netherlands, Finland, the Czech Republic, the United States and Poland. The decrease in these countries is mainly attributable to substitution as mobile phone subscribers give up fixed lines that they may now view as redundant.

The drop in fixed lines would likely have been larger in many countries without indirect support from broadband subscriptions. Some operators still require subscribers to pay for a fixed-line telephone connection (analogue or ISDN) in order to receive Internet access via DSL. The availability of broadband has also led many residential customers to drop second lines which they had subscribed to when using dial-up Internet access.

Analogue lines account for 98% of all standard fixed-line telephone connections (paths) in the OECD area (Tables 4.1 and 4.4). The remainder of fixed lines are delivered

Figure 4.3. **Net additions of fixed telephone access paths (analogue + ISDN lines) between 2003 and 2005**

Percentage



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over ISDN (Table 4.5). There is also an increasing number of VoIP phone service subscribers whose physical lines are typically categorised as broadband connections.

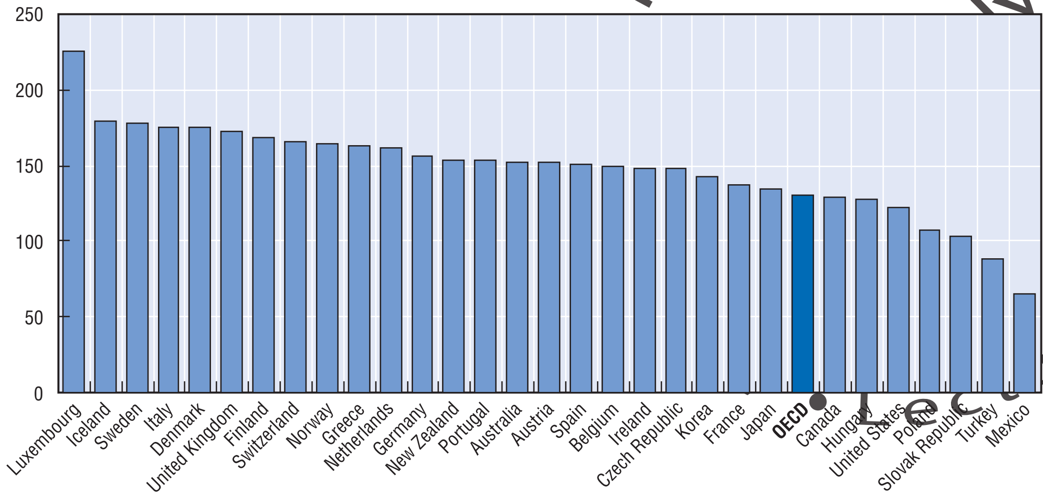
Statistics on analogue and ISDN lines can be compiled in two different ways. One method is to count the number of lines (or subscriptions); this yields the number of physical "paths". The other method counts channels or 64 kbit/s voice equivalents available on the lines. ISDN lines provide a certain number of channels each of which can support a voice conversation. For example, an ISDN "basic rate" connection includes two 64 kbit/s equivalents (comparable to two analogue phone lines) while an ISDN "primary rate" connection includes either 23 or 30 channels (similar to 23 or 30 analogue lines), each with 64 kbit/s of bandwidth. This edition of the *Communications Outlook* presents statistics based on both calculations but focuses on the number of physical paths (or subscriptions) rather than the number of channels.

Sweden had the highest penetration of fixed telephone access paths (analogue + ISDN lines) in 2005 with 60 per 100 inhabitants (Table 4.3). Canada, Luxembourg, Denmark and Switzerland follow, each with at least 51 lines per 100 inhabitants. Conversely Mexico, the Slovak Republic, Turkey, the Czech Republic and Poland have the lowest penetration of fixed lines per capita, each with less than 29 lines per 100 inhabitants.

The significance of fixed telephone access path statistics is decreasing as more voice traffic moves to mobile phones and broadband lines. A new measure of total communication access paths (analogue + ISDN + mobile + DSL + cable Internet) looks at the total number of communication subscriptions in the OECD area. Using this broader measure, Luxembourg has the highest number of paths per capita at nearly 226 lines per 100 inhabitants. Iceland, Sweden, Italy and Denmark all have at least 175 lines per 100 inhabitants. Only Turkey and Mexico have fewer total communication access paths than their population (Figure 4.4).

There may be a shift away from fixed telecommunication lines for voice but it is important for countries to have good fixed-line infrastructure so that subscribers can

Figure 4.4. **Total communication access paths per 100 inhabitants, 2005**



Note: Total communication access paths = analogue + ISDN lines + DSL + cable modem + mobile subscribers.

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access broadband Internet services. In many advanced telecommunication markets users are dropping fixed-line subscriptions in favour of mobile voice services. In less developed economies, particularly outside the OECD area, the lack of fixed-line infrastructure has also led to widespread adoption of mobile technologies. While this substitution has rapidly expanded voice access around the world, a lack of fixed-line infrastructure could severely hamper the development of high-speed broadband services.

Lines between mobile and fixed are blurring

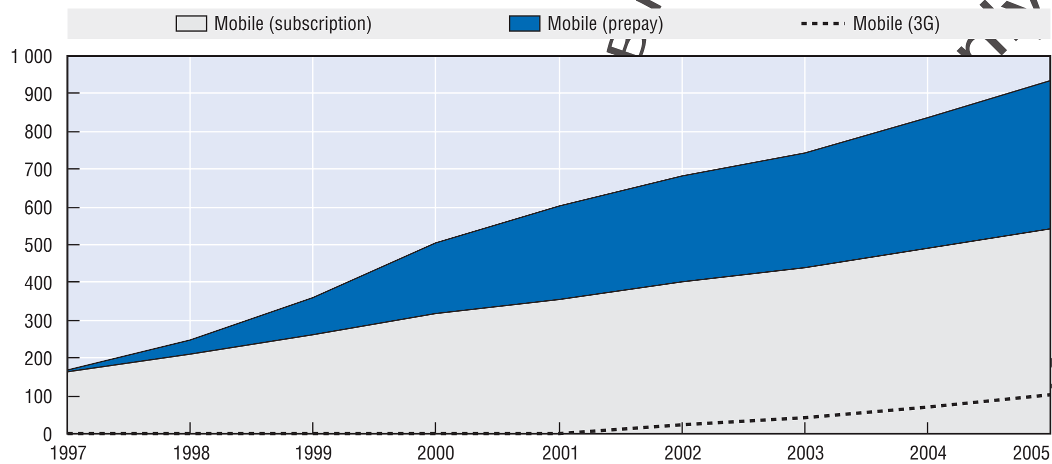
The line between fixed and mobile calls is blurring. Previous OECD *Communications Outlooks* have separated access paths by technology. However, the emergence of converged devices may necessitate a change in how telephone access paths are counted. For example, several fixed-line operators in the OECD area have introduced devices that place calls over the user's fixed line when the user is at home and over a mobile network when they are away. KT in Korea, BT in the United Kingdom, and Orange in France have launched phones that use the mobile network when away from home but can connect to the user's broadband connection via Bluetooth or Wi-Fi at home to place calls at fixed rates. KT's "OnePhone", BT's "Fusion" and Orange's "unik" networks allow users to roam seamlessly between a mobile network and the Bluetooth connection without disrupting an ongoing call.

All three services are limited to fixed line calling at the user's home and mobile networks (GSM or CDMA) when away. However, a number of combined Wi-Fi/mobile phones have appeared in OECD markets and could potentially become an even larger market for converged fixed/mobile services.

Mobile network growth

The number of mobile subscribers in the OECD area continues to climb, albeit more slowly than earlier in the decade (Figure 4.5). They grew by 41% between 1999 and 2000, but the growth rate fell to 10% between 2004 and 2005 (Table 4.7). In 2005, over three-quarters of the OECD-area population had a mobile phone (Table 4.8).

Figure 4.5. **Cellular mobile subscribers in OECD countries**



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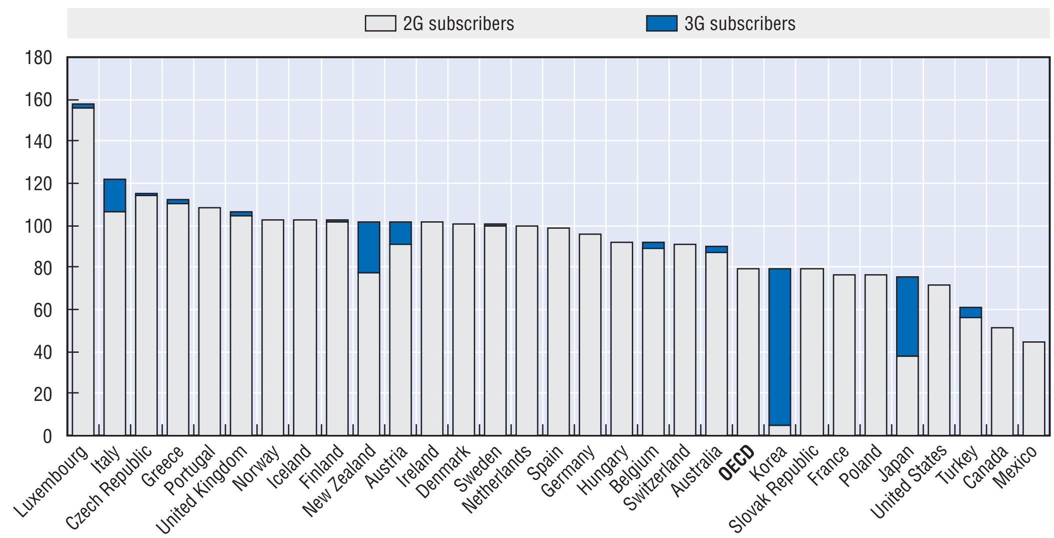
The absolute number of mobile subscribers in the OECD area reached nearly 933 million in 2005, or nearly 80 subscribers per 100 inhabitants. Luxembourg continues to lead in overall mobile penetration with 157 subscriptions per 100 inhabitants, followed by Italy, the Czech Republic, Greece and Portugal (Figure 4.6). Fourteen OECD countries have reached mobile penetration levels greater than 100%, that is, they have more "active" accounts (both subscriptions and prepaid) than the total population. As mentioned in previous *Communications Outlooks*, penetration rates greater than 100% can result from users having multiple SIM cards (accounts) which they use with a single phone or inactive prepaid accounts which have not yet expired. High international roaming charges have also increased the number of travellers picking up a local prepaid SIM card to make calls during their stay which will eventually expire (see Chapter 7 for further discussion).

Figure 4.6. **Cellular mobile subscribers per 100 inhabitants, 2005**



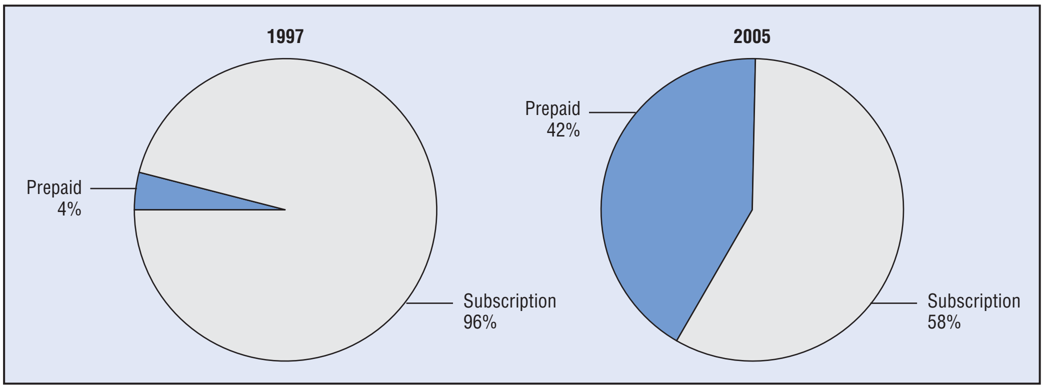
Note: Portugal's 2G data includes both 2G and 3G subscriptions.

StatLink http://dx.doi.org/10.1787/001065872504

Some have feared that the market for mobile telephony would reach saturation in many OECD countries. These fears have so far been unfounded. Markets continue to expand, partly because the age at which users get their first mobile phones continues to decline. A report done by the UK telecommunication wholesaler Carphone Warehouse and the London School of Economics found that in the United Kingdom, 51% of 10 year-olds have a mobile phone. The share jumped to 91% for 12-year-olds.[1] One of the main drivers behind children's mobile phones is the fact that parents can control usage via prepaid cards.

Prepaid plans now account for nearly 42% of all mobile phone subscriptions in the OECD area, a percentage that has held roughly constant since 2001. Prepaid plans increased their share primarily between 1997 and 2001 (Figure 4.7 and Table 4.9). Mexico and Italy have the highest percentage of mobile users on prepaid plans, each with higher than 90%. Portugal, Ireland, the Netherlands and Turkey all have more than 70% of users on prepaid plans. In contrast, Korea and Japan have the fewest number of users on prepaid plans; these subscribers make up less than 3% of all subscribers. Finland, the United States, Denmark, Canada and Norway are also significantly below the OECD average.

Figure 4.7. **Growth of prepaid mobile accounts in the OECD area**



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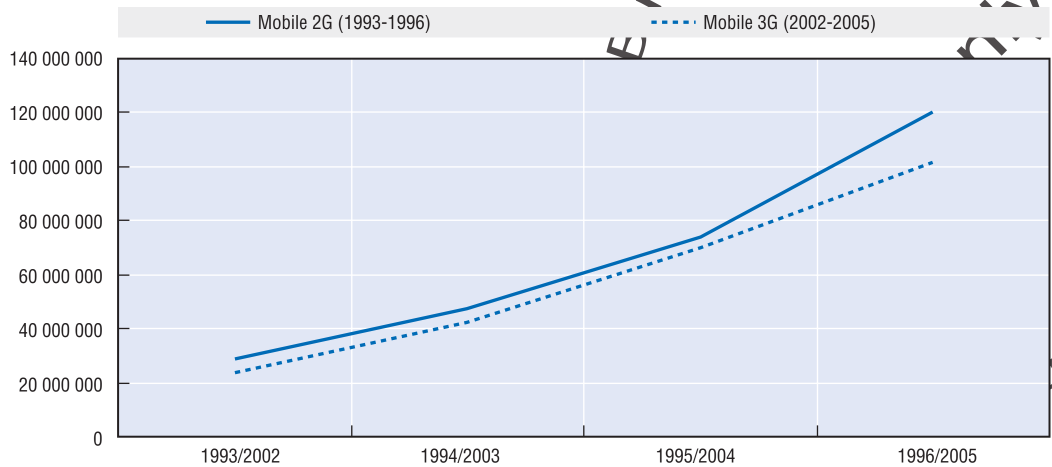
Many of the countries with the highest percentage of prepaid subscribers have GSM mobile operators. SIM cards for GSM phones have allowed users to use the same phone easily on different accounts whereas a CDMA user would need the phone reprogrammed to switch accounts. There has been some discussion recently in Korea on how to introduce SIM cards into phones on the CDMA network as a way to stimulate take-up.

All OECD countries have 2G mobile coverage for more than 90% of their populations. Even large countries with extensive rural areas typically have excellent coverage of places where people live. Now, operators are rolling out 3G networks but coverage is significantly lower in some OECD countries. Exceptions include Sweden, Korea, Luxembourg, Italy, the United Kingdom and the United States.

Operators continue to build out 3G networks and the number of subscribers on these networks is increasing. The growth of 3G subscribers mimics, in some ways, that of total cellular mobile subscribers nine years earlier. Figure 4.8 shows how subscriber numbers increased year on year after reaching the 20 million subscriber mark. By the fourth year, 3G subscriptions are only slightly below the level of mobile subscribers in a comparable time frame.

Figure 4.8. **Mobile 2G and 3G, four-year trend from 20 million subscribers, OECD**



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The number of subscribers to 3G networks is increasing rapidly but many users use the 3G network only for voice and not for value-added data services. As a result, many operators have launched data-only plans for business users to help increase utilisation of their 3G network capacity.

While the total number of mobile subscribers has increased, so has the functionality of phones in the market. New 3G handsets give users access to the Internet and multimedia content on the go. In addition, new handsets in Japan and Korea allow users to access new, dedicated terrestrial and satellite television networks.

Early in the decade some analysts believed that rollout of faster 3G data networks would usher in television on mobile phones. In reality, consumers' habits and the high cost of using the networks for data-intensive applications has made streaming video over mobile networks mainly a tool for low-bandwidth/high-value content such as highlight clips from sporting events. The high price of mobile 3G data has kept most users from using mobile phones to watch ordinary television programmes.

Because of the slow start of mobile television, network operators across the OECD area are considering other, more cost-effective ways to deliver video to mobile subscribers. Japan and Korea have the largest and most advanced mobile television networks.

Korea has two competing mobile television networks, one terrestrial (T-DMB) and the other via satellite (S-DMB). The terrestrial network broadcasts seven television and 13 audio channels over the free-to-air network using the spectrum set aside for channels "8" and "12". By the first half of 2006 there were already 1.13 million T-DMB handsets available in the market. Television and audio programmes are free to all users but some data functionality (such as real-time traffic information) is via a paid subscription. Korea and Japan also share a satellite for delivering mobile television over S-DMB. In Korea 15 television channels and 19 audio channels are available on the network. All content is by subscription only; there were 680 000 subscribers in Korea in June 2006.[2]

The Korean network rollout for S-DMB and T-DMB is interesting because both networks cover subways throughout Seoul, where roughly one-quarter of the population lives and works. Both the terrestrial and satellite broadcasters have installed repeaters throughout the public transport network that allow for seamless viewing. This is important

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because the peak viewing times on both networks are during long commutes to and from work. The national public broadcaster KBS creates mobile-specific content for peak periods and shows regular KBS programming during off-peak hours.

Operators in Denmark, Finland, France, Germany, the Netherlands, Spain, Sweden, Switzerland, the United States and the United Kingdom have started running trials of similar (DMB) or competing (DVB, MediaFLO) networks.

Wi-Fi

Consumers and businesses were already rapidly adopting Wi-Fi-based networking technologies at the time of the previous *Communications Outlook*. Since then there have been several interesting developments in terms of how Wi-Fi networks are forming, expanding and being used.

There are no precise statistics on the number of Wi-Fi hotspots in the OECD area. However, in October 2006, the hotspot location site "JiWire" tracked more than 129 000 Wi-Fi hotspots in 130 countries. The provider Boingo offers Wi-Fi access from any of its 60 000 affiliated hotspots across the world. At the national level, the incumbent Deutsche Telekom operated 9 300 WLAN hotspots in Germany alone in October 2006. The expansion of WLAN hotspots has allowed operators to find innovative ways to expand coverage and offer new services.

One emerging trend is that users are willing to share some of their own bandwidth in exchange for access on other subscribers' networks. The idea of this type of trade-off as a business model was put forward as early as 2001 but has only recently gained strong momentum with the advent of the FON Community (see Box 4.1).

Box 4.1. **Subsidising the rollout of shared Wi-Fi**

In June 2006, the Wi-Fi community of hotspots called FON announced that 54 000 people worldwide had signed up to share their Wi-Fi connections with other users. FON subscribers who grant access to their Wi-Fi connections at home are then allowed to roam freely on the Wi-Fi connection of other FON subscribers.

It is not necessary for FON network users to share their own connections. Provision is made for Internet subscribers who are wary of sharing their networks. Non-sharing subscribers can pay a small fee of USD 3 a day to use the network of other FON subscribers.

Alliances such as FON are helping unlock extensive, but private Wi-Fi coverage in many cities around the world. By pooling demand together the network operators are able to take advantage of what network economists call positive consumption externalities. In network economics, the value of the network to any individual user increases as the number of subscribers sharing their connections increases.

Source: Reuters UK, "Wi-fi crusader in $5 router giveaway", 25 June 2006, http://today.reuters.com/news/NewsArticle.aspx?type=internetNews&storyID=2006-06-25T200229Z_01_N25347620_RTRUKOC_0_US-WIFI-FON.xml.

With FON, users share their own connections via Wi-Fi but then have access to other FON routers outside their homes. However, ISPs are finding that shared bandwidth can also be tied to specific telecommunication services through a set-top box.

France's ISP "Free" has used its Wi-Fi-enabled set-top box to provide wireless VoIP roaming services to its subscribers. A small amount of Wi-Fi bandwidth can be dedicated to outside VoIP (over Wi-Fi) users in exchange for similar access from any other participant's set-top box. This allows a Free subscriber with a Wi-Fi-enabled handset to make calls throughout France, using their own fixed-line telephone subscription, as long as they are in Wi-Fi range of another participant's set-top box.

Payphones

The growth of mobile telephone coverage and penetration has had an effect on another element of operator networks – the number of payphones. The demand for using costly payphones has fallen considerably as more users make calls via mobile phones. This had led to a reduction in the number of payphones available in some OECD areas. However, reducing the number of payphones is not always easy as they are often considered part of operators' universal service responsibility and their removal tends to generate consumer concerns. In September 2006, the Australian operator Telstra announced that it would remove payphones. This was met with resistance from groups that felt the affected phones were needed next to "schools, railways and sporting facilities".[3] In response to Telstra's action, the Australian government announced on 8 June 2006 a number of initiatives to clarify customers' rights in relation to payphone services and the role of the telecommunication regulator (ACMA) in ensuring Telstra compliance in this area.[4] The situation can be particularly difficult for operators if the phones are not profitable. Telstra, for example, says that only 45% of its payphones throughout Australia break even on costs.[5]

Demand for payphones decreases in areas of the OECD where there is good mobile coverage and competition from providers. However, increased concern about radiation from mobile phone antennas among local residents has also left some areas without continuous mobile coverage.

For many of these reasons regulators are continuing to impose the provision of public phone service on incumbent operators. The Irish regulator ComReg recently concluded that the incumbent provider eircom was required to maintain payphones as part of its universal service obligations to June 2010.[6] In Switzerland, the Federal Communication Commission (ComCom) decided that public payphones should be an integral part of universal service though the end of 2017.

Some operators have found innovative ways to make the most of the equipment they may be obliged to maintain under existing universal service obligations. Telecom New Zealand has equipped some if its 4 500 public phones with Wi-Fi capability which is accessible in a 50-metre radius of the phone box.[7]

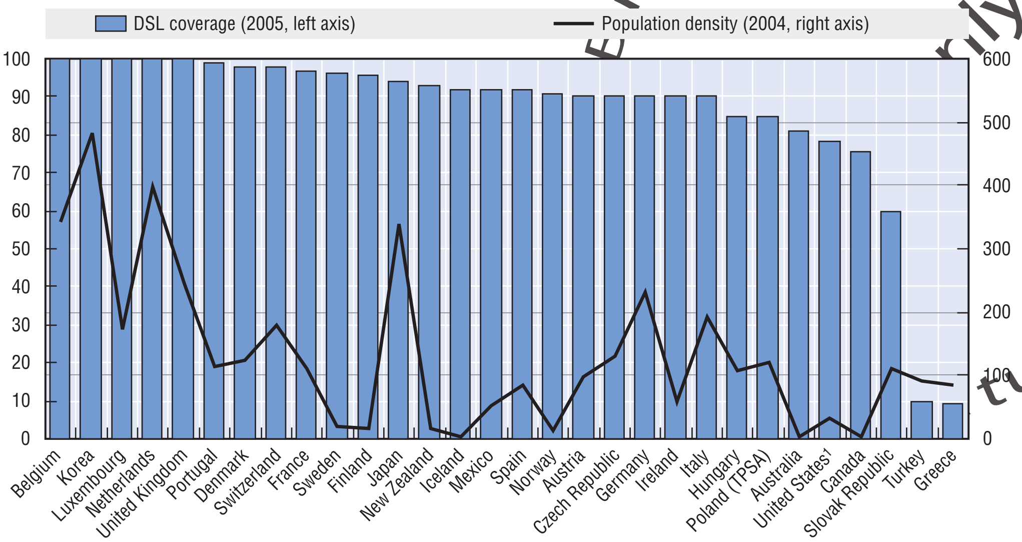
Broadband network growth

Broadband networks continue to expand across the OECD area. DSL networks have the most extensive broadband coverage in most OECD countries (Table 4.11 and Figure 4.9). However, in countries such as the United States and Canada broadband coverage by cable networks is also very high, and in some areas more extensive than DSL.

DSL coverage is particularly high in Belgium, Korea, Luxembourg, the Netherlands and the United Kingdom. Twenty-two OECD countries have at least 90% coverage measured by lines, households or population. Greece has the lowest DSL coverage in the OECD area with only 9% of the population able to obtain a DSL line.

DSL coverage statistics as given in Figure 4.9 only show the percentage of households/population that can subscribe to DSL or the percentage of lines that have

Figure 4.9. **DSL coverage and population density**



Note: DSL coverage is measured in various ways across the OECD. The percentages given above may represent the number of lines that have been upgraded, the population covered or the households which are able to subscribe.

1. Data for the United States is an average for Verizon, SBC, Bell South, Qwest, Sprint, Alltel, Cincinnati Bell, Centurytel and ACS.

StatLink http://dx.doi.org/10.1787/001108776886

been upgraded. This implies that subscribers have access to at least one DSL provider through their telecommunication exchange.

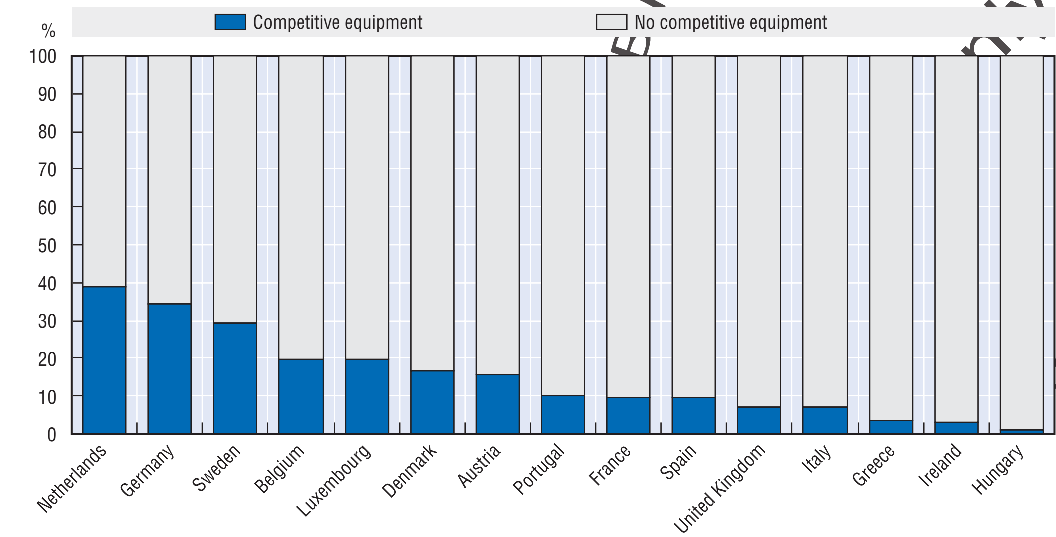
The statistics do not indicate whether DSL services are available from multiple providers or if competitive operators have installed equipment in the exchange. Some statistics are available from industry trade groups on the number of exchanges in which competitive operators have installed equipment at the main distribution frame (MDF). Data from the European Competitive Telecommunications Association (ECTA) show that the number of exchanges hosting competitive equipment remains low in many OECD countries and this could have implications for the competitiveness of broadband in OECD markets (Figure 4.10). Unbundling rules in many OECD countries still allow subscribers to access broadband from competitive operators via a wholesale arrangement.

Cable networks in Canada and the United States have extensive coverage in areas where they offer cable television services. The distance between the subscriber and the cable head end is not an important aspect of delivering broadband services as it is with DSL-based technologies. A report by the FCC in the United States showed that as of June 2006, cable Internet services were available to 93% of households that were passed by cable television. For comparison, the report showed that DSL is available to 79% of homes with access to telephone service from an incumbent provider.[8]

Broadband speeds

Operators across the OECD area are upgrading networks to offer faster download speeds to subscribers. Both DSL and cable operators have increased speeds to end-users as technology improves. The fastest broadband connections offered by incumbent telecommunication operators are in Korea and Japan. Both KT and NTT offer broadband at 100 Mbit/s. The third-fastest speed from an incumbent is from Verizon in the United States over its FiOS fibre network (Figure 4.11).

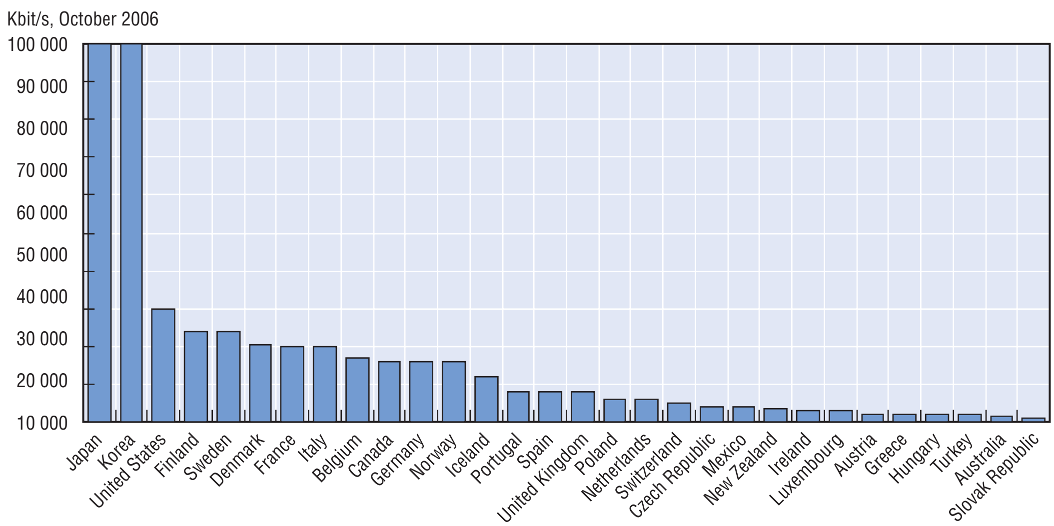
Figure 4.10. **Level of competition at the main distribution frame**



Source: European Competitive Telecommunications Association (ECTA), *www.ectaportal.com.*

StatLink http://dx.doi.org/10.1787/001144335826

Figure 4.11. **Fastest broadband download speeds offered by the incumbent telecommunications operator**

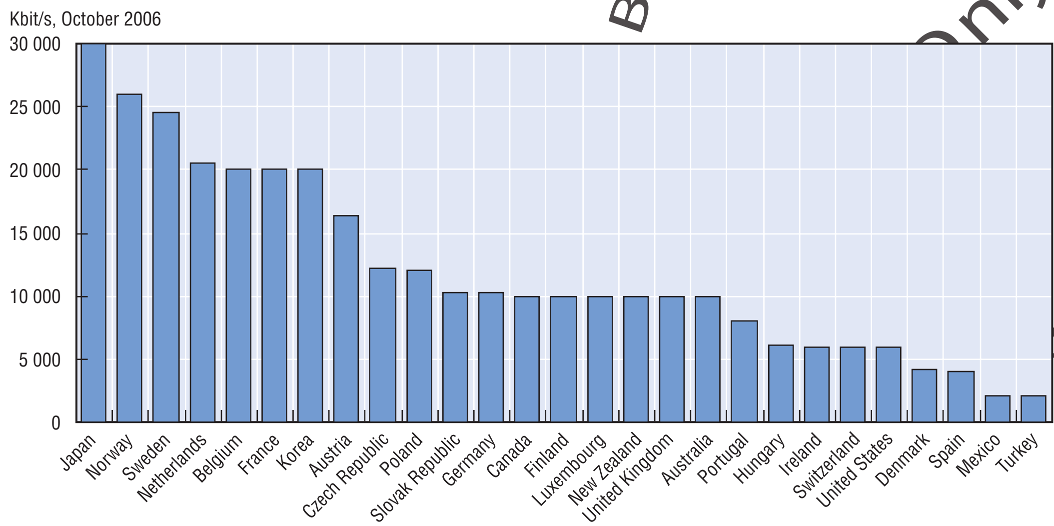


Note: The connections represented are either over DSL or fibre and refer to the fastest consumer speed available from the incumbent operator on the date in October 2006 when the data was gathered. Operators in countries such as Australia and Portugal increased speeds before the end of 2006 but after the collection date. The top speed plan in the United States is from Verizon.

StatLink http://dx.doi.org/10.1787/001151256048

The fastest offers from cable operators were in Japan, Norway, Sweden, the Netherlands, Belgium, France and Korea (Figure 4.12). Cable operators in all six countries offered broadband at speeds of 20 Mbit/s or greater. The fastest broadband speeds available in the OECD are over fibre optic lines. Cable providers in 17 countries offer broadband at speeds of 10 Mbit/s or greater. Only 13 incumbent DSL providers in the OECD offer similar speeds.

Figure 4.12. **Fastest broadband download speeds offered by the largest cable operator**



StatLink http://dx.doi.org/10.1787/001175848726

Transition to fibre

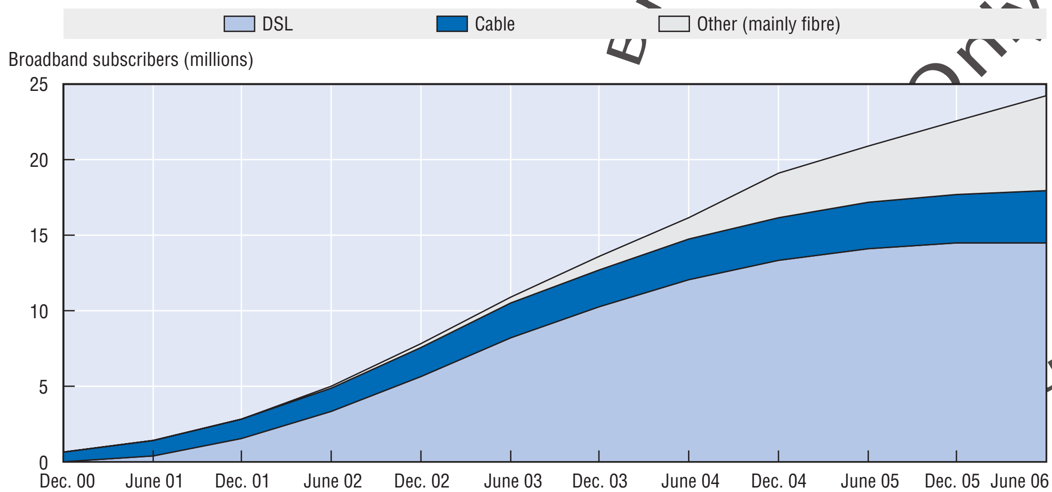
At 63%, the majority of broadband connections in the OECD area are still over DSL. However, some leading OECD countries are moving to upgrade last-mile, copper-based connections to fibre. Part of the impetus has been the transition to HDTV signals in many OECD countries. The bandwidth required for a standard television signal over IP is roughly 2 Mbit/s, which is typically available to DSL subscribers in the OECD. However, the bandwidth needed for one HDTV television signal will be significantly higher, roughly 10 Mbit/s for each channel streamed (depending on compression techniques). As mentioned earlier, incumbent providers in only 13 of the OECD's 30 member countries offered speeds of 10 Mbit/s or higher to residential subscribers in October 2006. In some sense, cable operators offering high-speed data have a slight advantage over DSL providers using copper twisted pair since their video is distributed alongside the data path, not over it.

Many of the fastest telecommunication networks in the OECD area use ADSL2+ technologies to reach the final consumer. However, current ADSL2+ connections would likely not support multiple HDTV streams to a household although they would be available over the cable TV network. Incumbents in only eight OECD countries offer theoretical maximum speeds that could potentially accommodate two HDTV streams at 10 Mbit/s apiece.

Broadband providers therefore are looking to two other network topologies to reach consumers of the last mile using fibre-to-the-node (FTTN) or fibre-to-the-home (FTTH). Technologies such as VDSL and VDSL2+ can offer speeds of 50 Mbit/s over very short distances and may be able to support multiple HDTV channels, although VDSL implementations at 26 Mbit/s are common. Some providers have gone a step further and have chosen to roll out fibre directly to end-users.

Korea and Japan have the most subscribers with access to the Internet via a fibre-based connection. Japan leads the world in fibre-to-the-home connections with 6.3 million subscribers in June 2006 (see Figure 4.13). The total number of DSL subscribers has fallen in both Korea and Japan as users upgrade to fibre-based connections. Fibre subscribers in Japan alone outnumber total broadband subscribers in 22 of the 30 OECD countries.

Figure 4.13. **Japanese broadband subscription growth towards fibre**



Source: OECD biannual broadband statistics: *www.oecd.org/sti/ict/broadband*.

StatLink http://dx.doi.org/10.1787/001204415335

In the United States, a number of incumbent telecommunication providers are pushing fibre closer to homes. Verizon is promoting its FiOS service which offers fibre connections to the home. In June 2006, Verizon had 375 000 subscribers with fibre connections in their homes. This was roughly 12% of all subscriber homes passed.[9]

Traditional HFC (hybrid fibre coaxial) cable providers may also eventually look to putting fibre all the way to the consumer as a way to offer faster bandwidth to users. Current specifications for DOCSIS 3.0, the cable modem standard, offer downstream bandwidths up to 160 Mbit/s. Since this bandwidth is shared among users, there may be contention problems. One longer-term solution is for cable providers to move toward fibre distribution directly to consumers and shift to a stream-on-demand type of service.

Competitive DSL providers have also started moving towards the provision of fibre-to-the-premises (FTTP) services. In France the competitive operator Free has announced that it will begin construction of an FTTP network throughout Paris and in any other area where Free subscribers make up a minimum of 15% of connections at an exchange.[10]

Investment

The transition to fibre-based broadband technologies, higher-speed mobile and the move towards next-generation networks has brought back growth in telecommunication investment. After a sharp decline between 2001 and 2003, investment started increasing again in 2004 and has continued through 2005 (Table 4.12). Investment rose 13% from USD 142 billion in 2003 to USD 160 billion in 2005 (Figure 4.14).

Investment growth leading up to 2000 was mainly driven by operators upgrading mobile networks, competitive operators installing equipment in local exchanges and extensive rollouts of backbone infrastructure by incumbent and competitive operators. The bursting of the speculative bubble in 2000 led to a decline in infrastructure investment for the next three years. Operators that had installed massive fibre optic backbone networks saw the price per Mbit/s drop as many long-haul markets suffered from overcapacity. Investment in third-generation mobile networks was slow to arrive, contributing to the decline in investment.

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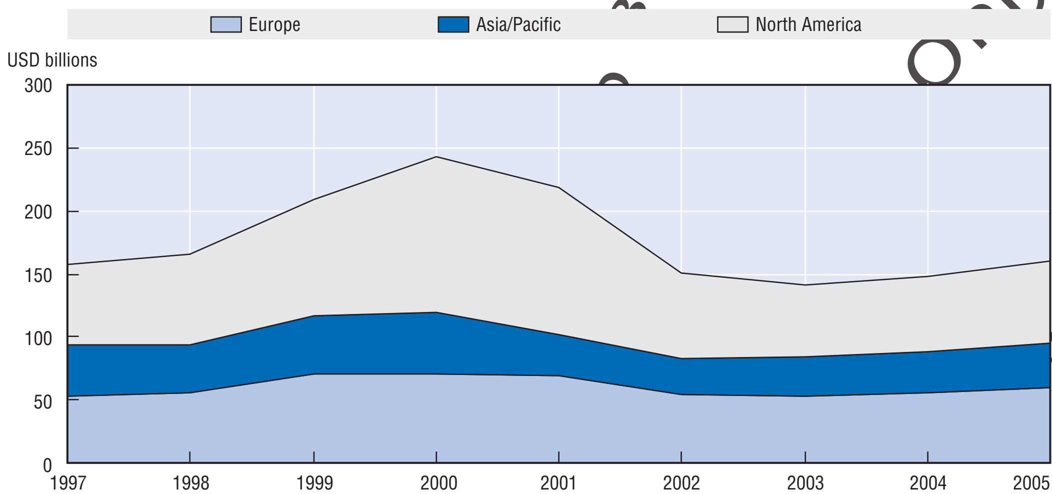
Figure 4.14. **Public telecommunications investment by region, 1997-2006, excluding spectrum fees**



StatLink http://dx.doi.org/10.1787/001252378481

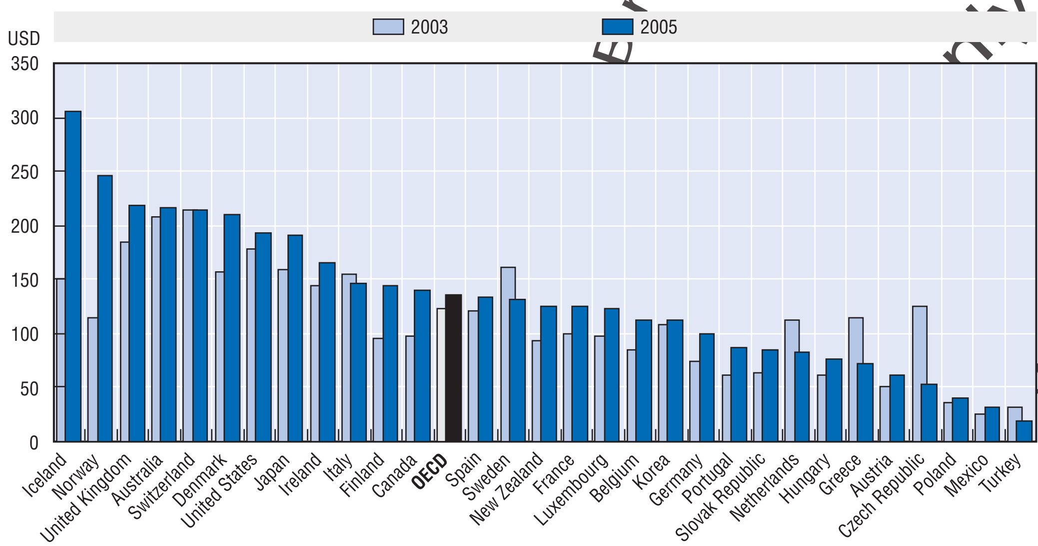
The level of investment began to rise in 2004 and the increase can be tied in part to impressive demand for broadband data services. Incumbent operators in several OECD markets have moved quickly to upgrade lines to better compete with cable Internet offerings and increase average revenue per user. Competition from new entrants over unbundled lines has also helped spur investment in several markets.

The North American region has typically had the largest amount of total telecommunication investment (including spectrum fees) in the OECD area (Table 4.13). In 1997, it accounted for 40% of all OECD telecommunication investment. That percentage increased through the year 1999 and reached 52% during the peak of the boom. The next four years saw a decline in investment across all regions, with the largest drop in North America. In 2005, the ratio of North American investment (41%) was again similar to the 1997 level of 40%. Telecommunication investment will likely continue to increase over the next few years as the largest telecommunication operators continue to build out fibre networks to consumers and expand wireless offerings.

High levels of investment are likely to continue because several large telecommunications firms have started building next generation networks. BT has started building its "21st Century Network" or "21CN" and notes that it will put USD 5.66 billion (GBP 3 billion) into capital expenditures in 2006, mainly towards the construction of the new network. For BT, the investment in the new network is a way to deliver long-term structural cost reduction by moving towards a simpler, lower-cost network architecture.

The two largest fixed telecommunication operators in the world by revenues (NTT and Verizon) have continued to roll out fibre lines directly to customers and have announced large capital outlays for the future. Verizon announced that it would spend USD 18 billion in net capital between 2004 and 2010 to deploy fibre. The company predicts that the new fibre network will save approximately USD 1 billion annually in operating expenses by 2010 owing to fibre's operating efficiencies. In addition, investment should become more attractive to operators as costs fall. The amount of capital expenditure outlay Verizon needed to pass a home in August 2006 was USD 873 and the cost is falling.[11] NTT in Japan is expected to invest USD 8.5 billion from 2004 to 2010 for its fixed communications operations.

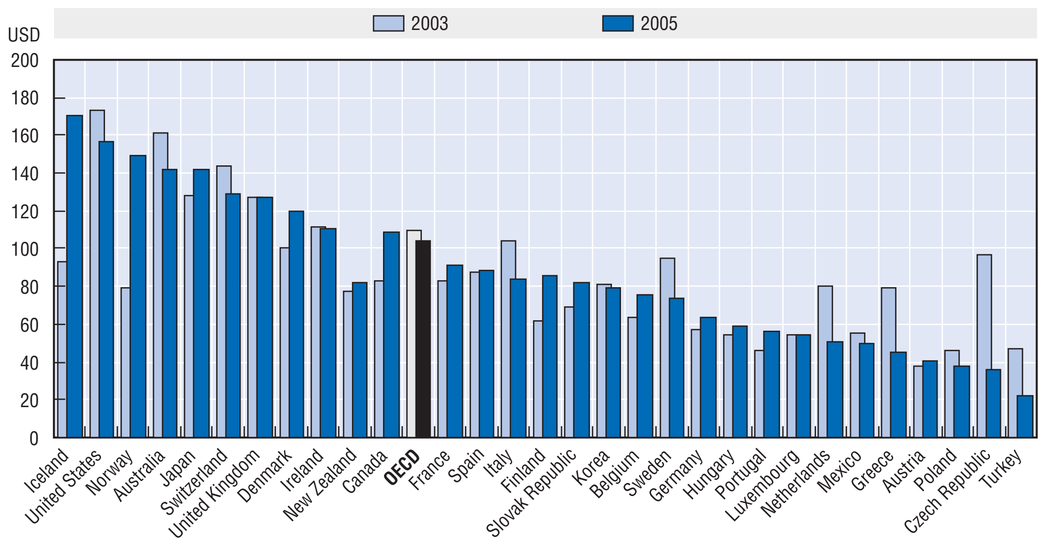
Figure 4.15. **Public telecommunications investment per capita, USD**



Note: Investment data contains estimates from Table 4.12.

StatLink http://dx.doi.org/10.1787/001262566612

Figure 4.16. **Public telecommunications investment per access path, USD**



Note: Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers. Investment data contains estimates from Table 4.12.

StatLink http://dx.doi.org/10.1787/001314138363

In terms of investment as a percentage of revenues, investment by operators in the United Kingdom accounted for 27% of telecommunication revenues in 2005 (Table 4.14). The OECD average for the ratio of investment to revenues was 15.3%. Investment was less than 10% of revenues in Luxembourg, Germany, Netherlands, Belgium, New Zealand, Greece and Austria.

Another important measure of investment is the ratio of telecommunication investment to gross fixed capital formation (GFCF) (Table 4.15). The ratio measures telecommunication investment as a percentage of domestic investment in fixed assets and shows the contribution of the telecommunications sector to overall physical capital formation. In 2005, telecommunication investment in the OECD area accounted for 2.24% of gross fixed capital formation. The percentage was highest in the Slovak Republic, the United Kingdom, Hungary, Poland and the United States. In the Slovak Republic telecommunications investment was 3.6% of GFCF in 2005, while in Luxembourg it was only 0.77%.

Telecommunication investment per capita was higher in 2005 than two years earlier in 24 of the 30 OECD countries (Figure 4.15). There was also a relatively wide variation in investment per total telecommunication access paths (Figure 4.16) with the strongest two-year growth in Norway, Iceland, Finland, Canada and Portugal.

Notes

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Table 4.1. **Access trends in the OECD area**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2000-2005)	CAGR (2003-2005)
Lines/subscribers											
Standard analogue access lines	475 335 259	477 429 469	475 915 636	469 859 046	461 189 804	446 793 367	436 680 776	428 325 718	418 466 488	-2.29	-2.11
ISDN lines	9 490 895	13 358 708	20 644 047	28 179 562	31 666 345	32 955 069	33 194 965	32 332 883	31 705 768	2.39	-2.27
ISDN channels	25 423 372	39 261 801	59 969 411	80 190 350	90 181 023	94 366 140	94 499 491	89 626 394	87 849 182	1.84	-3.58
Mobile subscribers	170 359 942	245 539 940	359 301 238	505 331 260	604 201 400	681 497 222	741 507 030	835 326 435	932 785 201	13.04	12.16
DSL lines	0	0	557 499	5 929 579	17 096 368	30 412 872	48 716 138	72 783 466	98 539 247	75.44	42.22
Cable modem subscribers	96 000	679 464	2 761 073	7 618 918	15 016 145	22 787 713	31 439 755	39 770 487	48 407 422	44.75	24.08
Telephone access											
Fixed telephone access paths (analogue + ISDN lines)	484 826 154	490 788 177	496 559 683	498 038 608	492 856 150	479 748 435	469 875 742	460 658 601	450 172 256	-2.00	-2.12
Total telephone access paths (analogue + ISDN lines + mobile)	655 186 096	736 328 117	855 860 921	1 003 369 868	1 097 057 550	1 161 245 657	1 211 382 772	1 295 985 036	1 382 957 456	6.63	6.85
Communication access											
Fixed communication access paths (analogue lines + ISDN lines + DSL + cable modem)	484 922 154	491 467 641	499 878 255	511 587 105	524 968 663	532 949 020	550 031 635	573 212 554	597 118 925	3.14	4.19
Total communication access paths (analogue lines + ISDN lines + DSL + cable modem + mobile)	655 282 096	737 007 581	859 179 493	1 016 918 365	1 129 170 063	1 214 446 242	1 291 538 665	1 408 538 989	1 529 904 125	8.51	8.84
Broadband											
DSL lines as percentage of fixed communication access paths	0.0	0.0	0.1	1.2	3.5	6.3	10.4	15.8	21.9		
Cable subscribers as percentage of fixed communication access paths	0.0	0.1	0.6	1.5	3.0	4.7	6.7	8.6	10.8		

StatLink http://dx.doi.org/10.1787/011108817257

Table 4.2. **Total communication access paths in the OECD area**
In thousands

	1993	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2003-2005)	CAGR (2000-2005)	CAGR (1996-2005)
Australia	8 866	13 431	14 289	15 247	16 474	18 595	21 771	23 811	25 896	28 381	31 248	9.85	10.94	9.84
Austria	3 580	4 297	4 732	5 755	7 806	9 629	10 141	10 375	10 856	11 913	12 532	7.44	5.41	12.63
Belgium	4 398	5 257	6 012	6 490	7 819	10 250	12 436	13 251	14 013	14 899	15 626	5.60	8.80	12.87
Canada	16 736	21 471	22 938	24 891	26 308	29 661	33 168	34 918	37 013	39 292	41 695	6.14	7.05	7.65
Czech Republic	1 961	3 019	3 795	4 700	5 752	8 254	10 628	12 016	13 036	14 007	15 092	7.60	12.83	19.58
Denmark	3 067	4 572	4 608	5 134	5 823	6 641	7 377	7 993	8 431	9 005	9 484	6.06	7.39	8.45
Finland	2 767	4 345	5 011	5 801	6 288	6 815	7 326	7 742	7 974	8 257	8 828	5.22	5.31	8.20
France	31 534	34 477	37 883	42 273	50 922	59 468	66 866	69 265	74 032	79 573	85 745	7.62	7.59	10.65
Germany	38 342	46 701	48 863	54 350	63 561	88 073	97 722	102 018	108 738	120 252	128 835	8.85	7.90	11.94
Greece	4 744	5 861	6 370	7 595	9 534	11 693	13 777	15 083	15 994	16 717	18 125	6.45	9.16	13.36
Hungary	1 498	3 154	3 859	4 530	5 240	6 670	8 445	10 250	11 391	12 275	12 946	6.61	14.18	16.99
Iceland	144	201	221	265	333	378	404	443	473	492	531	5.99	7.04	11.43
Ireland	1 167	1 687	2 011	2 531	3 261	3 658	4 431	4 784	5 144	5 593	6 162	9.44	10.99	15.48
Italy	24 179	31 450	37 023	45 434	55 065	66 899	76 239	78 734	84 869	92 530	102 487	9.89	8.91	14.03
Japan	59 360	89 517	101 103	109 934	119 128	129 376	138 971	149 491	159 621	167 280	172 266	3.89	5.89	7.54
Korea	16 686	23 131	27 762	34 778	45 832	53 152	59 982	64 944	64 545	67 634	69 051	3.43	5.37	12.92
Luxembourg	215	295	327	358	426	551	684	729	800	935	1 031	13.49	13.33	14.93
Mexico	7 621	9 860	10 995	13 276	18 659	26 418	35 601	41 106	46 822	57 529	68 923	21.33	21.14	24.12
Netherlands	7 634	9 156	10 818	11 114	15 152	19 594	20 097	20 788	22 690	26 432	26 345	7.75	6.10	12.46
New Zealand	1 532	2 197	2 463	3 018	3 301	3 946	4 215	4 399	4 853	5 509	6 283	13.79	9.75	12.38
Norway	2 335	3 743	4 152	4 547	5 114	5 649	5 987	6 267	6 608	7 335	7 627	7.43	6.19	8.23
Poland	4 416	6 751	8 322	10 413	13 437	17 693	22 172	25 873	29 505	35 622	40 941	17.80	18.27	22.17
Portugal	3 271	4 406	5 374	6 969	8 564	10 456	11 808	12 470	14 147	14 787	16 150	6.85	9.08	15.53
Slovak Republic	893	1 276	1 592	2 005	2 319	2 992	3 704	4 327	4 981	5 573	5 585	5.88	13.30	17.82
Spain	14 301	18 508	20 415	23 519	32 055	41 745	47 557	55 857	58 431	59 204	65 609	5.96	9.46	15.10
Sweden	5 910	8 561	9 244	10 197	11 235	12 545	13 505	14 370	15 337	15 491	16 033	2.24	5.03	7.22
Switzerland	4 335	4 828	5 328	5 923	7 210	8 808	9 519	10 209	10 954	11 497	12 397	6.39	7.08	11.05
Turkey	12 192	15 112	17 354	20 466	25 856	33 470	37 344	42 277	46 920	54 337	64 131	16.91	13.89	17.42
United Kingdom	27 340	36 655	38 291	44 443	55 588	67 265	77 051	81 405	85 701	95 213	103 829	10.07	9.07	12.26
United States[1]	147 096	176 849	194 131	211 051	230 765	256 576	270 243	289 252	301 764	330 977	364 367	9.88	7.27	8.36
OECD	458 118	590 768	655 282	737 008	858 830	1 016 918	1 129 170	1 214 446	1 291 539	1 408 539	1 529 904	8.84	8.51	11.15

1. The United States data do not include access lines (voice equivalents) for competitive telephone carriers and for certain small traditional telephone carriers.

Notes: For 2000, there were approximately 192 million channels. Total communication access paths = (analogue lines + ISDN lines + DSL + cable modem + mobile subscribers).

StatLink http://dx.doi.org/10.1787/011335583502

Table 4.3. **Fixed telephone access paths in the OECD area**
In thousands

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Per 100 inhabitants (2005)	CAGR (2003-2005)	CAGR (1996-2005)
Australia	9 440	9 710	9 900	10 120	10 511	10 511	10 790	10 911	10 370	10 120	49.4	-3.7	0.8
Austria	3 698	3 567	3 455	3 455	3 374	3 307	3 187	3 144	3 069	3 005	36.5	-2.2	-2.3
Belgium	4 780	5 037	4 734	4 609	4 475	4 315	4 279	4 226	4 148	4 118	39.3	-1.3	-1.6
Canada	18 051	18 722	19 384	19 187	19 527	19 810	19 274	19 055	18 804	18 355	56.9	-1.9	0.2
Czech Republic	2 817	3 273	3 735	3 806	3 898	3 669	3 389	3 279	3 059	2 869	28.0	-6.5	0.2
Denmark	3 255	3 164	3 203	3 182	3 210	3 179	3 075	2 996	2 909	2 797	51.6	-3.4	-1.7
Finland	2 869	2 919	2 955	3 007	3 057	3 082	2 943	2 736	2 560	2 276	43.4	-8.8	-2.5
France	31 991	32 128	31 050	30 253	29 597	29 248	28 980	28 673	28 502	28 186	45.0	-0.9	-1.4
Germany	40 964	40 687	40 437	40 110	39 666	39 696	39 650	39 380	39 081	38 995	47.3	-0.5	-0.5
Greece	5 330	5 432	5 539	5 640	5 760	5 813	5 769	5 656	5 613	5 522	49.7	-1.2	0.4
Hungary	2 681	3 153	3 494	3 639	3 592	3 454	3 301	3 255	3 197	3 001	29.7	-4.0	1.3
Iceland	154	155	159	161	161	158	158	152	150	151	50.9	-0.5	-0.3
Ireland	1 390	1 500	1 585	1 661	1 637	1 660	1 701	1 693	1 689	1 722	41.5	0.8	2.4
Italy	25 022	25 263	25 134	24 996	24 494	24 753	24 799	26 011	25 290	24 429	41.7	-3.1	-0.3
Japan	62 633	62 849	62 626	62 129	61 957	61 324	60 772	60 218	59 608	58 075	45.5	-1.8	-0.8
Korea	19 950	20 866	20 795	22 118	22 426	22 822	23 382	20 435	20 191	20 141	41.7	-0.7	0.1
Luxembourg	250	260	228	217	248	251	251	246	245	244	53.4	-0.3	-0.2
Mexico	8 826	9 254	9 927	10 927	12 332	13 774	14 975	16 330	18 073	19 512	18.5	9.3	9.2
Netherlands	8 152	9 129	7 767	8 211	8 334	7 985	7 852	7 677	7 434	5 942	36.4	-12.0	-3.5
New Zealand	1 719	1 753	1 763	1 759	1 749	1 765	1 801	1 798	1 801	1 790	43.6	-0.2	0.5
Norway	2 484	2 475	2 475	2 446	2 386	2 317	2 295	2 202	2 155	1 921	41.6	-6.6	-2.8
Poland	6 532	7 510	8 485	9 533	10 946	11 400	11 860	11 818	11 726	10 897	28.6	-4.0	5.8
Portugal	3 744	3 867	3 894	3 892	3 766	3 734	3 682	3 616	3 569	3 494	33.1	-1.7	-0.8
Slovak Republic	1 246	1 392	1 540	1 655	1 698	1 556	1 403	1 295	1 250	1 184	22.0	-4.4	-0.6
Spain	15 510	16 085	16 467	17 134	17 748	17 427	17 427	17 609	17 157	17 947	41.4	1.0	1.6
Sweden	6 065	6 075	6 089	6 102	6 067	5 970	5 844	5 761	5 627	5 436	60.2	-2.9	-1.2
Switzerland	4 171	4 284	4 224	4 153	4 108	4 101	4 077	4 016	3 941	3 831	51.1	-2.3	-0.9
Turkey	14 286	15 744	16 960	18 060	18 402	18 913	18 928	18 933	19 139	18 993	26.4	0.2	3.2
United Kingdom	29 829	29 828	31 442	31 646	31 823	32 070	31 221	30 974	30 667	30 234	50.2	-1.2	0.1
United States	132 835	138 745	141 342	142 749	141 089	134 791	122 684	115 781	109 634	104 988	35.4	-4.8	-2.6
OECD	470 675	484 826	490 788	496 560	498 039	492 856	479 748	469 876	460 659	450 172	38.4	-2.1	-0.5

Notes: Fixed telephone access paths: analogue + ISDN lines.

StatLink http://dx.doi.org/10.1787/011371485725

Table 4.4. **Standard analogue telecommunication access lines in the OECD area**

In thousands

	1993	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2004-2005)	CAGR (2000-2005)	CAGR (1996-2005)	Per 100 inhabitants (2005)
Australia	8 851	9 170	9 350	9 540	9 760	10 050	10 060	10 400	10 460	10 370	10 120	-2.41	0.14	1.10	49.43
Austria	3 578	3 656	3 482	3 299	3 202	3 034	2 900	2 754	2 687	2 609	2 562	-1.80	-3.33	-3.88	31.11
Belgium	4 396	4 725	4 939	4 549	4 353	4 042	3 884	3 854	3 805	3 733	3 711	-0.58	-1.69	-2.65	35.43
Canada	16 716	18 051	18 660	19 294	19 082	19 409	19 689	19 161	18 951	18 708	18 276	-2.31	-1.20	0.14	56.63
Czech Republic	1 961	2 817	3 273	3 732	3 795	3 872	3 585	3 243	3 094	2 867	2 695	-6.01	-6.99	-0.49	26.33
Denmark	3 060	3 225	3 104	3 086	2 934	2 833	2 769	2 679	2 618	2 552	2 476	-2.99	-2.66	-2.90	45.68
Finland	2 763	2 842	2 861	2 855	2 850	2 849	2 806	2 726	2 500	2 390	2 140	-10.48	-5.57	-3.10	40.79
France	30 992	31 600	31 572	31 050	30 253	29 597	29 248	28 980	28 673	28 502	28 186	-1.11	-0.97	-1.26	44.95
Germany	37 500	39 000	37 800	36 200	34 500	32 200	30 500	29 100	27 837	26 986	26 340	-2.39	-3.94	-4.27	31.94
Greece	4 744	5 329	5 431	5 536	5 611	5 659	5 608	5 413	5 200	5 080	4 939	-2.78	-2.69	-0.84	44.48
Hungary	1 498	2 675	3 133	3 457	3 614	3 492	3 294	3 092	3 038	2 980	2 792	-6.30	-4.38	0.48	27.68
Iceland	144	154	152	151	148	144	140	140	135	134	134	0.56	-1.39	-1.48	45.38
Ireland	1 167	1 390	1 500	1 536	1 585	1 590	1 590	1 600	1 600	1 600	1 600	0.00	0.13	1.58	38.57
Italy	24 167	24 918	24 801	24 251	23 453	22 569	22 244	21 943	23 000	22 400	21 725	-3.01	-0.76	-1.51	37.12
Japan	58 830	61 526	60 451	58 559	55 446	52 258	50 997	51 162	51 592	51 626	50 577	-2.03	-0.65	-2.15	39.58
Korea	16 686	19 942	20 845	20 756	21 944	22 326	22 764	23 277	20 331	20 126	20 006	-0.60	-2.17	0.04	41.42
Luxembourg	215	248	255	219	189	206	191	191	171	166	165	-0.90	-4.43	-4.45	35.97
Mexico	7 621	8 826	9 254	9 927	10 927	12 317	13 747	14 956	16 315	18 059	19 500	7.98	9.62	9.21	18.52
Netherlands	7 630	8 110	8 850	7 767	7 330	7 075	6 569	6 316	6 120	5 922	4 518	-23.71	-8.58	-6.29	27.69
New Zealand	1 530	1 719	1 753	1 763	1 759	1 749	1 765	1 801	1 798	1 801	1 790	-0.61	0.46	0.45	43.65
Norway	2 335	2 440	2 325	2 166	1 914	1 683	1 548	1 484	1 417	1 371	1 299	-5.21	-5.04	-6.76	28.11
Poland	4 416	6 532	7 510	8 479	9 483	10 814	11 225	11 534	11 323	11 174	10 352	-7.36	-0.87	5.25	27.13
Portugal	3 271	3 724	3 819	3 803	3 752	3 571	3 482	3 404	3 334	3 291	3 220	-2.16	-2.05	-1.60	30.52
Slovak Republic	..	1 246	1 392	1 539	1 651	1 686	1 525	1 350	1 234	1 184	*1 184*	0.00	-6.83	-0.57	21.97
Spain	14 300	15 413	15 854	16 285	16 770	17 102	17 427	17 427	17 609	17 157	17 947	4.60	0.97	1.71	41.35
Sweden	5 910	6 032	6 010	5 965	5 890	5 783	5 667	5 562	5 497	5 403	5 236	-3.09	-1.97	-1.56	57.98
Switzerland	4 300	4 045	4 076	3 883	3 622	3 382	3 240	3 163	3 089	3 012	2 923	-2.93	-2.87	-3.54	38.97
Turkey	12 192	14 286	15 744	16 960	18 060	18 395	18 904	18 915	18 917	19 125	18 978	-0.77	0.63	3.21	26.33
United Kingdom	27 072	29 668	29 569	31 051	31 045	30 940	31 060	30 141	29 903	29 685	29 329	-1.20	-1.06	-0.13	48.70
United States	146 524	131 966	137 571	139 773	140 994	139 233	132 758	121 026	114 432	108 313	103 749	-4.21	-5.71	-2.64	34.97
OECD	454 367	465 276	475 335	477 429	475 916	469 859	461 190	446 793	436 681	428 326	418 466	-2.30	-2.29	-1.17	35.72

Note: Values in italics are estimates.

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Table 4.5. **ISDN subscribers in the OECD area**

		1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2004-2005)	CAGR (2000-2005)
Australia	ISDN Channels (64Kbit/s Voice Equivalents)	15 000	..	539 050	720 700	722 300	1 049 000	1 235 000	1 268 000	1 213 000	1 288 000	..	..		
	ISDN Basic	7 500	193 600	269 525	360 350	360 350	360 350	461 000	451 000	390 000	451 000	..	..		
	ISDN Primary	..	..	0	0	0	0	0	0	0	0	..	..		
Austria	ISDN Channels (64Kbit/s Voice Equivalents)	10 418	47 766	122 564	244 166	427 400	663 200	903 800	1 046 400	1 121 000	1 189 348	1 213 538	1 185 490	-2.3	5.6
	ISDN Basic	3 859	16 308	40 642	83 083	152 200	247 600	331 900	398 700	424 000	447 839	449 914	432 590	-3.9	5.4
	ISDN Primary	90	505	1 376	2 600	4 100	5 600	8 000	8 300	9 100	9 789	10 457	10 677	2.1	5.9
Belgium	ISDN Channels (64Kbit/s Voice Equivalents)	2 606	78 066	145 984	270 260	507 468	655 804	1 051 716	1 075 996	1 074 440	1 090 738	1 068 358	1 057 186	-1.0	0.1
	ISDN Basic	1 153	27 288	53 342	95 935	179 769	251 327	425 958	423 653	417 340	411 884	407 309	398 483	-2.2	-1.3
	ISDN Primary	10	783	1 310	2 613	4 931	5 105	6 660	7 623	7 992	8 899	8 458	8 674	2.6	5.4
Canada	ISDN Channels (64Kbit/s Voice Equivalents)	19 600		0	369 240	612 899	724 417	937 717	1 115 586	1 139 670	1 116 302	1 054 325	778 797	-26.1	-3.6
	ISDN Basic	600		0	50 162	69 975	80 999	84 126	78 864	69 332	60 523	54 869	49 539	-9.7	-10.0
	ISDN Primary	800		0	11 692	20 563	24 453	33 455	41 646	43 522	43 272	41 069	29 553	-28.0	-2.4
Czech Republic	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	0	1 260	17 210	58 040	126 084	276 010	432 398	532 206	560 776	522 748	-6.8	32.9
	ISDN Basic	..	..	0	165	2 335	10 135	23 562	80 555	140 569	179 193	185 288	168 014	-9.3	48.1
	ISDN Primary	..	..	0	31	418	1 259	2 632	3 830	5 042	5 794	6 340	6 224	-1.8	18.8
Denmark	ISDN Channels (64Kbit/s Voice Equivalents)	..	41 688	89 574	176 000	346 000	710 302	1 008 814	1 141 052	1 066 758	1 042 720	988 068	930 974	-5.8	-1.6
	ISDN Basic	..	13 599	28 797	58 000	113 000	240 731	368 762	397 846	385 239	367 250	347 199	311 362	-10.3	-3.3
	ISDN Primary	..	483	1 066	2 000	4 000	7 628	9 043	11 512	9 876	10 274	9 789	10 275	5.0	2.6
Finland[1]	ISDN Channels (64Kbit/s Voice Equivalents)	..	25 544	90 184	218 946	329 028	467 346	656 930	674 286	711 436	792 396	678 814	546 864	-19.4	-3.6
	ISDN Basic	..	5 962	25 922	54 168	95 064	151 413	199 015	272 013	207 068	224 418	157 532	126 522	-19.7	-8.7
	ISDN Primary	..	454	1 278	3 687	4 630	5 484	8 630	4 342	9 910	11 452	12 125	9 794	-19.2	2.6
France	ISDN Channels (64Kbit/s Voice Equivalents)	542 000	1 417 600	782 400	1 112 800	2 807 255	3 634 739	4 373 260	4 773 539	5 084 292	5 218 318	5 038 787	4 780 645	-5.1	1.8
	ISDN Basic	91 000	258 800	391 200	556 400	0	0	0	0	0	0	0	0		
	ISDN Primary	12 000	30 000	0	0	0	0	0	0	0	0	0	0		
Germany	ISDN Channels (64Kbit/s Voice Equivalents)	842 400	2 778 800	5 204 600	7 342 400	10 229 600	13 637 000	17 947 000	21 839 000	24 544 000	26 530 000	27 690 000	28 810 000	4.0	9.9
	ISDN Basic	217 200	864 400	1 918 300	2 831 200	4 174 000	5 524 000	7 358 000	9 073 000	10 427 000	11 420 000	11 970 000	12 530 000	4.7	11.2
	ISDN Primary	13 600	35 000	45 600	56 000	62 720	86 300	107 700	123 100	123 000	123 000	125 000	125 000	0.0	3.0
Greece	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	4 566	5 604	19 956	99 424	312 324	567 940	880 964	1 100 064	1 271 858	1 364 360	7.3	34.3
	ISDN Basic	..	..	888	792	3 258	27 542	96 972	199 205	349 747	448 542	525 499	575 920	9.6	42.8
	ISDN Primary	..	..	93	134	448	1 478	3 946	5 651	6 049	6 766	7 362	7 084	-3.8	12.4
Hungary	ISDN Channels (64Kbit/s Voice Equivalents)	..	5 000	12 900	38 600	74 100	111 766	305 882	448 396	574 872	565 370	597 684	600 294	0.4	14.4
	ISDN Basic	..	2 500	6 450	19 300	37 050	22 343	95 641	155 468	203 676	212 275	211 422	202 082	-4.4	16.1
	ISDN Primary	..	..	0	0	0	2 236	3 820	4 582	5 584	4 694	5 828	6 538	12.2	11.3
Iceland	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	3 916	12 700	24 856	39 204	49 670	51 228	51 228	57 150	56 974	59 594	4.6	3.7
	ISDN Basic	..	..	698	3 425	7 388	12 192	16 300	17 379	17 379	15 900	16 022	15 472	-3.4	-1.0
	ISDN Primary	..	..	84	195	336	494	569	549	549	845	831	955	14.9	10.9
Ireland	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	0	0	97 700	152 446	208 340	271 848	354 448	335 860	321 630	427 648	33.0	15.5
	ISDN Basic	..	..	0	0	48 850	76 223	43 360	65 484	95 309	87 830	83 865	115 049	37.2	21.6
	ISDN Primary	..	..	0	0	0	0	4 054	4 696	5 461	5 340	5 130	6 585	28.4	10.2
Italy	ISDN Channels (64Kbit/s Voice Equivalents)	..	195 842	406 136	1 287 000	2 213 950	3 616 900	4 584 000	5 856 000	6 644 000	6 942 980	6 689 854	6 291 113	-6.0	6.5
	ISDN Basic	..	45 571	97 543	448 500	867 500	1 524 500	1 899 000	2 479 000	2 822 500	2 977 896	2 857 464	2 671 975	-6.5	7.1
	ISDN Primary	..	3 490	7 035	13 000	15 965	18 930	26 200	29 933	33 300	32 906	32 498	31 572	-2.8	3.8
Japan	ISDN Channels (64Kbit/s Voice Equivalents)	529 707	1 274 453	2 666 150	5 502 553	9 142 402	15 104 054	22 085 986	22 629 812	20 540 421	18 613 191	17 464 152	16 352 034	-6.4	-5.8
	ISDN Basic	211 436	519 846	1 084 928	2 364 520	4 019 707	6 600 080	9 571 522	10 233 239	9 547 424	8 562 120	7 909 803	7 433 784	-6.0	-4.9
	ISDN Primary	4 645	10 207	21 578	33 631	47 956	82 778	127 954	94 058	62 851	64 737	71 502	64 542	-9.7	-12.8
Korea	ISDN Channels (64Kbit/s Voice Equivalents)	..	8 618	16 810	42 220	102 372	436 588	299 608	211 892	336 952	332 280	253 182	408 428	61.3	6.4
	ISDN Basic	..	4 309	8 405	21 110	37 686	171 314	96 629	54 316	100 601	99 810	60 261	129 934	115.6	6.1
	ISDN Primary	..	..	0	0	900	3 132	3 545	3 442	4 525	4 422	4 422	4 952	12.0	6.9

1. In 2000, a change was made in the way Finnish data are compiled.

Table 4.5. **ISDN subscribers in the OECD area** (continued)

		1993	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2004-2005)	CAGR (2000-2005)
Luxembourg	ISDN Channels (64Kbit/s Voice Equivalents)		1 556	3 688	9 840	17 220	80 018	116 440	155 356	163 901	186 200	191 200	196 200	2.6	11.0
	ISDN Basic	..	778	1 844	4 920	8 610	27 544	40 640	57 968	57 968	73 600	77 600	78 600	1.3	14.1
	ISDN Primary	..	..	0	0	0	831	1 172	1 314	1 314	1 300	1 200	1 300	8.3	2.1
Mexico	ISDN Channels (64Kbit/s Voice Equivalents)			0	0	0	0	53 698	58 168	43 464	35 086	31 337	27 588	-12.0	-12.5
	ISDN Basic			0	0	0	0	13 739	26 669	19 317	15 128	13 748	12 368	-10.0	-2.1
	ISDN Primary			0	0	0	0	1 140	210	210	210	167	124	-25.7	-35.8
Netherlands	ISDN Channels (64Kbit/s Voice Equivalents)	4 450	95 000	420 000	810 000	0	2 294 000	3 078 778	3 420 000	3 668 000	3 786 000	3 640 000	3 428 160	-5.8	2.2
	ISDN Basic	1 100	22 000	30 000	270 000	0	862 000	1 239 389	1 395 000	1 514 000	1 533 000	1 490 000	1 403 280	-5.8	2.5
	ISDN Primary	75	1 700	12 000	9 000	0	19 000	20 000	21 000	22 000	24 000	22 000	20 720	-5.8	0.7
New Zealand	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	0	0	0	0	0	0	0	0	0	0		
	ISDN Basic	..	..	0	0	0	0	0	0	0	0	0	0		
	ISDN Primary	..	..	0	0	0	0	0	0	0	0	0	0		
Norway	ISDN Channels (64Kbit/s Voice Equivalents)	..	45 180	148 708	410 480	768 992	1 262 338	1 619 198	1 765 876	1 872 202	1 827 372	1 827 372	1 512 022	-17.3	-1.4
	ISDN Basic	..	11 580	41 819	146 005	304 636	524 999	696 289	760 463	801 971	775 686	775 686	612 356	-21.1	-2.5
	ISDN Primary	..	734	2 169	3 949	5 324	7 078	7 554	8 165	8 942	9 200	9 200	9 577	4.1	4.9
Poland	ISDN Channels (64Kbit/s Voice Equivalents)	..	164	476	800	26 402	123 714	317 678	482 650	785 859	1 254 914	1 371 716	1 365 680	-0.4	33.9
	ISDN Basic	..	82	238	400	5 956	49 500	130 260	170 000	321 605	485 877	541 858	534 685	-1.3	32.6
	ISDN Primary	..	..	0	0	483	824	1 905	4 755	4 755	9 439	9 600	9 877	2.9	39.0
Portugal	ISDN Channels (64Kbit/s Voice Equivalents)	..	37 902	81 934	173 670	313 654	477 352	645 154	816 772	858 502	859 828	851 946	830 690	-2.5	5.2
	ISDN Basic	..	7 101	18 212	45 060	85 907	132 926	185 957	240 176	267 401	271 229	267 843	264 040	-1.4	7.3
	ISDN Primary	..	790	1 517	2 785	4 728	7 050	9 108	11 214	10 790	10 579	10 542	10 087	-4.3	2.1
Slovak Republic	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	0	0	2 858	13 466	39 110	82 200	129 400	135 236	147 904	0		
	ISDN Basic	..	..	0	0	724	4 183	11 365	30 360	52 220	59 773	66 287	0		
	ISDN Primary	..	..	0	0	47	170	546	716	832	523	511	0		
Spain	ISDN Channels (64Kbit/s Voice Equivalents)	..	28 012	219 110	518 176	504 640	978 826	1 674 140	1 674 102	2 094 200	2 954 580	0	0		
	ISDN Basic	..	10 601	96 040	228 458	177 215	355 493	632 470	0	0	0	0	0		
	ISDN Primary	..	227	901	2 042	5 007	8 928	13 640	0	0	0	0	0		
Sweden	ISDN Channels (64Kbit/s Voice Equivalents)	..	39 900	102 500	205 500	382 900	661 000	966 600	1 050 000	1 014 000	998 000	1 011 000	976 000	-3.5	0.2
	ISDN Basic	..	12 000	31 300	62 700	119 000	203 000	270 000	286 000	265 000	245 000	204 000	179 000	-12.3	-7.9
	ISDN Primary	..	530	1 330	2 670	4 830	8 500	14 220	16 990	17 133	18 600	20 100	20 600	2.5	7.7
Switzerland	ISDN Channels (64Kbit/s Voice Equivalents)	34 960	236 946	399 180	612 000	952 202	1 443 810	1 854 130	2 143 180	2 224 112	2 234 174	2 241 824	2 222 600	-0.9	3.7
	ISDN Basic	7 280	65 958	120 540	201 000	331 516	517 245	712 295	845 750	899 296	913 567	915 172	892 765		
	ISDN Primary	680	3 501	5 270	7 000	9 639	13 644	14 318	15 056	14 184	13 568	13 716	14 569	6.2	0.3
Turkey	ISDN Channels (64Kbit/s Voice Equivalents)	..	..	0	0	0	0	19 730	54 400	223 046	216 834	177 838	200 488	12.7	59.0
	ISDN Basic	..	..	0	0	0	0	7 000	7 370	6 553	9 387	8 654	8 159	-5.7	3.1
	ISDN Primary	..	..	0	0	0	0	191	1 322	6 998	6 602	5 351	6 139	14.7	100.2
United Kingdom	ISDN Channels (64Kbit/s Voice Equivalents)	268 000	661 000	882 000	1 626 000	2 163 000	3 003 000	4 006 000	4 484 000	5 100 000	5 054 000	4 876 000	4 638 000	-4.9	3.0
	ISDN Basic	44 000	102 500	141 000	219 000	342 000	537 000	803 000	922 000	975 000	967 000	878 000	804 000	-8.4	0.0
	ISDN Primary	6 000	15 200	20 000	39 600	49 300	64 300	80 000	88 000	105 000	104 000	104 000	101 000	-2.9	4.8
United States	ISDN Channels (64Kbit/s Voice Equivalents)	571 823	1 246 825	2 346 542	3 712 457	6 455 437	8 471 657	9 713 563	10 747 334	10 419 575	8 210 344	8 310 257	8 335 579	0.3	-3.0
	ISDN Basic	268 857	502 375	839 909	1 108 602	1 410 684	1 517 861	1 569 564	1 714 689	1 320 430	1 086 537	1 050 416	960 474	-8.6	-9.4
	ISDN Primary	1 483	10 525	28 988	65 011	158 003	236 345	285 845	318 172	338 205	262 490	269 975	278 897	3.3	-0.5
OECD	ISDN Channels (64Kbit/s Voice Equivalents)	2 840 964	8 265 862	14 688 972	25 423 372	39 261 801	59 969 411	80 190 350	90 181 023	94 366 140	94 499 491	89 626 394	87 849 182	-2.0	1.8
	ISDN Basic	853 985	2 687 158	5 247 542	9 233 255	12 954 380	20 032 500	27 383 715	30 836 167	32 097 945	32 402 264	31 525 711	30 910 453	-2.0	2.5
	ISDN Primary	39 383	114 129	151 595	257 640	404 328	611 547	795 847	830 178	857 124	792 701	807 173	795 315	-1.5	0.0

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Table 4.6. **Total communication access paths per 100 inhabitants in the OECD area**

	1990	1992	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	47.1	48.9	51.0	72.9	76.8	81.1	86.5	96.5	111.5	120.6	129.6	140.5	152.6
Austria	41.8	44.0	47.2	54.0	59.4	72.2	97.7	120.2	126.1	128.3	133.7	145.7	152.2
Belgium	39.3	42.5	46.5	51.8	59.1	63.6	76.5	100.0	121.0	128.3	135.1	143.0	149.2
Canada	55.2	57.3	60.0	72.5	76.7	82.5	86.5	96.7	106.9	111.3	116.9	122.9	129.2
Czech Republic	15.7	17.6	23.2	29.3	36.8	45.7	55.9	80.3	104.0	117.8	127.8	137.2	147.5
Denmark	56.6	58.1	62.0	86.9	87.2	96.8	109.4	124.4	137.7	148.7	156.4	166.7	175.0
Finland	53.5	54.4	55.5	84.8	97.5	112.6	121.7	131.7	141.2	148.9	153.0	158.0	168.3
France	49.6	53.2	57.3	57.8	63.3	70.4	84.4	97.9	109.4	112.6	119.5	127.7	136.7
Germany	50.7	44.7	51.4	57.0	59.6	66.3	77.4	107.2	118.7	123.7	131.8	145.8	156.2
Greece	39.1	43.6	48.5	54.7	59.1	70.1	87.6	107.1	125.8	137.3	145.1	151.1	163.2
Hungary	9.6	12.5	21.5	30.6	37.5	44.1	51.2	65.3	82.9	100.9	112.5	121.5	128.3
Iceland	51.4	53.6	55.6	74.6	81.6	96.8	120.3	134.4	141.6	154.0	163.4	168.1	179.5
Ireland	28.1	31.4	36.5	46.5	54.9	68.2	86.9	96.3	114.8	121.9	128.9	137.8	148.5
Italy	39.4	41.7	43.7	55.3	65.1	79.8	96.7	117.5	133.8	137.8	147.3	159.1	175.1
Japan	44.2	46.6	49.7	71.2	80.2	87.0	94.1	102.0	109.3	117.3	125.0	130.9	134.8
Korea	35.7	35.6	42.0	50.8	60.4	75.1	98.3	113.1	126.7	136.4	134.9	140.7	143.0
Luxembourg	47.8	52.2	56.4	70.9	77.8	83.8	98.4	125.7	155.0	163.4	177.9	206.2	225.5
Mexico	6.6	8.0	9.8	10.7	11.7	13.9	19.2	26.8	35.6	40.5	45.6	55.3	65.5
Netherlands	46.4	48.7	52.5	59.0	69.3	70.8	95.8	123.1	125.3	128.7	139.9	162.4	161.5
New Zealand	43.8	43.2	44.8	58.8	65.1	79.1	86.0	102.2	108.5	111.6	121.0	135.6	153.2
Norway	50.3	52.9	56.8	85.4	94.3	102.6	114.6	125.8	132.7	138.1	144.8	159.8	165.0
Poland	8.6	10.3	14.8	17.5	21.5	26.9	34.8	46.2	58.0	67.7	77.2	93.3	107.3
Portugal	24.1	30.7	36.1	43.8	53.3	68.8	84.2	102.3	114.7	120.3	135.5	140.8	153.1
Slovak Republic	..	15.5	20.9	23.7	29.6	37.2	43.0	55.4	68.6	80.4	92.6	103.5	103.7
Spain	32.4	35.4	38.6	46.9	51.6	59.2	80.3	103.7	116.8	135.2	139.1	138.7	151.2
Sweden	68.3	68.4	68.6	96.8	104.5	115.2	126.8	141.4	151.8	161.0	171.2	172.2	177.5
Switzerland	58.7	60.9	65.6	68.0	74.9	83.0	100.6	122.2	130.7	139.0	147.9	154.2	165.3
Turkey	12.3	16.2	23.0	24.1	27.8	32.3	40.2	49.6	54.4	60.7	66.4	75.7	89.0
United Kingdom	44.1	45.2	50.3	63.0	65.7	76.0	94.7	114.2	130.3	137.2	143.9	159.1	172.4
United States	53.9	55.8	55.2	65.6	71.1	76.4	82.6	90.8	94.7	100.3	103.7	112.6	122.8
OECD	39.7	41.4	45.4	53.8	59.3	66.2	76.7	90.0	99.2	105.9	111.8	121.0	130.6

Notes: Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers.

StatLink http://dx.doi.org/10.1787/011410101657

Table 4.7. **Cellular mobile subscribers in the OECD area**

	1993	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR (2004-2005)	CAGR (2000-2005)	CAGR (1996-2005)
Australia	682 000	3 990 000	4 578 000	5 342 000	6 340 000	8 010 000	11 100 000	12 670 000	14 300 000	16 476 000	18 420 000	11.80	18.12	18.53
Austria	221 450	598 804	1 164 270	2 300 000	4 300 000	6 117 243	6 541 386	6 736 368	7 094 502	7 991 170	8 369 251	4.73	6.47	34.05
Belgium	67 771	478 172	974 494	1 756 287	3 186 602	5 629 000	7 690 000	8 101 778	8 605 834	9 131 705	9 604 695	5.18	11.28	39.56
Canada	1 332 982	3 420 318	4 194 761	5 346 026	6 911 038	8 726 636	10 648 824	11 872 050	13 227 851	14 888 766	16 663 763	11.92	13.81	19.24
Czech Republic	11 151	200 315	521 469	965 476	1 944 553	4 346 009	6 947 151	8 610 177	9 708 683	10 782 567	11 775 878	9.21	22.06	57.25
Denmark	357 589	1 316 592	1 444 000	1 931 000	2 628 585	3 363 552	3 960 165	4 477 845	4 767 277	5 167 998	5 468 956	5.82	10.21	17.14
Finland	459 074	1 476 976	2 091 791	2 845 985	3 273 433	3 728 625	4 175 587	4 516 772	4 747 000	4 999 060	5 384 572	7.71	7.63	15.46
France	467 000	2 440 139	5 754 539	11 210 100	20 619 000	29 681 300	36 997 400	38 593 000	41 702 000	44 544 000	48 099 000	7.98	10.14	39.27
Germany	1 768 000	5 782 200	8 175 500	13 913 000	23 446 000	48 202 000	56 126 000	59 128 000	64 800 000	74 316 000	79 200 000	6.57	10.44	33.75
Greece	28 000	531 488	938 038	2 056 084	3 894 312	5 932 403	7 963 742	9 314 000	10 330 000	11 057 602	12 448 473	12.58	15.98	41.96
Hungary	63 000	473 000	706 000	1 036 000	1 601 000	3 076 000	4 967 430	6 886 111	7 944 586	8 727 188	9 320 169	6.79	24.82	39.26
Iceland	17 409	46 302	65 746	106 000	172 600	215 000	235 400	260 900	279 670	290 068	304 001	4.80	7.17	23.26
Ireland	57 065	290 000	510 747	946 000	1 600 000	2 020 000	2 770 000	3 078 000	3 421 000	3 780 000	4 213 000	11.46	15.84	34.63
Italy	1 206 975	6 413 412	11 760 000	20 300 000	30 068 000	42 290 000	51 096 000	53 100 000	56 700 000	62 837 753	71 501 821	13.79	11.07	30.73
Japan	2 131 367	26 906 511	38 253 893	47 307 592	56 845 594	66 784 374	74 819 158	81 118 324	86 654 962	91 473 960	96 483 732	5.48	7.64	15.24
Korea	471 784	3 180 989	6 895 477	13 982 919	23 442 724	26 816 398	29 045 596	32 342 493	33 591 758	36 586 052	38 342 323	4.80	7.41	31.86
Luxembourg	5 082	45 000	67 208	130 000	208 364	303 274	432 400	473 000	539 000	646 000	719 500	11.38	18.86	36.07
Mexico	386 100	1 021 900	1 740 814	3 349 475	7 731 635	14 077 880	21 757 559	25 928 266	30 097 700	38 451 135	47 140 950	22.60	27.34	53.07
Netherlands	216 000	1 016 000	1 688 550	3 347 000	6 790 000	11 000 000	11 500 000	11 800 000	13 100 000	15 913 000	16 289 000	2.36	8.17	36.11
New Zealand	186 000	476 200	710 000	1 254 900	1 542 000	2 187 000	2 422 000	2 539 000	2 959 000	3 530 000	4 180 126	18.42	13.83	27.30
Norway	369 271	1 261 445	1 676 763	2 071 672	2 663 552	3 244 646	3 593 251	3 790 086	4 060 829	4 524 750	4 754 453	5.08	7.94	15.88
Poland	15 699	216 900	812 000	1 928 000	3 904 000	6 747 000	10 750 000	13 898 471	17 401 222	23 096 065	29 166 391	26.28	34.02	72.39
Portugal	101 231	663 651	1 506 958	3 074 633	4 671 458	6 664 951	7 977 500	8 528 944	10 030 472	10 362 120	11 447 670	10.48	11.43	37.22
Slovak Republic	3 125	28 658	200 141	465 364	664 072	1 293 736	2 147 331	2 923 383	3 678 774	4 275 164	4 275 164	0.00	27.01	74.39
Spain	257 261	2 997 212	4 330 282	7 051 441	14 884 207	23 938 970	29 655 729	37 219 833	38 622 582	38 625 000	42 694 115	10.53	12.27	34.33
Sweden	850 000	2 492 000	3 169 000	4 108 000	5 126 000	6 372 000	7 178 000	7 949 000	8 801 000	8 785 000	9 087 000	3.44	7.36	15.46
Switzerland	259 200	662 700	1 044 400	1 698 565	3 057 509	4 638 519	5 275 791	5 736 303	6 188 793	6 274 763	6 834 233	8.92	8.06	29.60
Turkey	84 187	806 339	1 609 808	3 506 100	7 796 000	15 062 744	18 420 000	23 323 118	27 887 535	34 707 549	43 608 965	25.65	23.69	55.80
United Kingdom	2 216 000	6 817 000	8 463 000	13 001 000	23 942 000	35 384 000	44 633 000	48 815 000	51 543 000	58 386 000	63 988 000	9.59	12.58	28.25
United States	14 712 000	44 043 000	55 312 293	69 209 321	86 047 000	109 478 000	123 375 000	147 767 000	158 722 000	184 700 000	213 000 000	15.32	14.24	19.14
OECD	29 003 773	120 093 223	170 359 942	245 539 940	359 301 238	505 331 260	604 201 400	681 497 222	741 507 030	835 326 435	932 785 201	11.67	13.04	25.58
World	34 161 906	144 965 802	214 483 373	318 316 658	489 998 313	740 189 267	964 129 347	1 159 813 232	1 411 079 246	1 758 834 068	2 177 301 487	23.79	24.08	35.13
OECD % share of world total	85	83	79	77	73	68	63	59	53	47	43			

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Table 4.8. **Cellular mobile penetration, subscribers per 100 inhabitants**

	Subscribers per 100 inhabitants										CAGR (2004-2005)	CAGR (1996-2005)
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**		
Australia	21.7	24.6	28.4	33.3	41.6	56.8	64.1	71.6	81.5	90.0	10.32	17.14
Austria	7.5	14.6	28.8	53.8	76.4	81.3	83.3	87.4	97.8	101.7	3.99	33.55
Belgium	4.7	9.6	17.2	31.2	54.9	74.8	78.4	83.0	87.7	91.7	4.61	39.08
Canada	11.6	14.0	17.7	22.7	28.4	34.3	37.8	41.8	46.6	51.6	10.89	18.10
Czech Republic	1.9	5.1	9.4	18.9	42.3	67.9	84.4	95.2	105.6	115.1	8.92	57.39
Denmark	25.0	27.3	36.4	49.4	63.0	73.9	83.3	88.4	95.7	100.9	5.51	16.76
Finland	28.8	40.7	55.2	63.4	72.0	80.5	86.8	91.1	95.6	102.7	7.35	15.16
France	4.1	9.6	18.7	34.2	48.9	60.5	62.7	67.3	71.5	76.7	7.33	38.49
Germany	7.1	10.0	17.0	28.6	58.6	68.2	71.7	78.5	90.1	96.0	6.62	33.65
Greece	5.0	8.7	19.0	35.8	54.3	72.7	84.8	93.7	100.0	112.1	12.15	41.39
Hungary	4.6	6.9	10.1	15.6	30.1	48.8	67.8	78.4	86.3	92.4	7.00	39.60
Iceland	17.2	24.3	38.7	62.3	76.5	82.6	90.7	96.7	99.1	102.8	3.64	21.96
Ireland	8.0	14.0	25.5	42.7	53.2	71.8	78.4	85.7	93.1	101.5	9.05	32.63
Italy	11.2	20.4	35.3	52.8	74.3	89.7	92.9	98.4	108.0	122.2	13.10	30.44
Japan	21.4	30.3	37.4	44.9	52.7	58.8	63.6	67.8	71.6	75.5	5.47	15.05
Korea	7.0	15.0	30.2	50.3	57.0	61.3	67.9	70.2	76.1	79.4	4.34	31.00
Luxembourg	10.8	16.0	30.5	48.2	69.2	97.9	106.0	119.8	142.5	157.3	10.40	34.63
Mexico	1.1	1.9	3.5	8.0	14.3	21.7	25.6	29.3	37.0	44.8	21.09	50.82
Netherlands	6.5	10.8	21.3	43.0	69.1	71.7	73.1	80.7	97.8	99.8	2.11	35.36
New Zealand	12.7	18.7	32.8	40.2	56.7	62.3	64.4	73.8	86.9	101.9	17.32	26.08
Norway	28.8	38.1	47.5	59.7	72.2	79.6	83.5	89.0	98.6	102.9	4.37	15.20
Poland	0.6	2.1	5.0	10.1	17.6	28.1	36.4	45.6	60.5	76.4	26.35	72.62
Portugal	6.6	14.9	30.4	45.9	65.2	77.5	82.3	96.1	98.7	108.5	9.98	36.50
Slovak Republic	0.5	3.7	8.6	12.3	24.0	39.7	54.3	68.4	79.4	79.4	-0.09	74.34
Spain	7.6	11.0	17.9	37.3	59.5	72.8	90.1	91.9	90.5	98.4	8.74	32.85
Sweden	28.2	35.8	46.4	57.9	71.8	80.7	89.1	98.2	97.7	100.6	3.03	15.19
Switzerland	9.3	14.7	23.8	42.7	64.3	72.4	78.1	83.6	84.2	91.1	8.23	28.82
Turkey	1.3	2.5	5.4	12.1	22.3	26.8	33.5	39.4	48.3	60.5	25.17	53.41
United Kingdom	11.7	14.5	22.3	40.8	60.1	75.5	82.3	86.5	97.6	106.3	8.90	27.73
United States	16.3	20.3	25.1	30.8	38.8	43.2	51.3	54.5	62.8	71.8	14.26	17.88
OECD	10.9	15.4	22.0	32.1	44.7	53.1	59.4	64.2	71.8	79.6	10.96	24.68

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Table 4.9. **Mobile pre-paid subscriptions**

	1996	% of total	1997	% of total	1998	% of total	1999	% of total	2000	% of total	2001	% of total	2002	% of total	2003	% of total	2004	% of total	2005	% of total
Australia	..	..	..	..	..	..	409 000	6.5	1 350 000	16.9	3 300 000	29.7	4 120 000	32.5	5 400 000	37.8	7 080 000	43.0	8 504 000	46.2
Austria	..	..	..	..	..	..	2 044 168	47.5	3 184 653	52.1	3 330 559	50.9	3 259 436	48.4	3 338 473	47.1	3 528 912	44.2	3 774 105	45.1
Belgium	..	..	..	..	..	..	1 275 000	40.0	3 377 400	60.0	4 901 138	67.0	5 330 641	65.8	5 716 309	62.3	6 036 299	66.1	6 042 295	62.9
Canada	..	..	..	..	340 899	6.4	1 132 142	16.4	1 878 650	21.5	2 736 028	25.7	2 937 224	24.7	3 147 000	23.8	2 809 181	18.9	3 832 665	23.0
Czech Republic	..	..	..	..	..	..	..	..	..	..	3 016 209	43.4	6 731 573	78.2	7 268 478	74.9	7 733 079	71.7	7 833 756	66.5
Denmark	..	..	..	..	..	..	979 811	37.3	1 244 886	37.0	1 473 871	37.2	1 354 376	30.2	1 117 962	23.5	1 012 648	19.6	998 485	18.3
Finland	..	..	..	..	..	..	29 907	0.9	74 573	2.0	83 512	2.0	90 335	2.0	94 000	2.0	349 934	7.0	368 560	6.8
France	..	..	..	..	..	..	7 279 489	35.3	13 277 600	44.7	18 060 600	48.8	17 107 589	44.3	17 149 000	41.1	17 124 000	38.4	17 584 000	36.6
Germany	..	..	..	..	2 087 000	15.0	5 533 000	23.6	26 318 000	54.6	31 374 000	55.9	31 338 000	53.0	33 307 000	51.4	37 529 000	50.5	40 200 000	50.8
Greece	..	..	..	..	716 314	34.8	2 052 085	52.7	3 468 960	58.5	5 029 014	63.1	6 066 000	65.1	6 750 000	65.4	7 285 964	65.9	8 338 521	67.0
Hungary	..	..	..	..	..	..	473 630	29.6	1 748 981	56.9	3 584 581	72.2	5 378 171	78.1	6 157 554	77.5	6 382 521	73.1	6 337 715	68.0
Iceland	..	..	..	..	5 500	5.2	40 000	23.2	63 000	29.3	88 000	37.4	88 000	33.7	112 573	40.3	124 508	42.9	132 907	43.7
Ireland	..	..	..	..	..	..	640 000	40.0	1 266 338	62.7	1 966 700	71.0	2 210 000	71.8	2 510 000	73.4	2 835 000	75.0	3 201 000	76.0
Italy	577 207	9.0	5 527 200	47.0	15 022 000	74.0	25 257 120	84.0	37 290 000	88.2	45 792 000	89.6	47 732 000	89.9	51 705 540	91.2	57 176 882	91.0	64 797 928	90.6
Japan	..	..	..	..	..	..	1 907 000	3.4	1 413 671	2.1	1 847 444	2.5	2 083 958	2.6	2 609 505	3.0	2 858 073	3.1	2 725 848	2.8
Korea	..	..	..	..	..	..	..	..	..	..	0	..	607 002	1.9	591 215	1.8	526 638	1.4	662 065	1.7
Luxembourg	..	..	..	..	..	..	46 631	22.4	119 560	39.4	179 416	41.5	179 416	37.9	318 000	59.0	381 200	59.0	419 200	58.3
Mexico	423 365	41.4	981 872	56.4	2 282 110	68.1	6 327 238	81.8	12 449 635	88.4	19 973 638	91.8	23 921 813	92.3	28 069 335	93.3	35 943 055	93.5	43 872 787	93.1
Netherlands	..	..	..	..	1 573 090	47.0	3 938 200	58.0	7 370 000	67.0	7 500 000	65.2	7 400 000	62.7	8 100 000	61.8	10 064 000	63.2	12 028 000	73.8
New Zealand	..	..	..	..	577 254	46.0	878 940	57.0	1 487 160	68.0	1 661 492	68.6	1 737 420	68.4	2 061 530	69.7	2 465 220	69.8	2 975 695	71.2
Norway	..	..	..	..	474 152	22.5	1 112 793	43.5	1 385 280	42.7	1 513 586	43.8	1 653 500	43.6	1 666 423	42.5	1 754 055	38.8	1 735 766	36.5
Poland	..	..	..	..	462 720	24.0	942 285	24.1	2 605 691	38.6	5 120 000	47.6	7 374 699	53.1	9 466 935	54.4	13 498 371	58.4	18 812 776	64.5
Portugal	..	..	..	..	2 428 960	79.0	3 705 968	79.3	5 305 301	79.6	6 366 045	79.8	6 690 198	78.4	7 967 529	79.4	8 220 954	79.3	9 290 549	81.2
Slovak Republic	..	..	..	..	..	..	127 007	19.1	483 441	37.4	1 535 671	71.5	1 961 330	67.1	2 284 105	62.1	2 444 941	57.2		
Spain	..	..	..	..	2 609 033	37.0	9 240 000	60.0	15 736 656	65.7	19 271 468	65.0	22 087 365	59.3	21 627 180	58.4	20 066 634	52.0	20 713 500	48.5
Sweden	..	..	235 000	7.4	1 016 000	24.7	1 983 000	38.7	2 773 000	43.5	3 536 000	49.4	4 309 000	54.2	5 003 000	56.8	4 629 000	52.7	4 626 000	50.9
Switzerland	36 000	5.4	209 000	20.0	590 000	34.7	1 053 425	34.5	1 707 078	36.8	2 154 579	40.8	2 314 844	40.4	2 601 322	42.0	2 485 148	39.6	2 808 411	41.1
Turkey	..	..	..	..	..	..	779 600	10.0	6 627 607	44.0	11 500 000	62.4	17 125 431	73.4	20 851 364	74.8	26 355 089	75.9	30 600 875	70.2
United Kingdom	..	..	..	..	2 910 000	22.4	12 059 000	50.4	27 399 926	77.4	31 037 000	69.1	33 411 000	68.4	34 610 000	67.9	38 974 000	66.8	42 305 000	66.1
United States	..	..	..	..	..	..	4 302 350	5.0	6 570 000	6.0	11 565 000	6.0	11 565 000	7.8	11 565 000	7.3	15 000 000	8.1	23 430 000	11.0
OECD	1 036 572	0.9	6 953 072	4.1	33 095 032	13.5	95 548 789	26.6	187 977 047	37.2	249 497 551	41.0	278 165 321	40.8	304 234 750	41.0	342 674 306	41.0	388 952 409	41.7

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Table 4.10. **Total outgoing mobile minutes**

In millions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	..	..	..	..	..	..	..	..	..	..
Austria	..	..	..	3 674	5 760	7 055	7 902	9 130	10 408	11 590
Belgium	..	..	..	..	..	..	6 961	7 686	8 308	9 371
Canada	..	..	10 924	12 611	18 270	21 705	29 820	41 166	49 243	64 253
Czech Republic	..	..	..	..	1 316	2 442	2 853	3 456	3 691	4 010
Denmark	979	1 301	1 621	2 117	2 695	2 885	3 482	4 153	5 162	6 488
Finland	919	1 832	3 198	4 514	5 294	6 520	7 276	8 161	9 643	10 848
France	..	..	9 968	20 571	35 437	44 419	51 844	63 469	74 248	81 704
Germany	..	..	..	17 401	25 004	31 288	33 970	37 089	41 019	..
Greece	..	..	..	..	..	..	4 738	6 826	9 053	11 309
Hungary	..	..	..	1 664	2 766	4 055	5 028	6 114	7 453	9 454
Iceland	..	..	..	..	187	220	..	360	410	476
Ireland	..	..	..	..	..	..	..	..	..	5 667
Italy	..	..	..	..	34 216	42 355	46 253	51 110	62 604	71 404
Japan	19 140	34 146	50 186	68 104	87 204	97 900	105 200	113 000	109 500	..
Korea	..	..	..	..	..	37 350	45 236	50 913	60 040	64 610
Luxembourg	..	..	..	..	..	..	..	383	444	488
Mexico	..	..	..	..	..	..	..	..	..	..
Netherlands	..	..	..	..	..	9 700	..	..	..	..
New Zealand	..	..	..	..	..	..	..	..	..	..
Norway	..	..	2 235	2 623	2 993	3 595	4 164	4 736	5 637	6 809
Poland	..	..				11 900	8 659	12 577	..	16 352
Portugal	..	..			81 262	8 691	9 358	10 076	10 653	11 597
Slovak Republic	70	226	483	662	1 150	1 339	3 692	2 845	..	..
Spain	..	..	..	..	..	..	..	..	..	..
Sweden	..	..	..	3 988	5 021	5 528	6 283	6 739	7 619	9 950
Switzerland	..	..	..	786	1 513	1 839	2 084	2 300	2 503	2 866
Turkey	..	..	..			5 859	6 255	11 715	20 319	35 508
United Kingdom	6 306	8 782	12 903	22 154	35 384	44 633	52 687	60 608	65 080	71 896
United States[1]	..	..	..	..	..	..	620 000	800 000	1 000 000	1 400 000

1. Values for the United States include both incoming and outgoing calls. Data for other countries are for outgoing calls only.

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Table 4.11. **Availability of digital subscriber lines (DSL) in the OECD area**

	Commercial service launch	Actual coverage by year end (%)						Indicator used to express coverage
		2000	**2001**	**2002**	**2003**	**2004**	**2005**	
Australia	August 2000	50.0	72.0	75.0	75.0	81.0	81.0	Population
Austria	November 1999	72.0	77.0	80.0	80.0	87.0	90.0	Lines
Belgium	October 1999	75.0	93.0	98.0	98.0	100.0	100.0	Lines
Canada	1996	69.0	70.0	75.0	75.4	75.4	75.4	Population
Czech Republic	March 2003	0.0	0.0	0.0	44.0	84.0	90.0	Population (customers)
Denmark	July 1999	65.0	90.0	95.0	95.0	96.0	98.0	Lines
Finland	May 2000	50.0	60.0	75.0	81.5	94.1	95.6	Lines
France	November 1999	32.0	66.0	71.0	79.0	90.0	97.0	Population
Germany	August 1999	60.0	70.0	80.0	85.0	90.0	90.0	Households
Greece	June 2003	0.0	0.0	0.0	0.0	6.0	9.0	
Hungary	September 2000		0.0	0.0	58.0	70.0	85.0	Population
Iceland	April 2000	33.0	51.0	78.0	90.0	92.0	92.0	Population
Ireland	May 2002	0.0	0.0	25.0	50.0	74.0	90.0	Lines
Italy	December 1999	45.0	67.5	70.0	80.0	85.0	90.0	Lines
Japan	September 2000		73.5	80.0	90.0	93.0	94.0	Households
Korea	April 1999		70.0	89.0	93.0	100.0	100.0	Lines
Luxembourg	2001	0.0	65.0	90.0	90.0	100.0	100.0	Population
Mexico	September 2001	0.0	0.0		58.9	75.5	92.0	Lines
Netherlands	June 2000	40.0	67.0	85.0	85.0	100.0	100.0	Lines
New Zealand	June 1999	60.0	69.0	83.0	84.8	92.0	93.0	Population (customers)
Norway	December 2000	20.0	50.0	58.0	67.0	77.0	91.0	Lines
Poland (TPSA)	2001	0.0	3.5	56.0	69.0	77.0	85.0	Lines
Portugal	December 2000						98.8	Lines
Slovak Republic	2003	0.0	0.0	0.0	14.5	50.0	60.0	
Spain	1999	62.2	81.3	89.3	92.0	92.0	92.0	Lines
Sweden	October 2000		70.0	75.0	78.0	90.0	96.0	Lines
Switzerland	October 2000	0.0	85.0	95.0	98.0	98.0	98.0	Lines
Turkey	February 2001	0.0	0.0	2.5	5.0	10.0	10.0	Lines
United Kingdom	July 2000	50.0	60.0	64.0	85.0	95.0	99.8	Lines
United States	1997	36.0	50.0	68.0	75.0	77.0	78.0	Lines
OECD (weighted average)		42.0	55.8	66.9	75.9	78.5	82.8	
OECD (simple average)		27.3	51.0	61.9	72.0	81.1	85.7	

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Table 4.12. **Public telecommunication investment in the OECD area**

USD millions (excluding spectrum fees)

	Average 1988-1990	Average 1991-1993	Average 1994-1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	2 285	2 130	3 050	*4 009*	*3 463*	*4 145*	*3 842*	*3 333*	*2 649*	4 166	*4 158*	4 440
Austria	965	1 308	1 283	996	1 662	2 002	2 619	1 620	905	411	436	509
Belgium	614	779	927	719	670	746	952	591	754	890	1 006	*1 187*
Canada	3 479	3 353	2 811	4 181	4 357	3 904	4 943	5 138	4 154	3 087	4 237	4 539
Czech Republic	..	226	818	1 421	1 164	854	471	599	455	1 267	512	*538*
Denmark	490	431	612	890	1 077	986	1 116	1 324	970	851	955	1 137
Finland	670	510	632	835	595	572	629	657	475	493	511	*758*
France	4 548	6 081	6 175	6 423	6 153	6 286	7 194	8 198	5 376	6 109	6 784	7 840
Germany	9 263	15 808	12 717	11 896	8 000	8 298	9 083	10 268	6 698	6 180	7 037	*8 162*
Greece	291	808	751	843	1 552	1 398	1 346	1 534	1 291	1 263	1 358	813
Hungary	216	456	754	764	662	812	820	750	713	625	653	*768*
Iceland	12	23	30	29	52	56	69	37	24	44	80	90
Ireland	174	202	260	462	515	460	704	442	575	575	*639*	*684*
Italy	7 365	8 657	5 065	5 555	5 959	7 187	6 526	7 208	8 936	8 862	8 746	8 609
Japan	15 389	20 339	33 120	32 815	29 023	33 546	36 516	23 917	19 257	20 422	23 191	24 449
Korea	2 587	3 167	4 615	3 049	4 495	7 038	7 766	5 990	6 396	5 205	5 289	5 463
Luxembourg	39	72	96	79	30	55	15	30	49	44	73	56
Mexico	1 409	2 214	1 862	1 971	3 164	4 028	5 226	5 751	3 130	2 584	3 615	3 431
Netherlands	1 144	1 572	1 511	3 274	5 900	10 418	3 174	2 671	1 564	1 821	*1 930*	*1 340*
New Zealand	362	367	340	389	298	352	379	289	412	376	418	515
Norway	500	483	361	541	477	541	578	597	707	524	*1 024*	*1 142*
Poland	140	489	896	1 006	1 365	1 862	2 434	1 965	2 326	1 363	1 492	1 539
Portugal	562	973	938	1 078	1 216	1 233	1 146	1 229	947	645	838	911
Slovak Republic	..	..	287	384	343	1 050	1 359	1 405	641	345	425	*461*
Spain	4 517	4 265	3 220	2 654	2 952	6 572	9 346	7 313	5 242	5 103	5 760	*5 797*
Sweden	1 079	1 164	1 197	1 404	1 159	1 014	1 637	1 714	1 423	1 452	1 577	1 182
Switzerland	1 597	1 786	1 761	1 637	1 275	2 034	2 245	1 643	1 653	1 580	1 661	1 604
Turkey	548	787	500	553	4 225	3 777	3 541	2 949	2 159	2 204	368	1 389
United Kingdom	4 830	3 738	4 887	9 971	8 987	12 800	14 122	14 159	10 185	10 933	*11 963*	*13 205*
United States	23 401	26 064	37 751	56 963	65 079	84 433	113 301	105 607	61 000	52 162	51 538	*57 179*
OECD	88 514	108 296	129 227	156 789	165 867	208 458	243 097	218 933	151 066	141 586	*148 273*	*159 739*

Notes: Data in italics indicate unofficial estimates derived from historic ratios of incumbent investment to total investment. Exchange rate fluctuations between years among national currencies and the US dollar will affect growth rates. For example, French telecommunication investment grew 15.6% in USD terms but only 14.1% in EUR terms between 2004 and 2005.

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Table 4.13. **Telecommunication investment by region**

USD millions (excluding spectrum fees)

	Average 1988-90	Average 1991-93	Average 1994-96	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	Average 2003-2005
Europe	39 603	50 662	45 678	53 413	55 989	71 012	71 124	68 907	54 068	53 584	55 827	59 723	56 378
(%)	45	47	35	34	28	27	48	30	39	38	38	37	38
North America	28 289	31 631	42 424	63 115	72 599	92 365	123 470	116 496	68 284	57 833	59 390	65 150	60 791
(%)	32	29	33	40	48	52	39	54	41	41	40	41	41
Asia/Pacific	20 622	26 003	41 125	40 261	37 279	45 081	48 503	33 530	28 714	30 169	33 055	34 867	32 697
(%)	23	24	32	27	24	22	14	17	21	21	22	22	22
OECD	88 514	108 296	129 227	156 789	165 867	208 458	243 097	218 933	151 066	141 586	148 273	159 739	149 866

Note: Calculations include unofficial estimates derived for Table 4.12.

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Table 4.14. **Public telecommunication investment as a percentage of telecommunications revenue**

	Average 1988-90	Average 1991-93	Average 1994-96	Average 1997-99	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	50.8	24.1	33.4	27.3	29.8	27.0	25.3	26.2	21.6	23.4	21.5	16.0	16.7
Austria	47.9	48.6	37.5	35.7	26.8	40.4	40.1	59.2	32.1	17.0	6.2	5.8	6.6
Belgium	32.9	30.5	28.1	14.3	17.0	13.1	12.6	13.1	8.7	10.1	9.4	9.1	8.8
Canada	38.0	27.6	23.3	22.5	24.5	22.6	20.3	24.0	24.6	19.6	13.3	16.4	16.9
Czech Republic	..	68.6	131.5	67.3	97.9	63.5	40.5	20.4	23.4	13.9	31.7	11.5	12.3
Denmark	29.9	19.3	21.6	25.5	25.5	28.7	22.2	26.7	31.2	22.1	15.4	15.0	17.3
Finland	47.8	25.1	35.1	19.2	27.1	16.4	14.2	15.7	15.7	10.0	9.5	9.0	14.3
France	30.6	32.7	26.9	22.6	22.4	23.1	22.3	26.5	28.0	15.8	14.3	13.9	15.5
Germany	47.8	48.5	34.6	20.0	27.4	16.3	16.2	17.6	19.0	11.5	8.6	8.5	9.6
Greece	32.7	66.8	38.0	31.6	25.6	36.2	33.0	26.4	27.4	19.4	14.8	14.0	8.1
Hungary	82.9	122.3	71.5	29.5	35.7	26.3	26.4	25.6	21.8	18.4	13.3	13.6	15.1
Iceland	17.6	27.8	28.8	26.4	18.9	31.1	29.2	27.5	17.3	10.6	13.7	20.9	19.5
Ireland	21.7	20.2	24.0	24.2	21.7	26.9	23.9	31.3	17.8	18.0	14.4	12.7	13.4
Italy	64.3	54.0	27.7	24.3	23.3	22.6	27.0	26.7	26.6	29.6	24.3	20.5	19.1
Japan	40.2	43.1	45.3	25.7	28.2	25.6	23.4	22.4	15.3	14.9	14.7	15.8	15.8
Korea	87.5	59.6	61.7	37.6	33.5	35.2	44.2	32.9	29.1	27.7	21.3	15.9	14.4
Luxembourg	49.6	53.5	39.8	16.6	25.8	8.9	15.1	4.5	8.1	12.4	9.3	13.8	9.9
Mexico	112.5	55.9	24.0	30.3	22.5	32.8	35.7	36.4	35.8	18.9	15.1	19.3	15.9
Netherlands	33.2	17.8	23.5	67.0	41.5	62.2	97.2	31.3	23.0	12.0	11.0	13.8	9.5
New Zealand	32.2	25.6	23.4	16.0	17.3	14.6	16.2	17.0	13.6	16.7	11.4	8.3	8.7
Norway	25.5	21.9	14.4	18.4	15.0	19.3	20.8	21.3	20.6	20.4	12.7	22.6	23.7
Poland	29.8	69.8	59.4	39.0	38.8	37.7	40.5	44.8	29.9	33.7	17.8	15.6	13.4
Portugal	62.1	70.2	43.5	27.4	27.2	28.8	26.1	22.7	20.5	14.7	8.3	9.3	10.1
Slovak Republic	..	..	197.3	130.9	85.1	71.3	236.3	169.0	149.3	62.7	25.7	26.2	22.7
Spain	109.0	51.5	31.3	22.2	18.6	18.5	29.4	41.2	29.0	17.6	13.2	12.6	12.1
Sweden	34.5	23.2	23.0	16.6	20.3	15.7	13.7	23.8	26.8	18.6	15.6	15.6	11.8
Switzerland	45.1	39.0	28.4	21.3	24.1	16.6	23.3	27.2	18.8	17.4	13.9	12.9	12.4
Turkey	52.6	37.3	20.8	55.7	13.7	84.0	69.4	57.4	50.3	32.2	21.1	3.2	11.2
United Kingdom	28.6	15.3	19.2	36.2	27.9	35.5	45.2	46.5	44.4	29.4	27.1	25.5	27.3
United States	17.6	17.6	21.9	25.8	23.2	25.0	29.3	35.3	31.6	18.0	15.3	14.9	15.9
OECD	31.6	29.7	29.4	26.6	25.3	25.9	28.6	30.6	26.8	18.3	15.5	14.9	15.3

Note: Calculations include unofficial estimates derived for Table 4.12.

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Table 4.15. **Public telecommunication investment as a percentage of gross fixed capital formation (GFCF)**

	Average 1988-90	Average 1991-93	Average 1994-96	Average 1997-99	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average 2003-2005
Australia	3.06	3.18	3.60	3.89	3.91	3.75	4.01	4.36	3.81	2.52	3.03	2.49	2.32	2.61
Austria	2.95	3.05	2.47	3.29	2.15	3.48	4.26	5.96	3.81	2.13	0.76	0.72	0.81	0.76
Belgium	1.69	1.78	1.80	1.39	1.45	1.30	1.43	1.98	1.25	1.55	1.54	1.50	1.60	1.55
Canada	2.89	3.08	2.63	3.28	3.30	3.55	2.99	3.57	3.67	2.90	1.82	2.11	1.93	1.95
Czech Republic	1.57	2.74	5.23	6.75	8.31	6.68	5.25	2.97	3.46	2.20	5.20	1.80	1.74	2.91
Denmark	2.06	1.71	1.96	2.85	2.66	3.03	2.86	3.45	4.17	2.85	2.05	1.97	2.12	2.04
Finland	1.97	2.32	3.25	2.80	3.68	2.41	2.31	2.68	2.70	1.95	1.66	1.49	2.05	1.73
France	1.92	2.29	2.22	2.41	2.58	2.34	2.30	2.79	3.15	1.96	1.81	1.73	1.86	1.80
Germany	2.97	3.51	2.45	2.06	2.63	1.74	1.82	2.24	2.72	1.81	1.43	1.48	1.69	1.53
Greece	1.79	3.99	3.48	4.82	3.50	6.04	4.93	5.01	5.49	4.05	2.86	2.59	1.51	2.32
Hungary	..	5.94	8.22	6.84	7.51	5.95	7.07	7.47	6.14	4.66	3.37	2.86	3.07	3.10
Iceland	0.98	1.94	2.59	2.53	1.95	2.64	3.00	3.57	2.23	1.56	2.04	2.64	1.98	2.22
Ireland	2.45	2.43	2.27	2.46	2.77	2.63	1.99	3.02	1.83	2.10	1.60	1.43	1.26	1.43
Italy	9.35	3.82	2.48	2.69	2.46	2.55	3.05	2.94	3.18	3.50	2.90	2.47	2.36	2.58
Japan	1.65	1.72	2.39	2.92	2.81	2.92	3.02	3.11	2.37	2.12	2.10	2.21	2.31	2.21
Korea	3.54	2.66	2.68	3.75	1.66	4.29	5.32	4.88	4.21	4.02	2.86	2.63	2.37	2.62
Luxembourg	1.89	2.33	2.64	1.26	1.97	0.72	1.11	0.36	0.66	0.97	0.71	1.06	0.77	0.85
Mexico	3.54	3.24	2.99	3.36	2.52	3.60	3.95	4.21	4.62	2.51	2.14	2.69	2.31	2.38
Netherlands	1.97	2.30	1.88	7.19	3.88	6.60	11.08	3.78	3.16	1.79	1.75	1.67	1.10	1.51
New Zealand	4.12	5.05	2.67	2.78	2.74	2.69	2.91	3.53	2.66	3.21	2.05	1.81	1.98	1.94
Norway	1.92	1.98	1.21	1.46	1.56	1.26	1.55	1.86	1.92	2.05	1.34	2.23	2.06	1.88
Poland	3.39	3.43	3.77	3.56	2.86	3.28	4.55	5.99	4.98	6.27	3.45	3.29	2.82	3.19
Portugal	3.56	4.65	3.97	3.82	3.80	3.87	3.79	3.77	4.02	2.96	1.86	2.13	2.29	2.09
Slovak Republic	..	..	5.48	8.99	5.30	4.28	17.39	25.83	23.35	9.58	4.19	4.19	3.62	4.00
Spain	4.23	3.34	2.64	2.87	2.12	2.14	4.34	6.26	4.63	2.90	2.13	1.98	1.75	1.95
Sweden	2.27	2.76	3.28	2.93	3.61	2.84	2.34	3.85	4.48	3.53	2.99	2.80	1.94	2.58
Switzerland	2.98	3.23	2.89	2.81	2.88	2.12	3.43	4.00	2.96	2.78	2.37	2.19	2.05	2.20
Turkey	1.99	1.94	1.27	6.34	1.09	8.55	9.37	8.01	11.19	7.08	5.94	0.69	1.95	2.86
United Kingdom	2.59	2.19	2.67	4.40	4.55	3.57	5.08	5.77	5.90	3.93	3.73	3.38	3.54	3.55
United States	2.41	2.54	2.89	4.10	3.71	3.91	4.67	5.83	5.47	3.26	2.67	2.40	2.41	2.49
OECD	2.51	2.54	2.61	3.43	3.11	3.30	3.89	4.43	4.17	2.88	2.42	2.25	2.24	2.30

Note: Calculations include unofficial estimates derived for Table 4.12.

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Table 4.16. **Public telecommunication investment per total communication access path**

USD millions

	Average 1988-90	Average 1991-93	Average 1994-96	Average 1997-99	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	Average 2003-2005
Australia	294.8	248.8	328.4	253.1	280.5	227.1	251.6	206.6	153.1	111.2	160.9	146.5	142.1	149.8
Austria	310.4	377.6	343.3	251.9	210.5	288.8	256.5	272.0	159.8	87.2	37.9	36.6	40.6	38.4
Belgium	164.3	183.1	196.8	106.1	119.7	103.2	95.3	92.9	47.6	56.9	63.5	67.5	76.0	69.0
Canada	238.6	206.1	159.4	168.6	182.3	175.0	148.4	166.6	154.9	119.0	83.4	107.8	108.9	100.0
Czech Republic	25.2	123.4	333.2	256.9	374.4	247.7	148.5	57.1	56.4	37.9	97.2	36.5	35.7	56.5
Denmark	171.9	143.4	189.4	190.7	193.1	209.8	169.3	168.0	179.5	121.3	100.9	106.1	119.9	109.0
Finland	260.2	186.1	221.1	120.1	166.6	102.6	91.0	92.3	89.7	61.3	61.8	61.9	85.9	69.9
France	168.6	199.9	187.3	146.2	169.6	145.6	123.4	121.0	122.6	77.6	82.5	85.3	91.4	86.4
Germany	312.2	438.3	298.6	173.7	243.5	147.2	130.5	103.1	105.1	65.7	56.8	58.5	63.4	59.6
Greece	76.8	180.4	145.7	161.1	132.3	204.3	146.7	115.1	111.3	85.6	79.0	81.2	44.8	68.3
Hungary	233.8	349.5	337.7	166.3	198.0	146.1	154.9	123.0	88.9	69.5	54.8	53.2	59.3	55.8
Iceland	96.6	166.5	198.5	164.0	129.1	195.7	167.3	183.7	92.3	54.8	92.8	162.6	170.1	141.8
Ireland	191.4	182.2	197.8	191.3	229.6	203.3	141.0	192.4	99.8	120.3	111.8	114.2	111.0	112.4
Italy	346.8	366.0	202.7	137.2	150.1	131.2	130.5	97.5	94.5	113.5	104.4	94.5	84.0	94.3
Japan	294.8	350.9	530.4	290.1	324.6	264.0	281.6	282.2	172.1	128.8	127.9	138.6	141.9	136.2
Korea	194.5	202.8	244.8	130.9	109.8	129.3	153.6	146.1	99.9	98.5	80.6	78.2	79.1	79.3
Luxembourg	222.5	353.6	409.7	151.5	240.6	85.0	129.0	27.5	44.2	67.3	54.7	77.6	54.2	62.2
Mexico	289.7	325.6	213.8	211.1	179.2	238.3	215.9	197.8	161.5	76.1	55.2	62.8	49.8	55.9
Netherlands	170.7	212.4	185.0	507.0	302.7	530.9	687.6	162.0	132.9	75.2	80.3	73.0	50.9	68.0
New Zealand	254.5	242.8	205.2	121.1	157.8	98.8	106.8	96.1	68.6	93.7	77.4	75.8	81.9	78.4
Norway	241.1	213.1	145.1	113.6	130.2	104.9	105.7	102.2	99.7	112.8	79.3	139.6	149.7	122.9
Poland	44.8	123.1	155.6	130.2	120.9	131.1	138.5	137.6	88.6	89.9	46.2	41.9	37.6	41.9
Portugal	267.6	325.2	257.7	173.0	200.5	174.5	144.0	109.6	104.0	75.9	45.6	56.7	56.4	52.9
Slovak Republic	..	71.8	256.0	288.3	241.2	170.8	452.8	454.4	379.4	148.2	69.3	76.2	82.5	76.0
Spain	383.1	309.4	212.5	153.5	130.0	125.5	205.0	223.9	153.8	93.8	87.3	97.3	88.4	91.0
Sweden	188.7	196.3	197.6	118.6	151.8	113.7	90.2	130.5	126.9	99.0	94.7	101.8	73.7	90.1
Switzerland	421.7	425.0	389.3	268.2	307.3	215.3	282.1	254.9	172.6	162.0	144.2	144.5	129.4	139.4
Turkey	92.9	79.1	35.8	128.1	31.9	206.4	146.1	105.8	79.0	51.1	47.0	6.8	21.7	25.1
United Kingdom	195.4	141.7	166.5	231.0	260.4	202.2	230.3	209.9	183.8	125.1	127.6	125.6	127.2	126.8
United States	178.8	182.2	238.3	322.6	293.4	308.4	365.9	441.6	390.8	210.9	172.9	155.7	156.9	161.8
OECD	227.8	246.2	261.7	235.7	239.3	225.1	242.7	239.1	193.9	124.4	109.6	105.3	104.4	106.4

Notes: Calculations include unofficial estimates derived for Table 4.12. Total communication access paths = analogue lines + ISDN lines + DSL + cable modem + mobile subscribers.

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Table 4.17. **Public telecommunication investment per capita**

USD

	Average 1988-90	Average 1991-93	Average 1994-96	Average 1997-99	1997	1998	1999	2000	2001	2002	2003	2004	2005	Average 2003-2005
Australia	135.97	121.83	168.73	205.76	215.45	184.09	217.74	199.38	170.69	134.11	208.52	205.80	216.85	210.39
Austria	126.24	165.56	159.44	194.63	125.02	208.38	250.48	326.91	201.44	111.91	50.66	53.28	61.82	55.25
Belgium	61.80	77.57	91.39	69.74	70.66	65.65	72.93	92.93	57.52	72.98	85.83	96.58	113.34	98.58
Canada	127.61	118.17	95.76	137.56	139.80	144.47	128.41	161.07	165.63	132.41	97.47	132.52	140.65	123.55
Czech Republic	3.79	21.86	79.21	111.35	137.90	113.08	83.08	45.89	58.62	44.63	124.16	50.15	52.61	75.64
Denmark	95.44	83.36	116.96	185.57	168.34	203.15	185.22	209.01	247.16	180.40	157.85	176.80	209.88	181.51
Finland	134.87	101.14	123.83	129.56	162.44	115.49	110.76	121.48	126.73	91.24	94.51	97.80	144.57	112.30
France	80.61	106.25	106.76	104.67	107.36	102.48	104.19	118.48	134.13	87.38	98.64	108.85	125.04	110.84
Germany	148.79	196.16	155.73	114.53	144.99	97.53	101.09	110.51	124.70	81.21	74.89	85.30	98.98	86.39
Greece	28.95	78.42	71.89	116.64	78.20	143.21	128.51	123.27	140.08	117.46	114.57	122.77	73.17	103.50
Hungary	20.75	44.21	73.70	72.66	74.24	64.47	79.29	80.34	73.66	70.16	61.66	64.61	76.13	67.47
Iceland	47.13	89.15	112.46	165.32	105.32	189.41	201.23	246.97	130.72	84.42	151.61	273.24	305.33	243.39
Ireland	49.47	57.01	72.16	129.12	126.12	138.68	122.55	185.18	114.53	146.57	144.14	157.34	164.91	155.46
Italy	128.67	152.72	89.28	109.55	97.65	104.71	126.28	114.60	126.51	156.34	153.84	150.34	147.09	150.42
Japan	125.07	163.49	263.89	251.71	260.41	229.70	265.00	287.91	188.10	151.10	159.90	181.52	191.35	177.59
Korea	60.93	72.40	102.35	104.81	66.34	97.11	150.98	165.21	126.50	134.32	108.79	110.00	113.13	110.64
Luxembourg	103.11	182.69	234.21	128.45	187.09	71.26	126.98	34.63	68.56	109.94	97.38	160.12	122.23	126.58
Mexico	17.00	26.07	20.63	31.82	20.98	33.03	41.44	52.98	57.48	30.87	25.16	34.76	32.59	30.84
Netherlands	77.01	103.58	97.75	414.83	209.79	375.72	658.98	199.37	166.51	96.87	112.27	118.57	82.13	104.32
New Zealand	108.63	104.52	92.99	90.92	102.76	78.13	91.86	98.21	74.37	104.52	93.65	102.81	125.47	107.31
Norway	118.26	112.68	82.87	117.16	122.72	107.59	121.17	128.59	132.31	155.82	114.76	223.09	247.11	194.99
Poland	3.68	12.75	23.21	36.50	26.03	35.29	48.16	63.62	51.38	60.84	35.70	39.07	40.32	38.36
Portugal	56.71	98.85	95.17	116.03	106.79	120.04	121.25	112.04	119.36	91.29	61.82	79.77	86.38	75.99
Slovak Republic	..	7.73	53.62	109.83	71.33	63.54	194.63	251.70	260.14	119.22	64.19	78.90	85.49	76.19
Spain	116.46	109.34	82.09	101.99	67.05	74.31	164.61	232.11	179.60	126.87	121.50	134.92	133.58	130.00
Sweden	127.06	134.34	135.72	134.69	158.68	130.96	114.42	184.49	192.66	159.43	162.08	175.35	130.93	156.12
Switzerland	239.14	259.96	249.97	230.93	230.18	178.82	283.80	311.39	225.49	225.18	213.33	222.88	213.84	216.68
Turkey	9.97	13.48	8.12	44.71	8.85	66.57	58.70	52.48	42.98	31.00	31.17	..	19.28	16.81
United Kingdom	84.21	64.45	83.38	180.93	170.99	153.69	218.11	239.81	239.53	171.69	183.58	199.94	219.29	200.93
United States	94.57	102.05	143.50	248.87	208.69	235.66	302.27	401.17	370.07	211.62	179.18	175.34	192.73	182.42
OECD	86.76	102.21	119.21	159.02	141.93	149.06	186.06	215.08	192.26	131.69	122.51	127.37	136.35	128.74

Note: Calculations include unofficial estimates derived for Table 4.12.

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Chapter 5

Broadband and Internet Infrastructure

The number of Internet users and subscribers in OECD countries continues to grow rapidly. At the end of 2005, there were 265 million active subscribers to fixed Internet connections and, of these, 60% were using broadband access. Broadband subscriptions have increased by more than 60% a year over the last five years. This chapter studies the growth of the Internet with particular attention to broadband. Other key topics include the number of Internet hosts and the rise in "bot infections". The chapter also includes data and analysis of domain name registrations, the growth in autonomous systems, the move from IPv4 to IPv6 and peering arrangements.

Introduction

Internet use continues to grow and the number of subscribers using broadband access technologies has increased rapidly. At the end of 2005, there were around 265 million active subscribers to fixed Internet connections in OECD countries. Of these, 60% were using broadband access, and broadband subscriptions have increased by more than 60% a year over the last five years. By mid-2006, there were more than 178 million broadband subscribers in the OECD area. European countries have continued to advance, with Denmark, the Netherlands and Iceland overtaking Korea and Canada in terms of broadband penetration rates over the past year. The expansion of broadband access is supporting new technologies and applications, such as Voice over Internet Protocol (VoIP); the number of registered Skype users reported at the end of 2005 was equivalent to around 50% of worldwide broadband subscribers. Mobile Internet access is also growing; an estimated 53% of cellular mobile phone subscribers worldwide have handsets capable of accessing data services, although only 56% are reported to be regular users of Internet services such as web browsing and e-mail. Nevertheless, carriers report rapid growth in mobile data service revenues.

The supporting Internet infrastructure enables and reflects this growth. Almost 400 million hosts were connected to the Internet in January 2006, an increase of more than 77 million over the previous year. Domain name registrations experienced similar growth, while security concerns and the maturity of e-commerce led the number of secure servers worldwide to increase by around 50% a year to more than 515 000 by mid-2006. The Internet is a network of networks, or autonomous systems. At the end of 2005, 20 451 autonomous systems were visible in Internet routing tables, 78% of them in OECD countries. There were 1.7 billion routed IPv4 addresses visible, with an average of 1.24 addresses per inhabitant in OECD countries. Nine countries had more than one IPv4 address per inhabitant, led by the United States with 3.14 per inhabitant. A steady fall in the average number of IPv4 addresses being advertised per autonomous system suggests an increasingly competitive environment. The largest networks play a central role in Internet traffic exchange, passing traffic to each other on the basis of peering agreements. The fact that no one network accounts for more than 5% of all peerings, and that the top ten networks account for a declining 13%, also suggests an increasingly competitive environment.

Internet subscribers

Because of the widespread interest in the take-up and use of the Internet, the number of people accessing the Internet is a key indicator. Unfortunately, there is no single measure of adoption. Some national statistical agencies report number of "users" based on business and household surveys of Internet access, while many organisations report the number of "users" or "households" on line. From an international perspective, the major drawback is the lack of a common definition of terms like "user", and limited information

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about regularity or intensity of use. An alternative approach is to compile information on Internet subscribers by country from major telecommunication and cable carriers' reports of numbers of subscribers to their Internet services and their estimated market shares. The advantage is that the term "subscriber" has a more specific meaning for most carriers, namely, the number of active registered Internet accounts. The definition of "active" varies a little from country to country (*e.g.* from accessing an account every 45 days to every six months). Nevertheless, these data provide the best internationally comparable source of information on the take-up of Internet services.

A number of factors affect subscriber numbers, including the declining business model that encouraged the registration of "free" Internet accounts and the recent rapid adoption of mobile Internet access. In countries where Internet access is based on monthly subscriptions, accounts are often shared by a number of users, while in those with "free" dial-up Internet access, fees for access are typically billed via the telecommunication operator and then shared with the ISP, which encourages users to have multiple individual accounts. Mobile access provides a different Internet experience, with major differences in price and practical limitations on capabilities, with the result that a mobile Internet subscriber is not equivalent to a fixed line dial-up or broadband Internet subscriber. For that reason they are treated separately, with a discussion of active subscribers to fixed Internet services followed by a brief discussion of mobile Internet subscribers and mobile data revenues.

Fixed Internet subscribers

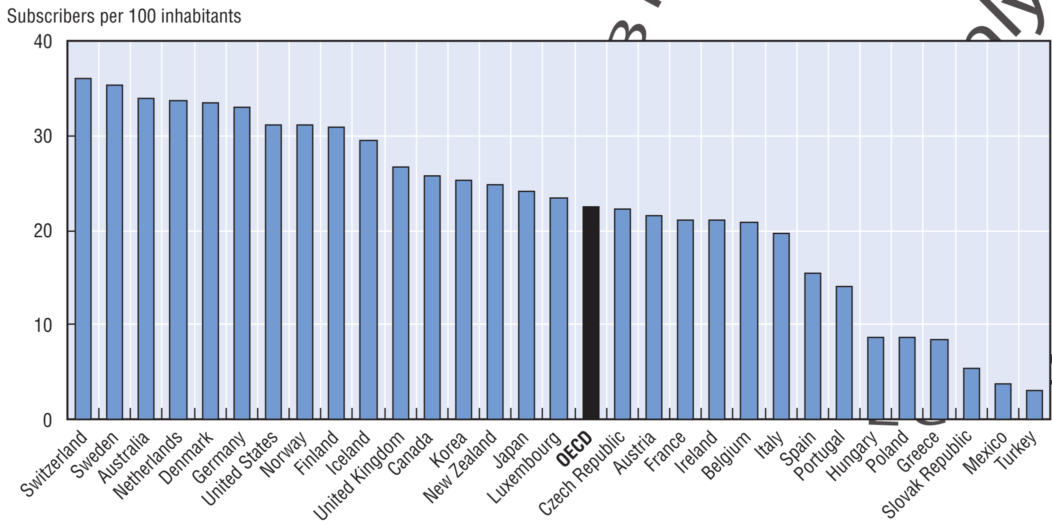
At the end of 2005, there were around 263 million active Internet subscribers with fixed Internet connections in OECD countries, up from around 158 million in 2000 or by more than 10% a year (Table 5.1). More than 92 million of all OECD fixed Internet subscribers were in the United States (35%), Japan (31 million), Germany (27 million), the United Kingdom (16 million), France (13 million) and Korea (12 million) were also among the countries with the largest fixed Internet subscriber populations. Recent growth in the number of fixed Internet subscribers varies considerably from country to country, with Turkey, Iceland, the Czech Republic, Portugal and Luxembourg experiencing strong growth, while Denmark, the Netherlands, the United Kingdom, the United States, France and Sweden experiencing slower growth.

Growth in fixed Internet penetration across OECD countries is reflected in the overall increase in subscribers from 14 per 100 inhabitants in 2000 to 24 per 100 in 2005. The highest penetration is in Switzerland, Sweden, Australia, the Netherlands, Denmark, Germany, the United States, Norway and Finland, all of which have more than 30 subscribers per 100 inhabitants (Figure 5.1). Relatively lower penetration levels are evident in Turkey, Mexico, the Slovak Republic, Greece, Poland and Hungary, all of which had fewer than ten subscribers per 100 inhabitants. Hence, despite some evidence of slowing subscriber growth in countries that were early adopters significant differences in Internet connectivity remain.

Dial-up access

Dial-up subscribers accounted for 91% of all fixed line Internet subscribers in 2000. By the end of 2005, they accounted for 40%, with the actual number of dial-up subscribers declining since 2003-04. At the end of 2005, dial-up subscribers accounted for a very small share of fixed Internet subscriptions in Korea, compared with more than 70% in Greece, the Czech Republic and Poland. Other countries with a relatively high share of dial-up access

Figure 5.1. **Fixed Internet subscribers per 100 inhabitants, December 2005**



Note: Excludes mobile phone access to the Internet.

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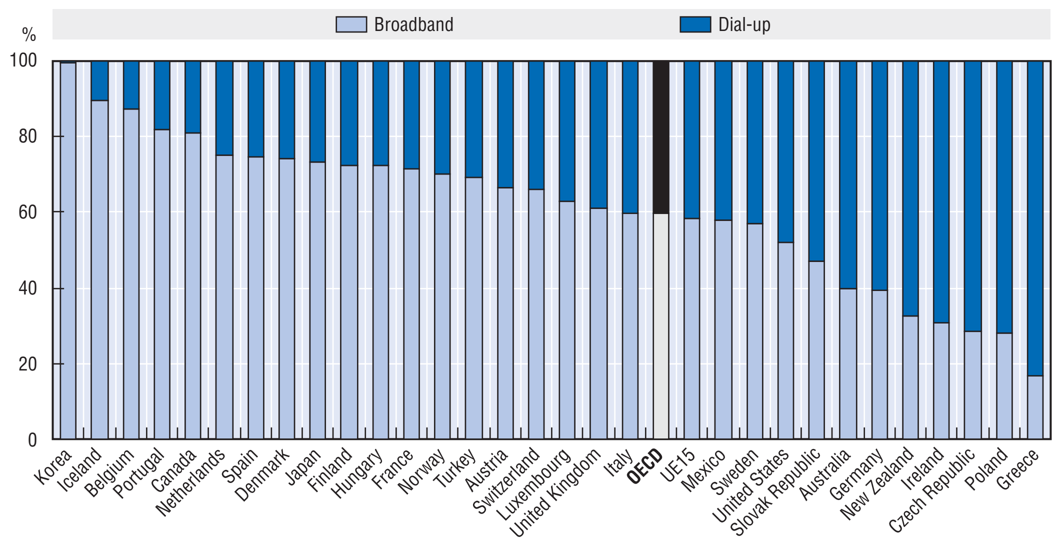
included Ireland, Germany, Australia, New Zealand and the Slovak Republic. In addition to Korea, dial-up access accounted for less than 25% of total fixed Internet subscribers in Iceland, Belgium, Canada, Portugal, Japan and Denmark (Figure 5.2).

Figure 5.2. **Dial-up and broadband shares of total fixed Internet subscribers, December 2005**



Note: Excludes mobile phone access to the Internet.

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Broadband access

The quality of the Internet experience for entertainment, business and e-commerce depends upon bandwidth and ready availability. By the end of 2005, there were almost 160 million broadband Internet subscribers in OECD countries, up from fewer than

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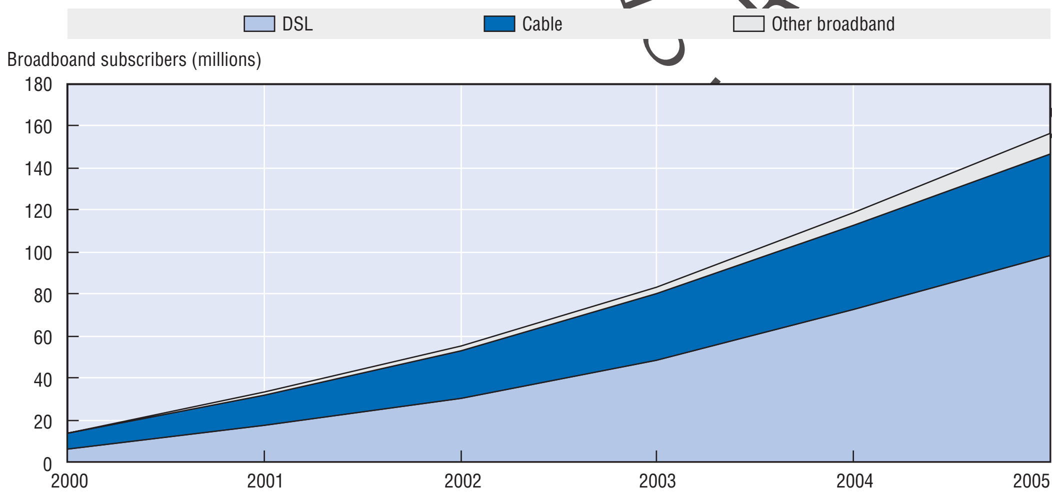
14 million at the end of 2000, or by more than 60% a year (Figure 5.3). Over the five years, the number of broadband subscribers using DSL connection increased from fewer than 6 million to 98 million (by 75% a year) and the number using cable connections increased from 7.6 million to nearly 49 million (by 45% a year). Hence, the share of DSL subscriptions increased from 43% of all broadband connections in 2000 to more than 63% by the end of 2005, with DSL subscriptions surpassing cable in 2001 (Table 5.2).

Figure 5.3. **Broadband subscribers in OECD countries, 2000-05**



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At the end of 2005, 31% of all broadband subscribers in the OECD area were in the United States (49 million). Japan, Korea and Germany were the other large broadband markets, with 23 million, 12 million and 11 million broadband subscribers, respectively. Between 2003 and 2005, Greece, the Czech Republic, the Slovak Republic and Mexico experienced the most rapid growth in broadband subscriptions (from a relatively low base), while Korea, Canada, Iceland, Belgium and Denmark had the lowest growth (from a relatively high base), an indication that the later adopters may be catching up with earlier adopters.

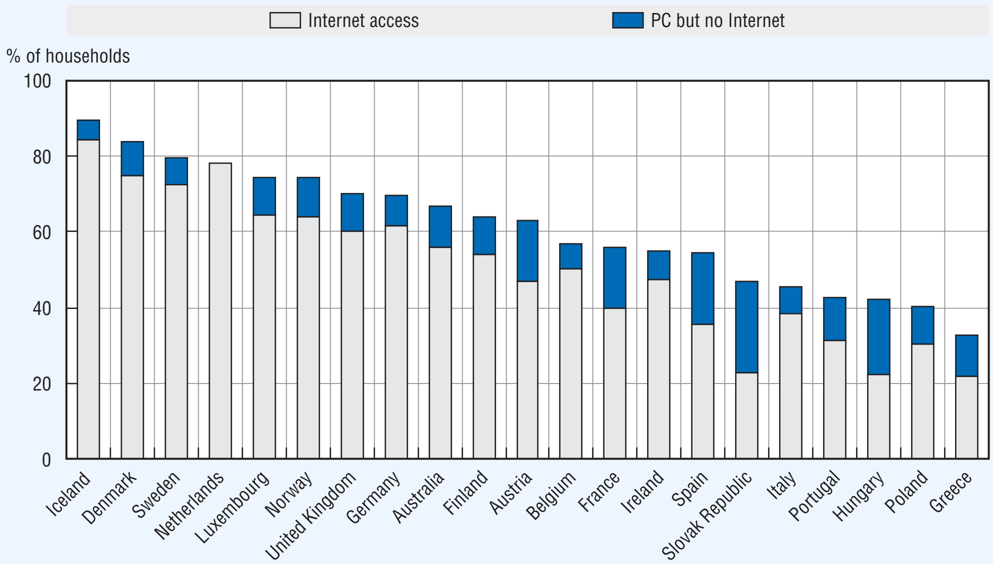
On a per capita basis, Iceland surpassed Korea as the leader in broadband development in late 2005, with more than 26 broadband subscribers per 100 inhabitants at year's end. A further seven OECD countries had at least 20 broadband subscribers per 100 inhabitants: The Netherlands (25), Denmark (25), Switzerland (24), Finland (22), Norway (22), Canada (21) and Sweden (20). There were fewer than three broadband subscribers per 100 inhabitants in Greece, Turkey, Mexico, Poland and the Slovak Republic. Clearly, while there is some evidence of catch-up, significant differences in access remain.

Iceland led the development of DSL access, with nearly 26 DSL subscribers per 100 inhabitants at the end of 2005. Finland, Norway, the Netherlands, Switzerland and Denmark also had more than 15 DSL subscribers per 100 inhabitants, and 17 OECD countries had more than ten DSL subscribers per 100 inhabitants. However, Greece, Mexico, Poland, the Slovak Republic and Turkey all had fewer than three DSL subscribers per 100 inhabitants. Canada, the Netherlands, the United States, Denmark, Korea and Switzerland were the leaders in cable access at the end of 2005, with between 9 and 12 cable subscribers per 100 inhabitants. Twenty countries (including Italy and Greece) fell below the OECD average of 4.2 cable subscribers per 100 inhabitants.

Box 5.1. **Household PC and Internet penetration**

Penetration of personal computers is one factor affecting Internet penetration rates. Evidence suggests a strong correlation, with household Internet access following acquisition of a computer.

Figure 5.4. **Household penetration of PCs and Internet, 2005**



Note: Household penetration rates at 2005 or most recent year. Excludes countries for which data are incomplete.

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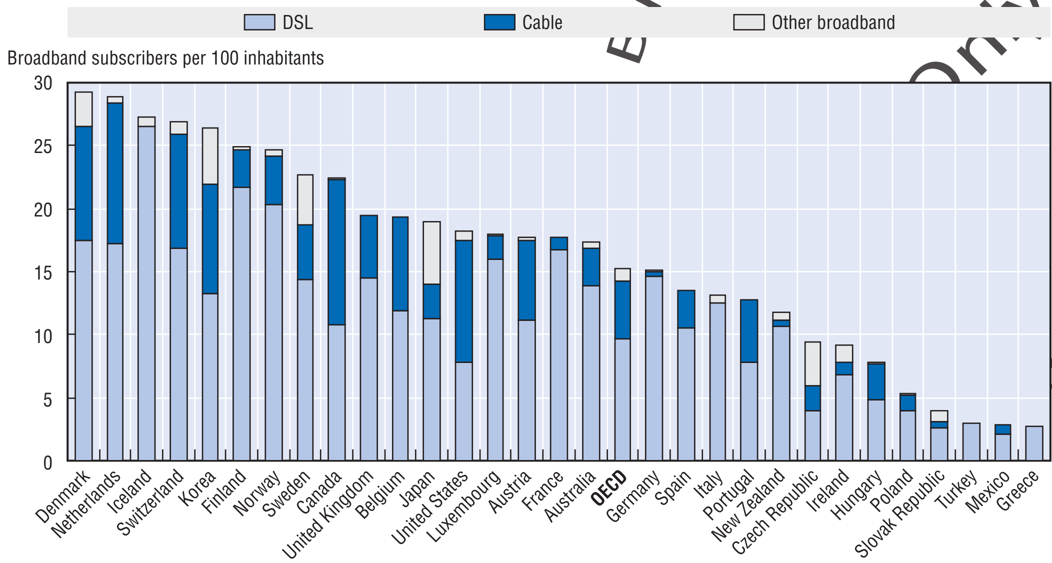
So rapid is the development of broadband in OECD countries that more than 21 million subscribers were added during the first half of 2006. By the end of June 2006, there were more than 178 million broadband subscribers in the OECD area, of which 53 million in the United States and 24 million in Japan (Table 5.3). On a per capita basis, there are now 15.3 broadband subscribers per 100 inhabitants in OECD countries. European countries have continued to advance, with Denmark, the Netherlands, Iceland and Switzerland overtaking Korea and Canada in terms of broadband penetration rates over the past year. By mid-2006, Denmark, the Netherlands, Iceland, Korea, Switzerland and Finland each had 25 or more subscribers per 100 inhabitants (Figure 5.5). The strongest per capita broadband subscriber growth has been in Denmark, Australia, Norway, Switzerland, the Netherlands, Finland, Luxembourg and the United Kingdom, each of which added more than six subscribers per 100 inhabitants over the preceding year.

Fibre to the home is becoming increasingly important for broadband access, particularly in countries with high broadband penetration. In Denmark, power companies are rolling out fibre to consumers as they work to bury overhead power lines. Municipal broadband projects are also expanding in many northern European countries and throughout the OECD. Telecommunication operators in several OECD countries have also begun or announced large fibre-to-the-premises (FTTP) rollouts. Japan leads the OECD in FTTP with 6.3 million fibre subscribers in June 2006. Nevertheless, DSL continues to be the

Figure 5.5. **Broadband access per 100 inhabitants, June 2006**



Notes: Data for Mexico and Sweden are estimates.

The OECD statistics for the "Other Broadband" category of the Czech Republic include a large number of fixed wireless broadband connections provided over mobile networks. Broadband subscriptions over 3G-type networks are not included for other countries but are for the Czech Republic because the connections make use of fixed equipment in a home and offer speeds greater than 256 kbit/s to individual users

StatLink http://dx.doi.org/10.1787/001432828005

leading platform in 28 OECD countries, while cable modem subscribers outnumber DSL subscribers in Canada and the United States. Overall, DSL accounted for 63% of broadband connections in OECD countries in mid-2006, cable modem for 30% and other technologies (*e.g.* satellite, fibre and fixed wireless) for just 7%.

Fixed subscriptions by technology

Differences in broadband access opportunities and the continuing importance of dial-up Internet access in some countries are apparent when fixed Internet subscribers per 100 inhabitants are presented by access technology (Figure 5.7). Some countries have a high percentage of total Internet subscribers using dial-up connections (Australia, the Czech Republic, Germany, New Zealand, Poland and Greece), while dial-up subscribers are a small minority in others (Belgium, Canada, Iceland and Korea). Among other factors, this may reflect consumer behaviour in response to price difference (*e.g.* the consolidation of multiple "free" dial-up subscriptions into single household broadband accounts) and technological change (*e.g.* household adoption of wired and wireless networking, allowing shared access).

Mobile Internet access

Mobile Internet access involves access via mobile phone-based technologies, which provide a more limited, slower speed access than fixed lines. It excludes wireless access from computers (*e.g.* Wi-Fi). Third-generation (3G) mobile subscriber numbers are presented in Chapter 4 (see Figure 4.8).

Box 5.2. **Voice over Internet Protocol (VoIP)**

Voice over Internet protocol (VoIP) has emerged in a variety of forms, all of which are experiencing rapid growth. From an industry supply side perspective five key groups provide VoIP services, although borders between providers are not always clear. They include:

- Independent specialist suppliers of VoIP software and services, whether primarily PC-based (*e.g.* Skype) or phone-based (*e.g.* Vonage).
- Internet services providers (ISPs), which are increasingly offering VoIP in conjunction with their broadband access plans for business and residential customers.
- Cable operators, which are also adding VoIP to their cable television and broadband plans.
- Telecommunications services providers, which are responding by enhancing their business IP telephony offerings and bundling VoIP with their broadband plans for small business and residential customers.
- Equipment manufacturers, which are developing the equipment to support the various forms IP telephony, such as specialist headsets or handsets for particular systems, telephony-enabled routers or premise-based equipment such as IP-PBX.

Regulators, observing VoIP products from a variety of different providers, are torn between the traditional regulated framework of telephony and the more open framework of the Internet. Issues range from the geographic or non-geographic allocation of VoIP numbers and number-IP linking (*e.g.* ENUM) to service obligations relating to emergency calls.

The players

Among the independent suppliers, Skype and Vonage have proved popular. Operating primarily in North America, Vonage reported 1 853 253 subscriber lines by mid-2006, up from fewer than 400 000 at the end of 2004 with subscribers more than tripling in 2005. Vonage's revenue exceeded USD 260 million in the first half of 2006, following annual revenues of USD 269 million in 2005 and USD 80 million in 2004. Skype, which was acquired by eBay in October 2005, reported 113 million registered users by mid-2006, up from just 4 million in early 2004, the equivalent of an increase of 380% a year. Skype served 6.9 billion minutes of traffic in the first quarter of 2006 and 7.1 billion in the second quarter, which it claims is the equivalent of more than 7% of international long distance minutes (eBay, 2006). Skype has already achieved considerable penetration of the potential subscriber market in some OECD countries – with 3 million subscribers in the United Kingdom which has around 11 million broadband subscribers (26% penetration), 5 million in Germany which has 12 million broadband subscribers (40%), 700 000 in Finland which has around 1.3 million broadband subscribers (53%), and 6 million in the United States which has 56 million broadband subscribers (Figure 5.6). Worldwide, Skype's 113 million registered users compare with some 225 million broadband subscribers.

Many Internet services providers (ISPs) now offer VoIP services. In Europe, the number of voice over broadband (VoB) connections increased from an estimated 2.5 million to 6.2 million in 2005. Tiscali, which bundles VoIP with ADSL, reported more than 100 000 VoIP users at the end of March 2006, with around 43 000 in the Netherlands, 40 000 in Italy and 20 000 in Germany. In Australia, ISPs accounted for an estimated 28% of VoIP service providers in mid-2006, with around 250 offering wholesale or retail voice services (Hartstein, 2006). Cable operators are also expanding VoIP services.

In North America, Cablevision is among the leaders of cable providers offering VoIP services and had 4 million VoIP subscribers in mid-2006. Time Warner Cable reported 1.1 million Digital Phone subscribers at the end of 2005, having added 880 000 subscribers during the year. Rogers Communications reported more than 164 700 residential voice-over-cable telephony subscriber lines, with 68 000 net additions during the quarter. In the United Kingdom, NTL reported that their "Triple Play" was a major source of growth, accounting for 35% of subscribers. Telecommunications services providers are now responding with VoIP products for household and small business customers in addition to their existing business network solutions. In Europe, France Telecom surpassed 1 million VoIP subscribers in early 2006. BT is also building a VoIP subscriber base, while KPN reported 156 000 VoIP package subscribers with a take-up rate of 17% of broadband subscribers in the consumer market alone. In North America, Verizon and AT&T each had around 160 000 VoIP subscribers by mid-2006.

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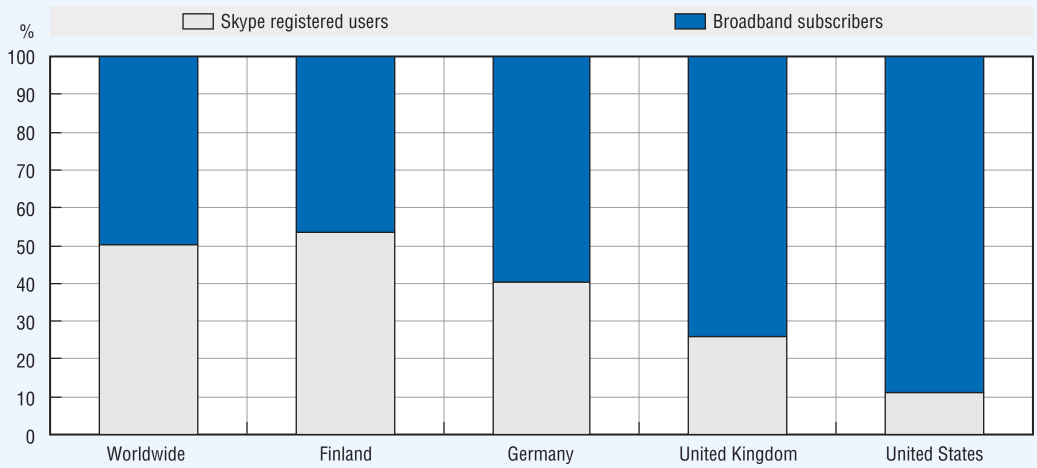
Box 5.2. **Voice over Internet Protocol (VoIP)** *(cont.)*

Figure 5.6. **Skype's registered users as a share of broadband subscribers, June 2006**



Source: OECD, based on eBay financial reporting.

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Equipment manufacturers are supporting these developments, and there have been a number of announcements of initiatives extending the basic equipment offerings available. Skype noted the availability of more than 400 hardware devices for use with Skype software, and partnerships with such companies as Linksys, Intel and Motorola. Vonage and D-Link have combined to offer a wireless broadband router with two phone ports bundled with Vonage's VoIP service; and Cisco has entered into a partnership with Nokia to build dual-mode VoIP and cellular handsets and with Intel to create VoIP-enabled notebook PCs. The former is an example of what some see as the biggest opportunity, making VoIP mobile and bringing it to the familiar cellular mobile handset.

The market

VoIP has become an essential part of the so-called "triple play" of voice, data and video, with competition driving all parties to add VoIP and video (*e.g.* Video on Demand or IP-TV) to their broadband services to attract and retain customers. As a result, VoIP has emerged from its role as an alternative system for large businesses to an increasingly viable alternative for some 225 million broadband subscribers worldwide, whether small businesses or households.

One estimate put the number of VoIP subscribers worldwide at more than 23 million at the end of 2005, up from 14 million or by 63% over the year (Point-Topic, 2006). Retail VoIP subscribers (*i.e.* those making phone-to-phone calls over IP networks) increased more quickly than subscribers to independent Internet or PC-based services (*e.g.* Skype); the former rose from 10.3 million to almost 19 million over the year (or by 81%), while the latter increased from 4 million to 4.7 million (by 17%). The strongest growth in 2005 occurred in the Americas, where retail subscriber numbers rose from 1.4 million to 4.7 million or by 230%. There was a 182% increase in retail VoIP subscribers in Europe during the year (from 1.9 million to 5.3 million), and a more modest 25% increase in the Asia-Pacific region (from 7 million to almost 9 million).

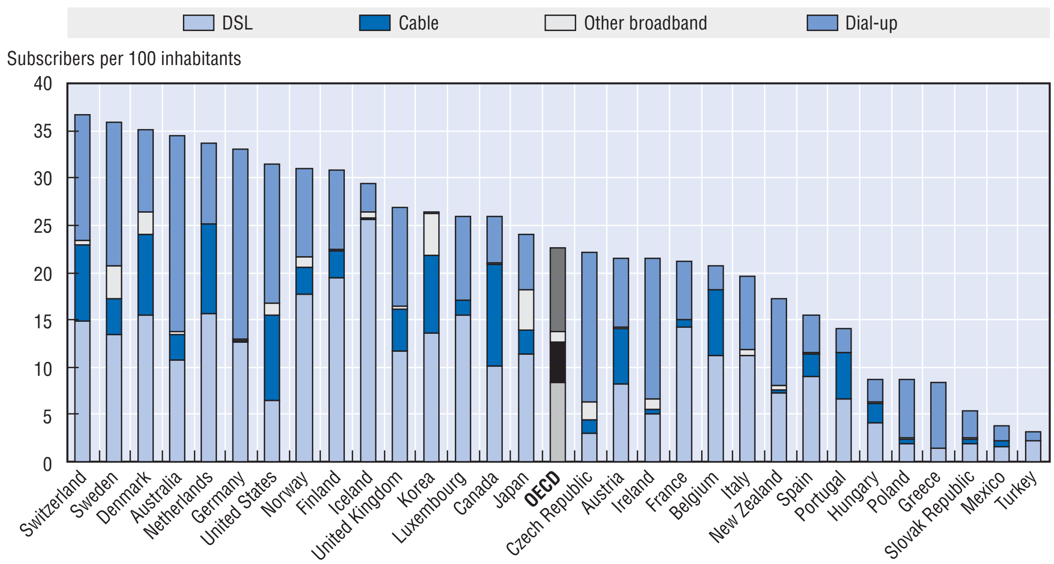
Japan, France and the United States had the largest VoIP subscriber base at the end of 2005, with Germany, the Netherlands and Norway emerging as major markets. Tiscali estimated a total of around 200 000 VoIP subscribers in the United Kingdom, 325 000 in Italy, 600 000 in the Netherlands and 2 million in Germany at the end of 2005. In North America, Vonage is a major provider, but cable companies are increasingly active. Time Warner alone added 900 000 VoIP subscribers during 2005, an average of more

Box 5.2. **Voice over Internet Protocol (VoIP)** *(cont.)*

than 17 000 a week. By mid-2006, there were an estimated 6.9 million VoIP subscribers in the United States alone. In Europe, France had an estimated 2.8 million retail VoIP subscribers at the end of 2005 (excluding Skype users), with France Telecom increasing its subscriber base from 144 000 to 830 000 during the year in response to the success of packages offered by its ISP competitors Free and Neuf. Slower growth in Asia is thought to reflect the relative saturation of the VoIP market in Japan, where Yahoo! Broadband reported more than 4 million VoIP subscribers as early as mid-2004. It may also reflect regulatory hurdles in China (Point-Topic, 2006).

In mid-2006, ISP-Planet ranked Skype (paid only VoIP), Vonage and Cox Digital Phone first on VoIP subscriber numbers, with 1.8 million subscribers each. They were followed by Time Warner Digital Phone with 1.6 million VoIP subscribers, CableVision 988 000, CallWave 780 000 and Comcast Digital Phone 729 000. A further four providers reported between 100 000 and 250 000 VoIP subscribers (ISP-Planet, 2006).

Figure 5.7. **Fixed Internet access per 100 inhabitants, December 2005**



Note: Excludes mobile phone access to the Internet.

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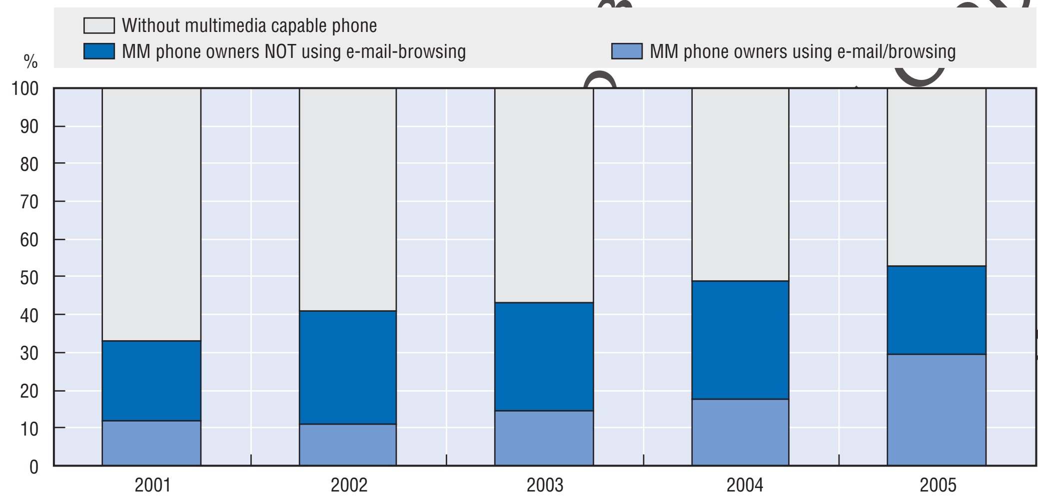
Mobile phone capability and use

In mid-2005, 53% of mobile phone subscribers surveyed worldwide (up from 33% in early 2002) reported having phones that could access data services, such as mobile e-mail and browsing (ATKearney, 2005). Japan had the highest level of access, with 83% of respondents reporting having Internet-capable phones, followed by 62% of respondents in Australia and New Zealand, 60% in Korea and China, 52% in western Europe, 48% in North America and 46% in Scandinavia. While it has often been noted that many subscribers do not use the full capabilities of their mobile phones, no fewer than 56% of multimedia phone owners worldwide reported that they had used e-mail and/or browsed their operator's portal at least once a month, as had 92% in Japan, 60% in North America, 45% in western Europe and 44% in Australia and New Zealand. All represented a significant increase over the previous year (Figure 5.8). The major reasons cited in the Kearney Survey for not using,

Figure 5.8. **Mobile phone capabilities and uses, 2001-05**

Percentage of mobile phone owners surveyed



Note: The 2005 survey covered 4 000 mobile phone users in Australia, Canada, the Czech Republic, Denmark, Finland, France, Germany, Italy, Japan, Korea, Mexico, New Zealand, Poland, Portugal, Spain, Sweden, the United Kingdom and the United States, as well as China, Brazil and Russia.

Source: OECD, compiled from Mobinet Index.

StatLink http://dx.doi.org/10.1787/001527636704

or not making greater use of, data services included cost and poor content, with 31% of data services users naming cost as the main barrier, compared with 27% of non-users; and 35% of non-users naming poor content as the main barrier, compared with 27% of users.

Mobile data revenue

One indicator of the adoption of mobile Internet services is the growth in mobile data revenue reported by carriers (see Chapter 3). Not all carriers report data and voice revenue separately, and many that do include SMS and MMS messaging revenue with mobile phone-based Internet revenue. Nevertheless, the limited mobile services revenue data available are indicative.

During the year to March 2005, mobile data accounted for more than 23% of the O2 Group's gross services revenue (USD 2.8 billion). In the United Kingdom, O2's data revenue reached USD 1.8 billion, up from USD 438 million in 2001, with data revenue accounting for 24% of the total; in Germany they reached USD 730 million and accounted for 22% of revenue; and in Ireland they reached USD 225 million and accounted for 21%. By mid-2006, non-SMS data accounted for 39% of Eurotel Czech Republic customer revenue, 22% of O2 Germany's, 16% of O2 Ireland's and 13% of O2 United Kingdom's.

Throughout its international operations, T-Mobile reported a 43% increase in revenue from new mobile data services (excluding text messaging) during 2005 to EUR 900 million. During the first half of 2006, non-voice revenues accounted for 18% of T-Mobile's services revenue in Germany, 11% in the United States, 18% in the United Kingdom, 12% in Austria, 16% in the Netherlands, 15% in Hungary, 14% in the Slovak Republic and 20% in the Czech Republic.

Similarly, Vodafone reported that during the year to the end of March 2006, messaging revenue amounted USD 6.5 billion and data revenue to USD 1.5 billion, with the latter increasing by more than 60%. In the United Kingdom, Vodafone earned around USD 1.7 billion from messaging and data services, the latter increasing 56% to

USD 400 million. In Germany, Vodafone's data services (excluding messaging) earned USD 462 million, up 57%. In Spain data revenues were up 62% to USD 191 million, and in Italy they were up 45% to USD 178 million. Elsewhere, Vodafone's data revenues increased by 77% during the year.

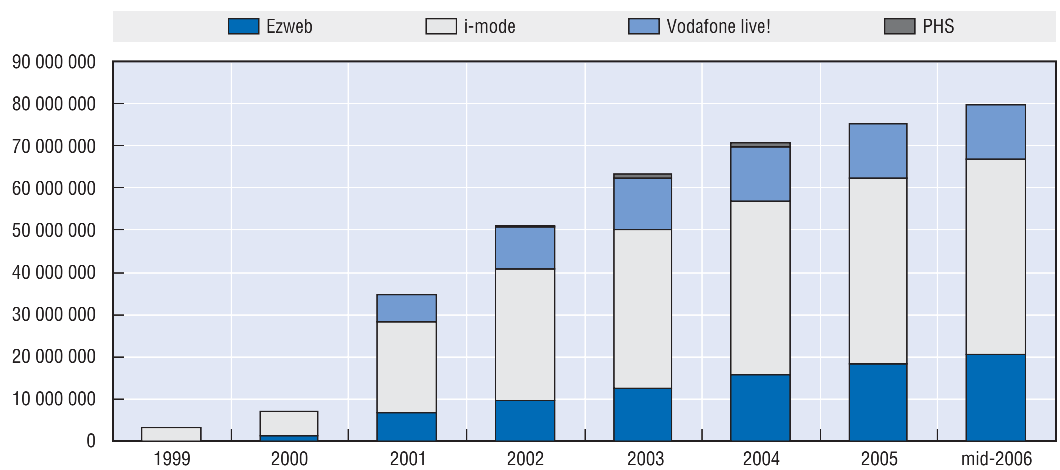
Box 5.3. **I-mode**

The i-mode service is one subset of mobile Internet access that provides access for i-mode capable handsets to specially designed e-mail and web content based on a cut-down version of HTML. NTT DoCoMo launched i-mode in Japan in 1999. In Europe, i-mode services were launched by E-Plus in Germany in March 2002, follow later in that year by KPN Mobile in the Netherlands, BASE in Belgium and Bouygues Telecom in France. Telefónica Móviles launched i-mode in Spain in June 2003, Wind of Italy in November 2003 and COSMOTE in Greece in June 2004 to coincide with the Olympic Games. During October and November 2004, Telstra launched i-mode services in Australia and O2 in the United Kingdom and Ireland. By early 2006, there were more than 50 million i-mode subscribers in OECD countries, of which more than 46 million in Japan (Table 5.4). Growth of i-mode subscribers has been rapid, rising from just 3.1 million at the end of 1999, or by 50% a year.

In Japan, where i-mode services are most developed, other modes of mobile Internet access are also popular. KDDI launched a rival EZweb service and J-Phone launched J-Sky (later acquired by Vodafone, re-launched as Vodafone Live! and now recently acquired by Softbank Mobile). From just 3 million in 1999, the number of Internet subscriptions from mobile phones in Japan increased to almost 80 million by mid-2006 (Table 5.5 and Figure 5.9).

Figure 5.9. **Mobile Internet services in Japan, 1999-2006**

Number of subscribers



Source: OECD, compiled from company reports.

StatLink http://dx.doi.org/10.1787/001543404250

In the United States, wireless services data revenues are reported to have exceeded USD 7 billion during the first half of 2006, with Cingular, Verizon, Sprint Nextel and T-Mobile accounting for more than USD 6.3 billion. Growth has been rapid. Verizon increased it wireless data revenue by more than 100% for the last year, Sprint Nextel by 71%, T-Mobile

65% and Cingular 54% (Sharma 2006). Verizon earned more than USD 1 billion in mobile data revenue in the second quarter of 2006 for the first time, with 28.9 million data customers and data accounting for 13% of service revenue. In Japan, data revenue accounted for 27% of KDDI mobile user revenues during the year to the end of March 2005. More than 95% of Korean cellular mobile phone subscribers have Internet access, and wireless Internet revenues accounted for 26% of total SK Telecom user revenues during the first half of 2006. Australia's Telstra reported mobile data revenue of USD 413 million for the year to the end of June 2006, up by more than 30% a year from just USD 72 million in 2000.

Internet hosts

The number of Internet hosts is a commonly used indicator of Internet development. A host is a domain name with an associated IP address and includes any computer or device connected to the Internet via a full- or part-time, direct or dial-up connection. In the past, a host was a single machine, but with the development of virtual hosting, where a single machine acts like multiple systems and has multiple domain names and IP addresses, hosts are no longer necessarily individual devices. Host devices are not always accessible to automated surveying techniques (*e.g.* because of security firewalls). With recent increased concern over security, it is likely that data will somewhat understate growth in the number of hosts over time as more firewalls are installed. Consequently, host counts tend to be on the low side and should be seen as an indicator of the minimum size of the Internet. Nevertheless, the number of hosts is indicative of the extent of hosting activities.

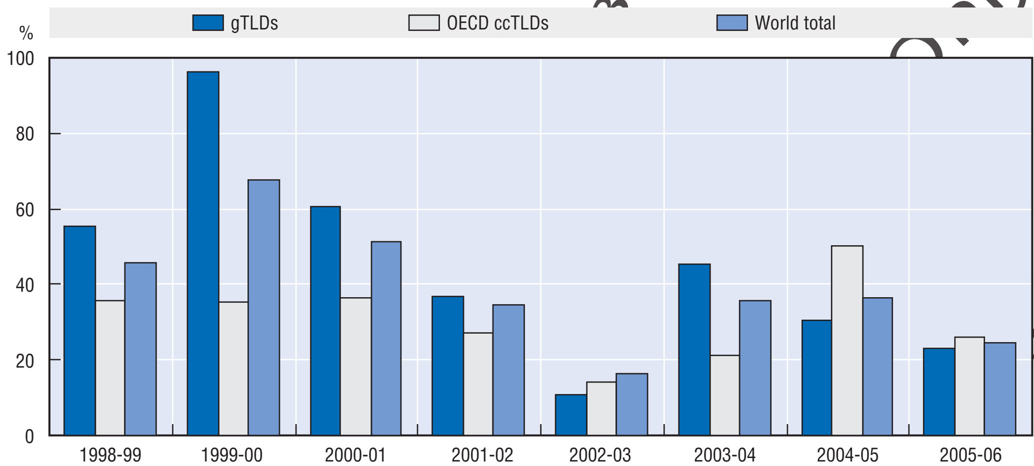
In January 2006, there were 395 million hosts connected to the Internet worldwide, up from fewer than 30 million in January 1998 (Table 5.6). The total number of hosts worldwide increased by 38% a year, with those under gTLDs increasing by 43% a year and those under OECD-related ccTLDs increasing by 30% a year. The visibility of hosts to ISC surveys may also have been affected by increased Internet security, and this may be one factor in generally slower growth and in slower growth under gTLDs than ccTLDs in recent years (Figure 5.10).

More than 240 million of the hosts found in January 2006 were under the major generic domains (gTLDs), of which more than 170 million under .net and 69 million under .com. There were 121 million hosts connected under OECD-related country code domains (ccTLDs). The largest OECD country code domain (ccTLD) at that time was .jp (Japan), with almost 25 million hosts. There were just 2.44 million hosts under the .us domain, but there were almost 15 million under the various United States-related domains (.us, .edu, .mil and .gov) combined. Other large ccTLDs included .it (Italy) with 11.2 million hosts, .de (Germany) with 9.9 million, .nl (Netherlands) 7.3 million, .fr (France) 6.9 million, .au (Australia) 6.0 million and .uk (United Kingdom) 5.8 million.

Among OECD-related ccTLDs, .mx (Mexico) has experienced the fastest growth, with hosts increasing by 67% a year since 1998. Other OECD-related ccTLDs experiencing strong growth in the number of hosts included .pl (Poland) at 63% a year, .it (Italy) at 61% a year, .pt (Portugal) at 56% a year, .tr (Turkey) at 54% a year, .be (Belgium) at 52% a year and .sk (Slovak Republic) at 51% a year. A wide range of growth rates is evident across both country-code and generic domains (Figure 5.11).

Figure 5.10. **Annual growth in Internet hosts, 1998-2006**

Percentages

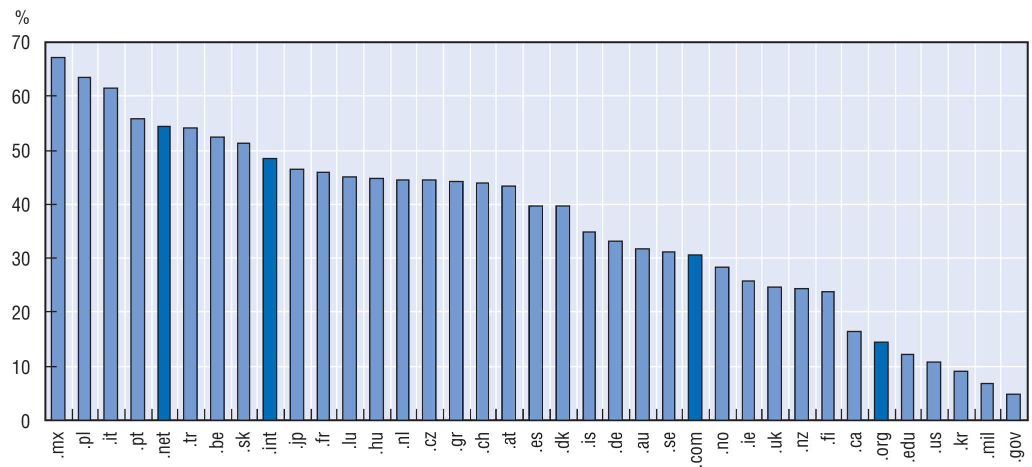


Source: OECD, based on Internet Software Consortium surveys (www.isc.org).

StatLink http://dx.doi.org/10.1787/001547626871

Figure 5.11. **Average annual growth in Internet hosts by domain, 1998-2006**

Percentages



Source: OECD, based on Internet Software Consortium surveys (www.isc.org).

StatLink http://dx.doi.org/10.1787/001562221710

Domain names

The Domain Name System (DNS) translates Internet addresses back and forth between domain names (the online equivalent of a business, brand or personal name) and IP numbers (the online equivalent of an address). Domain names enable users to find and refer to a person or organisation in a way that is easily recognisable and allow businesses to use recognised business and brand names in the online world. The registration of a domain name indicates interest in adopting a web presence, and is an important indicator of the development of the Internet.

By mid-2006, more than 100 million domain names were registered worldwide. While data are incomplete, it is evident that more than 67 million were registered under major gTLDs and more than 28 million under OECD-related country code top level domains (ccTLDs). Since

Box 5.4. **Infected machines and broadband connections**

As well as many benefits, broadband Internet access brings some dangers. Symantec tracks the presence of "bot"-infected computers (*i.e.* PCs with software maliciously installed to provide attackers with unauthorised control). "Bots" enable attackers to steal information and may be used for identity theft, the theft of confidential data, denial of service attacks and by the senders of SPAM e-mail to use the machine as a part of a "bot net". Because of the distributed nature of the "bots", the source of such attacks and the identity of the attacker are largely untraceable. "Bot nets" of up to 100 000 machines have been discovered.

At then end of 2005, Symantec identified around 772 000 distinct bots worldwide, of which almost 475 000 in OECD countries. In the six months to the end of 2005, China experienced the largest increase in "bot"-infected computers, with a 37% increase. Opportunities for "bot" infection depend upon accessibility, so it is interesting to compare rates of infection with levels of broadband adoption (Figure 5.12). With around 160 million broadband Internet subscribers across OECD countries at the end of 2005, there were 0.3 infected machines per 100 connections (an infection rate of 0.3%). Within this overall rate of infection, however, there were significant variations. The United Kingdom appears to have had by far the highest infection rate among OECD countries, with almost 1.8 infected machines per 100 broadband connections (1.8% infection). Poland (1%) and Greece (0.7%) also had relatively high rates of infection. Conversely, Japan had the lowest rate of infection among OECD countries at that time, with just 0.07 infected machines per 100 broadband connections. Hence, the apparent rate of infection in the United Kingdom was almost 24 times that in Japan.

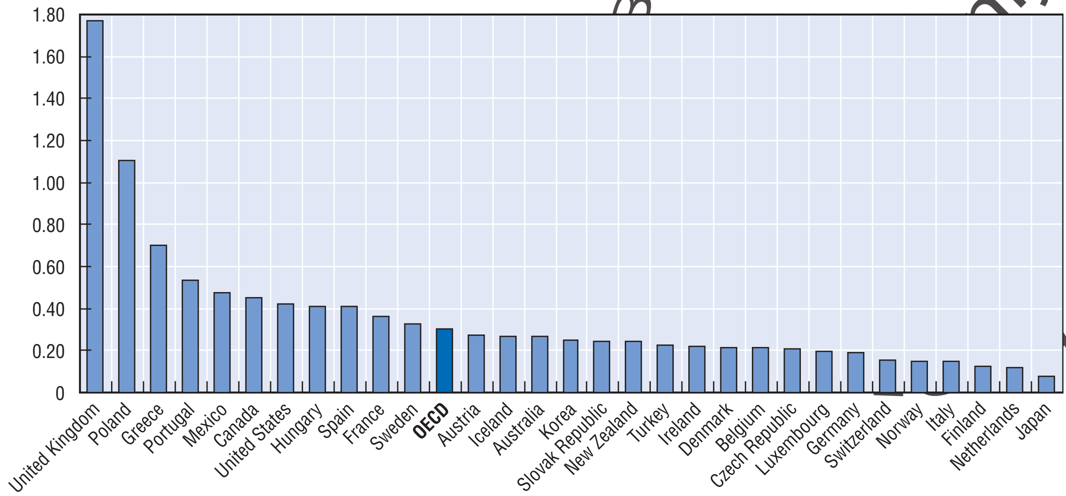
The reasons for these differences are not entirely clear. "Bots" are detected by sensors deployed by Symantec and its customers (more than 40 000 sensors in 180 countries), so Symantec's market share may be one factor. However, given the international nature of "bot nets" it is unlikely to be the most significant factor. As might be expected, there is a correlation between levels of Internet access and the number of detected infections on a per capita basis (Figure 5.13). Intuitively, one might expect the role of English as the language of choice for attacks to be a factor in the United Kingdom's high infection rate, but much lower infection rates in New Zealand, Australia, the United States and Canada suggest that it is by no means the only one. The recent rapid growth of broadband in the United Kingdom may also be a factor, compared with more mature broadband markets such as Korea or Japan. This may relate to both user experience and to supply-side practices (*i.e.* a relative lack of protective action by ISPs and users in the United Kingdom). As experience grows ISPs may find that marketing anti-virus software with access plans gives them an advantage in the market. A further more recent factor in the United Kingdom may be that broadband is being bundled "free" by companies selling other services (*e.g.* cellular mobile phone subscriptions). In such an environment there may be less incentive for the provider to build in extra costs, such as anti-virus software, and less incentive for users to add costs to an ostensibly free product, even though a "tragedy of the commons" phenomenon may be developing.

mid-2000, the number of registered domain names has increased by around 26% a year, with slightly faster growth in OECD-related ccTLD registrations than gTLD registrations (Table 5.7).

Registrations by domain

Differences in the magnitude of registrations under each gTLD and ccTLD relate to a number of factors. For ccTLDs factors include the pace of Internet development in the given country and relative openness in the conditions applied to the registration of domain names. The largest OECD ccTLD domain is .de (Germany) with more than 10 million registrations by mid-2006. Other relatively large OECD-related ccTLDs include .uk

Figure 5.12. **"Bot"-infected machines per 100 broadband connections, December 2005**

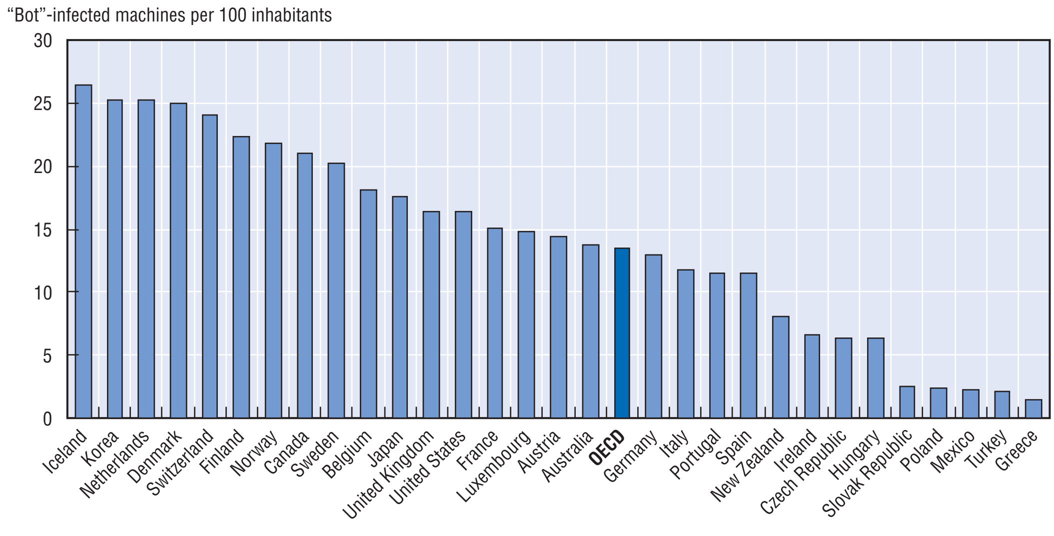


Note: Excludes dial-up access to the Internet.

Source: OECD, based on data provided by Symantec.

StatLink http://dx.doi.org/10.1787/001614057815

Figure 5.13. **"Bot"-infected machines per 100 inhabitants, December 2005**



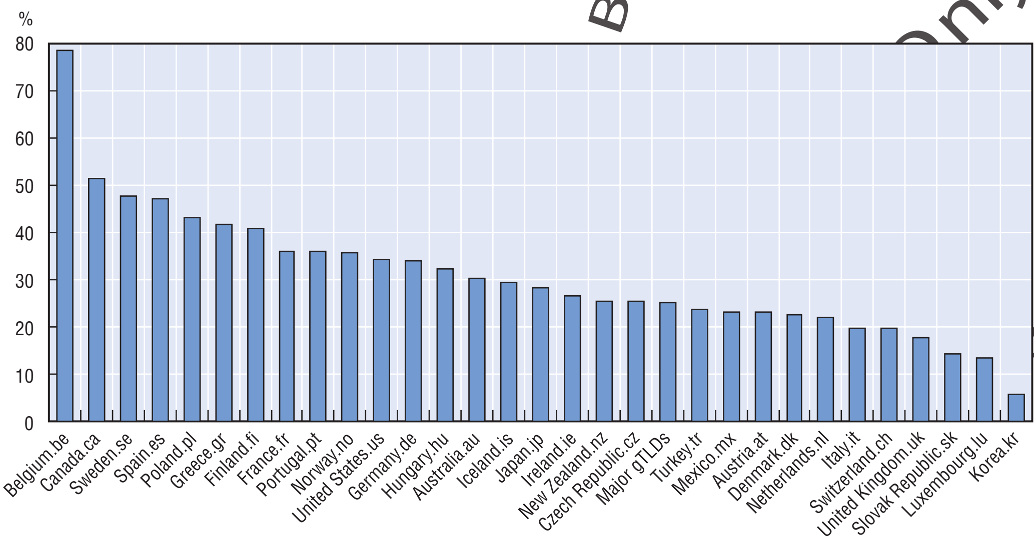
Source: OECD, based on data provided by Symantec.

StatLink http://dx.doi.org/10.1787/001615156431

(United Kingdom) with 5.1 million registered names, .nl (Netherlands) with 1.7 million, .it (Italy) with 1.2 million and .be (Belgium) with just over 1 million. These compare with 55 million registered names under the most widely used gTLD (.com). Among domains for which data are available, OECD-related ccTLDs experiencing above average growth in registrations over the period from mid-2000 to mid-2006 included those related to Belgium, Canada, Sweden, Spain, Poland, Greece and Finland (Figure 5.14).

OECD-related ccTLDs accounted for around 30% of all worldwide domain name registrations in mid-2006, within which .de (Germany) accounted for 10% and .uk (United

Figure 5.14. **Annual growth in domain name registrations by domain, 2000-2006 (per cent)**



Note: As at mid-year or nearest available data point. For the United States (.us), Hungary (.hu), Slovak Republic.(sk) and Turkey (.tr) growth is calculated over a shorter period owing to data limitations.

StatLink http://dx.doi.org/10.1787/001617548252

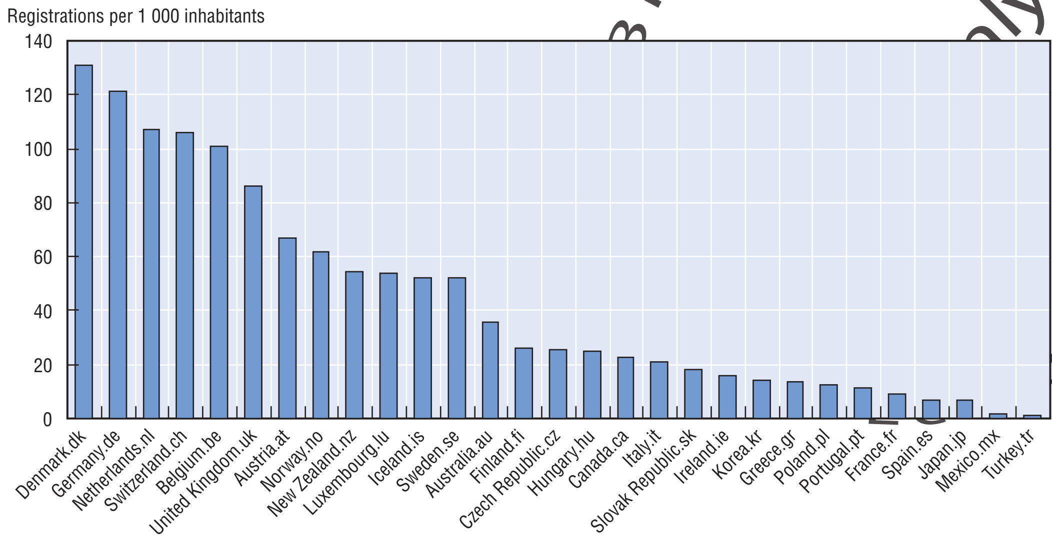
Kingdom) accounted for 5% of all worldwide domain name registrations. On a per capita basis, the highest number of registrations under ccTLDs were in .dk (Denmark), .de (Germany), .nl (Netherlands), .ch (Switzerland) and .be (Belgium), all of which had more than 100 domain names registered per 1 000 inhabitants (Figure 5.15). However, a country's position is not an indicator of its relative performance, because some ccTLDs limit registrations to users with a presence in that country and limit the number of registrations per entity, while others do not. These practices are designed to limit speculation or cyber-squatting, or to give the ccTLD a distinctive national presence, rather than to maximise the number of registrations. Historically, some ccTLDs had policies that meant users simply preferred gTLDs, and some business users may have preferred gTLDs in order to project an international image.

Registrations by country

Limited data are available on the geographic distribution of domain names. It can be assumed that users adopting ccTLDs are either based in the related country or seek to reflect a presence there. Users that adopt gTLDs may be anywhere, and the related website and content, if any, may or may not be co-located with the user. WebhostingInfo (*www.webhosting.info*) publishes geographic gTLD registrations according to the location of the hosting company. Table 5.8 shows the number of domain name registrations under related ccTLDs and major gTLDs by registry location for the OECD countries.

Across the OECD, around 30% of registrations are under country-related ccTLDs and 70% under gTLDs, including 51% under .com, 7% under .net, 5% under .org, 3% under .info and 1% under .biz. A further 2% are registered under .eu (Europe) (Figure 5.16). However, these shares vary considerably from country to country. For historical reasons, the ccTLD .us accounts for a very small share of US-related registrations. Other countries with a relatively high proportion of gTLD registrations include Turkey, Canada, Spain and France, in all of which gTLD registrations account for more than 70% of all country-related registrations. Conversely, ccTLD

Figure 5.15. **OECD-related ccTLD registrations per 1 000 inhabitants, July 2006**

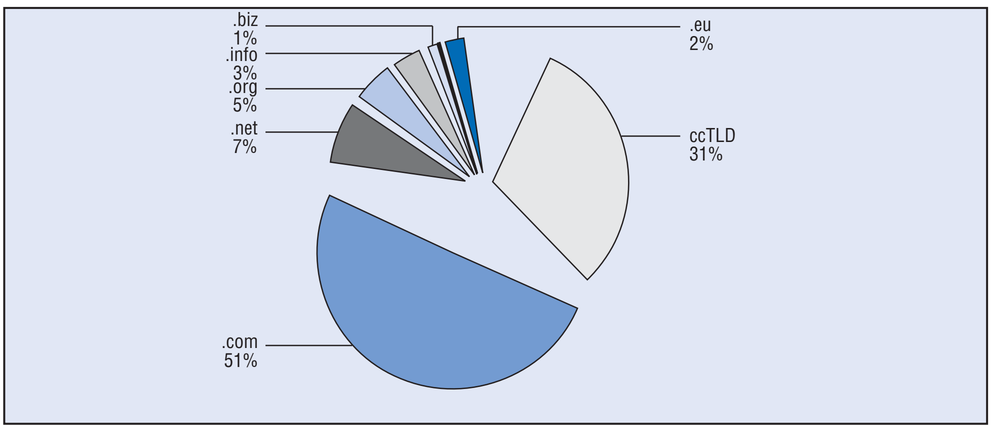


Note: At mid-year or nearest available data point. The United States is excluded owing to data limitations.

StatLink http://dx.doi.org/10.1787/001628478752

registrations account for more than 80% of all country-related registrations in the Slovak Republic, Belgium, Hungary, Iceland, Switzerland, New Zealand and Poland (Figure 5.17).

Figure 5.16. **Shares of OECD-related domain name registrations under ccTLDs and major gTLDs, August 2006**

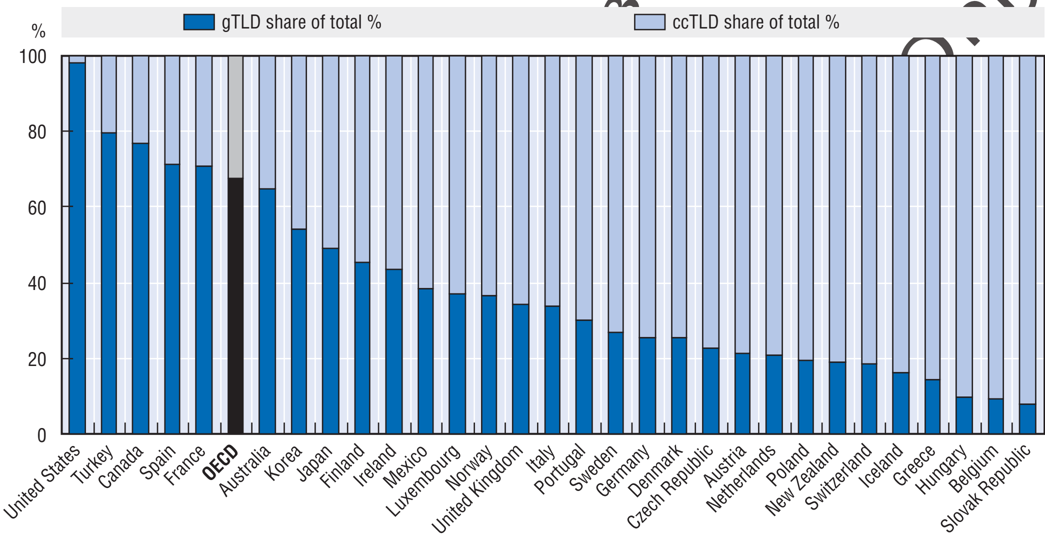


Source: OECD, compiled from country and generic NICs and WebhostingInfo (*www.webhosting.info*).

StatLink http://dx.doi.org/10.1787/001655252468

Combining ccTLDs and country-related registrations under major gTLDs (and .eu) reveals that, on a per capita basis, Denmark (184 domain names per 1 000 inhabitants), Germany (174), the United States (159), Netherlands (154), the United Kingdom (140) and Switzerland (130) had the highest level of domain name registrations in August 2006 (Figure 5.18). The average across OECD countries was 81 domain names registered per 1 000 inhabitants, up from 52 per 1 000 in 2004. Registrations were significantly lower in Mexico, Turkey, Japan, Portugal, Greece and Poland.

Figure 5.17. **Shares of gTLDs in OECD-related domain name registrations, August 2006**

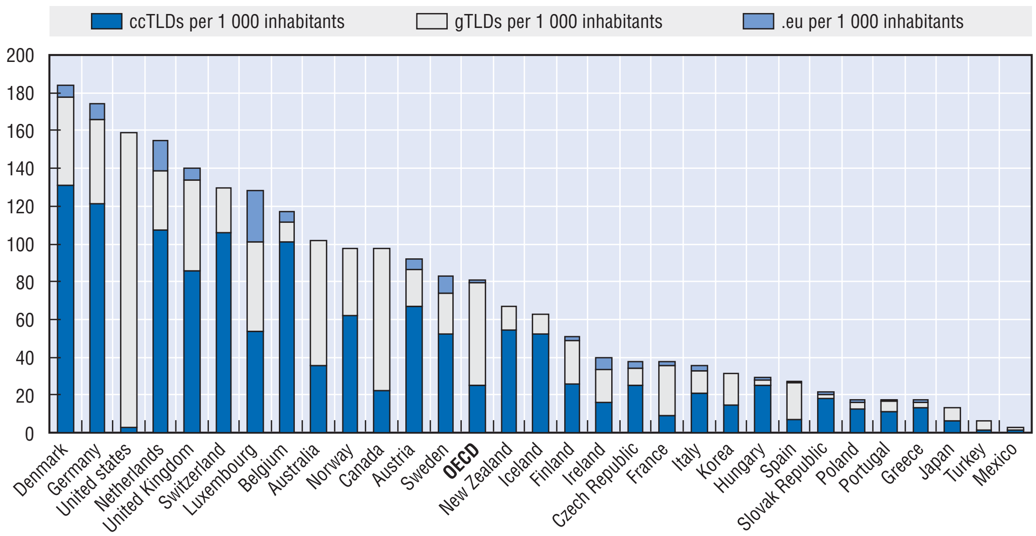


Note: Data for the United States' ccTLD are for 2004 and include .us and .edu only.

Source: OECD, compiled from country and generic NICs and WebhostingInfo (*www.webhosting.info*).

StatLink *http://dx.doi.org/10.1787/001658162321*

Figure 5.18. **Domain name registrations per 1 000 inhabitants, August 2006**

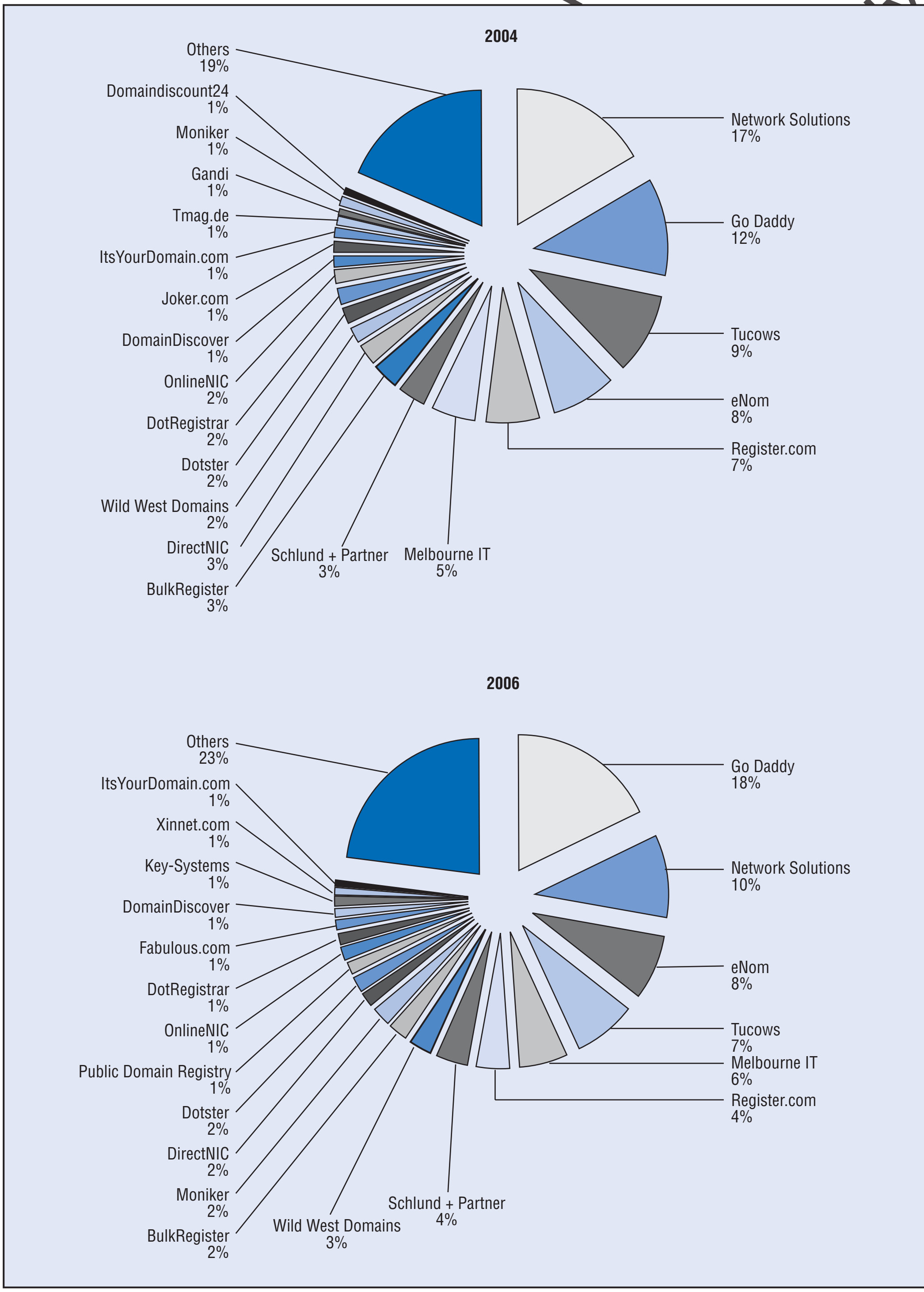


Note: Data for the United States ccTLD are for 2004 and include .us and .edu only. Population refers to 2005.

Source: OECD, compiled from country and generic NICs and WebhostingInfo (*www.webhosting.info*).

StatLink *http://dx.doi.org/10.1787/001771373270*

Figure 5.19. **Domain name registrars' market share, 2004-06**



Source: OECD, compiled from country and generic NICs and WebhostingInfo (*www.webhosting.info*).

StatLink http://dx.doi.org/10.1787/001816302235

The domain name registration market

gTLD registries perform back-office functions and provide services to registrars. Registrars, in turn, provide services to users. Following reforms introduced by ICANN, new registrars rapidly gained market shares. The market is still relatively concentrated, but the market shares of the top 20 and top four firms are falling. In September 2004, the top 20 gTLD registrars accounted for 81% of the market and the top four for 45%. The largest registrar, Network Solutions, accounted for 16.6% of the gTLD registration market, Go Daddy for 12% and Tucows for 9.5%. Go Daddy, Domainsite.com, domaindiscount24 and ItsYourDomain.com were among the fastest growing registrars at that time. By August 2006, the top 20 registrars' market share had fallen to 77% and that of the top four firms to 43%. However, Go Daddy accounted for 18% of the market, while no other registrar accounted for more than 10% (Figure 5.19).

Web servers

A number of organisations undertake web server surveys. As each uses its own methodology this can make comparisons difficult. Research undertaken by E-Soft (*www.SecuritySpace.com*) is indicative. At the end of July 2006, E-Soft's survey reported almost 20 million web servers, of which more than 11 million were in the major gTLD domains. Reflecting the commercial growth on the Internet, .com alone accounted for almost 9 million web servers (almost 45% of the worldwide total). Among OECD-related ccTLDs, .de (Germany) with 1.6 million web servers, .uk (United Kingdom) with 635 000 and .nl (Netherlands) with 601 500 were the largest (Table 5.9).

The total number of web servers worldwide increased by 32% a year between mid-2000 and mid-2006, with gTLDs .com and .org increasing by 32% a year and .net by 37% a year. The fastest-growing OECD-related ccTLDs were .be (Belgium), which experienced 49% a year growth in the number of web servers recorded, .pl (Poland) 48% a year and .hu (Hungary) 47% a year.

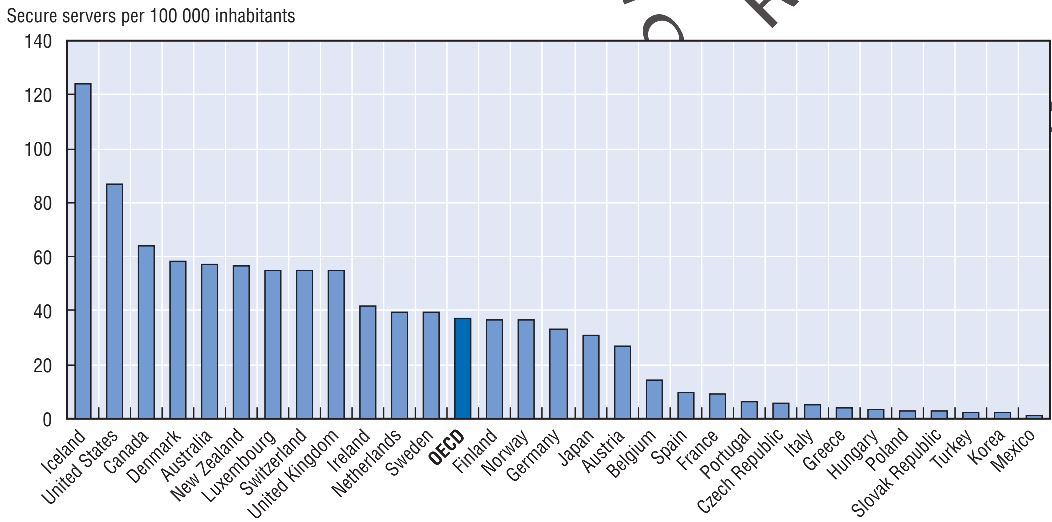
Secure servers

The Secure Socket Layer (SSL) protocol for encrypted transmission over TCI/IP networks is the most commonly used means to provide a secure end-to-end link for e-commerce transactions and restricted access to privileged information both within and between organisations. Hence, Netcraft's SSL surveys provide one of the best indicators of the growth and diffusion of e-commerce.

In July 2006, the Netcraft survey found 515 384 secure servers worldwide, of which 84% (435 034) were in OECD countries (Table 5.10). More than 250 000 secure servers were located in the United States (almost 50% of the worldwide total), almost 40 000 in Japan, 33 000 in the United Kingdom, 27 000 in Germany and just over 20 000 in Canada. The total number of secure servers worldwide increased by almost 50% a year between 1998 and 2006, while the number of secure servers located in OECD countries increased by 47% a year. Among OECD countries, those experiencing fastest growth in secure servers over the period included Turkey, Japan, Germany, Greece, Poland, the United Kingdom, the Netherlands and Denmark. The Slovak Republic, the United States, Spain, Italy, Australia, Hungary and Canada experienced growth below the OECD average. As e-commerce matures, the increase in the number of secure servers has slowed somewhat in OECD countries to 21% during 2004-05 and 18% during 2005-06.

There were 37 secure servers per 100 000 inhabitants across OECD countries in July 2006, up from just 1.8 per 100 000 in July 1998. Countries with higher levels of penetration include Iceland (124 per 100 000 inhabitants), the United States (87), Canada (64), Denmark (59), and Australia and New Zealand (57). Adoption levels vary widely: Nine OECD countries had more than 50 secure servers per 100 000 inhabitants in July 2006 and 11 had fewer than 10 (Figure 5.20).

Figure 5.20. **Secure servers per 100 000 inhabitants, July 2006**



Note: Population refers to 2005 or most recent year.
Source: OECD, based on Netcraft SSL surveys (*www.netcraft.com*).

StatLink http://dx.doi.org/10.1787/001831736226

By domain, .com (commercial) accounts form by far the largest share of secure servers, with 142 246 severs at the end of July 2006, or 53% of the total (on the more restricted definition adopted by E-Soft). The other major gTLDs (*i.e.* .net and .org) each accounted for around 20 000. Major OECD ccTLDs included .jp (Japan) with 11 315 secure servers (4.3% of total) and .de (Germany) with 9 119 (3.4%) (Table 5.11).

National and regional Internet development

Allocation of autonomous system numbers and IP addresses are the foundation of Internet activities. Autonomous systems are the networks that form the Internet (a network of networks). They may be ISPs, ranging from the largest "Tier 1" ISPs to small local ISPs, academic, military or government networks, or firms with a particular need for some networking independence. They are allocated autonomous system numbers (ASNs) in order to identify themselves and their customers, and IP addresses in order to manage traffic routing. Access to ASNs for entities with a demonstrated need is important for preserving the openness of the Internet and enabling new market entry. Hence, tracking national and regional allocations of ASNs reveals changing market dynamics.

Autonomous systems

Border Gateway Protocol (BGP) routing tables provide a snapshot of Internet topology at a particular place and time. In late 2005, 20 451 autonomous systems were visible in the Internet routing table, up from 2 899 in late 1997 or by 28% a year (Table 5.12), of which 78%

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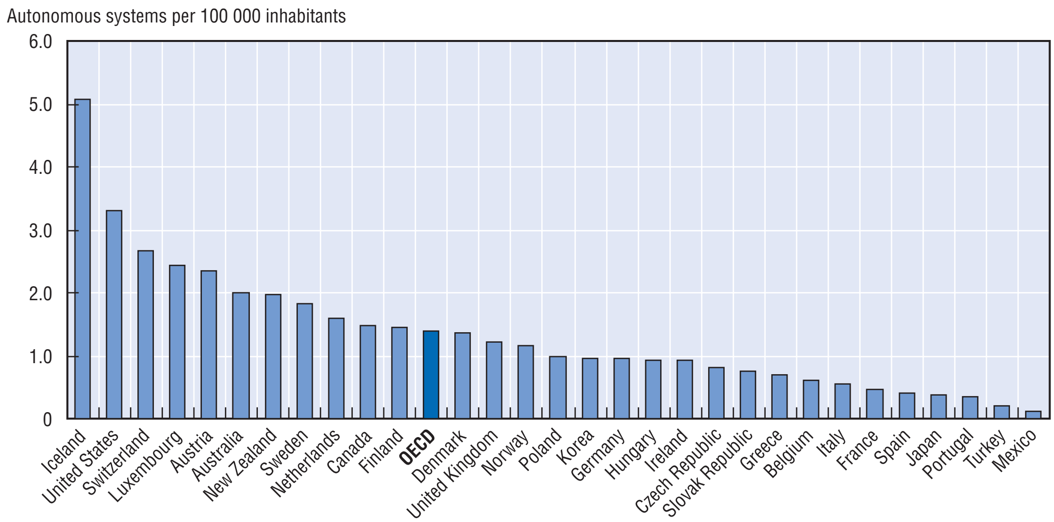
(16 031) were in OECD countries. By far the largest share have their origin in the United States, which accounted for more than 47% of the world total, although it should be noted that these networks may be offering service anywhere around the world. By comparison, Germany accounted for just 3.9% of the world's visible autonomous systems (792), the United Kingdom for 3.6% (732), and Canada and Japan each for 2.3% (473).

As the Internet develops outside its country of origin, the United States' share of the total number of autonomous systems in use is falling, from 56% in November 1997 to 47% in November 2005. Nevertheless, the number of autonomous systems in the United States increased rapidly over the period, from 1 627 to 9 698 or by 25% a year. The decreasing share of autonomous systems attributed to the United States reflects catch-up growth in use of the Internet in the rest of the world, with all other OECD countries increasing their share of the world total from 25% in 1997 to 31% in 2005. Meanwhile, the rest of the world also experienced an increase in the number of autonomous systems, during the same period, from 544 to 4 420, or by 30% a year.

When weighted by population, Iceland had 5.1 autonomous systems per 100 000 inhabitants at the end of 2005, followed by the United States (3.3), Switzerland (2.7) and Luxembourg (2.4), while 16 countries had less than 1 (Figure 5.21). The countries with a large number of autonomous systems per capita all have well-developed Internet markets, yet countries such as Japan and France with well-developed markets have a much lower ratio. This may reflect such factors as industrial structure, and the number of ISPs and level of competition between them.

Figure 5.21. **Autonomous systems per 100 000 inhabitants, November 2005**



Source: OECD, based on data provided by Tom Vest (Packet Clearing House) from raw data generated by the University of Oregon Route Views project.

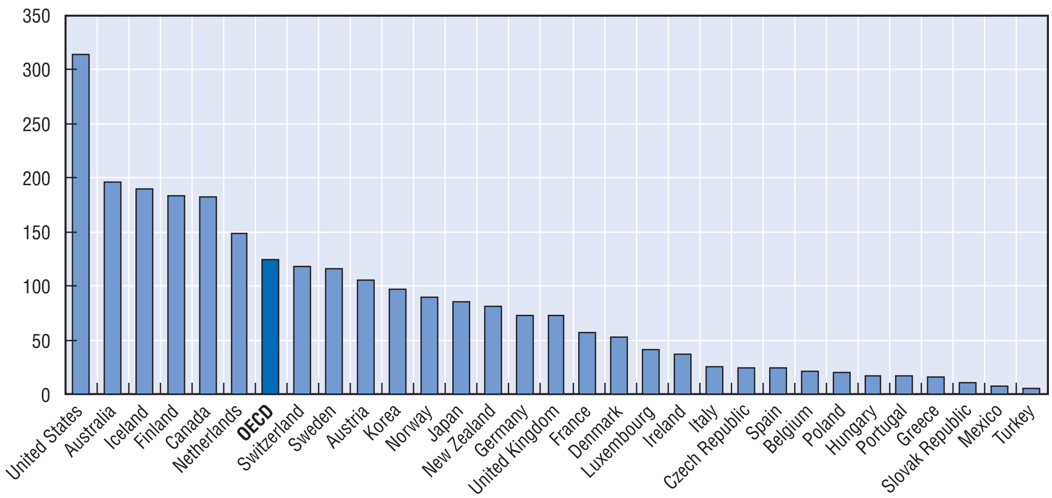
StatLink http://dx.doi.org/10.1787/001876335164

Address space (IPv4)

An IP address is a numeric identifier for a device connected to the Internet. Networks using the TCP/IP protocol route messages based on the IP address of the destination. Routed IP addresses are the number of such identifiers that autonomous systems inject into the Internet routing table (*i.e.* in essence, the number being used). Currently, most routed IP addresses are IPv4; the next generation of numbering (IPv6) is gradually being introduced around the world. In late 2005, there were around 1.7 billion routed IPv4 addresses, up from just over 1 billion in 1997 (Table 5.13).

These data may slightly overstate the actual number of routed IPv4 addresses as some autonomous systems inject IP addresses that are also visible as a part of larger IP prefixes introduced by ASNs associated with a different country. This happens, for example, when one network receives some of its IP addresses from a foreign network operator, perhaps in conjunction with an IP transit service. In these cases, the IP addresses will be counted as part of the "national Internet production" of both countries (i.e. double-counted). As a result, the worldwide sum of IPv4 addresses counted at the national level is around 10% to 15% higher than the number that might be reported from other sources. The benefit of this approach, however, is that it makes it possible to see the growth in the use of IP addresses by country (OECD, 2006, p. 17).

Figure 5.22. **Routed autonomous systems and IPv4 addresses, August 2006**

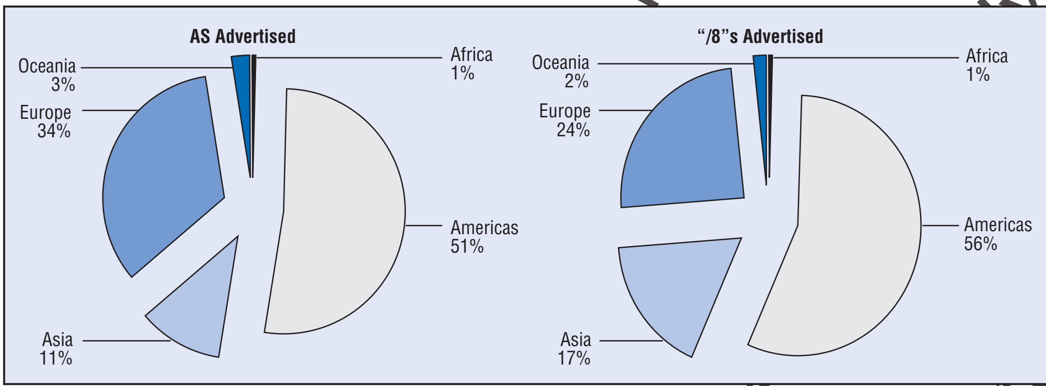


Source: OECD, based on data provided by Tom Vest (Packet Clearing House) from raw data generated by the University of Oregon Route Views project.

StatLink http://dx.doi.org/10.1787/001886302031

In late 2005, OECD countries accounted for 83% of globally routed IPv4 addresses, down from 93% in 1997 (Table 5.13). The United States had by far the largest share, with 53% of the worldwide total, down from 71% in late 1997. The next largest shares were attributable to Japan (6.3%), Germany (3.5%), Canada (3.4%), Korea (2.7%), the United Kingdom (2.5%) and Australia (2.3%). Growth in routed IPv4 addresses also reflects catch-up, with Poland, the Czech Republic and Turkey, together with Belgium, Ireland, Italy and Korea, among the OECD countries experiencing the fastest growth. On a per capita basis, the United States is the largest user of routable IPv4 address, with 314 addresses per 100 inhabitants (Figure 5.23). Other countries to record more than one routed IP address per person include Australia, Iceland, Finland, Canada, the Netherlands, Switzerland, Sweden and Austria. There was an average of 1.24 IPv4 addresses per inhabitant across the OECD, with Mexico (7.9) and Turkey (5.5) the only OECD countries with fewer than ten addresses per 100 inhabitants. To date, allocation of IPv6 address space has been limited. As at mid-August 2006, RIPE NCC had allocated 789 IPv6 prefixes, APNIC 447, ARIN 262, LACNIC 63 and AFRINIC 19. Hence, IPv4 allocations still provide an overview of the development of the Internet.

Figure 5.23. **Routed autonomous systems and IPv4 addresses, August 2006**



Source: OECD, based on routing table data from AS6447 (*Route-Views.Oregon-ix.net*).

StatLink http://dx.doi.org/10.1787/002007855828

Regional allocations

As noted, Border Gateway Protocol routing tables provide a snapshot of Internet topology from a particular place and time. In August 2006, 35 038 ASNs had been allocated, of which 22 100 were being advertised and were visible from AS6447 (Route-Views.Oregon-ix.net). Of those advertised (*i.e.* being used), 51% were related to the Americas, 34% to Europe, 11% to Asia, 3% to Oceania and 1% to Africa. At the same time, some 2.3 billion IPv4 addresses (/8s – "slash eights") had been allocated, of which 1.5 billion were being advertised. Of the latter, 56% were related to the Americas, 24% to Europe and 17% to Asia (Figure 5.23).

Allocations and market development

Address space allocations can be seen as an indicator of market development. Large fluctuations can sometimes be observed from year to year in national allocations, as in the case of the series for Turkey for November 1998 (Table 5.13). When this occurs it is generally the result of a configuration error by an autonomous system. Another possible reason is an autonomous system with a new allocation of IP addresses advertising them all, instead of only those required for current needs. The data available at the Oregon Route Views Project allow researchers to identify which autonomous system is responsible for the fluctuations. In this case the problem was identified as a configuration error. Consequently, the mid-point between 1997 and 1999 would better represent the situation in Turkey.

Leaving aside such one-off fluctuations, available data show the average number of routed IPv4 addresses per routed autonomous system decreasing (Table 5.14). Worldwide, the average number of IPv4 addresses per routed autonomous system fell from 354 308 in late 1997 to 84 809 in late 2005; across the OECD the average number fell from 405 851 to 90 218, or by 16% and 17% a year, respectively. All OECD countries experienced a decline. This reflects the fact that more entities are using ASNs and their own IPv4 address blocks and is indicative of an increasingly competitive environment.

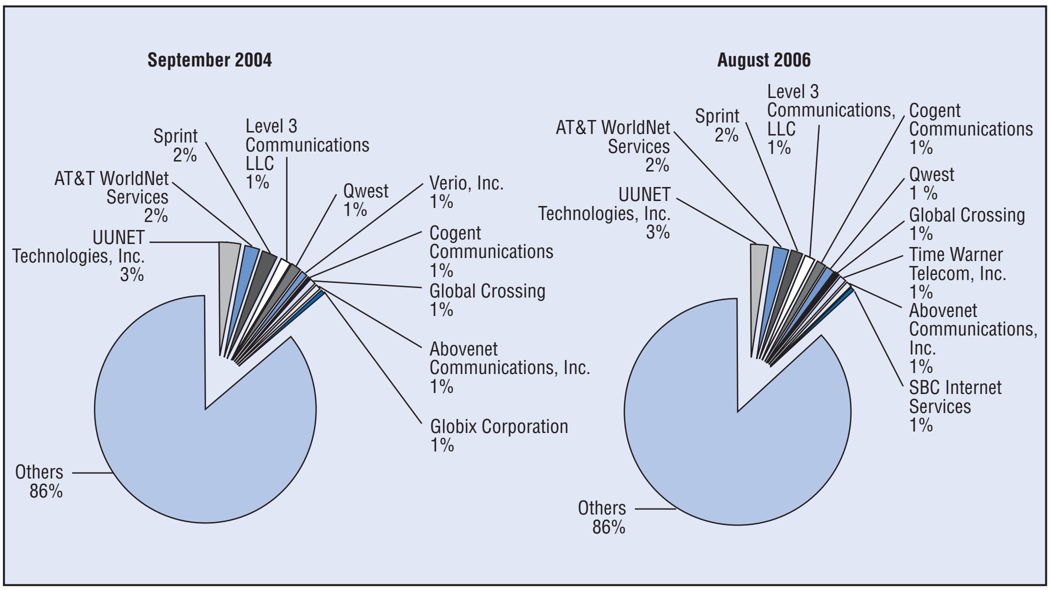
Peering

Internet topography is typically analysed at the inter-domain level, with autonomous systems (as the nodes and autonomous systems peerings as the links. Peering is the arrangement of Internet traffic exchange between networks (*e.g.* ISPs). Larger ISPs with their own backbone networks agree to carry traffic from other large ISPs in exchange for the carriage of their traffic on the other ISPs' backbones. They may also exchange traffic with smaller ISPs so that they can reach regional end points. The value of a peer in peering arrangements depends upon the number of users for whom, and to whom, it provides access. FixedOrbit provides a regular snapshot of Internet peering, showing the centrality of various networks in terms of the number of peers with which they exchange traffic. These data provide a picture of the size and market shares of the larger ISPs, and how those shares change over time.

In late August 2006, FixedOrbit reported a total of 94 638 peerings, up from 78 862 in September 2004. However, the top ten networks' share of peerings declined slightly, from 14.2% of all peerings to 13.4%. UUNET Technologies was the largest network in terms of peering relationships, with 2 402 peers, or 2.54% of total peerings, and controlled around 33 million IP addresses. The second largest peer, AT&T WorldNet Services, reported 2 025 peers or 2.14% of total peerings (Table 5.15). While there were movements within the top ten over the period, the cohort was relatively stable (Figure 5.24). Those dropping out of the top ten included Verio and Globix (which had 636 and 533 peers, respectively, in 2004). Time Warner Telecom came into the top ten in August 2006 (with 715 peers), as did SBC Internet Services (with 655 peers). These large peer networks play a central role in Internet traffic exchange, but none accounted for more than 3% of peerings. These data suggest both a development and maturing of Internet peering and traffic exchange relationships.

Figure 5.24. **Top 10 networks defined by number of peers, 2004-06**

Share of total peering, percent



Source: OECD, compiled from FixedOrbit statistics (*www.fixedorbit.com*).

StatLink http://dx.doi.org/10.1787/002034854752

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Table 5.1. **Internet subscribers to fixed networks, 2000-2005**

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	Per 100 inhabitants						Annual growth 2000-2005 %
							2000	**2001**	**2002**	**2003**	**2004**	**2005**	
Australia	3 862 000	3 979 000	4 354 500	5 305 700	5 989 300	6 962 000	20.0	20.4	22.0	26.6	29.6	34.0	12.5
Austria	991 400	1 156 600	1 347 500	1 514 900	1 629 418	1 777 492	12.4	14.4	16.7	18.7	19.9	21.6	12.4
Belgium	1 151 024	1 438 191	1 717 684	1 832 059	2 036 022	2 175 526	11.2	14.0	16.6	17.7	19.5	20.8	13.6
Canada	4 376 790	5 899 186	6 825 030	7 263 166	7 656 714	8 276 699	14.3	19.0	21.8	22.9	23.9	25.6	13.6
Czech Republic	418 448	457 016	1 522 181	2 093 018	2 140 664	2 262 969	4.1	4.5	14.9	20.5	21.0	22.1	40.2
Denmark	1 684 805	2 023 461	1 533 049	1 652 733	1 679 122	1 818 278	31.6	37.8	28.5	30.7	31.1	33.6	1.5
Finland	810 000	950 000	1 495 640	1 812 410	1 222 929	1 617 200	15.6	18.3	28.8	34.8	23.4	30.8	14.8
France	5 452 443	7 005 322	9 160 992	10 704 525	11 906 997	13 265 600	9.0	11.5	14.9	17.3	19.1	21.2	19.5
Germany	11 105 000	14 934 000	19 254 000	23 011 286	23 404 983	27 206 600	13.5	18.1	23.3	27.9	28.4	33.0	19.6
Greece	297 072	350 072	393 932	530 476	686 463	927 340	2.7	3.2	3.6	4.8	6.2	8.4	25.6
Hungary	220 395	319 461	427 733	593 391	681 235	881 116	2.2	3.1	4.2	5.9	6.7	8.7	31.9
Iceland	15 035	57 478	74 285	96 406	63 548	87 075	5.3	20.2	25.8	33.3	21.7	29.4	42.1
Ireland	583 636	600 000	738 000	1 108 000	798 848	874 700	15.4	15.5	18.8	27.8	19.7	21.1	8.4
Italy	6 204 900	7 976 000	8 726 019	10 063 318	11 076 301	11 516 696	10.9	14.0	15.3	17.5	19.0	19.7	13.2
Japan	18 126 945	23 073 888	28 284 119	32 615 165	29 547 385	30 796 456	14.3	18.1	22.2	25.5	23.1	24.1	11.2
Korea	5 083 803	9 367 080	10 879 934	11 867 959	11 968 260	12 237 532	10.8	19.8	22.8	24.8	24.9	25.3	19.2
Luxembourg	24 500	80 000	91 861	106 456	130 472	107 357	5.6	18.1	20.6	23.7	28.8	23.5	34.4
Mexico	1 031 646	1 883 638	2 111 945	2 444 374	3 166 903	3 972 925	1.0	1.9	2.1	2.4	3.0	3.8	31.0
Netherlands	5 000 000	5 900 000	6 372 000	5 310 345	5 423 333	5 491 667	31.4	36.8	39.5	32.7	33.3	33.7	1.9
New Zealand	542 234	644 500	874 100	969 776	991 695	1 017 239	14.0	16.6	22.2	24.2	24.4	24.8	13.4
Norway	1 019 478	1 255 581	1 349 671	1 252 817	1 426 623	1 436 207	22.7	27.8	29.7	27.4	31.1	31.1	7.1
Poland	930 000	1 200 000	1 605 846	1 626 613	1 832 231	3 267 441	2.4	3.1	4.2	4.3	4.8	8.6	28.6
Portugal	336 140	466 813	666 876	905 037	1 252 773	1 482 111	3.3	4.5	6.4	8.7	11.9	14.0	34.5
Slovak Republic	65 798	97 980	130 385	178 359	203 594	285 825	1.2	1.8	2.4	3.3	3.8	5.3	34.1
Spain	3 222 400	3 673 959	3 924 541	5 217 453	5 153 574	6 706 218	8.0	9.0	9.5	12.4	12.1	15.5	15.8
Sweden	2 138 300	2 696 100	2 963 400	3 130 000	3 210 561	3 196 000	24.1	30.3	33.2	34.9	35.7	35.4	8.4
Switzerland	1 651 690	2 054 234	2 337 048	2 703 924	2 306 291	2 700 089	22.9	28.2	31.8	36.5	30.9	36.0	10.3
Turkey	4 459	10 715	25 531	1 261 071	1 527 521	2 211 896	0.01	0.02	0.04	1.8	2.1	3.1	246.0
United Kingdom	12 599 693	12 299 000	13 392 319	14 555 900	15 412 000	16 081 300	21.4	20.8	22.6	24.4	25.8	26.7	5.0
United States	68 656 828	77 097 722	96 203 589	95 624 203	92 352 520	92 520 000	24.3	27.0	33.4	32.8	31.4	31.2	6.1
OECD	157 606 862	188 946 997	228 783 710	247 350 840	246 878 281	263 159 553	13.9	16.6	19.9	21.4	21.2	22.5	10.8

Note: "Other" broadband technologies include: satellite broadband Internet, fibre-to-the-home Internet access, ethernet LANs, and fixed wireless subscribers (at downstream speeds greater than 256 kbps).

Source: OECD

StatLink http://dx.doi.org/10.1787/011501845606

Table 5.2. **Broadband access, 2000-2005**

	December 2000				December 2001				December 2002			
	DSL	Cable	Other	Total	DSL	Cable	Other	Total	DSL	Cable	Other	Total
Australia	10 000	64 000	0	74 000	50 000	110 000	5 000	165 000	177 900	173 200	12 400	363 500
Austria	38 500	98 900	0	137 400	100 600	192 000	0	292 600	179 500	272 000	0	451 500
Belgium	43 810	102 013	0	145 823	230 000	201 000	17 349	448 349	518 919	350 939	25 813	895 671
Canada	460 544	947 246	0	1 407 790	1 069 121	1 640 534	40 531	2 750 186	1 659 181	2 112 926	32 923	3 805 030
Czech Republic	0	10 000	0	10 000	100	12 000	0	12 100	100	16 800	0	16 900
Denmark	26 399	41 000	0	67 399	150 173	87 500	0	237 673	306 944	133 548	2 805	443 297
Finland	15 000	15 000	0	30 000	43 500	24 500	0	68 000	229 000	54 000	500	283 500
France	67 532	121 911	0	189 443	430 000	190 322	0	620 322	1 409 000	282 992	0	1 691 992
Germany	200 000	5 000	0	205 000	1 870 000	30 000	0	1 900 000	3 160 000	45 000	14 000	3 219 000
Greece	72	0	0	72	72	0	0	72	72	0	1 860	1 932
Hungary	400	1 904	0	2 304	6 200	17 419	2 460	26 079	32 054	31 190	2 460	65 704
Iceland	2 035	0	0	2 035	9 978	0	500	10 478	23 785	0	500	24 285
Ireland	300	0	0	300	300	100	0	400	3 300	2 300	5 000	10 600
Italy	114 900	0	0	114 900	390 000	0	25 000	415 000	835 525	0	140 494	976 019
Japan	9 732	625 000	0	634 732	1 524 348	1 303 000	12 000	2 839 348	5 645 728	1 954 000	206 189	7 805 917
Korea	2 353 341	1 556 072	156 235	4 065 648	5 178 323	2 936 280	629 601	8 744 204	5 664 915	3 553 830	1 181 352	10 400 097
Luxembourg	0	0	0	0	1 215	15	0	1 230	5 561	70	1 230	6 861
Mexico	0	8 622	0	8 622	5 300	64 479	41 291	111 070	78 110	124 052	44 854	247 016
Netherlands	10 000	250 000	0	260 000	145 000	467 000	200	612 200	340 000	796 000	200	1 136 200
New Zealand	9 676	658	0	10 334	25 579	2 500	0	28 079	54 000	4 900	5 200	64 100
Norway	1 485	16 344	0	17 829	31 803	45 339	7 050	84 192	130 034	52 066	8 444	190 544
Poland	0	0	0	0	1 796	19 900	0	21 696	14 000	100 000	0	114 000
Portugal	0	25 154	0	25 154	2 886	93 721	2 709	99 316	52 005	207 486	3 298	262 789
Slovak Republic	0	0	0	0	0	420	0	420	0	420	0	420
Spain	44 956	13 459	0	58 415	375 816	98 466	0	474 282	957 204	252 765	0	1 209 969
Sweden	49 000	56 300	46 000	151 300	242 100	115 000	106 000	463 100	421 000	156 000	151 400	728 400
Switzerland	4 416	56 475	0	60 891	42 935	98 753	0	141 688	199 144	196 740	18 858	414 742
Turkey	292	4 167	0	4 459	2 818	7 897	0	10 715	2 967	22 564	0	25 531
United Kingdom	38 000	19 693	0	57 693	140 000	208 000	2 000	350 000	590 000	779 319	2 000	1 371 319
United States	2 429 189	3 580 000	175 611	6 184 800	5 026 405	7 050 000	304 531	12 380 936	7 687 924	11 112 606	384 608	19 185 138
OECD	5 929 579	7 618 918	377 846	13 926 343	17 096 368	15 016 145	1 230 222	33 308 735	30 412 872	22 787 713	2 246 388	55 411 973

	December 2003				December 2004				December 2005				Growth 2000-2005 (%)	Per 100 inhabitants (2005)
	DSL	Cable	Other	Total	DSL	Cable	Other	**Total**	DSL	Cable	Other	Total		
Australia	433 900	251 200	13 600	698 700	1 130 200	404 300	13 800	1 548 300	2 174 800	533 600	76 600	2 785 000	106.6	13.8
Austria	279 500	338 000	1 000	618 500	442 075	410 490	13 253	865 818	682 181	475 736	21 975	1 179 892	53.7	14.3
Belgium	728 093	452 918	32 293	1 213 304	996 118	622 777	49	1 618 944	1 175 419	727 271	49	1 902 739	67.2	18.2
Canada	2 198 243	2 532 000	32 923	4 763 166	2 713 754	2 885 037	32 923	5 631 714	3 234 248	3 441 528	32 923	6 708 699	36.7	21.0
Czech Republic	13 818	34 680	0	48 498	106 000	60 000	89 200	255 200	309 000	138 000	203 000	650 000	130.5	6.4
Denmark	473 351	194 320	38 610	706 281	633 500	295 000	95 660	1 024 160	827 361	390 443	132 611	1 350 415	82.1	24.9
Finland	405 700	85 400	3 200	494 300	585 650	112 350	81 929	779 929	1 018 700	148 900	6 600	1 174 200	108.2	22.4
France	3 262 800	393 854	0	3 656 654	6 072 723	454 035	3 239	6 529 997	8 900 000	560 000	5 600	9 465 600	118.6	15.1
Germany	4 400 000	60 000	53 200	4 513 200	6 709 683	145 000	50 000	6 904 683	10 400 000	240 000	66 600	10 706 600	120.6	13.0
Greece	8 588	0	1 888	10 476	46 547	0	4 916	51 463	154 000	0	2 340	156 340	364.9	1.4
Hungary	114 813	77 189	10 000	202 002	239 810	111 431	9 500	360 741	412 860	212 145	14 500	639 505	208.1	6.3
Iceland	40 086	829	491	41 406	50 612	670	1 982	53 264	75 897	432	1 688	78 017	107.4	26.4
Ireland	25 300	4 900	2 850	33 050	115 583	8 045	11 220	134 848	202 300	25 000	43 400	270 700	290.0	6.7
Italy	2 158 458	0	243 481	2 401 939	4 402 585	20	298 647	4 701 252	6 556 648	0	340 048	6 896 696	126.8	11.8
Japan	10 272 052	2 475 000	894 259	13 641 311	13 325 408	2 873 076	2 898 688	19 097 172	14 480 958	3 226 680	4 807 453	22 515 091	104.2	17.6
Korea	6 574 593	3 943 012	1 091 296	11 608 901	6 777 398	4 079 204	1 064 837	11 921 439	6 556 605	4 011 417	1 622 689	12 190 711	24.6	25.2
Luxembourg	13 322	2 029	220	15 571	40 000	4 081	64	44 145	60 024	7 113	220	67 357	..	14.9
Mexico	213 494	180 753	34 131	428 378	695 050	309 114	33 291	1 037 455	1 606 563	662 957	31 534	2 301 054	205.7	2.2
Netherlands	944 000	969 000	200	1 913 200	1 884 561	1 200 000	1 000	3 085 561	2 551 052	1 562 521	1 000	4 114 573	73.7	25.2
New Zealand	90 000	5 734	8 042	103 776	168 272	10 123	13 300	191 695	297 000	16 000	18 000	331 000	100.0	8.1
Norway	275 997	69 587	18 520	364 104	562 000	93 000	25 000	680 000	818 966	132 800	55 000	1 006 766	124.1	21.8
Poland	135 495	150 000	11 796	297 291	500 000	300 000	18 575	818 575	607 659	270 000	43 093	920 752	..	2.4
Portugal	184 344	315 577	3 198	503 119	420 631	434 958	2 829	858 418	697 242	511 541	2 750	1 211 533	117.0	11.5
Slovak Republic	4 210	3 498	10 969	18 677	38 334	9 235	4 100	51 669	105 000	20 800	8 100	133 900	..	2.5
Spain	1 660 450	539 754	6 804	2 207 008	2 604 067	817 737	19 826	3 441 630	3 915 435	1 052 996	25 843	4 994 274	143.4	11.5
Sweden	570 000	205 000	206 000	981 000	849 661	229 000	248 900	1 327 561	1 200 000	310 000	314 000	1 824 000	64.5	20.2
Switzerland	446 309	302 289	29 903	778 501	802 000	480 000	31 765	1 313 765	1 132 362	600 000	52 837	1 785 199	96.5	24.1
Turkey	56 624	42 700	96 402	195 726	452 398	37 404	16 650	506 452	1 500 000	30 000	0	1 530 000	221.4	2.1
United Kingdom	1 820 000	1 364 200	16 700	3 200 900	4 133 000	2 027 000	36 000	6 196 000	6 977 000	2 630 300	219 000	9 826 300	179.4	16.4
United States	10 814 512	16 446 332	483 508	27 744 352	15 285 846	21 357 400	709 274	37 352 520	19 909 967	26 469 242	1 647 378	48 026 587	50.7	16.3
OECD	48 716 138	31 439 755	3 345 484	83 403 291	72 783 466	39 770 487	5 830 717	118 384 670	98 539 247	48 407 422	9 796 831	156 743 500	62.3	13.5

Note: "Other" broadband technologies include: satellite broadband Internet, fibre-to-the-home Internet access, ethernet LANs, and fixed wireless subscribers (at downstream speeds greater than 256 kbps).

StatLink http://dx.doi.org/10.1787/011633647642

Table 5.3. **Broadband access per 100 inhabitants, to end June 2006**

	DSL	Cable	Other	Total	Rank	Total subscribers
Australia	13.9	2.9	0.6	17.4	17.0	3 518 100
Austria	11.2	6.3	0.2	17.7	15.0	1 460 000
Belgium	11.9	7.4	0.0	19.3	11.0	2 025 112
Canada	10.8	11.5	0.1	22.4	9.0	7 161 872
Czech Republic[1]	3.9	2.0	3.5	9.4	23.0	962 000
Denmark	17.4	9.0	2.8	29.3	1.0	1 590 539
Finland	21.7	3.1	0.2	25.0	6.0	1 309 800
France	16.7	1.0	0.0	17.7	16.0	11 105 000
Germany	14.7	0.3	0.1	15.1	18.0	12 444 600
Greece	2.7	0.0	0.0	2.7	30.0	300 168
Hungary	4.8	2.9	0.1	7.8	25.0	791 555
Iceland	26.5	0.0	0.7	27.3	3.0	80 672
Ireland	6.8	1.0	1.4	9.2	24.0	372 300
Italy	12.6	0.0	0.6	13.2	20.0	7 697 249
Japan	11.3	2.7	4.9	19.0	12.0	24 217 012
Korea	13.2	8.8	4.5	26.4	5.0	12 770 911
Luxembourg	16.0	1.9	0.0	17.9	14.0	81 303
Mexico	2.1	0.7	0.0	2.8	29.0	2 950 988
Netherlands	17.2	11.1	0.5	28.8	2.0	4 705 829
New Zealand	10.7	0.5	0.6	11.7	22.0	479 000
Norway	20.4	3.8	0.4	24.6	7.0	1 137 697
Poland	3.9	1.3	0.1	5.3	26.0	2 032 700
Portugal	7.9	4.9	0.0	12.8	21.0	1 345 602
Slovak Republic	2.6	0.5	0.9	4.0	27.0	216 771
Spain	10.5	3.0	0.0	13.5	19.0	5 864 034
Sweden	14.4	4.3	4.0	22.7	8.0	2 046 222
Switzerland	16.9	9.0	1.1	27.0	4.0	1 998 961
Turkey	2.9	0.0	0.0	3.0	28.0	2 128 600
United Kingdom	14.6	4.9	0.0	19.4	10.0	11 622 929
United States	7.8	9.7	0.7	18.2	13.0	53 598 302
OECD	9.7	4.5	1.1	15.3		178 015 829

Note: "Other" broadband technologies include: satellite broadband Internet, fibre-to-the-home Internet access, ethernet LANs, and fixed wireless subscribers (at downstream speeds greater than 256 kbps).

1. The OECD statistics for the "other" broadband category of the Czech Republic include a large number of fixed wireless broadband connections provided over mobile networks. Broadband subscriptions over 3G networks are not included for other countries but an exception was made for the Czech Republic because the connections make use of "fixed" equipment in a home and offer speeds greater than 256 kbit/s to individual users. The Czech market is particular due to the high number of these wireless broadband connections as a percentage of total connectivity. It is important to note that there is continuing debate in international circles as to whether this type of wireless connection (numbering 188 000 in CZ) should be included in international broadband comparisons.

StatLink http://dx.doi.org/10.1787/011652847504

Table 5.4. **Mobile Internet: i-mode subscribers, 1999-2006**

	1999	2000	2001	2002	2003	2004	2005	mid-2006	Carrier and launch
Australia							30 000	30 000	Telstra - launched November 2004
Belgium				2 000	25 000	28 000		300 000	Base - launched October 2002
France				100 000	500 000	666 000	1 000 000	1 400 000	Bouygues - launched November 2002
Germany				123 000	440 000	855 000	1 093 000	1 048 000	Eplus - launched March 2002
Greece								500 000	COSMOTE - launched June 2004
Ireland							..	..	O2 - launched October 2005
Italy					100 000		..	800 000	Wind - launched November 2003
Japan	3 130 000	5 603 000	21 695 000	31 250 000	37 758 000	41 077 000	44 021 000	46 360 000	NTT DoCoMo - launched 1999
Netherlands				111 000	403 000	661 000	704 000	800 000	KPN - launched April 2002
Spain						450 000		1 100 000	Telefonica - launched June 2003
United Kingdom							..	..	O2 - launched October 2005

Note: Data as reported during the years indicated, or most recent for 2006.

Source: OECD, compiled from carrier reports and www.imodestargey.com.

StatLink http://dx.doi.org/10.1787/011661341186

Table 5.5. **Mobile phone-based internet subscribers in Japan, 1999-2006**

	1999	2000	2001	2002	2003	2004	2005	mid-2006
Ezweb		1 349 000	6 716 000	9 639 000	12 541 000	15 700 000	18 259 000	20 523 000
i-mode	3 130 000	5 603 000	21 695 000	31 250 000	37 758 000	41 077 000	44 021 000	46 360 000
Vodafone live!			6 156 000	9 747 000	12 162 000	12 956 000	12 874 000	12 875 000
PHS				334 000	765 000	990 000	..	..
Total	3 130 000	6 952 000	34 567 000	50 970 000	63 226 000	70 723 000	75 154 000	79 758 000

Note: As of 31 March.

Source: KDDI Fact Book 2006.

StatLink http://dx.doi.org/10.1787/011720442168

Table 5.6. **Internet hosts by domain, 1998-2006**

	Domain	Hosts, January									Annual growth 1998-2006 %
		1998	1999	2000	2001	2002	2003	2004	2005	2006	
Australia	.au	665 403	792 351	1 090 468	1 615 939	2 288 584	2 564 339	2 847 763	4 820 646	6 039 486	31.7
Austria	.at	109 154	143 153	274 173	504 144	657 173	838 026	982 246	1 594 059	1 957 154	43.4
Belgium	.be	87 938	165 873	320 840	417 130	668 508	1 052 706	1 454 350	2 012 283	2 546 148	52.3
Canada	.ca	839 141	1 119 172	1 669 664	2 364 014	2 890 273	2 993 982	3 210 081	3 839 173	2 817 010	16.3
Czech Republic	.cz	52 498	73 770	112 748	153 902	213 803	239 885	315 974	724 631	993 778	44.4
Denmark	.dk	159 358	279 790	336 928	435 556	707 141	1 154 053	1 467 415	1 908 737	2 316 370	39.7
Finland	.fi	450 044	546 244	631 248	771 725	944 670	1 140 838	1 224 155	1 915 506	2 505 805	23.9
France	.fr	333 306	488 043	779 879	1 229 763	1 670 694	2 157 628	2 770 836	4 999 770	6 863 156	46.0
Germany	.de	994 926	1 316 893	1 702 486	2 163 326	2 681 325	2 891 407	3 421 455	6 127 262	9 852 798	33.2
Greece	.gr	26 917	51 541	77 954	148 552	182 812	202 525	245 650	377 221	503 685	44.2
Hungary	.hu	46 082	83 530	113 695	158 732	210 804	254 462	313 576	611 887	894 800	44.9
Iceland	.is	17 450	21 894	29 598	44 040	61 682	68 282	106 296	144 636	191 528	34.9
Ireland	.ie	38 406	54 872	59 681	88 406	95 381	97 544	111 467	138 833	240 958	25.8
Italy	.it	243 250	338 822	658 307	1 630 526	2 282 457	3 864 315	5 469 578	9 343 663	11 222 960	61.4
Japan	.jp	1 168 956	1 687 534	2 636 541	4 640 863	7 118 333	9 260 117	12 962 065	19 543 040	24 903 795	46.6
Korea	.kr	121 932	186 414	283 459	397 809	439 859	407 318	253 242	213 045	245 566	9.1
Luxembourg	.lu	4 273	21 894	9 670	11 744	16 735	17 260	28 214	61 785	84 257	45.2
Mexico	.mx	41 659	112 620	404 873	663 553	918 288	1 107 795	1 333 406	1 868 583	2 555 047	67.3
Netherlands	.nl	381 172	564 129	820 944	1 309 911	1 983 102	2 415 286	3 419 182	6 443 558	7 258 159	44.5
New Zealand	.nz	169 264	137 247	271 003	345 107	408 290	432 957	474 395	651 065	971 900	24.4
Norway	.no	286 338	318 631	401 889	525 030	629 669	589 621	1 013 273	1 237 270	2 109 283	28.4
Poland	.pl	77 594	108 588	183 057	371 943	654 198	843 475	1 296 766	2 482 546	3 941 769	63.4
Portugal	.pt	39 533	49 731	90 757	177 828	263 821	291 355	299 923	605 648	1 378 817	55.9
Slovak Republic	.sk	11 836	17 953	25 906	36 680	68 972	80 660	98 788	188 352	322 753	51.2
Spain	.es	168 913	264 245	415 641	663 553	1 497 450	1 694 601	1 127 366	1 304 558	2 459 614	39.8
Sweden	.se	319 065	431 809	594 627	764 011	1 141 093	1 209 266	1 539 917	2 668 816	2 817 010	31.3
Switzerland	.ch	114 816	224 350	306 073	461 456	613 918	723 243	1 018 445	1 785 427	2 125 269	44.0
Turkey	.tr	24 786	32 496	90 929	113 603	139 805	199 823	344 859	611 557	794 795	54.3
United Kingdom	.uk	987 733	1 423 804	1 901 812	2 291 369	2 462 915	2 583 753	3 715 752	4 449 190	5 778 422	24.7
United States		*6 618 382*	*8 746 846*	*10 490 416*	*12 052 491*	*12 579 595*	*11 683 370*	*11 422 195*	*13 872 605*	*14 831 525*	10.6
	.us	1 076 583	1 562 391	1 875 663	2 267 089	2 125 624	1 735 734	1 757 664	2 429 244	2 441 426	10.8
	.edu	3 944 967	5 022 815	6 085 137	7 106 062	7 754 038	7 459 219	7 576 992	8 992 398	9 806 021	12.1
	.mil	1 099 186	1 510 440	1 751 866	1 844 369	1 906 902	1 880 903	1 410 944	1 667 794	1 861 535	6.8
	.gov	497 646	651 200	777 750	834 971	793 031	607 514	676 595	783 169	722 543	4.8
gTLDs		*14 005 613*	*21 742 617*	*42 685 540*	*68 514 456*	*93 617 371*	*103 654 125*	*150 831 956*	*197 045 451*	*242 569 338*	42.8
	.com	8 201 511	12 140 747	24 863 331	36 352 243	44 520 209	40 555 072	48 688 919	56 428 268	69 578 775	30.6
	.net	5 283 568	8 856 687	16 853 655	30 885 116	47 761 383	61 945 611	100 751 276	139 057 448	171 346 396	54.5
	.org	519 862	744 285	959 827	1 267 662	1 321 104	1 116 311	1 332 978	1 459 335	1 516 898	14.3
	.int	672	898	8 727	9 435	11 048	11 594	13 625	13 120	15 756	48.3
	.biz	0	0	0	0	1 477	16 680	28 586	53 672	45 934	..
	.info	0	0	0	0	2 128	8 349	15 502	30 828	60 533	..
	.name	0	0	0	0	7	217	318	913	1 267	..
	.pro	0	0	0	0	2	2	5	15	36	..
	.areo	0	0	0	0	0	132	315	627	768	..
	.coop	0	0	0	0	9	148	417	1 191	2 953	..
	.museum	0	0	0	0	4	9	15	19	22	..
	.travel	0	0	0	0	0	0	0	15	0	..
World Total	World	29 669 611	43 229 694	72 398 092	109 574 429	147 344 723	171 638 297	233 101 481	317 646 084	394 991 609	38.2

Source: Internet Software Consortium (http://www.isc.org/)

StatLink http://dx.doi.org/10.1787/011722834188

Table 5.7. **Domain name registrations under top level domains, 2000-2006**

	Domain	Registrations July				Annual growth %	Share of world domains %
		2000	2002	2004	2006		
Australia	.au	148 539	300 000	447 384	721 952	30.2	0.7
Austria	.at	157 387	252 441	341 841	548 060	23.1	0.5
Belgium	.be	32 709	206 989	348 401	1 056 976	78.5	1.1
Canada	.ca	60 000	300 000	447 689	720 094	51.3	0.7
Czech Republic	.cz	66 555	119 145	174 914	259 590	25.5	0.3
Denmark	.dk	208 300	397 552	528 886	708 693	22.6	0.7
Finland	.fi	17 603	36 210	86 793	137 040	40.8	0.1
France	.fr	89 097	155 554	268 361	564 839	36.0	0.6
Germany	.de	1 732 994	5 666 269	7 799 823	10 013 686	34.0	10.0
Greece	.gr	18 670	55 190	80 000	150 332	41.6	0.2
Hungary	.hu	..	81 804	100 000	250 000	32.2	0.3
Iceland	.is	3 300	8 200	10 500	15 500	29.4	0.0
Ireland	.ie	15 506	29 920	40 205	63 933	26.6	0.1
Italy	.it	417 609	735 156	909 241	1 236 918	19.8	1.2
Japan	.jp	190 709	482 644	587 412	845 603	28.2	0.8
Korea	.kr	494 074	479 643	612 840	693 515	5.8	0.7
Luxembourg	.lu	11 404	15 454	17 845	24 376	13.5	0.0
Mexico	.mx	49 947	71 590	91 559	174 490	23.2	0.2
Netherlands	.nl	532 596	748 510	1 005 292	1 745 976	21.9	1.7
New Zealand	.nz	56 765	107 046	149 269	221 433	25.5	0.2
Norway	.no	45 541	150 000	208 546	285 947	35.8	0.3
Poland	.pl	56 708	..	136 787	485 891	43.0	0.5
Portugal	.pt	18 739	38 048	57 546	118 452	36.0	0.1
Slovak Republic	.sk	..	57 091	64 100	97 811	14.4	0.1
Spain	.es	29 590	43 476	85 309	298 600	47.0	0.3
Sweden	.se	45 241	102 785	225 507	468 825	47.7	0.5
Switzerland	.ch	267 425	445 230	609 426	785 406	19.7	0.8
Turkey	.tr	..	40 059	62 163	94 076	23.8	0.1
United Kingdom	.uk	1 938 740	3 635 585	3 802 885	5 141 040	17.6	5.1
United States							
.gov		730	..	..	..	..	..
.mil		..	..	..	..	..	..
.us		..	269 233	875 016	*875 016*	34.3	0.9
.edu		6 154	7 409	7 397	*7 397*	3.1	0.0
OECD ccTLDs		*6 712 632*	*15 038 233*	*20 182 937*	*28 811 467*	27.5	28.8
Major gTLDs		*17 476 025*	*27 113 371*	*38 278 040*	*67 395 913*	25.2	67.4
.com		13 721 175	21 198 557	30 267 141	54 621 977	25.9	54.6
.net		2 305 075	3 586 124	4 910 121	7 903 266	22.8	7.9
.org		1 449 775	2 328 690	3 100 778	4 870 670	22.4	4.9
.int		..	..	..	..	..	..
.biz		..	700 962	1 028 314	1 448 400	..	1.4
.info		..	864 457	1 235 485	3 293 113	..	3.3
.name		..	..	..	..	..	..
Europe	.eu	..	..	..	2 036 467	..	..

Note: Registrations at mid-year, or nearest available count. Values in italics are estimates.

Source: OECD, compiled from country and generic NICs, August 2006.

StatLink http://dx.doi.org/10.1787/011725260177

Table 5.8. **Domain name registrations, 2006**

	ccTLD	.com	.net	.org	.info	.biz	Others	Total gTLDs	.eu	Total	gTLD share of total %
Australia	721 952	1 150 411	81 891	47 656	32 556	17 594	44	1 330 152		2 052 104	64.8
Austria	548 060	93 771	21 594	17 696	24 632	5 095	44	162 832	47 351	758 243	21.5
Belgium	1 056 976	66 436	23 826	9 313	8 863	2 669	26	111 133	56 648	1 224 757	9.1
Canada	720 094	1 919 847	214 865	153 626	66 762	36 456	2 159	2 393 715		3 113 809	76.9
Czech Republic	259 590	48 762	16 694	5 967	12 552	3 057	751	87 783	37 670	385 043	22.8
Denmark	708 693	158 749	40 921	22 593	18 265	14 028	626	255 182	32 286	996 161	25.6
Finland	137 040	80 412	28 404	6 343	4 011	1 306	135	120 611	7 838	265 489	45.4
France	564 839	1 093 091	194 073	139 445	186 786	33 074	8 592	1 655 061	121 184	2 341 084	70.7
Germany	10 013 686	2 191 553	577 991	311 733	457 437	145 929	3 504	3 688 147	666 301	14 368 134	25.7
Greece	150 332	20 854	3 160	1 777	887	586	72	27 336	14 220	191 888	14.2
Hungary	250 000	20 196	4 292	1 751	2 137	646	366	29 388	17 555	296 943	9.9
Iceland	15 500	1 811	633	204	54	50	237	2 989		18 489	16.2
Ireland	63 933	55 394	7 060	4 151	2 747	1 395	312	71 059	27 606	162 598	43.7
Italy	1 236 918	476 002	102 993	67 079	28 701	22 406	2 758	699 939	123 023	2 059 880	34.0
Japan	845 603	599 835	144 792	30 770	26 435	18 013	2 392	822 237		1 667 840	49.3
Korea	693 515	580 325	179 542	31 435	7 945	12 642	2 658	814 547		1 508 062	54.0
Luxembourg	24 376	13 197	3 019	2 092	1 487	1 368	315	21 478	12 282	58 136	36.9
Mexico	174 490	91 878	7 424	5 551	2 069	793	170	107 885		282 375	38.2
Netherlands	1 745 976	349 354	62 508	41 643	47 495	15 720	5 367	522 087	252 390	2 520 453	20.7
New Zealand	221 433	40 572	4 295	2 791	1 682	2 018	249	51 607		273 040	18.9
Norway	285 947	104 380	29 565	16 045	9 850	5 713	831	166 384		452 331	36.8
Poland	485 891	75 370	17 524	10 243	18 203	5 543	2 250	129 133	53 074	668 098	19.3
Portugal	118 452	42 758	6 656	3 338	1 546	525	210	55 033	9 718	183 203	30.0
Slovak Republic	97 811	5 219	1 262	528	1 184	460	696	9 349	8 539	115 699	8.1
Spain	298 600	626 962	101 700	64 012	40 365	13 229	965	847 233	43 493	1 189 326	71.2
Sweden	468 825	131 617	25 690	16 609	11 173	6 622	7 268	198 979	78 087	745 891	26.7
Switzerland	785 406	112 583	23 526	16 565	16 620	7 607	269	177 170		962 576	18.4
Turkey	94 076	288 015	48 270	22 489	7 070	4 697	1 398	371 939		466 015	79.8
United Kingdom	5 141 040	2 024 489	350 519	206 883	147 376	100 038	30 389	2 859 694	379 765	8 380 499	34.1
United States	882 413	35 053 173	4 636 119	3 195 409	1 781 750	875 513	266 441	45 808 405		46 690 818	98.1
OECD	28 811 467	47 517 016	6 960 808	4 455 737	2 968 640	1 354 792	341 494	63 598 487	1 989 030	94 398 984	67.4
EU-15	22 277 746	7 424 639	1 550 114	914 707	981 771	363 990	60 583	11 295 804	1 872 192	35 445 742	31.9
World	..	54 621 977	7 903 266	4 870 670	3 293 113	1 448 400	..	72 137 426	2 036 476	..	..

Note: ccTLD registrations at August 2006, or nearest available count. For gTLD registrations the country is that of the registry company (*i.e.* of registration), not necessarily that of the domain name holder or the related website or host.

Source: OECD, compiled from country and generic NICs and WebhostingInfo (www.webhosting.info), August 2006.

StatLink http://dx.doi.org/10.1787/011736204765

Table 5.9. **Web servers by domain, July 2006**

Domain		Web Servers, July 2000	2004	2006	Annual growth %
Australia	.au	26 119	121 004	163 737	25.8
Austria	.at	22 078	75 113	119 022	23.4
Belgium	.be	7 386	51 684	180 654	49.1
Canada	.ca	22 105	106 883	152 681	27.3
Czech Republic	.cz	12 626	69 120	116 240	32.0
Denmark	.dk	25 280	147 681	204 654	29.9
Finland	.fi	9 836	25 284	37 762	18.3
France	.fr	20 471	55 981	155 163	28.8
Germany	.de	179 542	1 063 877	1 593 296	31.4
Greece	.gr	3 337	18 488	28 993	31.0
Hungary	.hu	5 392	41 556	118 214	47.1
Iceland	.is	1 199	7 243	9 731	29.9
Ireland	.ie	2 905	11 545	17 592	25.2
Italy	.it	33 168	191 690	297 304	31.5
Japan	.jp	45 581	297 446	399 275	31.2
Korea	.kr	11 576	433 837	140 699	36.6
Luxembourg	.lu	1 409	3 747	5 321	18.1
Mexico	.mx	4 552	14 860	21 065	21.1
Netherlands	.nl	48 014	305 358	601 492	37.2
New Zealand	.nz	8 757	40 055	58 330	26.7
Norway	.no	10 531	48 471	69 061	26.5
Poland	.pl	22 265	373 468	524 888	48.4
Portugal	.pt	5 113	14 637	25 588	22.3
Slovak Republic	.sk	4 479	22 711	62 126	38.9
Spain	.es	9 146	19 342	36 269	18.8
Sweden	.se	23 265	50 773	82 574	17.2
Switzerland	.ch	36 082	190 134	182 553	22.5
Turkey	.tr	4 897	14 227	19 918	19.2
United Kingdom	.uk	131 415	437 404	634 677	21.8
United States					
	.us	17 299	98 633	115 445	26.8
	.edu	46 272	106 244	129 458	13.7
	.mil	2 587	3 270	3 040	2.0
	.gov	6 648	14 642	18 909	14.0
gTLDs					
	.com	992 618	7 239 594	8 884 634	31.5
	.net	106 613	1 078 762	1 293 624	36.6
	.org	124 150	791 389	1 081 603	31.1
World total	World	2 213 960	14 978 181	19 863 342	31.6

Source: http://www.securityspace.com/s_survey/sdata/200607/domain.html

StatLink http://dx.doi.org/10.1787/011758315828

Table 5.10. **Secure servers in OECD countries, 1998-2006**

	July 1998	July 1999	July 2000	July 2001	July 2002	July 2003	July 2004	August 2005	July 2006
Australia	632	1 305	2 828	3 704	4 693	4 830	8 079	9 604	11 562
Austria	98	241	447	881	949	1 073	1 590	1 807	2 201
Belgium	52	159	268	431	439	512	912	1 159	1 468
Canada	929	1 789	3 896	6 050	7 768	9 378	15 166	17 913	20 373
Czech Republic	19	88	194	383	185	213	315	387	598
Denmark	44	112	289	523	660	890	1 681	2 116	3 169
Finland	68	180	343	660	744	870	1 255	1 479	1 919
France	222	632	1 297	1 969	2 511	2 646	3 799	4 607	5 632
Germany	492	1 630	3 761	6 442	7 987	7 912	13 163	20 853	27 300
Greece	8	48	87	176	170	181	270	350	424
Hungary	18	26	90	165	86	122	199	278	345
Iceland	13	29	67	91	136	170	249	286	367
Ireland	56	97	245	467	579	701	1 201	1 456	1 685
Italy	167	432	795	1 264	1 167	1 327	1 977	2 427	2 990
Japan	429	1 170	2 900	7 952	7 179	10 513	19 610	30 403	39 608
Korea	38	106	243	397	562	623	878	950	1 031
Luxembourg	11	26	44	68	97	104	184	203	249
Mexico	26	58	176	310	324	379	605	804	987
Netherlands	127	306	541	1 064	1 332	1 723	3 595	4 963	6 419
New Zealand	90	227	482	778	983	1 124	1 668	1 952	2 313
Norway	55	130	273	491	528	666	1 122	1 330	1 680
Poland	23	61	188	467	373	382	557	791	1 116
Portugal	27	59	116	192	214	286	443	601	667
Slovak Republic	15	..	45	110	38	47	61	96	143
Spain	239	432	759	1 194	1 315	1 764	2 745	3 429	4 196
Sweden	145	406	811	1 261	1 246	1 437	2 826	2 881	3 535
Switzerland	152	401	854	1 370	1 555	1 769	2 826	3 345	4 053
Turkey	7	50	116	285	400	432	855	1 150	1 646
United Kingdom	714	1 735	4 404	7 916	10 288	11 714	20 339	26 542	32 690
United States	14 674	32 053	65 565	86 025	106 884	120 661	197 769	225 865	254 668
OECD	19 590	43 988	92 124	133 086	161 392	184 449	305 939	370 027	435 034
EU-15	2 470	6 495	14 207	24 508	29 698	33 140	55 980	74 873	94 544

Source: Netcraft (http://www.netcraft.com)

StatLink http://dx.doi.org/10.1787/011540652372

Table 5.11. **Secure servers by domain, July 2006**

	Domain	Secure Servers			Annual growth %
		2000	**2004**	**2006**	
Australia	.au	720	2 527	4 003	23.9
Austria	.at	401	675	983	11.9
Belgium	.be	74	251	448	25.2
Canada	.ca	501	2 035	3 318	26.7
Czech Republic	.cz	71	620	1 092	40.7
Denmark	.dk	239	734	1 074	20.7
Finland	.fi	134	488	858	26.1
France	.fr	595	893	1 334	10.6
Germany	.de	3 170	5 776	9 119	14.1
Greece	.gr	69	158	231	16.3
Hungary	.hu	176	476	708	19.0
Iceland	.is	18	96	169	32.3
Ireland	.ie	228	257	389	6.9
Italy	.it	473	1 217	1 723	17.5
Japan	.jp	863	5 055	11 315	37.9
Korea	.kr	22	125	159	28.0
Luxembourg	.lu	11	34	71	26.3
Mexico	.mx	51	182	268	23.0
Netherlands	.nl	392	913	1 781	20.8
New Zealand	.nz	162	607	1 012	25.7
Norway	.no	159	476	737	21.1
Poland	.pl	211	1 200	2 155	33.7
Portugal	.pt	92	229	316	16.7
Slovak Republic	.sk	8	135	258	54.4
Spain	.es	323	624	912	13.9
Sweden	.se	214	561	994	21.2
Switzerland	.ch	838	1 219	1 681	9.1
Turkey	.tr	32	164	242	28.8
United Kingdom	.uk	2 851	4 656	6 686	11.2
United States					
	.us	226	1 388	2 527	35.2
	.edu	1 321	7 120	11 298	30.8
	.mil	118	1 146	1 340	35.5
	.gov	201	941	1 561	29.2
gTLDs					
	.com	32 551	102 399	142 246	20.2
	.net	4 065	13 777	19 543	21.7
	.org	3 558	13 033	18 583	23.0
World total	World	57 519	181 363	266 156	21.1

Source: http://www.securityspace.com/s_survey/sdata/200607/domain.html

StatLink http://dx.doi.org/10.1787/011546423738

Table 5.12. **Routed autonomous systems by country, 1997-2005**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1997-2005
Australia	46	160	153	194	255	293	325	364	402	31
Austria	25	48	44	68	89	112	132	163	192	29
Belgium	7	16	16	24	31	32	49	60	65	32
Canada	93	142	139	196	260	315	372	439	473	23
Czech Republic	7	13	12	20	30	43	61	68	84	36
Denmark	7	15	14	29	37	38	49	61	74	34
Finland	17	26	26	32	42	51	61	72	76	21
France	29	121	118	149	194	210	237	261	299	34
Germany	52	203	193	326	455	515	587	683	792	41
Greece	13	35	34	52	58	64	66	73	77	25
Hungary	25	39	38	44	60	67	79	87	95	18
Iceland	3	3	2	5	5	8	10	15	15	22
Ireland	2	9	9	12	12	12	20	28	38	44
Italy	23	80	78	133	219	248	273	295	317	39
Japan	115	173	165	197	252	339	409	439	473	19
Korea	38	117	112	260	342	329	415	444	466	37
Luxembourg	1	5	5	6	7	9	11	11	11	35
Mexico	35	52	50	69	84	89	102	108	119	17
Netherlands	28	59	55	85	126	152	186	230	260	32
New Zealand	4	24	24	35	43	54	55	72	81	46
Norway	5	8	8	22	30	33	41	48	54	35
Poland	5	27	27	70	126	164	203	294	379	72
Portugal	4	15	15	25	25	25	27	33	38	32
Slovak Republic	8	12	12	15	22	26	31	34	40	22
Spain	8	29	28	57	101	121	145	167	179	47
Sweden	19	38	36	51	74	91	116	141	165	31
Switzerland	19	51	47	77	113	128	146	174	197	34
Turkey	8	32	28	51	75	88	100	120	140	43
United Kingdom[1]	82	173	167	236	336	419	535	646	732	31
United States	1 627	3 475	3 280	4 879	6 342	7 306	8 119	8 995	9 698	25
OECD	2 355	5 200	4 935	7 419	9 845	11 381	12 962	14 625	16 031	27
EU-15	317	872	838	1 285	1 806	2 099	2 494	2 924	3 315	34
RoW	544	1 125	1 063	1 553	2 121	2 618	3 123	3 747	4 420	30
Total	2 899	6 325	5 998	8 972	11 966	13 999	16 085	18 372	20 451	28

1. UK data points include data reported under GB.

Note: Data are for November of each year.

Source: Tom Vest (Packet Clearing House www.pch.net) from raw data generated by the University of Oregon Route Views project.

StatLink http://dx.doi.org/10.1787/011563656178

Table 5.13. **Routed IPv4 addresses by country, 1997-2005**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1997-2005
Australia	18 197 869	19 808 634	19 779 194	36 810 256	51 587 719	34 485 920	35 200 460	37 018 673	39 664 028	10.2
Austria	1 572 352	2 052 352	2 023 424	3 209 729	4 501 392	5 091 328	5 302 016	6 284 032	8 660 736	23.8
Belgium	274 688	173 056	173 056	460 544	666 624	907 520	1 195 776	1 470 496	2 226 992	29.9
Canada	42 856 129	29 748 102	28 893 830	32 232 320	32 984 748	34 265 372	34 582 521	36 708 912	58 391 616	3.9
Czech Republic	384 000	444 672	436 480	591 104	697 088	768 000	1 049 856	1 591 872	2 471 168	26.2
Denmark	975 104	1 300 225	1 292 033	1 537 152	1 912 256	2 156 928	1 976 832	2 329 088	2 842 880	14.3
Finland	5 651 712	6 263 476	6 263 476	6 740 900	6 936 564	7 030 109	7 913 216	8 677 120	9 597 952	6.8
France	17 915 616	24 969 338	24 967 290	25 459 588	26 099 709	26 387 996	28 843 944	31 818 304	35 516 193	8.9
Germany	39 405 971	43 203 812	43 010 532	47 474 948	52 440 195	50 455 336	50 640 603	54 146 634	60 272 657	5.5
Greece	624 128	852 480	844 032	1 101 568	1 315 584	1 442 816	1 371 648	1 654 272	1 722 496	13.5
Hungary	704 128	867 594	858 634	968 192	1 194 624	1 250 432	1 388 544	1 885 440	1 730 816	11.9
Iceland	202 752	280 064	279 552	320 768	341 248	386 816	412 672	510 976	559 872	13.5
Ireland	98 560	143 424	143 424	238 464	182 784	245 760	352 000	678 400	1 477 888	40.3
Italy	1 678 080	10 157 569	10 141 185	12 677 120	14 482 496	15 336 192	16 030 720	14 902 784	14 951 936	31.4
Japan	34 235 817	36 440 724	36 125 076	38 415 984	49 213 357	60 322 163	67 593 600	95 834 256	108 666 249	15.5
Korea	6 913 280	11 613 380	10 401 220	17 723 936	23 397 244	26 903 137	32 004 359	36 694 182	47 067 694	27.1
Luxembourg	73 728	48 640	48 640	50 944	76 800	82 176	126 208	163 328	186 112	12.3
Mexico	3 779 328	4 729 984	4 728 960	5 122 288	5 556 224	5 816 192	6 256 308	6 791 796	8 200 324	10.2
Netherlands	18 260 632	18 929 520	18 915 952	21 104 870	23 954 857	17 444 224	20 128 032	23 237 638	24 258 044	3.6
New Zealand	2 730 512	2 690 262	2 690 262	2 831 360	2 998 937	3 173 029	3 189 248	3 411 456	3 326 720	2.5
Norway	4 244 992	2 221 824	2 221 824	2 529 536	2 539 776	2 816 512	3 301 632	3 871 744	4 132 352	-0.3
Poland	500 224	1 799 936	1 799 936	2 361 856	2 933 760	3 555 584	4 020 480	6 730 024	7 585 024	40.5
Portugal	362 496	510 720	510 720	718 592	875 136	1 008 672	972 288	1 294 592	1 747 712	21.7
Slovak Republic	148 992	219 648	219 648	360 192	416 096	441 856	390 152	444 928	592 992	18.8
Spain	2 107 904	2 622 976	2 582 016	3 263 284	4 275 713	4 517 056	5 235 840	7 709 120	10 392 512	22.1
Sweden	2 881 792	3 710 832	3 707 984	4 530 853	5 424 138	5 957 920	6 580 748	9 418 272	10 490 413	17.5
Switzerland	4 075 008	4 565 568	4 462 336	5 253 444	5 939 488	6 459 936	6 571 136	8 166 272	8 744 708	10.0
Turkey	824 832	18 117 632	1 311 744	1 622 528	1 728 000	1 943 552	2 412 800	2 679 040	3 986 176	21.8
United Kingdom[1]	17 942 661	37 882 584	37 592 008	38 465 969	22 006 584	25 248 752	33 031 466	38 211 824	43 372 386	11.7
United States	726 156 894	727 832 576	717 022 860	784 392 573	839 325 273	804 889 773	856 639 878	908 083 464	923 453 218	3.1
OECD	955 780 181	1 014 201 604	983 447 328	1 098 570 862	1 186 004 414	1 150 791 059	1 234 714 983	1 352 418 939	1 446 289 866	5.3
EU-15	109 825 424	152 821 004	152 215 772	167 034 525	165 150 832	163 312 785	179 701 337	201 995 904	227 716 909	9.5
RoW	71 359 616	85 416 440	83 985 656	116 498 796	161 297 791	166 926 800	173 431 978	238 562 804	288 128 847	19.1
Total	1 027 139 797	1 099 618 044	1 067 432 984	1 215 069 658	1 347 302 205	1 317 717 859	1 408 146 961	1 590 981 743	1 734 418 713	6.8

1. UK data points include data reported under GB.

Note: Data are for November of each year.

Source: Tom Vest (Packet Clearing House www.pch.net) from raw data generated by the University of Oregon Route Views project.

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Table 5.14. **Average routed IPv4 addresses per AS by country, 1997-2005**

	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1997-2005
Australia	395 606	123 804	129 276	189 744	202 305	117 699	108 309	101 700	98 667	-15.9
Austria	62 894	42 757	45 987	47 202	50 577	45 458	40 167	38 552	45 108	-4.1
Belgium	39 241	10 816	10 816	19 189	21 504	28 360	24 404	24 508	34 261	-1.7
Canada	460 819	209 494	207 869	164 451	126 864	108 779	92 964	83 619	123 450	-15.2
Czech Republic	54 857	34 206	36 373	29 555	23 236	17 860	17 211	23 410	29 419	-7.5
Denmark	139 301	86 682	92 288	53 005	51 683	56 761	40 344	38 182	38 417	-14.9
Finland	332 454	240 903	240 903	210 653	165 156	137 845	129 725	120 516	126 289	-11.4
France	617 780	206 358	211 587	170 870	134 535	125 657	121 704	121 909	118 783	-18.6
Germany	757 807	212 827	222 852	145 629	115 253	97 972	86 270	79 278	76 102	-25.0
Greece	48 010	24 357	24 824	21 184	22 682	22 544	20 783	22 661	22 370	-9.1
Hungary	28 165	22 246	22 596	22 004	19 910	18 663	17 577	21 672	18 219	-5.3
Iceland	67 584	93 355	139 776	64 154	68 250	48 352	41 267	34 065	37 325	-7.2
Ireland	49 280	15 936	15 936	19 872	15 232	20 480	17 600	24 229	38 892	-2.9
Italy	72 960	126 970	130 015	95 317	66 130	61 839	58 721	50 518	47 167	-5.3
Japan	297 703	210 640	218 940	195 005	195 291	177 941	165 266	218 301	229 738	-3.2
Korea	181 928	99 260	92 868	68 169	68 413	81 772	77 119	82 645	101 004	-7.1
Luxembourg	73 728	9 728	9 728	8 491	10 971	9 131	11 473	14 848	16 919	-16.8
Mexico	107 981	90 961	94 579	74 236	66 146	65 350	61 336	62 887	68 910	-5.5
Netherlands	652 165	320 839	343 926	248 293	190 118	114 765	108 215	101 033	93 300	-21.6
New Zealand	682 628	112 094	112 094	80 896	69 743	58 760	57 986	47 381	41 071	-29.6
Norway	848 998	277 728	277 728	114 979	84 659	85 349	80 528	80 661	76 525	-26.0
Poland	100 045	66 664	66 664	33 741	23 284	21 680	19 805	22 891	20 013	-18.2
Portugal	90 624	34 048	34 048	28 744	35 005	40 347	36 011	39 230	45 992	-8.1
Slovak Republic	18 624	18 304	18 304	24 013	18 913	16 994	12 586	13 086	14 825	-2.8
Spain	263 488	90 447	92 215	57 251	42 334	37 331	36 109	46 162	58 059	-17.2
Sweden	151 673	97 653	103 000	88 840	73 299	65 472	56 731	66 796	63 578	-10.3
Switzerland	214 474	89 521	94 943	68 227	52 562	50 468	45 008	46 933	44 389	-17.9
Turkey	103 104	566 176	46 848	31 814	23 040	22 086	24 128	22 325	28 473	-14.9
United Kingdom	218 813	218 974	225 102	162 991	65 496	60 260	61 741	59 151	59 252	-15.1
United States	446 316	209 448	218 605	160 769	132 344	110 168	105 511	100 954	95 221	-17.6
OECD	405 851	195 039	199 280	148 075	120 468	101 115	95 257	92 473	90 218	-17.1
EU-15	346 452	175 253	181 642	129 988	91 446	77 805	72 053	69 082	68 693	-18.3
RoW	131 176	75 926	79 008	75 015	76 048	63 761	55 534	63 668	65 188	-8.4
Total	354 308	173 853	177 965	135 429	112 594	94 129	87 544	86 598	84 809	-16.4

Note: Data are for November of each year.

Source: Tom Vest (Packet Clearing House www.pch.net) from raw data generated by the University of Oregon Route Views project.

StatLink http://dx.doi.org/10.1787/011621046885

Table 5.15. **Top 10 networks defined by number of peers, 2004-2006**

	Top 10: September 2004		Top 10: August 2006	
Rank	Network	Peers	Network	Peers
1	UUNET Technologies, Inc.	2347	UUNET Technologies, Inc.	2402
2	AT&T WorldNet Services	1902	AT&T WorldNet Services	2025
3	Sprint	1732	Sprint	1720
4	Level 3 Communications, LLC	1171	Level 3 Communications, LLC	1302
5	Qwest	1092	Cogent Communications	1210
6	Verio, Inc.	636	Qwest	1176
7	Cogent Communications	623	Global Crossing	739
8	Global Crossing	597	Time Warner Telecom, Inc.	715
			Abovenet Communications, Inc	701
9	Abovenet Communications, Inc	549		
10	Globix Corporation	533	SBC Internet Services	655
	Top 10	11182	Top 10	12645
	Others	67680	Others	81993
	Total peering	78862	Total peering	94638

Source: FixedOrbit (www.fixedorbit.com).

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Chapter 6

Broadcasting

Markets for broadcasting are changing constantly. In many countries, the switchover from analogue to digital broadcasting is now taking off. People are able to receive audio-visual content through a number of different networks on a variety of devices. This chapter examines some of the main developments that are currently shaping broadcasting markets and will continue to do so in the next few years. It discusses technological developments, the availability and uses of content and channels, market structure and regulation. The chapter concludes by identifying some of the main challenges in this fast-changing landscape, for both regulators and market players.

Introduction

Markets for broadcasting are undergoing constant change. In many countries, the switchover from analogue to digital broadcasting is now taking off. People are able to receive audio-visual (AV) content through a number of different networks (satellite, cable, terrestrial, UMTS, IPTV, DVB-H) on a variety of devices (including PCs, mobile telephones and other portable devices). The convergence of telecommunications and broadcasting, made possible by digitalisation, has resulted in a number of commercial offers of which the triple- (or multiple-) play strategies of telecommunications and cable companies are among the most prominent.

Traditional public and commercial broadcasters are facing audience fragmentation and have to diversify their offer in order to retain a sufficiently large audience, either by starting new digital channels themselves or by expanding to new platforms such as broadband Internet and mobile phones. New players are entering the broadcasting markets, such as IPTV operators, ISPs and network operators, with a range of digital television channels and online video services. In addition to the traditional broadcasters and channel operators that produce, commission or buy programmes, schedule programmes and transmit them to viewers, a number of other players now offer a variety of linear (traditional scheduled TV services) and non-linear (on-demand commercial content and content on the Internet) AV services. This leads to shifting market definitions and boundaries, both technologically and economically, and to debate about how traditional broadcasting policies and regulations should respond.

This chapter examines some of the main developments that are currently shaping broadcasting markets and will continue to do so in the next few years. First, it discusses technological developments such as the market penetration of different broadcast networks and the digitalisation of these networks, the availability and uses of content and channels, the market structure and regulation. The chapter concludes by identifying some of the main challenges in this fast-changing landscape, both for regulators and market players.

Market penetration of distribution platforms and digitalisation

Television households and broadcast distribution platforms

In most countries, the number of terrestrial-only households dropped over the last decade, from 52% in 1995 to 35% in 2002 (*OECD Communications Outlook* 2005, p. 202) and has continued dropping in most OECD countries for which data are available. At present, the majority of TV households in OECD countries have access to multichannel networks, such as cable and satellite or digital terrestrial television.

Tables 6.1 and 6.2 contain data from a number of OECD countries on the composition of television households by distribution platform during the period 1995-2005.

The data illustrate the vast differences between the dominating distribution platforms in each country. Terrestrial television remains the main platform for Italy (84% in 2005), Spain (88% in 2005) and the Czech Republic (71% in 2005). By contrast, in 2005, in Belgium (88%), Korea (77%), the Netherlands (92.3%) and Switzerland (89.9%), cable represents the main distribution platform. The only country where DBS is the main distribution platform is Austria (52%).

Table 6.3 contains data from a number of OECD countries on cable television penetration during the period 2000-05. Overall, the data indicate an increase in terms of both cable availability and cable subscribers. Although the largest increases in terms of cable penetration have been registered in Korea and Mexico, other countries scored significant increases in the number of cable subscribers, among them, most notably, Spain and Portugal, where the increase exceeded 50%. The only countries to have registered a fall in the number of cable subscribers since 2000 were Austria (after an initial growth from 1995 to 2002), Ireland (despite increased cable penetration over the same period) and the United States. After a steady growth in the number of households that subscribed to cable in the United States, this number started to decline in 2001. The number of so-called "pay units" (*i.e.* individual premium services) per household in the United States increased from 2.3 to 3.5, a rise of 52%, between 2000 and 2005. During this same period, even though the number of cable households declined, cable revenues increased by 64%.

Saturated cable markets include Belgium, the Netherlands and, to a lesser extent, Korea, indicating that the cable television market retains at least the potential for growth in most OECD countries over the coming years. Although cable dominates the subscription television market, the market share of satellite is growing.

According to OECD data, cable is still the main multi-channel network in the majority of OECD countries. Only in Austria, Italy, Sweden, Turkey and the United Kingdom is satellite the dominant multi-channel network. Data from the European Audiovisual Observatory (EAO) and the European Commission (EC) both confirm the dominance of cable.

In several countries DBS has proved to be one of the more dynamic and consistent growth markets. With 27.2 million households subscribing in 2005, the US market has more than quintupled since 1997 and increased 1.5 times since 2001 (Table 6.4). In Korea, it grew from 3% in 2003 to 10% by 2005; in Ireland, it grew from 9% in 1995 to 28% in 2005; and in Austria, from 37% in 1995 to 52% in 2005. According to the European Audiovisual Observatory the penetration of satellite also showed substantial growth in Belgium (with 33.3%), the Netherlands (with 23.8%), Finland (with 20.9%) and Turkey (with 19.6%). In most countries this meant a decrease in the number of terrestrial households, but in countries like Ireland, Austria and the United States, the number of cable households suffered as well. The growth of satellite does not hold for all countries. After a period of growth from 1995 to 2000, the number of satellite households decreased in Denmark and Spain. In Hungary satellite's share of television households declined from 23% in 1995 to 13.4% in 2005. Nonetheless, as noted below, the satellite market in OECD countries shows great potential.

Digitalisation of broadcast distribution networks

Table 6.4 shows that digitalisation is taking off significantly. For the OECD countries for which data are available, the average of digital television households was 14.6% in 2001, excluding the United States, and 20%, including the United States. According to EAO data the EU25 average for digital television households was 17.3% in 2003 and 23.2% in 2005. The United Kingdom leads with 61%.

As in 2001 and 2003, satellite was the leading platform for digital television distribution in the OECD countries in 2005. In 17 countries the majority of the households that receive digital television access it through satellite. In Austria, Greece, Luxembourg, Turkey, the Czech Republic (98%) and Poland (98%), satellite even has a (near) 100% market share in the digital television market. Cable is the dominant digital platform in Belgium and Switzerland, and only in Finland does digital terrestrial television (DTT) hold the largest market share. Although digital television households in OECD countries predominately rely on satellite, the market share of cable and/or DTT is growing in several countries: the United Kingdom (DTT), Sweden (DTT), Spain (cable), Portugal (cable), Norway (cable), the Netherlands (cable) and Ireland (cable).

There are different ways of offering television through the Internet. Television can be made available to all on the World Wide Web in streaming or downloadable formats, or it can be provided by multicast through a closed network over a dedicated part of the network to subscribers as IPTV. In this mode it is similar to cable television's offer.

The roll-out of (broadcast) television via Internet Protocol (IPTV) is still in its infancy. According to a 2005 Idate report on IPTV, there were 2.5 million IPTV households worldwide.[1] Europe was home to 1 million IPTV households, with France and Italy the most dynamic markets. Although Korea and Japan are among the leading countries worldwide in broadband access, IPTV is lagging behind in these markets. This is partly due to regulatory difficulties in obtaining IPTV licences in these markets.

The growth of digital terrestrial television and IPTV will further enhance competition between infrastructures. In certain densely populated areas, industrial zones fibre, Wi-Fi and WiMax might also offer (sometimes additional) possibilities.

The analogue switch-off

All OECD member countries have published their plans concerning analogue switch-off, *i.e.* the termination of the transmission of the analogue terrestrial signal. Most EU member states have followed the European Commission's (EC) recommendations, published in May 2005, to phase out analogue terrestrial broadcasting by 2012, and some (*e.g.* Germany, the Netherlands) have already started this process.

As Table 6.5 shows, the first countries to offer DTT were Germany, the United Kingdom and the United States in 1998. By 2006, with the exception of Norway, Poland, Portugal, Ireland and Turkey – the last two are running pilots at the moment – all countries have started transmission of DTT.

Since September 2006, Luxembourg (with more than 95% cable households) is the first country to have completed the switch-off process. Using the date set by the EC of 2012 as a benchmark for the switch-off deadline, it is possible to categorise countries according to their plans as fast, medium or slow. The first group will terminate the analogue signal before 2010 and includes countries such as the Netherlands (2006), Finland (2008), Italy (2008), Switzerland (2008), Denmark (2009), Norway (2009) and the United States (2009). The second, and largest group, will terminate analogue terrestrial broadcasting between 2010 and 2012 and includes countries such as the Czech Republic, France, Germany, Ireland, Portugal, the Slovak Republic, Japan, Australia, Spain, Korea, Hungary and Belgium. The last group has planned the switch-off between 2012 and 2015 and includes Greece, New Zealand, Poland, Turkey and the United Kingdom.

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Only two countries, Luxembourg and Canada, have explicitly mentioned the market as the defining parameter for the date of the switch-off. In Canada the analogue terrestrial signal will be terminated when more than 85% of the households have access to DTT.

OECD countries have different strategies for the analogue switch-off. Germany (where Berlin terminated the transmission of the analogue terrestrial signal in 2003), while the United Kingdom and the Czech Republic use a phased approach per region. Other countries, like Finland and Denmark, have planned a general, national switch-off.

A couple of countries have altered their original plans. Greece, Italy and the United States have changed their target date for switching off analogue TV. In the United States the market had not met a number of criteria that had been put forward for the original deadline set for 2006. Other countries have brought the date forward, like the Slovak Republic, Spain and the Netherlands.

As discussed above, the number of households with digital television in OECD countries has increased in the last couple of years and the switch-off dates for analogue terrestrial television are coming closer. The penetration of DTT, however, is still lagging. In nine of the OECD countries where terrestrial television is the most important distribution platform, the penetration of DTT is less than 10%. Terrestrial television households are 88% in Spain, 87.6% in and 84% in Italy. In France, with 62% terrestrial television households (see Tables 6.1 and 6.4), only 11% of digital television households had DTT in 2005. Meeting the target date for analogue switch-off may be problematic in some countries with a high percentage of terrestrial television households that need to convert their equipment. Countries that have set a switch-off date for the next few years include Turkey (2008), Finland (2009), Greece (2010) and France (2010-11).

Channel and content availability

Channel availability

There were 141 national free-to-air (FTA) terrestrial channels (both public and private) in 23 OECD countries in 2006 (Table 6.6). The number of FTA channels per country ranges from two in the Slovak Republic to 27 in Turkey.

Surveys from the OECD and the European Audiovisual Observatory show the enormous growth in channel offerings in OECD countries through cable and satellite. According to the European Audiovisual Observatory, the total number of national channels in all the European OECD countries (including channels available through cable and satellite) rose from 816 in 2004 to 1 165 in 2006; an increase of 43%. The same report registered 35 pay-per-view (PPV) channels. The number of channels available via satellite and cable ranges from on in Iceland to 306 in the United Kingdom. Information available on 11 OECD countries (including Canada, Korea, Mexico and New Zealand) shows that the number of channels available via satellite almost doubled in comparison to 2005. Especially in Canada, the United States and New Zealand the number of available channels has grown substantially.

Although the number of channels available across all platforms keeps rising, available Nielsen Media Research information indicates that in the United States, on average, 15 channels per week were actually watched. Nonetheless, the availability of premium channel television packages has caused a decline in the FTA market share. With a share of 47% of the prime-time audience in 2006, the broadcasting networks lost 1% (or 3%, if calculated as an all-day audience share) during the 2004-05 television season.

Audience shares of public service broadcasters

Table 6.7 provides data on the daily audience shares of public service broadcasters (PSB) for 21 European OECD countries (with separate data for different language groups in Belgium and Switzerland, for a total of 24 cases)[2] for the period 1999-2004; for the United States (data up to 2006); and for the remaining OECD countries (data up to 2002).

In most of the European countries, the audience share of the PSB ranges between 35 and 50%. The Turkish PSB, with only a 7.1% audience share, scores lowest, and Poland, with 51.9%, highest. In 11 of the 24 European cases, the share of the PSBs has been declining since 1999, the losses ranging from 1.6 percentage points in the Czech Republic, to 8.4 percentage points in Ireland. In 13 cases, the audience share increased, with Flanders (Belgium) on top with a 9 percentage point increase. In half of the countries these data were not the result of a regular, consistent development. In Turkey and Finland, for example, the data show a growth of audience share between 1999 and 2004, but a decline between 2002 and 2004. By 2004, in the Czech Republic and Ireland the PSB had lost their daily audience share compared to 1999, but the data actually increased if compared to 2002. In the United States, PSB only has a 2% share of the daily audience.

In multi-channel households and in countries with a high number of local commercial channels, PSBs audience shares are lower than in countries where a substantial number of households still depend on analogue terrestrial television; where a limited number of channels is available; or in less competitive national markets.

Enhanced, personalised and interactive television services

Digitalisation also enables numerous additional services. Among them, services that enlarge viewers' choice and allow them to manage the selection and scheduling of programmes according to their own preferences, such as electronic programme guides (EPGs); Delay TV and video on demand (VoD) services; and a variety of interactive services, such as voting for candidates in TV contests, or participating in TV quiz shows by pressing the red button on the remote control. An indication of the impact this trend might have are the data on market penetration of hardware that enables viewers to manage their own programme schedules (*e.g.* PVRs, the new generation of set-top boxes with hard disks and Media Centres that integrate TV and PC/Internet, as well as devices such as Slingbox which allow viewers to shift their viewing geographically). These devices enable the use of on-demand services and Electronic Programme Guides for delayed viewing; as well as the use of interactive services and targeted advertising.

With respect to VoD and PVRs, the United States is ahead of Europe. In Europe as a whole, PVRs are not yet widely available, except in the United Kingdom. As of early 2005, 770 000 UK households were equipped with a PVR[3] compared to fewer than 1.5 million in Europe as a whole. For the United States, Nielsen Media Research reported that 11% of TV households were equipped with a PVR as of the end of 2006. In these households, a substantial amount of television programmes is no longer watched in real-time but deferred or recorded.

A commercial challenge for providers of digital television and other audio-visual content lies in the fact that technologies such as PVRs and EPGs enable a more individualised viewer experience, as well as the option to skip commercials. This endangers current models for commercial broadcasting based on advertising. In addition to licence fees (in the case of PSBs) or advertising, other revenue streams may need to be generated, such as "smart" forms of advertising (in-script, product placement) and income

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from pay-per-view services or subscriptions. By adding interactivity to TV programmes, revenues can also be generated via text message or telephone responses, or by enhancing the core audio-visual production into a whole world of related products, such as websites, communities, merchandising, SMS traffic, ringtones and fan magazines. Some of these complementary services will provide added revenues.

A recent trend is the enormous popularity of user-generated content on websites like YouTube, Hyves, MySpace and Google Video. Users, especially young people, engage in sharing pictures and video clips, in rating and tagging the clips, and in remixing material for their own purposes. Because the platforms are immensely popular, they are developing into an interesting channel for advertisers. Like sharing music, software and film through P2P networks, user-generated content is now another important driver behind the further uptake of broadband Internet and 3G mobile telephony. A large part of all Internet traffic is now taken up by audiovisual content and there is increasing demand for higher bandwidth, both upstream and downstream.

Tests with high definition television (HDTV) started decades ago, but the first market launches only took place in the late 1990s. Some countries, such as the United States, offer terrestrial HDTV, while others use satellite or cable. In addition, DTT does not always include high definition TV. In Japan, the United States, Canada, Korea, Australia, France and the United Kingdom there are a number of full HDTV channels; in most other OECD countries HDTV productions and broadcasts are still limited to a number of individual programmes and events (*e.g.* sports events). Satellite, and to a much lesser extent cable, are the most suitable platforms for transmitting HDTV programmes. The amount of spectrum required means that HDTV may not be suitable for DTT in all countries or xDSL networks. In combination with the availability of flat screen television sets and HD DVDs, HDTV could become one of the drivers behind further growth in pay television services.

Television viewing time

Table 6.8 illustrates the evolution in television viewing time in a number of OECD countries over the period 1997-2005. In spite of increasing competition in terms of the multiplication of the platforms on which similar audio-visual content is offered, and more customised viewing options, the data do not allow concluding that broadcast television has lost its appeal. Worth noting, however, is a certain amount of fluctuation in the amount of viewing time over the period. For most countries the net amount of time dedicated to television viewing has increased over the observed period (with the exception of New Zealand, Spain and Korea). In the United States, a country with television viewing time more than twice that of other OECD countries, the amount of time dedicated to this activity increased between 1997 and 2005.

Television is still the most used medium and, according to a 2005 IDATE report, towards the end of 2004, Europeans were devoting 33% of their media time to television, compared to 20% for the Internet,[4] Especially among the younger generation, however, the time spent on prime-time television viewing is dropping, while Internet usage (and multi-tasking) is increasing.

The Internet is also increasingly used for audio-visual entertainment activities. While still primarily a communication tool used for e-mailing and searching for information, the increased availability of broadband Internet is transforming it into a network for gaming, downloading and sharing music; and also for watching and sharing pictures and videos or television services.

Changes in market structure

Revenues in broadcasting markets

OECD revenue data for broadcast markets are incomplete. IDATE has concluded (Table 6.9) that in the European Union both private and state-funded television channels show weak average annual growth.[5] Private channels saw an improved profit margin. Dedicated television channels have witnessed strong growth in operating revenues but are still not very profitable. Channel packagers saw revenue increases and deficit reductions. The television sector remains financed mainly by advertising or state funding in the case of public service channels. This share has dropped, and the share of channel packagers and themed and shopping channels has increased.

In Table 6.10 ZenithOptiMedia (2004) shows how the share of advertising on television, radio, the Internet and billboards has increased since 2000, while the share of advertising in print media has diminished. For 2006 and 2007, it forecasts a continuation of this trend and an increase of approximately 4-5% in the total spending on advertising.

New entrants and more competition

Digitalisation enables more efficient use of networks. That, in turn, opens up bandwidth to allow more channels, as well as the possibility of high definition television (HDTV), on-demand services such as near video on demand (NVoD), video on demand (VoD), IPTV, vlogs (video blogs), video podcasts, streaming and downloadable television programmes, personalised television platforms and audio-visual online reality shows. The competition between existing players and new market entrants is intense. General-interest channels have to compete with new players offering specific niche and themed channels. New players now also include network operators, ISPs, Internet companies, computing companies and search engines, all attempting to increase their customers' loyalty by offering video content. They also include advertisers trying to link their brand name to particular types of content. The number of households connected to broadband Internet continues to grow. This enables people to watch video material over the Internet – paid content as well as an increasing amount of video content available free of charge. All market players are competing for the same audience's viewing time, advertising budgets or other sources of revenue.

Networks are becoming interchangeable because IP makes it possible to transmit text, audio and video content over any network. This has led cable companies to offer Internet and VoIP services over their networks and telecommunication operators to introduce audio-visual services, starting with video-on-demand, and gradually expanding their offer to full television packages through IPTV. This strategy of service bundling, labelled triple or multiple play, enhances considerably the possibilities for competition between networks. It leads to horizontal markets in different devices. It also enables two-way interaction and communication. On the other hand, bundling strategies can also lead to a lock-in for consumers and make it more difficult to switch from one network provider to another.

Regulation

Broadcasting regulations can be broadly divided into requirements for obtaining broadcast licences (including ownership regulation) and spectrum capacity; obligations concerning the content of broadcast programmes, such as the obligation to provide a certain percentage of national programming or certain types of programmes (news,

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children's programmes, etc.); and restrictions, concerning for instance advertising or public decency. Broadcasting services have usually been subject to stricter regulations than other audio-visual services or media types, first, because of the scarcity of broadcast spectrum, and, second, because of the impact radio and television can have on society and their importance for democracy. A range of new audio-visual services have become available over digital distribution networks and the Internet. As a result, a key regulatory issue regarding this market arises: namely, whether these services should be considered as broadcasting services, thus falling under the jurisdiction of media regulators; or as communication services, thus falling under the jurisdiction of telecommunications regulators; or, finally, as information society services.

Definition of broadcasting

The legal definitions of broadcasting in OECD countries show some variation (Table 6.11). One definition of broadcasting is formulated as follows: "any transmission of radio and television programme signals that can reach a general audience"; other definitions are phrased in similar terms. Encrypted or encoded signals (for pay television channels) are, in most countries, except Mexico and the United States, included in this definition. On-demand services – where viewers can choose individual programmes that are then transmitted one-to-one, and for which they are usually billed separately – are often excluded from the definition of broadcasting.

However, the distinctions between both domains are not always clear and vary among OECD countries. Table 6.11 shows the variation in definitions and services subject to regulation. In Canada, video on demand (VoD) is considered to be broadcasting if the service is provided by a broadcasting distribution undertaking, but not when the service is delivered over the Internet. In the first case, the service provider is required to hold a broadcasting licence.

In France and Spain, VoD is exempt from regulation. In Germany, the legal definition of a VoD service as a broadcasting or as a licence-free *telemedia* does not depend on the nature of the transmission (and is thus technology neutral), but on its content and relevance for opinion forming. In the United Kingdom, VoD services are not considered to be broadcasting, but are still subject to a light form of self-regulation. VoD services are overseen in the United Kingdom by a self-regulatory body called the Association for Television on Demand (ATVoD).

Ireland, Norway, Poland, New Zealand, Portugal, Switzerland, Turkey and the United Kingdom exclude the Internet, television services on mobile phones, or IP-based audio-visual services from their broadcasting regulation. IP-based services are considered to be telecommunication services, since they are only available "on demand", though in some countries this is currently under review (Portugal). The current UK Communications Act largely excludes from statutory regulation linear video services transmitted over the Internet, unless they satisfy the definition of a "Television Licensable Content Service" (TLCS). The definition for TLCS is intended to cover only services which are broadly identical to broadcast television. This definition leaves some room for interpretation whether IPTV services are identical to broadcast television or not.

IPTV is in some countries considered broadcasting if the broadcasting stream can be received by all viewers at the same time, and is thus similar to terrestrial cable, and satellite broadcast services. In Spain, no licence is required for IPTV, but content regulation applies.

Formulating a clearer and harmonised definition of what constitutes services subject to European regulations on broadcasting is one of the main challenges of the current revision of the European Union's Television without Frontiers Directive (TWF).

The TWF Directive contains definitions and minimum requirements that member states of the European Union have to include in their national legislation. Member states may lay down more detailed or stricter rules for broadcasters under their jurisdiction. This has resulted in considerable variation between EU member states concerning content regulations and restrictions placed on advertisements. The EC proposals of December 2005 for a review of the TWF attempt to harmonise definitions of audio-visual media services (the so-called non-linear or on demand services) and to modernise the current TV broadcasting regulation (linear services), thereby providing more legal certainty to stakeholders and contributing to more uniform regulations within the European internal market. The EC proposes to distinguish between linear and non-linear services. Linear services are services for which the broadcaster non-linear services are services for which the viewer has a greater degree of control over the moment of reception.

The most important current provisions of the TWF Directive are as follows:

- Protection of minors and public decency:

  Programmes which might seriously impair the physical, mental or moral development of minors are prohibited, in particular programmes that involve pornography or gratuitous violence. Those which might simply be harmful to minors, when they are not encrypted, must be preceded by an acoustic warning or made clearly identifiable throughout their duration by means of a visual symbol.

  Broadcasts must not contain any incitement to hatred on grounds of race, sex, religion or nationality.

- European, independent and recent productions:

  Where practicable and by appropriate means, EU member states shall ensure that broadcasters forming part of a national network ensure that:

  - European production account for over 50% of the transmission hours of each broadcaster.
  - European independent productions account for at least 10% of transmission hours; of these, an "adequate proportion" must be works transmitted within five years of production.

  Excluded are:

  1. The time appointed to news, sports events, games, advertising and teletext and teleshopping.
  2. Broadcasters that serve a local audience and do not form part of a national network.

- TV advertising:

  The proportion of transmission time devoted to teleshopping spots, advertising spots and other forms of advertising, with the exception of teleshopping windows (including self-promotion and excluding public service messages and charity appeals), shall not exceed 20% of any given clock hour.

  The transmission time for advertising spots shall not exceed 15% of the daily transmission time.

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Must-carry

Must-carry obligations were originally included in legislation to guarantee that (privatised) network operators would carry channels considered to be of public interest on their networks. This was especially relevant for analogue networks with limited and usually scarce capacity. Increasing availability of bandwidth in digital networks and increasing competition between networks have raised the question of the extent to which must-carry provisions are still relevant. However, as scarcity is not merely a matter of technical availability but also an economic issue, governments have kept must-carry obligations in place. The result of increasing availability of network capacity is an ongoing debate as to whether must-carry obligations apply to analogue networks only, or also to digital networks. As the provisions originated in an era where the distinction was not yet considered, laws often do not make this explicit. A number of countries still see a role for "must carry" in order to achieve general interest objectives in audio-visual content (for example, media pluralism and cultural diversity).

As Table 6.12 shows, most OECD countries apply some form of must-carry regulation. Must-carry channels often include local, regional and public service channels. Must-carry as a general rule applies to infrastructures that attract a significant amount or percentage of viewers. As Table 6.12 shows, terrestrial networks have lost much of their former dominance. At present, in most countries must-carry rules apply to cable operators. In some countries they apply to terrestrial and/or satellite operators (Canada, France, Korea, the Slovak Republic and the United States).

Fourteen OECD countries have imposed "must list" rules for electronic programming guides on data licensees (Australia), electronic communication network operators (Belgium) or cable operators operating an EPG (Switzerland). The "must list" rules can be limited to PSB channels, to must-carry channels or to another selection of channels. In most countries, the rules are defined in general terms, such as "non-discriminatory access for broadcasters" and "accessibility for end-users to digital radio and television". Only three countries (Belgium, France and the United Kingdom) have must-offer obligations imposed on their PSBs.

Cross-media ownership

A considerable number of countries have limitations on the number of radio or television channels that one licensee can own, sometimes defined on a local level, sometimes on a regional or national level, sometimes for radio or television only, sometimes for both media types (Table 6.13). There are also cross-media stipulations in 21 OECD countries, which set restrictions on cross-media ownership by acquisition (usually not by autonomous growth). The purpose of these limitations is usually to guarantee content and diversity of opinion and to prevent any one licensee or media company from gaining too much influence over the content on offer in local, regional or national media markets across different media types. In the United Kingdom, the Netherlands, Austria, the Slovak Republic and Italy, media laws stipulate a maximum interest (in percentages) that a publisher of newspapers can have in television channels or *vice versa*. Some countries do not have such specific regulations but reserve the right to intervene should this represent a threat to freedom of expression and freedom of speech (Portugal in the case of television, Sweden). In other countries, decisions are taken on a case-by-case basis (Canada, Switzerland). Most European countries do not have any regulation limiting foreign ownership of national media. That is not the case in certain non-European countries such as the United States, Australia, Canada, Japan, Korea and Mexico. However, certain EU countries – Austria, Italy and Spain – set a number of limitations on non-EU foreign ownership of their national media.

Challenges

There are still a number of obstacles to further growth and to open and competitive digital television markets.

First, piracy of audio-visual material, including television broadcasts, through the Internet is increasing. It follows large-scale music piracy through peer-to-peer networks. Fear of piracy causes some reticence on the part of content rightsholders, especially as regards entering into deals with broadcasters, network operators or Internet companies that wish to make television programmes and audio-visual content available on the web.

Second, but related to the piracy threat, platform owners, broadcasters or other market players that want to offer television programmes on line or on digital television channels have difficulties in concluding copyright deals for these digital platforms. Content rights owners, broadcasters, packagers and network operators have sometimes conflicting interests or find it hard to conclude deals on sharing investments and revenues, especially as the exact size of costs and revenues of the different "television windows" is still not clear or certain.

Traditional market players sometimes fear that making their programmes available on digital channels and the Internet will cannibalise their current television offers and the underlying business model of selling advertising time on free-to-air television channels in return for viewers. At the same time they require new revenue streams so that they need to make their content available to new distribution platforms.

Third, the lack of standardisation in the middleware for end-user devices, such as set-top boxes for digital television, is considered as a bottleneck for the development of digital and interactive television services.

There is, finally, also some concern about the bundling strategies of incumbents, or dominant, network operators, as these might result in a lock-in for consumers and reduce competition. Apart from these obstacles there are a number of challenges, both for the traditional players on the broadcast market and for new entrants, such as developing new business models and responding to new and often unpredictable patterns of media use and consumption.

For traditional television companies, the main challenge lies in how to compete with new entrants that offer television or audiovisual content over IP networks and that enable more personalised, mobile and interactive viewing.

Network operators are among the new entrants to broadcasting markets. They have started acquiring their own television programmes, content for on-demand purposes, and advertising, instead of simply functioning as distribution platforms for broadcasters' channels. Increasingly, television production companies also enter into deals with network operators to make their archive content available or offer their programmes directly to viewers through the Internet, instead of indirectly through broadcasters' programme schedules. Finally, companies such as Yahoo!, YouTube and Google offer a platform for user-generated content. This is a relatively recent but fast-growing trend that encompasses phenomena such as vlogs, vodcasts and Internet communities or platforms such as MySpace, YouTube, MSN and Google Video. These allow users to upload, tag, rate

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and share audio-visual content. Companies such as YouTube, MSN and Google Video also offer regular television programmes in order to increase the popularity of their platforms. All these developments lead to more competition for the traditional players on the television market. It also means that new business models will have to be developed in order to generate revenues.

Regulators face the difficult task of striking the right balance between ensuring that markets remain free and open through network- and technology-neutral regulation and an appropriate level of consumer protection, with guarantees for media diversity, and other public and cultural values, as understood and defined by each country.

Notes

1. IDATE (2006), IPTV Markets, deployment and new services, Montpellier, France.
2. The OECD has 30 member countries, including 23 European countries. For some OECD countries no statistics were available. For Switzerland and Belgium separate sets of data were made available for their respective separate administrative and language regions.
3. IDATE (2005), "TV 2015. The future of TV financing in Europe", Montpellier, France, pp. 41-42.
4. IDATE (2005), "TV 2015. The future of TV financing in Europe", Montpellier, France.
5. IDATE (2005), "TV 2015. The future of TV financing in Europe", Montpellier, France.

Table 6.1. **Data on television, cable and home satellite usage, 1995-2005**

	Households (000)					Television-equipped households (000)					Cable television subscribers (000)					DBS subscribers (000)					"Terrestrial only" HH [(TV-equipped households) - (cable television subscribers) - (DSB subscribers)] (000)				
	1995	2000	2002	2003	2005	1995	2000	2002	2003	2005	1995	2000	2002	2003	2005	1995	2000	2002	2003	2005	1995	2000	2002	2003	2005
Australia	6 690	7 250	7 488	..	..	6 500	7 177	7 100	..	..	..	1 340	1 450	1 500	..	..	430	402	804	..	..	5 407	5 248	..	..
Austria	3 131	3 283	3 282	3 278	3 460	2 648	3 185	3 184	3 196	3 356	750	1 248	1 313	1 311	1 315	972	1 369	1 433	1 470	1 730	926	568	438	415	311
(Wallonia)	4 079	4 244	4 325	4 368	4 440	3 794	4 531	4 382	4 485	4 541	3 629	3 789	3 882	3 917	4 004	255	220	290	..	..	..	522	210	..	..
Canada	10 655	11 699	11 592	11 898	..	10 485	11 575	11 924	..	..	7 799	7 983	7 625	7 577	..	..	967	2 014	..	..	..	2 625	2 285	..	..
Czech Republic	3 880	3 822	4 054	..	..	3 213	4 425	4 439	3 091	3 263	475	536	656	720	760	..	..	470	..	177	..	..	3 313	..	2 326
Denmark	2 374	2 419	2 437	2 476	2 517	2 061	2 349	2 364	2 402	2 429	1 190	1 041	1 079	1 400	..	211	800	800	637	381	660	508	486	365	..
Finland	2 181	2 262	2 301	2 318	2 366	1 915	2 160	2 163	2 166	2 198	829	806	832	894	1 014	153	245	206	193	234	933	1 109	1 125	1 079	950
France	22 885	24 261	24 643	..	..	21 557	..	23 411	..	..	1 858	3 020	3 430	..	..	305	2 413	2 790	..	..	19 394	..	17 191	..	..
Germany	36 938	38 124	38 720	..	..	32 634	..	36 350	..	..	15 800	20 000	20 630	..	..	9 525	12 900	13 650	..	..	7 309	..	2 070	..	..
Greece	3 510	3 590	..	..	..	3 332	..	3 510	..	..	..	..	..	..	..	130	190	70	..	..	..	..	..	..	..
Hungary	3 795	3 751	3 780	..	3 860	3 773	..	3 700	..	3 744	1 381	1 607	1 727	..	2 123	859	..	827	..	425	1 533	..	1 146	..	1 196
Iceland	95	100	104	..	..	91	..	101	..	..	1	1	35	..	..	..	..	6	..	..	..	..	60	..	..
Ireland	1 123	1 287	1 328	1 382	1 454	991	..	1 300	1 338	1 427	480	630	552	533	569	90	150	272	345	393	421	..	476	460	465
Italy	21 168	21 176	..	22 187	22 772	16 091	..	20 900	22 076	22 658	..	60	80	86	110	479	2 350	2 550	2 408	3 500	..	..	18 270	19 582	19 048
Japan	44 108	47 419	48 638	49 261	50 382	35 377	37 274	37 953	38 157	37 512	11 005	18 705	23 332	24 684	27 440	9 430	13 068	13 761	14 039	14 220	14 943	5 501	860	0	0
Korea	12 958	15 443	16 489	16 988	17 656	14 517	15 113	15 854	16 380	17 640	7 053	9 992	11 435	13 524	13 495	..	..	539	1 318	1 826	..	..	3 880	1 537	2 319
Luxembourg	155	169	174	..	..	155	..	172	..	..	40	124	138	..	..	10	30	33	..	..	105	..	1	..	..
Mexico	18 500	23 485	24 672	..	25 803	16 000	21 031	23 093	..	23 920	1 250	2 283	2 480	..	..	..	668	980	..	..	..	18 081	19 633	..	..
Netherlands	6 559	6 954	7 041	..	..	5 850	..	7 000	..	..	5 842	6 200	6 500	..	..	294	330	500	..	..	0	..	0	..	..
New Zealand	1 260	1 422	1 458	1 482	1 535	1 145	..	1 330	..	..	2	21	27	..	..	..	217	391	442	563	..	..	911	..	..
Norway	1 845	1 923	1 981	..	..	1 582	..	1 980	..	..	677	823	840	..	..	232	530	510	..	..	673	..	630	..	..
Poland	13 050	13 130	13 132	..	..	11 996	..	12 125	..	..	2 719	3 539	3 529	..	..	..	2 500	2 500	..	..	..	..	6 096	..	..
Portugal	3 310	4 155	5 047	5 047	5 047	3 191	..	3 561	..	..	58	925	1 262	1 334	1 399	308	418	425	341	394	2 825	..	1 874	..	..
Slovak Republic	1 893	1 932	1,666	1,898	..	1 742	..	1 681	..	..	400	731	698	745	..	310	620	620	..	..	1 032	..	363	..	..
Spain	12 224	12 642	13 462	14 233	15 265	11 683	12 579	13 395	14 176	15 188	..	298	811	997	1 062	738	1 685	1 996	1 796	1 854	10 945	10 596	10 588	11 383	12 272
Sweden	4 087	4 363	4 449	4 407	4 400	3 368	4 045	4 057	4 075	4 131	1 875	1 770	2 200	..	300	705	1 050	1 090	..	..	788	1 225	767	..	..
Switzerland	2 970	3 153	3 035	..	..	2 435	2 661	2 760	2 778	2 682	2 325	2 629	2 739	2 745	2 739	210	295	850	..	..	0	0	0	..	..
Turkey	12 700	14 400	16 447	..	17 268	11 500	..	15 650	..	16 524	404	885	955	1 017	1 017	219	1 836	2 096	..	8 402	10 877	..	12 599	..	7 104
United Kingdom	23 302	24 900	25 200	25 400	25 400	20 736	24 100	24 500	24 700	24 900	1 423	3 562	3 357	3 303	3 319	3 610	4 624	6 290	6 893	7 666	15 703	15 914	14 853	14 504	13 915
United States	98 500	102 600	107 400	108 600	111 600	95 300	102 200	106 642	108 400	110 200	62 100	66 600	66 100	66 000	65 200	2 200	14 800	19 400	21 600	27 200	31 000	20 800	21 142	20 800	17 800
OECD	379 926	405 359	394 344	..	..	345 663	..	396 582	..	..	131 363	161 148	169 696	..	..	31 245	64 704	77 760	..	..	..	..	..	..	..

Source: OECD and ITU.

StatLink http://dx.doi.org/10.1787/011768380821

Table 6.2. **Composition of television households by distribution platform, 1995-2005**

Percentage

	1995			2000			2002			2003			2005		
	Cable television subscribers as a % of total TVHH	DBS subscribers as a % of total TVHH	"Terrestrial only" HH as a % of total TVHH	Cable television subscribers as a % of total TVHH	DBS subscribers as a % of total TVHH	"Terrestrial only" HH as a % of total TVHH	Cable television subscribers as a % of total TVHH	DBS subscribers as a % of total TVHH	"Terrestrial only" HH as a % of total TVHH	Cable television subscribers as a % of total TVHH	DBS subscribers as a % of total TVHH	"Terrestrial only" HH as a % of total TVHH	Cable television subscribers as a % of total TVHH	DBS subscribers as a % of total TVHH	"Terrestrial only" HH as a % of total TVHH
Australia	..	..	..	19	6	75	20	6	74	..	..	..	..	..	..
Austria	28	37	35	39	43	18	41	45	14	41	46	13	39	52	9
Belgium (Wallonia)	96	7	..	84	5	12	89	7	5	87	..	..	88	..	..
Canada	74	..	..	69	8	23	64	17	19	..	..	..	..	..	..
Czech Republic	15	..	..	12	..	..	15	11	75	23	..	..	23	5	71
Denmark	58	10	32	44	34	22	46	34	21	58	27	15	..	16	..
Finland	43	8	49	37	11	51	38	10	52	41	9	50	46	11	43
France	9	1	90	..	..	..	15	12	73	..	..	..	..	..	..
Germany	48	29	22	..	..	..	57	38	6	..	..	..	..	..	..
Greece	..	4	..	..	..	..	..	2	..	..	..	..	..	..	..
Hungary	37	23	41	..	..	..	47	22	31	..	..	..	57	11	32
Iceland	1	..	..	..	..	..	35	6	59	..	..	..	..	..	..
Ireland	48	9	42	..	..	..	42	21	37	40	26	34	40	28	33
Italy	..	3	..	..	..	..	0	12	87	0	11	89	0	15	84
Japan	31	27	42	50	35	15	61	36	2	65	37	0	73	38	0
Korea	49	..	..	66	..	..	72	3	24	83	8	9	77	10	13
Luxembourg	26	6	68	..	..	..	80	19	1	..	..	..	..	..	..
Mexico	8	..	..	11	3	86	11	4	85	..	..	..	..	..	..
Netherlands	100	5	0	..	..	..	93	7	0	..	..	..	..	..	..
New Zealand	0	..	..	..	..	..	2	29	69	..	..	..	..	..	..
Norway	43	15	43	..	..	..	42	26	32	..	..	..	..	..	..
Poland	23	..	..	..	..	..	29	21	50	..	..	..	..	..	..
Portugal	2	10	89	..	..	..	35	12	53	..	..	..	..	..	..
Slovak Republic	23	18	59	..	..	..	42	37	22	..	..	..	..	..	..
Spain	..	6	94	2	13	84	6	15	79	7	13	80	7	12	81
Sweden	56	21	23	44	26	30	54	27	19	..	..	..	7	..	..
Switzerland	95	9	0	99	11	0	99	31	0	99	..	..	102	..	..
Turkey	4	2	95	..	..	..	6	13	81	..	..	..	6	51	43
United Kingdom	7	17	76	15	19	66	14	26	61	13	28	59	13	31	56
United States	65	2	33	65	14	20	62	18	20	61	20	19	59	25	16

Note: "Terrestrial only" HH equals TVHH - (cable subscribers + home satellite antennas)

Source: OECD and ITU (see Table 6.1)

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Table 6.3. **Cable television: subscribers, households passed and penetration rate**

	Cable television subscribers (000)				Households passed by cable (%)				Households passed by cable which subscribe (%)			
	2000	2002	2003	2005	2000	2002	2003	2005	2000	2002	2003	2005
Australia	1 340	1 450	1 500	..	..	..	..	..	..	..	..	..
Austria	1 248	1 313	1 311	1 315	56	57	58	..	68	70	69	..
Belgium (Wallonia)	3 789	3 882	3 917	4 004	95	..	..	..	94	94	93	94
Canada	7 983	7 625	7 577	..	93	95	98	..	73	67	65	..
Czech Republic	536	656	720	760	..	27	27	24	14	16	..	80
Denmark	1 041	1 079	1 400	..	..	..	80	82	1	1	1	42
Finland	806	832	894	1 014	..	..	..	..	..	..	..	..
France	3 020	3 430	..	..	..	..	..	..	..	..	..	..
Germany	20 000	20 630	..	..	..	..	..	..	..	..	..	..
Greece	..	..	..	..	..	..	..	..	..	..	..	..
Hungary	1 607	1 727	..	2 123	..	..	..	0.8	..	..	..	0.69
Iceland	1	35	..	..	..	..	..	..	..	..	..	..
Ireland	630	552	533	569	76	75	72	94	64	55	53	40
Italy	60	80	86	110	..	..	..	..	..	..	..	..
Japan	18 705	23 332	24 684	27 440	39	48	50	..	..	..	..	55
Korea	9 992	11 435	13 524	13 495	..	72	106	119	..	96	75	64
Luxembourg	124	138	..	..	..	..	..	..	..	..	..	..
Mexico	2 283	2 480	..	..	9	15	..	19	..	..	..	..
Netherlands	6 200	6 500	..	..	..	..	..	..	..	..	..	..
New Zealand	21	27	..	..	..	..	..	..	..	..	..	..
Norway	823	840	..	..	..	..	..	..	..	..	..	..
Poland	3 539	3 529	..	..	..	..	..	34	..	..	..	..
Portugal	925	1 262	1 334	1 399	63	67	70	75	35	37	38	37
Slovak Republic	731	698	745	..	..	..	..	..				
Spain	298	811	997	1 062	0.25	0.43	0.45	0.57	0.09	0.14	0.15	0.15
Sweden	1 770	2 200	..	300	..	..	49	50	..	..	..	14
Switzerland	2 629	2 739	2 745	2 739	..	..	..	..	..	..	..	..
Turkey	885	955	1 017	1 017	..	6	..	6	..	..	..	..
United Kingdom	3 562	3 357	3 303	3 319	..	51	51	50	..	27	26	26
United States	66 600	66 100	66 000	65 200	97	97	98	100	67	64	62	59
OECD	161 148	169 696	..	..	..	..	..	..	..	..	..	..

Source: OECD and ITU.

StatLink http://dx.doi.org/10.1787/011866167302

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Table 6.4. **Digital television households by distribution platform**

Millions

	2001				2003				2005			
	Total digital TVHH	Cable DTV HH	Satellite DTV HH	Terrestrial DTV HH	Total digital TVHH	Cable DTV HH	Satellite DTV HH	Terrestrial DTV HH	Total digital TVHH	Cable DTV HH	Satellite DTV HH	Terrestrial DTV HH
Australia	0.40	0	0.40	0	1.10	0	0.80	0.30	..	..	..	..
Austria	0.16	0.02	0.14	0	0.21	0.02	0.19	0	0.23	0.02	0.21	0.0002
Belgium	0.11	0.11	0	0	0.18	0.16	0.02	0	0.23	0.22	0	0.001
Canada	2.42	0.81	1.61	..	3.59	1.39	2.20	..	..	..	2.32	1.84
Czech Republic	..	..	..	..	0	0	0	0	0.09	0	0.09	0.002
Denmark	0.62	0.39	0.23	0	0.35	0.08	0.27	0	0.56	0.21	0.33	0.02
Finland	0.10	0.01	0.08	0	0.21	0.02	0.10	0.09	0.69	0.12	0.07	0.50
France	4.04	0.65	3.39	0	4.62	0.92	3.70	0	6.31	1.07	4.33	0.69
Germany	7.80	4.00	3.80	0	12.58	5.00	7.20	0.38	6.60	2.05	1.55	3.0
Greece	0.11	0	0.11	0	0.25	0	0.25	0	0.21	0.00	0.21	0
Hungary	..	..	..	..	0	0	0	0	..	..	..	..
Iceland	..	..	..	..	..	..	..	..	..	..	..	..
Ireland	0.22	0.03	0.19	0	0.46	0.10	0.36	0	0.43	0.15	0.28	0
Italy	2.60	0.03	2.57	0	2.85	0	2.85	0	4.17	0	3.24	0.80
Japan	..	..	3.0	..	..	..	9.10	..	..	..	11.30	..
Korea	0.50	0	..	0.50	3.10	0	1.30	1.80	3.70	0.05	1.82	..
Luxembourg	..	..	..	..	0.01	0	0.01	0	0.0002	0	0.0002	0
Mexico	..	..	..	..	..	..	..	..	..	..	..	..
Netherlands	0.71	0.19	0.52	0	0.69	0.11	0.55	0.03	0.72	0.19	0.52	0
New Zealand	..	..	..	..	..	..	..	..	..	..	0.56	0
Norway	..	..	..	..	0.62	0.06	0.56	0	0.61	0.13	0.48	0
Poland	..	..	..	..	0.70	0.00	0.70	0	1.21	0.02	1.17	0.02
Portugal	0.20	0.01	0.20	0	0.51	0.02	0.49	0	0.55	0.15	0.40	0
Slovak Republic	..	..	..	..	0.02	0	0.02	0	0.01	0	0.01	0.01
Spain	2.51	0	2.26	0.25	2.38	0.15	2.06	0.17	2.49	0.57	1.70	0.20
Sweden	1.03	0.28	0.66	0.09	1.25	0.17	0.88	0.20	1.33	0.27	0.61	0.45
Switzerland	..	..	..	..	0	0	0	0	0.16	0.15	0	0.02
Turkey	..	..	..	..	..	..	..	..	0.89	0	0.89	0
United Kingdom	8.70	2.00	5.50	1.20	12.00	2.30	6.80	2.90	15.62	2.51	7.91	5.18
United States	34.90	16.70	17.90	0.30	45.30	22.50	21.60	1.20	..	28.60	27.20	..

Note: The most recent figures from Canada date from 2004.

Sources: OECD, EAO for all European countries, TVHH 2001 from ITU; EPRA.

StatLink http://dx.doi.org/10.1787/011866240358

Table 6.5. **Digital terrestrial television transition information**

	Digital terrestrial television start date	Analogue switch-off date	Is there an HD requirement for DTT?
Australia	2001 (regional phase-in)	2009 (regional phaseout), subejct to review	Yes
Austria	2007-2010	2010	No
Belgium	Has started	Not yet decided	
Brazil	Non-available	2016	
Canada	Has started	Market driven; when 85% of a distributor's subscribers can receive digital signals	No (but if HD offered, broadcaster must make it available).
Czech Republic	Has started	2010 - 2012	
Denmark	2005	2009 (November)	
Finland	2000	2007 (July)	No
France	Has started	2010 (March) or 2011 (November)	
Germany	1998	2010 (but completed 2003 in one state)	No
Greece	2006	2015	
Hungary	2005	2012	No
Iceland			
Ireland	Two year pilot started in 2006	Aiming at 2012	No
Italy	2003	December 1, 2008	
Japan	2003	July 24, 2011	Yes
Korea	2001	2010	Yes
Luxembourg	Tests have begun		
Mexico	2004		Yes
Netherlands	2003	2006 (October)	No
New Zealand			
Norway	2009	2009	No
Poland	Testing	2014	
Portugal	Non-available	Target is for 2012	
Slovak Republic	2004	2012	
Spain	1999	2010 (April)	No
Sweden	1999	2008 (February), started Autumn 2005	No
Switzerland	2004	2008	No
Turkey	Pilot	2014	
United Kingdom	1998	2007 (region sequence), 2012 (final UK switchover), 2013 (Channel Islands)	
United States	1998	February 17, 2009	No

Source: OECD, except Italy, Slovak Republic, Spain from EPRA June 2004 report.

StatLink http://dx.doi.org/10.1787/011877354210

Table 6.6. **Channel availability**

	Total available national terrestrial FTA channels (2005)	Premium satellite service	Cable and satellite combined
		Number of channels (2005)	Number of channels (2004)
Australia	..	..	..
Austria	3	..	16
Belgium (Flemish)	2	..	23
Belgium (French)	3	..	17
Canada	4	399 video, 76 audio	..
Czech Republic	4	45	10
Denmark	4	..	12
Finland	4	..	6
France	8	120	129
Germany	5	..	120
Greece	14	..	15
Hungary	..	..	26
Iceland	..	..	1
Ireland	4	..	26
Italy	13	100+	151
Japan	128	185	..
Korea	4	100 video, 60 audio, 30 data	..
Luxembourg	..	..	7
Mexico	3	169	..
Netherlands	3	178 video, 272 audio	49
New Zealand	10	59	..
Norway	..	..	10
Poland	3	..	37
Portugal	4	54	20
Slovak Republic	2	..	4
Spain	6	92	36
Sweden	3	58	23
Switzerland	3	7	7
Turkey	26	..	73
United Kingdom	5	500	306
United States	9	850+ video and audio	..

Sources: OECD, FCC, EAO Yearbook 2005.

StatLink http://dx.doi.org/10.1787/011885123423

Table 6.7. **Daily audience share of public service television**

Percentage

	1999	2000	2001	2002	2004	Change in percentage points, 1999-2004
Australia	18.1	17.6	18.6	20.4		2.3
Austria	58.5	56.6	55.5	54.3	51.3	-7.2
Belgium (French)	22.2	23.2	23	21.7	20.3	-1.9
Belgium (Flemish)	30.6	31.7	33.5	36	37.6	7
Canada	13.25	12.58	12.02	11.29		-1.96
Czech Republic	32.1	31.2	29.2	29.4	30.5	-1.6
Denmark	66.8	68.2	67.8	70.4	71.6	-4.8
Finland	43	42.3	43.3	45.3	44.9	1.9
France	42.2	42.3	45.3	45.3	40.7	-1.5
Germany	42.8	43.1	43.3	44.4	44.1	1.3
Greece	9.5	10.6	9.5	10.9	14	4.5
Hungary	15.6	13.6	13.2	15.3	17.4	1.8
Iceland	..	..	..	..		..
Ireland	49.7	47.3	43.4	40.5	38.2	-11.5
Italy	47.6	47.3	46.9	46.5	44.3	-3.3
Japan	..	..	..	..		..
Korea	..	..	..	..		..
Luxembourg	..	..	..	..		..
Mexico	..	..	..	..		..
Netherlands	34.5	36.4	36	35.9	36.5	2
New Zealand	..	..	..	..		..
Norway	39.8	40.5	41	42.4	44.2	4.4
Poland	51.1	46.2	45.4	45.9	46.8	-4.3
Portugal	32.6	29.9	25.7	26.4	29.1	-3.5
Slovak Republic	18.1	18.4	20.2	21	24.6	6.5
Spain	49.4	49.3	49.6	50.2	46.2	-3.2
Sweden	47.2	43.8	41.9	42.9	39.7	-7.5
Switzerland (German)	34.6	34	34.4	36.2	35	0.4
Switzerland (Italian)	35.7	33.7	33.7	31.9	36.5	0.8
Switzerland (French)	37.3	36.3	35.2	33.9	35.4	-1.9
Turkey	5.3	5.9	6.9	8.3	7.1	1.8
United Kingdom	49.5	48.4	47.9	47.3	46.4	-3.1
United States	3	3	3	3	2	-1

Note : Figures are shares of total FTA viewing for all OECD countries except Canada, which is the share of total viewing (including pay TV).

Source: EAO Yearbook 2003; US data from Nielsen via NCTA; Canadian data from OECD; Australian data from ABA.

StatLink http://dx.doi.org/10.1787/012026170104

Table 6.8. **Average household TV viewing time per day (hours)**

	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	..	..	...	...	3.3	3.3	3.2	..	..
Austria	2.37	..	2.45	2.47	2.53	2.7	2.68	2.73	2.77
Belgium (Wallonia)	3.33	..	3.47	3.5	3.6	3.6	3.6	3.67	3.83
Canada	3.25	..	3.09	3.07	3.19	3.09	..	..	..
Denmark	..	..	..	..	..	..	2.6	3	3
Finland	2.48	..	2.68	2.8	2.78	2.85	2.88	2.93	2.82
Ireland	..	..	..	..	..	2.6	2.55	..	..
Italy	..	..	..	..	..	..	3.83	4	4.1
Japan	3.56	3.7	3.58	3.75	3.85	3.61	3.7	3.91	3.71
Korea	..	..	..	3.3	3.1	3.2	3.2	3.17	..
New Zealand	2.77	2.83	2.77	2.8	2.8	2.85	2.88	2.88	2.68
Portugal	2.75	2.62	3.37	3.38	3.22	3.08	3.45	3.57	3.53
Spain	..	..	3.73	3.7	3.77	3.92	4.1	3.63	3.62
Sweden	..	2.4	2.38	2.5	2.47	2.45	..	2.52	2.43
Switzerland	2.2	2.3	2.4	2.4	2.43	2.47	2.47	2.47	2.45
Turkey	..	..	..	..	..	..	4	4	5
United Kingdom	..	..	..	..	..	..	3	..	..
United States	7.2	7.25	7.38	7.52	7.65	7.7	7.92	8.02	8.18

StatLink http://dx.doi.org/10.1787/012062441601

Table 6.9. **Broacasting revenues: EU25**

EUR millions

	1999	2000	2001	2002	2003
State funded TV	25 188	26 068	27 172	27 358	27 440
Advertising TV channels	17 272	19 480	19 002	18 220	18 293
Premium TV channels	3 157	3 343	3 641	3 699	3 332
Channel package suppliers	5 154	6 725	7 646	8 222	10 275
Thematic TV channels	2 290	23 732	3 248	3 374	3 405
TV-shopping firms	1 152	1 324	1 465	1 659	1 783
Total	54 213	59 672	62 174	62 532	64 528

Note: Data are for all 25 European Union countries.

Source: IDATE (2005), TV 2015. The Future of TV Financing in Europe, Montpellier, France.

StatLink http://dx.doi.org/10.1787/012067504553

Table 6.10. **Developments in advertising market shares for different media types in Europe (%)**

	2000	2001	2002	2003	2004	*2005*	*2006*	*2007*
Television	31.6	31.9	32.7	33.2	33.7	*33.8*	*34.1*	*34.6*
Newspapers	35.0	34.0	33.1	32.3	31.9	*31.7*	*31.3*	*30.8*
Magazines	20.1	20.4	20.0	19.5	18.9	*18.6*	*18.4*	*18.1*
Billboards	6.1	6.5	6.6	6.7	6.6	*6.6*	*6.6*	*6.6*
Radio	5.0	5.0	5.0	6.0	6.0	*6.0*	*6.0*	*6.0*
Internet	1.1	1.2	1.3	1.7	2.2	*2.7*	*2.9*	*3.1*
Cinema	0.8	0.9	0.9	0.9	0.9	*0.9*	*0.9*	*0.9*

Note: Figures in italics are estimates.

Source: ZenithOptimedia, 2004.

StatLink http://dx.doi.org/10.1787/011770618811

Table 6.11. **Definitions of broadcasting & regulation for internet and VoD**

	Definition of broadcasting	Is regulation of video on demand (VoD) technology-neutral?	Are Internet video transmissions "broadcasting?"
Australia	TN, CA	TN	No
Austria	It is assumed at present that broadcasting services provided over the Internet do not have to be treated as broadcasting, as these services are not able to reach an arbitrary number of recipients with the identical content at the same time. The definition of broadcasting applies to encrypted subscription services.	Video-on-demand is not treated as broadcasting regardless of the transmission method.	An IP-based video service, such as TV over DSL, which can guarantee the availability of broadcasting streams to all subscribed costumers at the same time, would be treated as a broadcasting service.
Belgium (Flanders)	The term "broadcasting " is defined by art. 2, 1° of the co-ordinated decrees related to radio and television, 4 March 2005. The term applies to every emission of signals of radio or television programmes to the public, irrespective of the platform used or technical procedure. It also includes the point-to-point technique. Individualised information which is confidential however is not included.	No	As per the definition of broadcasting (art. 2, 1° of the co-ordinated decrees): "every emission of signals of radio or television programmes to a public, regardless of the platform or technical procedure used." In other words: the carrier is neutral. Broadcasting services over Internet will be treated as broadcasting.
Belgium (Wallonia)			Yes, but under study in French region.
Canada	TN, CA. "Broadcasting" means any transmission of programmes, whether or not encrypted, by radio waves or other means of telecommunication for reception by the public by means of broadcasting receiving apparatus, but does not include any such transmission of programmes that is made solely for performance or display in a public place.	VoD services that are delivered by broadcasting distribution undertakings (including cable, satellite and MDS) are required to have a broadcasting licence. VoD services that are delivered over the Internet are exempt from regulation along with other broadcasting services that are delivered over the Internet.	Technically yes, but regulator has exempted from broadcast regulation.
Czech Republic	TN, CA. The Act on broadcasting defines the term "broadcasting" as primary dissemination of original radio and television programmes and teletext, intended to be received by the public in encoded or unencoded form, through terrestrial radio transmission facilities, cable systems and satellites, in both analogue and digital form. According to the Act on electronic communications broadcasting is part of electronic communication services which are provided by means of electronic communication networks (based on the principle of technological neutrality).		Distribution of radio and TV programmes on the Internet is not considered radio and TV broadcasting and the Media Act does not apply. It is understood as distribution of audio-video information and not as distribution of programmes. The Authors´ Act prohibits live broadcasting over Internet. TV corporations release over the Internet only programmes which they have produced. Thus all four national and a number of regional TV channels use the Internet.

Table 6.11. **Definitions of broadcasting & regulation for internet and VoD (continued)**

	Definition of broadcasting	Is regulation of video on demand (VoD) technology-neutral?	Are Internet video transmissions "broadcasting?"
Denmark	TN, CA. Broadcasting is defined as “broadcasting of sound and television programmes to the general public by means of radio equipment” (*i.e.* radio frequency spectrum assigned for terrestrial use), cable systems for the distribution of sound and television programmes to premises used for private residence and distribution by satellite.	No specific content regulation on VoD services. General regulations on fair trading, e-commerce and protection of consumer interests, etc., apply.	There is no specific licence regime under the Broadcasting Act concerning Internet services. Nor is transmission of “TV-like” content on the Internet subject to an authorisation or licensing scheme under the Danish telecommunications regulation
Finland	TN, CA. Broadcasting shall refer to the initial transmission or provision by wire or over the air, including that by satellite, in unencoded or encoded form, of radio and television programmes intended for reception by the public.	TN	There is no separate regulation regarding the Internet. All communications networks and technologies are equally regulated (technological neutrality) through the Communications Market Act.
France	Audio-visual services include audio-visual communication services as defined by art. 2 as well as services making audio-visual, cinematographic or audio works available to the public irrespective of the technical means used.	VoD service is an online services and therefore not an audio-visual communication service.	A television services is any commercial service which is electronically delivered for simultaneous reception by the public or a category of the public and is primarily composed of n ordered sequence of programmes composed of images and sound.
Germany	TN, CA. Broadcasting is the provision and transmission for the general public of presentations of all kinds of speech, sound and picture using electromagnetic oscillations without junction lines or along or by means of a conductor. The transmission platform is therefore irrelevant. The definition includes presentations which are transmitted in encoded form or can be received for a special payment.	TN The legal definition of a video-on-demand service as broadcasting or as a licence-free telemedia does not depend on the nature of the transmission but on its content and its relevance for opinion formation.	Media services are information and communication services intended for the public in text, image or sound, which are disseminated using electromagnetic oscillations without junction lines or along or by means of a conductor. Media services are a subgroup of telemedia. Telemedia are other information and communication services than broadcasting and telecommunication. Nevertheless, media services (telemedia intended for the public) with a programme-related content are vital components of the services offered by broadcasters and are therefore protected by the Constitution. They are in principle free of licensing requirements unless they are exceptionally to be defined as broadcasting. Such exceptions include, for example, information on current transmissions.
Greece	TN, CA. The transmission by wire or by air, including by satellite, in unencoded or encoded form, of television programmes intended for reception by the public. It includes the communication of programmes between undertakings with a view to their being relayed to the public. It does not include communication services providing items of information or other messages on individual demand such as telecopying, electronic data banks and other similar services, as long as these services do not transmit audiovisual works of any form.	No input.	No input.

Table 6.11. **Definitions of broadcasting & regulation for internet and VoD (continued)**

	Definition of broadcasting	**Is regulation of video on demand (VoD) technology-neutral?**	**Are Internet video transmissions "broadcasting?"**
Hungary	TN, CA.	No current regulation.	No.
Iceland			
Ireland	TN, CA. Broadcasting means a service which comprises a compilation of programme material of any description and which is transmitted or relayed by means of wireless telegraphy, a cable or MMD system or a satellite device, directly or indirectly for reception by the general public, whether that material is actually received or not, but does not include such a service provided by means of the Internet. Broadcasting includes encrypted and unencrypted services free to air and subscription services.	True VoD is not available.	No.
Italy	TN, CA. The term refers to the delivery of television and radio programmes. Subscription and encrypted services are also included.	Apparently TN (classified as telecom service)	Audiovisual services provided over the Internet are not currently covered by existing legislative and regulatory framework.
Japan	TN, CA	TN	No
Korea	TN, CA. Broadcasting refers to the planning, programming/production and the transmission of a broadcasting programme to the public (including receivers of individual contracts; "viewers") through telecom facilities.	TN. Since VOD service is a telecom service, it is regulated by the MIC.	MIC and KBC are currently discussing how to define the provision of linear content service(broadcasting service) over the Internet.
Luxembourg	TN, CA.	TN.	Yes.
Mexico	• Broadcasting: services provided by the propagation of electromagnetic waves of radio or associated radio and video using frequency bands from the spectrum attributed by the state. This term applies only to open services and not to the DTH. • Radio and TV: the use of electromagnetic waves through the installation, functionality and operation of broadcasting stations through modulation, amplitude systems or frequency, television, facsimile or other technical procedure possible. Audio and television services are terrestrial. • Pay TV (cable, DTH and MMDS): considered a public telecommunications service for which the subscriber pays a monthly rate.	TN	Content on the Internet is not regulated. To become an ISP only registration is required.

Table 6.11. **Definitions of broadcasting & regulation for internet and VoD (continued)**

	Definition of broadcasting	Is regulation of video on demand (VoD) technology-neutral?	Are Internet video transmissions "broadcasting?"
Netherlands	The Dutch Media Act in its definition and interpretation of broadcasting and programme services does not make any distinction between the different transmission platforms. In principle therefore it is not relevant whether a service is offered via cable, satellite or terrestrial airwaves. Nevertheless, due to legal provisions, audiovisual services offered via the Internet or mobile networks will usually not be considered as broadcasting but as telecommunications since they are only available on individual demand.	No VOD offered ("near VOD is broadcasting")	No (but transmissions by public broadcasters subject to some regulation) According to Dutch regulations Internet services are not considered broadcasting but telecommunication services, since on the Internet information is sent to a user on individual request.
New Zealand	TN, CA	TN	No
Norway	TN (unclear if subscription services included)	TN	No (they are regulated as "data transmission")
Poland	TN, CA This term includes in particular transmission of programme services by the means of terrestrial, satellite and cable networks. It also includes subscription services and encrypted services.	n/a	Those services are not treated as a broadcasting, as they not fulfil the definition of broadcasting set in the Broadcasting Act. Such services are subject to the Telecommunication Law.
Portugal	TN, CA. The term "broadcasting" applies across platforms, excluding internet transmissions. Subscription and encrypted services fall under the heading of broadcasting.	TN. There is no difference. Regulation should aim at technological neutrality.	No (data transmission). This kind of services is under consideration although most cases fall under the legal framework for electronic communications .
Slovak Republic	TN, CA. Broadcasting is the spreading of original coded or uncoded radio programme services or television programme services as well as other sound, visual or audio-visual information including teletext via public telecommunication networks or telecommunication equipment defined for reception by the public; broadcasting does not include communication services directed to providing information or other communications on the basis of individual demand or broadcasting via Internet.	Broadcasting does not include communication services directed to providing information or other communications on the basis of individual demand.	Broadcasting does not include communication services directed to providing information or other communications on the basis of individual demand or broadcasting via Internet.
Spain	TN, CA. Television is primary broadcasting, with or without cable, terrestrial or by satellite, codified or not, of televised programmes for the public. This definition does not include communication services rendered upon individual request, the aim of which is to supply information or provide other services, such as facsimile services, electronic databases and similar services.	TN. VoD is considered a telecommunications service and is subject to its general regulations; no distinction is made according to the transmission means used. Currently, VoD services are rendered by the cable operator ONO and video services by ADSL Imagenio, Jazztel and Wanadoo.	Under current regulation, the Administration construes radio or television by Internet to be radio and television and subject to content rules that govern them, regardless of the fact that concession and licence regulations are not applied to them.

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Table 6.11. **Definitions of broadcasting & regulation for internet and VoD (continued)**

	Definition of broadcasting	**Is regulation of video on demand (VoD) technology-neutral?**	**Are Internet video transmissions "broadcasting?"**
Sweden	TN, CA. When the term "broadcasting" is used in Sweden it refers to services that can be received by the general public and it is normally not limited to any particular transmission platforms or any particular service.	TN. A true VoD service would not be treated differently according to the transmission method.	Services transmitted over the Internet that are initiated by the broadcaster may be treated as broadcast services according to the Radio and Television Act.
Switzerland	TN, CA.	TN.	Apparently not (they are classified as telecommunications services).
Turkey	TN (CA apparently included). This law deals with matters relating to radio and television broadcasts transmitted by any and all techniques, methods or means and by electromagnetic waves or other means under any denotation for reception domestically or abroad.		No regulation
United Kingdom	TN, CA. The term "broadcasting" in UK legislation refers to "transmission by wireless telegraphy". However, when referring to television channels, the term "service" is generally used. A television service becomes licensable (and subject to regulation) if it is made available for reception by members of the public. A service is available for reception by members of the public (broadly) if it can be received, whether that requires the viewer to purchase a new receiver or set-top box, to pay for a subscription, or to install an aerial (or satellite dish).	Yes. True on demand services are not licensable and are not regulated by Ofcom. VoD services are overseen by a self-regulatory body called the Association for TV on Demand (ATVoD). ATVoD membership is not limited by choice of transmission technology. The current ATVoD membership includes cable operators, BT (PSTN), and operators of proprietary networks like Homechoice (Video Networks). Homechoice was recently acquired by the ISP Tiscali.	No. Statutory regulation only extends to linear services; on-demand services are subject to a self-regulatory regime. The current Communications Act largely excludes from statutory regulation linear video services transmitted over the Internet, unless they satisfy the definition of a "Television Licensable Content Service" (TLCS). The definition for TLCS is intended to capture only services which are broadly identical to broadcast TV.
United States	Under the Communications Act of 1934, the term "broadcasting" means the dissemination of radio communications intended to be received by the public, directly or by the intermediary of relay stations.	TN. VoD is not treated differently from other subscription services	The Internet is not regulated. Also, under provisions of the Communications Act of 1934, broadcast regulation pertains to radio communications intended to be received by the public, directly or by the intermediary of relay stations.

Table 6.12. **Must-carry and EPG must-list obligations**

	Must-carry regulations		Are EPG services subject to must-list regulation?
	Cable	Satellite	
Australia	n.a.	n.a.	- For datacasting licensee. - Listing must be equivalent for all public or commercial broadcasting services. - If requested by broadcaster.
Austria	The Private Television Law states the obligation of cable network operators to broadcast the radio and television programmes of the PSB and the television programmes of private nation-wide broadcasters.	No Austrian satellite services.	Yes.
Belgium	- All Flemish and Dutch PSB programmes.	No.	Electronic communication network operators must make EPG facilities available for selected digital services.
Canada	- For cable licensees. - Extensive conditions, dependent on number of subscribers.	Yes.	There are no specific regulatory requirements governing access to the electronic programming guides of distributors using digital technology, but they are subject to general prohibition against "undue preference" for any party, including the proprietor). However, distributors generally include all the channels they distribute in their electronic programming guides.
Czech Republic	All national channels of statutory (public) broadcasters available and all national analogue channels of licensed (private) broadcasters, including local broadcasting on frequencies shared with a licensed national broadcaster.	Only light regulation is applied within the scope of the acts on broadcasting and electronic communications.	Context of content and technical regulation of EPG and API in the Czech Republic is regulated in the Act on electronic communications. No action has so far been required in the framework of regulation of all types of TV digital broadcasting.
Denmark	All public service radio and television programmes broadcast by DR, TV 2/DANMARK and the regional TV 2 stations including the regional programmes intended for reception in the area concerned.	No.	National IT and Telecom Agency may lay down rules requiring multiplex operators to offer access to APIs and to EPGs on fair, reasonable and non-discriminatory basis.
Finland	-Public service television and radio programmes that are freely receivable in the municipality in which the network is located. -Freely receivable ancillary and supplementary services related to these programmes.	No.	The only legislation that applies specifically to electronic programme guides covers the content and structure of the opening page of an electronic programme guide.
France	Must-carry obligations are imposed only on cable operators with a significant number of viewers who use their services as their main means of accessing free-to-air broadcasting services. Cable operators must also carry local channels and local cable channels.	Must-carry obligations are imposed only on cable and satellite operators with a significant number of viewers who use their services as their main means of accessing free-to-air broadcasting services.	The law does not distinguish between conditional access services and other services but between audio-visual communication services and other services (online communication services for the public, such as VoD, services for private correspondence). Within audio-visual communication services, the law distinguishes among television services, radio services and other services (such as EPG).

Table 6.12. **Must-carry and EPG must-list obligations (continued)**

	Must-carry regulations		Are EPG services subject to must-list regulation?
	Cable	**Satellite**	
Germany	- For cable operators and DVB-T. - extensive regulation at level of *Länder*. - More detailed for analogue than for digital cable operators.	A distinction must be made between personal criteria (organisational form, loyalty to constitution, independence from state and its institutions, etc.) and other preconditions to ensure a diversity of opinions. These preconditions apply irrespective of whether the applicant is German or from abroad..	Public service channels should be given appropriate prominence.
Greece	No cable service.	Multichoice Hellas SA.	n.a.
Hungary	Yes.	No.	n.a.
Iceland	..	..	n.a.
Ireland	The four national free-to-air terrestrial channels.	No.	n.a.
Italy	No.	No.	n.a.
Japan	A cable television broadcaster that is also a licensee for cable television broadcasting facilities, in a zone which has been designated by the Ministry of Internal Affairs and Communications as having signal interference, is required to obtain and retransmit all terrestrial broadcasting programmes intact and simultaneously (Cable Television Law Article 13). If a content distributor registers as a "Broadcaster on Telecommunications Service", there is no requirement for telecommunications carriers to transmit particular channels. (Law Concerning Broadcast on Telecommunications Service, Telecommunications Business Law, etc.)	There is no requirement for DBS operators to transmit particular channels. (Broadcast Law, Law concerning Broadcasts on Telecommunications Service).	No specific regulation.
Korea	-The transmission of the terrestrial broadcasting service: KBS1, EBS. - Three or more respective public and religious channels recognised by the KBC and one TV broadcasting channel as a regional channel.	Yes.	No.
Luxembourg	No.	No.	n.a.
Mexico	Federal government channels (*e.g.* Congreso channel).	Not provided in Mexico.	No.

Table 6.12. **Must-carry and EPG must-list obligations (continued)**

	Must-carry regulations		Are EPG services subject to must-list regulation?
	Cable	Satellite	
Netherlands	- For cable operators. - At least 15 channels, including national + regional + municipal public broadcasters + Belgian PSBs.	No.	The operator of a system of conditional access, which is suitable for and aimed at the transmission of digital services, provides these services on fair, reasonable and non-discriminatory technical facilities, so that persons concluding an agreement with this operator can receive these services. These provisions deal with conditional access for digital TV and associated facilities, such as APIs or EPGs.
New Zealand	No.	No.	No.
Norway	- Cable owners. - Must transmit Norwegian Broadcasting Corporation/ TV2 / terrestrial public TV services.	No.	n.a.
Poland	-National programme services of public radio and television. -Regional programme services of public radio and television, received in the given area.	No	The chairman of the National Broadcasting Council may impose obligations upon business operators aimed at ensuring consumers' access to EPG, at ensuring users' access to digital radio and television transmissions, etc.
Portugal	Not yet established under the Law 5/2004 of 10 February. The TV channels that are currently carried by cable are a legacy from the previous legislation.	The DTH service available in Portugal is an extension of the main cable operator's offer, in areas not covered by its cable network.	Not defined, but the communications regulator can impose obligations on any undertaking that is necessary to provide access to APIs (application program interfaces) specified by the competent authorities (the media authority) under the law.
Slovak Republic	Public and local service broadcasters and broadcasters by licence which can be received by ordinary receiving equipment.	Yes.	No.
Spain	-Specific channels. -A percentage of the Spanish language channels must belong to independent channel holders.	No.	Yes, but no further information available.
Sweden	Yes, SVT1, SVT2, SVT24, Barnkanalen, Zunskapskanalen, TV4 and one "public access" channel licensed by the Radio and TV Authority.	No.	API and EPG are not regulated by law; however, the Radio and TV Authority has been commissioned by the government to monitor the development of the API situation and report any issues that may require further action by the legislature. This is also the case for electronic programme guides.

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Table 6.12. **Must-carry and EPG must-list obligations (continued)**

	Must-carry regulations		Are EPG services subject to must-list regulation?
	Cable	**Satellite**	
Switzerland	Cable operators: Swiss PSBs + terrestrial and public channels designated to the regional and linguistic area of the cable operator.	No.	If a cable operator provides EPG: due prominence for Swiss PSB + first 20 positions to be assigned to terrestrial and public channels designated to the regional and linguistic area of the broadcaster.
Turkey	..	..	No.
United Kingdom	Not for cable, but for terrestrial transmission networks10: BBC, Channel 3-5 if digital + public teletext service.	No.	- Appropriate prominence for PSBs. - Specific rules for disabled people. - BSkyB must allow any TV service if requested.
United States	US must-carry requirements are not content regulations, but obligations to provide carriage to local broadcast stations. Under the Communications Act, cable operators must set aside up to one third of their channel capacity for the carriage of local commercial television stations and additional channels for local non-commercial stations depending on the system's channel capacity. DBS operators may provide local-into-local broadcast television service. Unlike cable operators that are required to carry local television stations in every market they serve, a DBS operator must carry all stations in any market where it chooses to carry one local television station. In both the cable and DBS contexts, commercial broadcasters may elect to be carried pursuant to must-carry status or retransmission consent. Where a station elects must-carry it is generally guaranteed carriage without compensation for this carriage; under retransmission consent, the broadcaster and cable or DBS operator negotiate an agreement that may involve compensation in return for permission to retransmit the broadcast signal.	The Satellite Home Viewer Improvement Act of 1999 requires that any DBS operator, who delivers local broadcast signals in any market, must deliver all available local broadcast signals. A DBS operator is not required to deliver any local broadcast station that substantially duplicates the signal of another local network affiliate.	No.

Table 6.13. **Media cross-ownership regulation**

	Cross-media ownership regulation	Foreign ownership limits	Limitations on number of stations
Australia	Local/national TV limit; local radio limit; cross-media limit	Commercial television 15%; no two foreign owners together greater than 20%; no more than 20% directors foreign; pay TV services 20% single, 35% foreign in aggregate	n.a.
Austria	Cross-media limits for nation wide providers of terrestrial TV, cable TV and satellite TV in case of certain levels of coverage in radio, cable networks and the daily and weekly press.	49% terrestrial, cable, DBS (but European Economic Area members not considered foreign)	There exists no limitation on the number of stations.
Belgium	Radio limits within French communities; television limits within French community	Flemish none; French n/a	Flemish community: a legal person can only exploit two radio stations on national level, one in each region and local 293. French community: n/a
Canada	Cross-media limits are based on a case-by-case review. In case a licensee controls television and newspaper operations, news management functions and news gathering functions have to be kept separate.	20% (33.3% for a holding corporation)	There exists no limitation on the number of stations on the national market, only regarding possible dominance in a specific (regional) market.
Czech Republic	A provider of national broadcasting is not allowed to take a majority share in an undertaking of another provider of national (analogue) broadcasting. One legal or natural person can be a holder of at most two licences for providing of national digital broadcasting at the same time.	Each foreign owner has to satisfy the conditions for an undertaking in the Czech Republic according to the Code of Commerce (no specifics given)	There exists no limitation on the number of stations.
Denmark	n.a.	n.a.	n.a.
Finland	None	None	n.a.

Table 6.13. **Media cross-ownership regulation (continued)**

	Cross-media ownership regulation	Foreign ownership limits	Limitations on number of stations
France	For terrestrial television, arts. 41-1, 41-1-1, 41-2 et 41-2-2 of the Law of 30 September 1986 as amended define the thresholds of concentration of medias at the national and sub-national levels. At the national level, an authorisation cannot be delivered if it would place the operator in more than two of the following three situations: - Run one or several analogue television services serving at least 4 million inhabitants. - Run one or several terrestrial analogue radio stations serving at least 30 million inhabitants. - Run or control daily newspapers containing political and general information which represent more than 20% of the total national distribution. At sub-national level, an authorisation cannot be delivered if it would place the operator in more than two of the following three situations: - Run one or several analogue television services, national or otherwise, received in the zone in question. - Run one or several analogue radio stations, national or otherwise, for which the potential audience in the zone exceeds 10% of the total of the potential audiences. - Run or control one or more daily newspapers containing political and general information, national in scope or not, which are distributed in the zone in question. For the other electronic networks, no limitation.	For terrestrial television, according to art. 40 of the Law of 30 September 1986 as amended, the same "foreign" (other than European Union) natural or legal person may not hold more than 20% of the capital or voting rights of an entity which holds an authorisation to distribute a radio or television service for a service that is delivered in French. For the other electronic networks, no limitation.	For terrestrial television (art. 41 of the Law of 30 September 1986 as amended), the same person can hold a single authorisation for a national television service distributed in analogue form, seven authorisations for national television services distributed in digital format. A grouping of authorisations by the same person for local services must not exceed 12 million inhabitants and cannot represent two services in the same zone. The law also covers joint holding of authorisations for national and local television services, and prohibits the grouping of these authorisations if the audience for the national service exceeds 2.5% of the total audience for television services (the calculation is to be determined by a decree which has not yet appeared). For the other electronic networks, no limitation.
Germany	Newspaper cross-media limits only. There is a range of licensing restrictions to ensure diversity of opinion.	None	There exists no limitation on the number of stations.
Greece	Local radio, local television, cross-media	Terrestrial "free access" television 25%	n.a.
Hungary	None	None	n.a.
Iceland	n.a.	n.a.	n.a.
Ireland	n.a.	n.a.	n.a.
Italy	Broadcasters cannot acquire a share of newspaper companies until 2010. TLC operators can not gain more than 10% of revenues of integrated communications systems (SIC). SIC is composed by the following main markets: TV, radio, newspaper, magazine, advertising and sponsorship.	None for EEA countries; other countries limit based on reciprocity. A legal entity based in a foreign country cannot control a national terrestrial broadcaster, if that country does not apply a reciprocity condition clause.	20% of programmes diffused on a national basis.

Table 6.13. **Media cross-ownership regulation (continued)**

	Cross-media ownership regulation	Foreign ownership limits	Limitations on number of stations
Japan	One operator cannot control all three media (television service, radio service and newspapers) in one area. A terrestrial broadcaster cannot own more than half of the voting rights of a programme-supplying broadcaster on BS. A broadcaster can not own a certain percentage of voting rights of another broadcaster: -Between terrestrial broadcasters (in an area), more than 10% of voting rights. -Between terrestrial broadcasters (in different areas), one-fifth or more of voting rights. -Between local terrestrial broadcasters (within 7 connected different areas), one-third or more of voting rights or no regulation according to geographic conditions (eased in 2003). -To programme-supplying broadcaster on BS or CS, one-third or more of voting rights. -Cable television broadcaster, broadcaster on telecommunications services, no regulations. No more than one-fifth of the directors of a broadcaster can also serve as directors or another broadcaster. The executive directors of a broadcaster cannot be the executive director of another broadcaster.	Terrestrial broadcaster, programme-supplying broadcaster on DBS. There is a foreign ownership restriction on terrestrial broadcasting which limits foreign persons and others (foreign government or its representative, foreign judicial person or organisation) from holding more than 20% of the voting shares of licensees of terrestrial broadcasting radio station. Calculation of the amount of foreign ownership includes the voting shares that foreign persons and others hold indirectly (*i.e.* the voting shares owned by judicial person or organisations of which foreign persons and others hold a certain amount of shares). -Facility-supplying broadcaster on DBS. Foreigners or foreign-controlled enterprises are not granted licences for broadcasting stations. In this case, "foreign-controlled" means that an enterprise is represented by foreigners, one-third or more of the directors are foreigners, or one-third or more of the total voting rights are owned by foreigners. -Cable television broadcaster, broadcaster on telecommunications services, no regulation.	Terrestrial broadcaster: the number of stations controlled by one operator is basically limited to 1. Programme-supplying broadcaster on BS (broadcasting satellite) digital broadcasting: the number of transponders used by one operator is basically limited to a half. Programme-supplying broadcaster on CS (communications satellite) digital broadcasting: the number of transponders used by one operator is basically limited to 4.
Korea	Television and radio limits; cross-media limits	Terrestrial prohibited; cable 49%, satellite 33%	n.a.
Luxembourg	Local radio limit; unspecified cross-media limits	None	n.a.
Mexico	No limit on number of stations; n/a for cross-media limits	Prohibited for terrestrial TV; Foreign investment shall not exceed 49% of the total capital for MMDS, DBS and cable, some possible exceptions in case of cellular telephone services.	n.a.
Netherlands	Limit for commercial broadcasters to their share of the (non)daily newspaper market, in order to guarantee plurality and diversity of news provision.	None	Only one FM frequency or combination of FM frequencies shall be used to transmit the radio programmes of one and the same establishment. Unclear on the exact number of stations.
New Zealand	None	No specific limits, but foreign investment requires approval of the Overseas Investment Commission.	No sector specific regulation. Acquisitions are subject to the mergers and acquisitions provisions of the Commerce Act and a "substantially lessen competition" test is applied.
Norway	No specific limits (but "general regulations of competition and media ownership apply").	None	n.a.

Table 6.13. **Media cross-ownership regulation (continued)**

	Cross-media ownership regulation	Foreign ownership limits	Limitations on number of stations
Poland	None, except if the media regulatory body considers freedom of expression and the presentation of different opinions to be endangered.	Companies having foreign shareholders may be awarded a broadcasting licence if the stake held by foreign persons in the share capital of the company does not exceed 49% and persons of Polish nationality who permanently reside in Poland constitute a majority of the members of the Board of Management of the said company.	n/a
Portugal	None, except if the competition authority considers the expression of freedom of speech and the presentation of different opinions endangered.	None	No specific regulation for television. Individuals and companies may only detain holdings in a maximum of five radio broadcasting operators.
Slovak Republic	Limits on newspaper ownership for broadcasters and vice versa for newspapers or broadcasting services that reach half of the Slovak population. Any connection through capital between a national broadcasting service and a publisher of national periodicals.	n.a.	One broadcasting licence for television and one broadcasting license for radio. This does not apply to monothematic channels (excluding news channels).
Spain	Local and national television limits, but no cross media limits.	Capital share of persons who are not from any member state of the EU cannot exceed directly or indirectly 25% of the total amount.	There exists no limitation on the number of stations.
Sweden	None. Some licences for terrestrial television stipulate that ownership and influence on the licensee may not change in a way that would substantially affect ownership concentration within the media field.	None.	There exists no limitation on the number of stations.
Switzerland	Case-by-case on number of stations; no specific cross-media limits	Art. 11 (3) LRTV and art.2 and art. 7(2)(3) of the Ordinance of the Federal Council on radio and television (ORTV): the person requesting a Swiss licence for the distribution of a radio or television programme must be a legal person whose headquarters are in Switzerland and under Swiss control (that is, more than half of the equity or shares are in Swiss hands and these persons hold more than half of voting rights at general assemblies or shareholders' meetings) ; le person requesting can also be a natural person domiciled in Switzerland or a legal person under foreign control but whose headquarters are in Switzerland, to the extent that the foreign state offers the same degree of reciprocity to Swiss citizens or legal persons under Swiss control.	According to art. 11(1g) LRTV, le candidate for a broadcasting licence undergoes a specific examination with respect to its market situation. The authority thus ensures that diversity of views and offerings is not endangered. In this framework, the Competition Commission can also express its views. A response is given on a case-by-case basis. .

Table 6.13. **Media cross-ownership regulation (continued)**

	Cross-media ownership regulation	Foreign ownership limits	Limitations on number of stations
Turkey	No cross-media limits.	Radio and television 25%	Unspecified limits on number of stations.
United Kingdom	Limits on cross-media ownership that involves newspapers. Political bodies and advertising agencies are disqualified from holding a Broadcasting Act licence.	None	There exists no limitation on the number of stations.
United States	In markets where there are at least 20 separately owned TV, radio, cable and newspaper “voices” an entity can own up to 2 TV and 6 radio stations (or 1 TV and 7 radio stations). There is a sliding scale for markets with fewer than 20 voices.	Limited to 20% of any entity.	For TV, there is no limit on the number of stations one entity can own on a national basis as long as the stations do not collectively reach more than 39% of the US population. In any individual local TV market, an entity can own up to 2 TV stations if one station is not among the top four rated stations and there are at least eight independent TV stations in the market. Radio has no limit on the number of stations owned nationally nor on the percent of population reached. Radio does; however, have limits on the number of stations owned in any given local radio market. In markets with 45 or more stations, the limit is eight stations. There is a sliding scale for markets with fewer than 45 stations.

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Chapter 7

Main Trends in Pricing

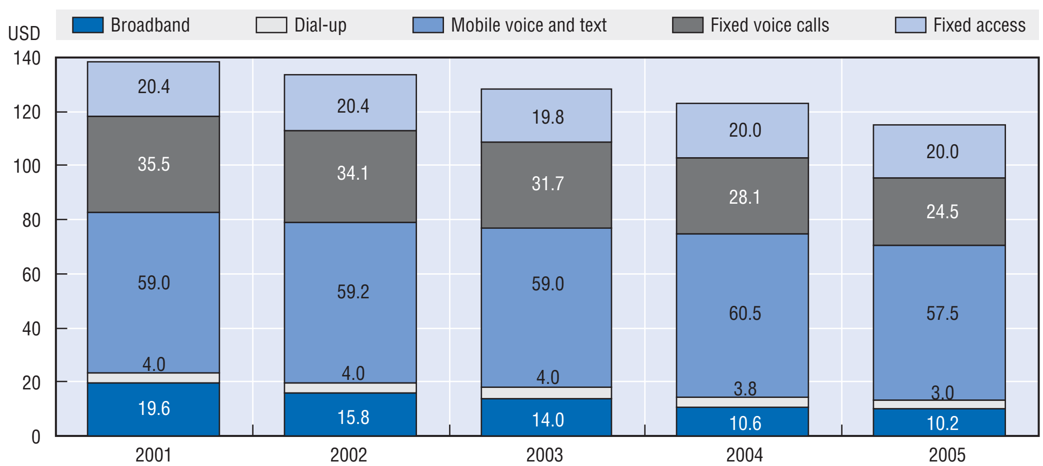
Prices for communications across the OECD area have continued to fall and users commonly receive better services for prices lower than they paid just two years earlier. The chapter looks at telecommunication pricing trends in the OECD area. It highlights the growth of flat-rate communication plans for both voice and data services. It also uses the OECD telecommunication price comparison methodology to provides comparative data on the different baskets of communication services across the OECD area for fixed and mobile telephony for both residences and business subscribers. A section devoted to broadband pricing examines total subscription costs as well as prices per Mbit/s for all 30 OECD member countries. Finally, the chapter looks at the development of bundled services and pricing for leased lines.

Introduction

Prices for communications across the OECD area have continued to fall over the past two years. Interestingly, some of these savings have been spent on new telecommunication services. The result of this transfer of revenues from one service to another has helped telecommunication providers weather the decline in revenues from fixed-line telephony highlighted in Chapter 3. Broadband providers have been the largest beneficiaries of this transfer, while companies providing only fixed-line services have faced steep revenue declines.

Telecommunication prices have fallen in real terms in many OECD countries. For example, yearly expenditure on a standard basket of telecommunications services in the United Kingdom in 2005 was USD 115.21 (GBP 61.10); the same consumption would have been 20% more expensive in 2001 just four years earlier. Prices for broadband in the United Kingdom have decreased rapidly and the costs of fixed-line telephony have decreased the least (see Figure 7.1).

Figure 7.1. **Real cost of average UK household telecommunication consumption**



Note: Single exchange rate of 1 GBP = 1.8857 USD was used for all years.

Source: OFCOM, *www.ofcom.org.uk/research/cm/overview06/year/*.

StatLink *http://dx.doi.org/10.1787/002051205576*

One of the ways communication providers have addressed falling voice revenues is by bundling higher-margin services such as broadband and television with voice. In September 2005, the OECD examined 87 firms across the OECD area and found such "triple-play" or "multiple-play" offers available from 48 providers in 23 countries. Multiple play offers were available on all key wired infrastructure such as DSL, cable and fibre. The price of a combined video, voice and data offer varies over the OECD area but prices for bundled services in some countries were less expensive than a stand-alone broadband connection in others.

Flat-rate plans

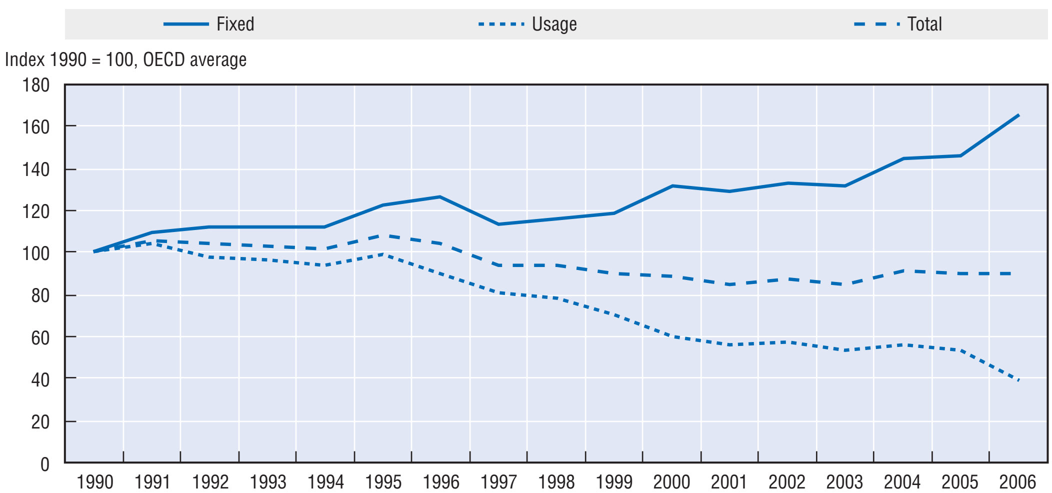
Another key trend to gain prominence is the ability to subscribe to flat-rate calling and data plans. Flat-rate plans are commonly preferred by consumers who may be willing to pay more for a connection if they do not have to worry about the amount of time they spend on the phone or on line. AT&T in the United States first offered flat-rate mobile plans in the late 1990s. However, similar unlimited calling plans have been slow to appear in other OECD countries.

Mobile operators in particular have found ways to offer the convenience and security of flat-rate plans to users. Mobile operators such as Orange in France offer unlimited calling to three other mobile phones on the Orange network at no extra charge.[1] T-Mobile in the United States allows family members to share a basket of minutes for off-network calls while all calls to other T-Mobile subscribers are free. Vodafone in the United Kingdom has a similar plan for business subscribers on which all calls to other employees on the same plan are free. Vodafone also offers free calls to the fixed lines of the enterprise for the first 60 minutes of each call.[2] It has also introduced free on-net calling in Portugal.

Flat-rate calling to fixed lines is also becoming more common on fixed networks with the rapid adoption of VoIP by operators and users. In September 2005, unlimited flat-rate calling to fixed lines was available in 14 of the 30 OECD countries (Table 7.1). Recently, however, these offers have started to include some calls to mobile phones.

This shift away from per-call charges (often referred to as rebalancing) can be easily seen in Figure 7.2, Figure 7.3 and Table 7.2. The total cost of fixed-line calling has decreased gradually since 1990. Usage charges alone dropped over 60% in the last 16 years. However, much of the decline in usage charges was recouped through increased fixed subscription charges. The combination of increases for fixed-line subscriptions and the reduction in usage charges has led to a net decline of 11% in the residential market and 34% in the business market for fixed-line charges.

Figure 7.2. **Time series for residential phone charges**



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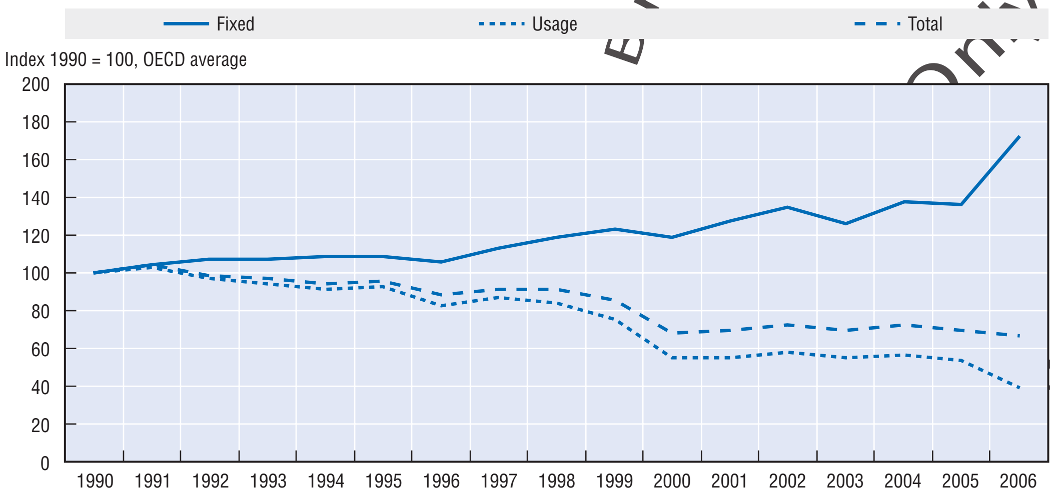
In some cases, operators have attempted to shift all fixed and mobile charges to one monthly subscription. In 2005, France Telecom (now Orange) introduced an offer of unlimited phone calls from a France Telecom fixed line to other fixed lines and mobile

Figure 7.3. **Time series for business phone charges**



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phones throughout Europe and the North America for USD 100.60 (EUR 79) per month. A less expensive option was also available which made calls to fixed and mobile phones free during evenings and weekends. Recently, France Telecom modified the offer to include only a limited number of calls to mobiles per month. While the price of the calling plan decreased by USD 12.73 (EUR 10) per month, subscribers can now only use 240 minutes of mobile calling on the plan.[3]

Another area in which flat-rate calling plans have become popular is data services on 3G and other mobile networks. Flat-rate data plans are more transparent for users who may not be able to judge effectively how much data traffic they are using at a given time. Flat-rate data plans have proven popular in the United States which had over 3 million mobile broadband subscribers at the end of 2005.[4] T-Mobile in the United States offers unlimited data plans over its mobile and Wi-Fi network for USD 49.99 per month.[5] Subscribers can access the network using a GPRS/EDGE/Wi-Fi combination PCMCIA card for a laptop or a handset or PDA with mobile/Wi-Fi functionality. Sprint in the United States offers 3G data services for USD 59.99 per month to voice subscribers and for USD 79.99 per month for data only subscribers.[6]

T-Mobile in the Czech Republic also offers a dedicated data service over a UMTS 3G network. Subscribers can choose plans ranging from USD 17.90 (CZK 399) for 256 kbit/s to USD 44.81 (CZK 999) for 1 024 kbit/s. The plans have between a 1 and 10 Gigabyte data cap on the 3G portion but users have unlimited access to GPRS and Wi-Fi on the network.[7]

Fixed-line operators have also moved towards flat-rate converged phone products as a way to maintain existing fixed-line subscribers. These converged plans typically allow users to make unlimited calls between fixed lines and a limited number of mobile phones that are on the incumbent operator's mobile network. Operators benefit by keeping all calls on-network and providing an incentive for users to continue paying for a fixed line. The Swiss incumbent Swisscom has a plan called "Swisscom together" which allows one fixed line number to be linked with two to five mobile phones in a "group". Subscribers pay an additional USD 15.27 (CHF 19) per month to form a group with two mobile phones linked to the fixed line. The cost of adding mobile phones to the plan is USD 7.23 (CHF 9) per month. These charges are in addition to the mobile and fixed line subscription charges.[8]

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Convergence is also taking place in the phones themselves. In October 2006, Orange in France announced a new converged mobile/fixed handset called unik. Orange broadband subscribers can choose flat-rate calling plans that are applied to any calls started from a Wi-Fi connection in the home. For USD 12.73 (EUR 10) per month users can make unlimited calls from the broadband connection (via Wi-Fi functionality on their phones) to fixed lines. Users can make unlimited calls from the fixed broadband connection to fixed lines and Orange mobile customers for USD 28.01 (EUR 22) per month. Calls made from outside the home are routed over the mobile network and charged separately. However, calls are classified "at home" as long as the call begins on the fixed network, even if the users leave Wi-Fi range during the conversation and move onto the mobile network.[9]

The trend towards flat-rate calling and Internet access has contributed to the price declines seen across OECD-area telecommunications markets. An area in which this is apparent is the pricing of fixed-line telephony.

Residential and business telecommunication baskets

The OECD has several baskets for following prices for fixed-line and mobile telephony. These baskets are developed with input from member countries and telecommunications operators in an effort to produce the best "representative" consumption basket for the entire OECD area. Since the baskets represent one standard level of consumption they are not intended to reflect specific calling patterns in a particular country. Creating a standard consumption basket, however, is the most efficient and meaningful way to do cross-country comparisons of such telecommunication prices.

Box 7.1. **OECD price baskets**

Fixed-line baskets					Mobile baskets		
Business		Residential			Residential/Business		
SOHO	SME	Low	Medium	High	Low	Medium	High

Box 7.1 shows the arrangement of the eight baskets according to network and usage type. Five of the baskets are dedicated to fixed-line telephony, while the other three are for mobile. The fixed line baskets are broken down between business and residential use while the mobile baskets represent both. One key difference between the business and residential plans is the inclusion of taxes on the residential portion.

The business baskets are broken down into usage patterns common for small offices/ home offices (SOHO) and a larger consumption pattern found in small and medium-sized enterprises (SME). The SOHO basket is for one user while the SME basket gives prices for a medium-sized enterprise (assumed to have 30 employees). The residential baskets cover three consumption levels (low, medium and high).

Tables 7.3 through 7.10 show the relative prices for all eight OECD baskets and include both subscription and consumption charges. For a certain country the prices may appear more competitive in one basket than in another. This is commonly the result of offers tailored to specific national calling patterns that may mimic the composition of a certain basket more closely than others.

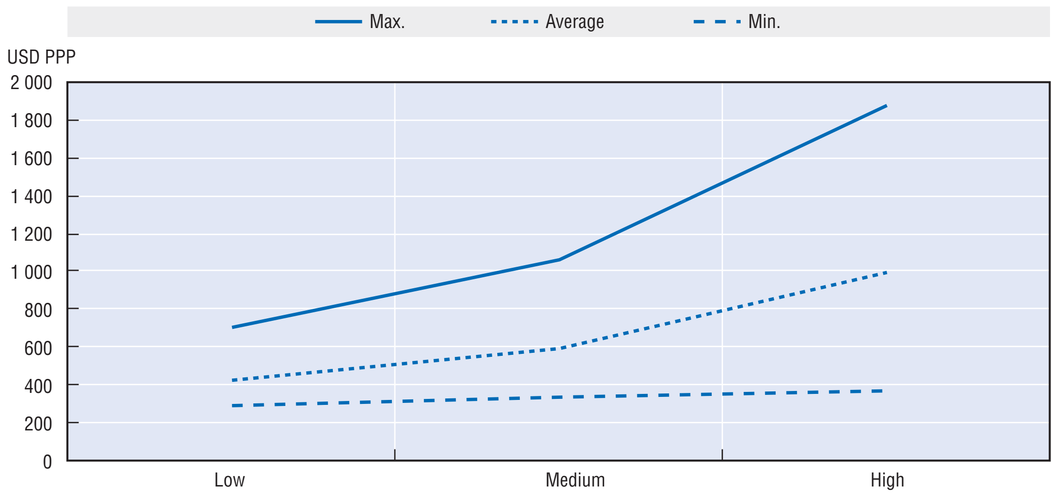
Residential fixed-line baskets

The three residential fixed-line baskets examine the price of 600 (low), 1 200 (medium), or 2 400 (high) calls over a one-year period. Calls are also broken down according to distance, destination (fixed, mobile and international), and time of day. All prices are given in USD purchasing power parity (PPP) for international comparison.

The prices found across baskets vary little in terms of the lowest-priced offer but significantly for the most expensive. For example, the least expensive residential low-usage basket in the OECD is USD 295 in Iceland but the least expensive residential high-usage basket is only USD 73 more per year for triple the amount of calls in Canada (see Figure 7.4).

Figure 7.4. **Residential fixed-line baskets: Price spread**

By basket type, yearly, USD PPP



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The most expensive high-usage baskets are found in Poland, the Czech Republic, Turkey and Hungary where the cost of the calling basket (one year of calls and subscription) is more than USD 1 500. In contrast, the same calling basket is 75% less expensive in Canada and 65% less expensive in the United States.

The low-usage baskets range in yearly price from USD 295 in Iceland to USD 707 in the Czech Republic for an average of USD 424 across the OECD (see Figure 7.5 and Table 7.3). The most expensive countries are the Czech Republic, Poland, Mexico, Hungary and Portugal. The average subscription comprises approximately 64% of the total price of the low-usage basket.

The total number of calls doubles from 600 to 1 200 a year in moving from the low- to medium-usage basket but the average price increases only 37% across the OECD area (Figure 7.6 and Table 7.4). This reflects the lower marginal cost of making additional calls once a subscriber has paid for the monthly subscription. The most expensive medium-usage baskets are in Poland, the Czech Republic and Turkey while the least expensive are in Canada and Iceland. The variation in prices is significant among countries as well. The same basket of medium-usage calls in Poland is more than three times more than in Canada.

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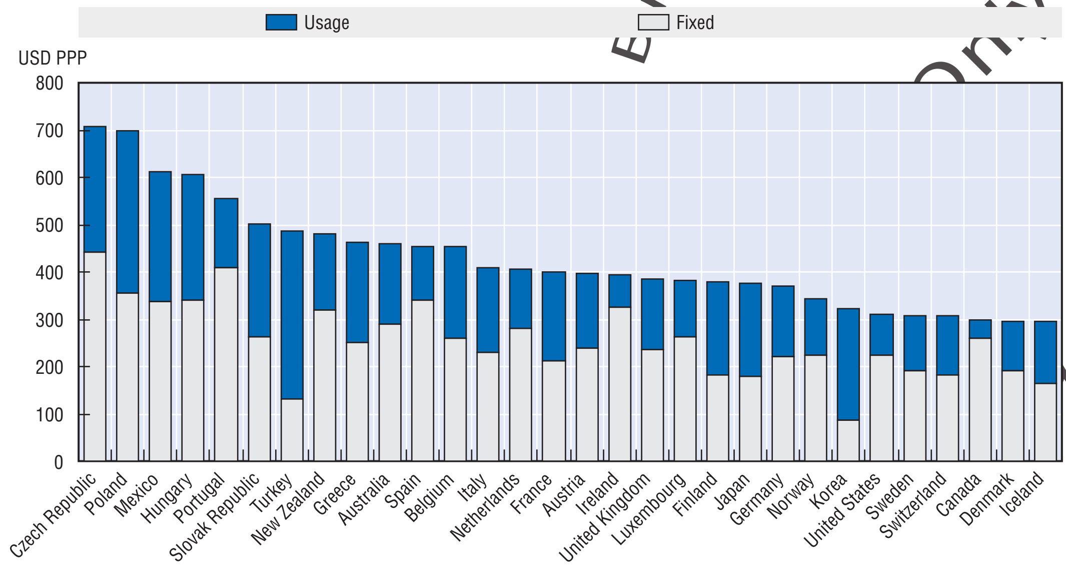
Figure 7.5. **OECD residential fixed-line basket: Low usage, August 2006**



Note: Discounts, if available, are subtracted from the usage charges.

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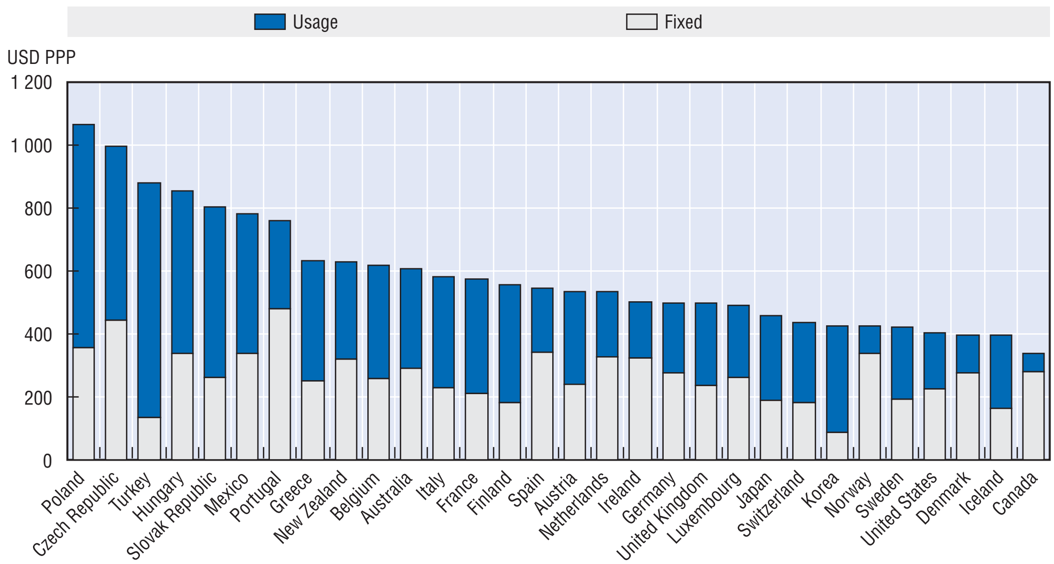
Figure 7.6. **OECD residential fixed-line basket: Medium usage, August 2006**



Note: Discounts, if available, are subtracted from the usage charges.

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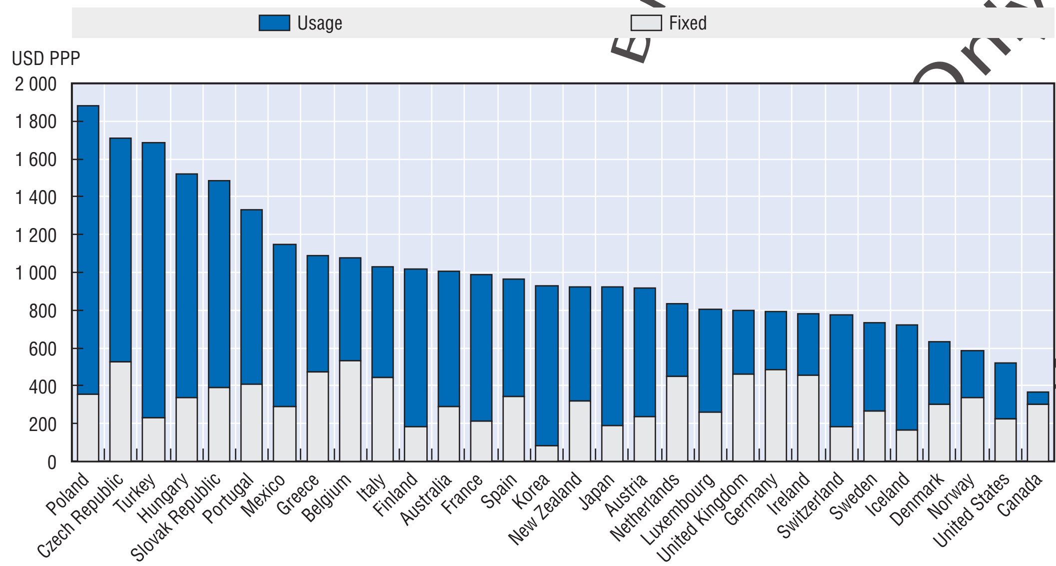
The middle-usage basket has a lower proportion of the total monthly cost contained in the subscription fees than the low-usage basket. In the middle-usage basket, 42% of the basket's cost is from the subscription and the rest from variable costs of making the calls. This proportion varies widely among countries. In Canada, 83% of the price is in the subscription. By contrast, in Turkey the subscription is only 15% of the price.

The number of calls doubles again between the medium- and high-usage baskets to 2 400 calls a year (Figure 7.7 and Table 7.5). The average price increase for double the

Figure 7.7. **OECD residential fixed-line basket: High usage, August 2006**



Note: Discounts, if available, are subtracted from the usage charges.

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amount of calls is 70% across countries. Subscription charges are a smaller portion of the total price of the baskets. In Korea, for example, the subscription corresponds to only 9% of the total price of the basket. Over the 30 OECD countries the subscription charge is 31% of the price of the large basket of calls. Exceptions are countries such as Canada and the United States where operators offer flat-rate local and/or domestic calls as part of the monthly subscription charge.

Poland, the Czech Republic and Turkey again have the most expensive high-usage baskets in the OECD, each with a yearly price of over USD 1 600 (PPP) or USD 133 (PPP) per month. By contrast, the same basket in Canada and the United States would be only USD 368 and USD 518 for the entire year. The price of the basket in the most expensive country, Poland, is five times the price in Canada, the least expensive.

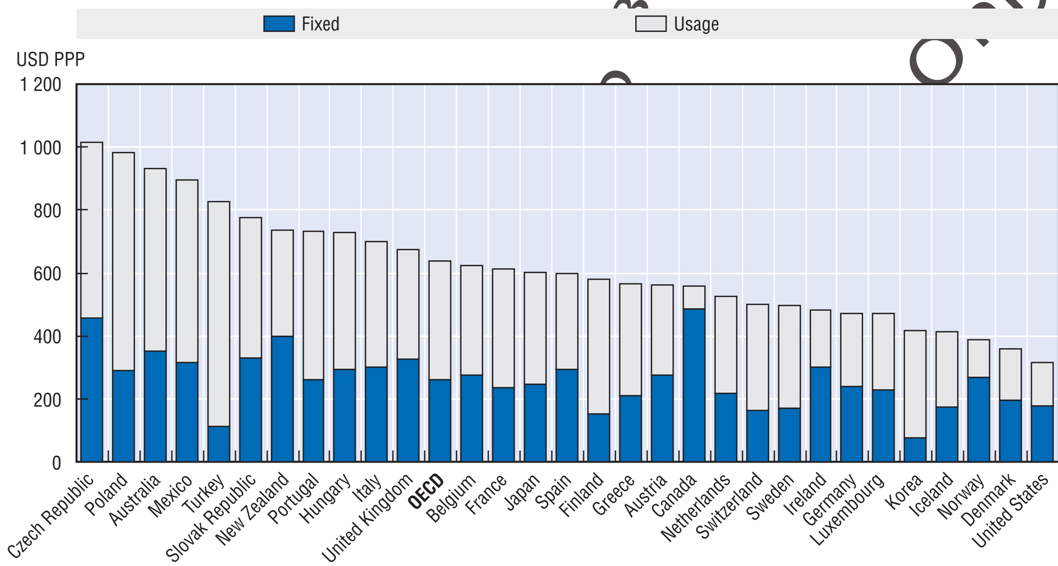
Business fixed-line baskets

The OECD has two business baskets that focus on prices for two broad groups of business customers. The first basket attempts to mimic the calling patterns in a home office (small office). The second basket looks at small and medium-sized enterprises (assumed to have 30 employees and 30 lines).

The least expensive basket of calls for small offices/home offices is in the United States where a yearly price would be USD 315 (PPP) without tax. The most expensive home office basket is in the Czech Republic for USD 1 015 per year (Table 7.6).

Finally, the basket geared towards small and medium-sized enterprises examines the cost of 30 channels (64 kbit equivalents) over one year in each country (Table 7.7). The least expensive SME basket for companies is in Norway where the yearly price would be USD 12 665 (PPP). By contrast, the most expensive countries for a small or medium-sized enterprise purchasing the SME basket are the Czech Republic, Poland, Australia and Mexico, each at more than USD 35 000 for the year, roughly three times more than in Norway or the United States for the same calls.

Figure 7.8. **OECD business fixed-line basket: Small office/home office, August 2006**



Note: Discounts, if available, are subtracted from the usage charges.

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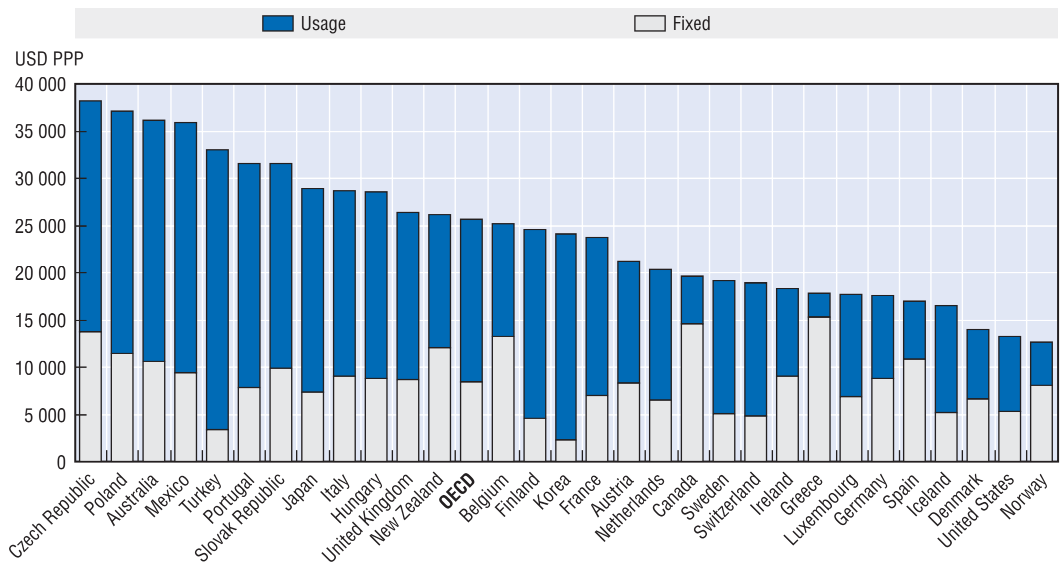
Figure 7.9. **OECD business fixed-line basket: Small and medium-sized enterprises, August 2006**



Note: Discounts, if available, are subtracted from the usage charges.

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International pricing trends

There is still significant variation in the price of making an international call in OECD countries (Table 7.11). However, there has been a shift away from per-call international pricing since the last *Communications Outlook* in 2005. One key trend has been the extension of flat-rate fixed calling plans to include international calls to fixed lines. The price of calling internationally has been under extreme pressure from VoIP because operators are able to send the voice call partially over the Internet and terminate the call locally as a way to minimise costs. The previous *Communications Outlook* drew attention to how VoIP operators such as Skype entered the market and attracted users by offering very low international call charges (see Chapter 5, Box 5.2 and Figure 5.6).

In the past two years, several fixed-line replacement VoIP companies have begun offering free international calls to fixed lines in selected countries as part of the basic subscription. Vonage is one of the largest VoIP providers in the United States and offers unlimited calls to Canada, France, Ireland, Italy, Puerto Rico, Spain and the United Kingdom as part of its basic subscription plans.

One of the most extensive offers of unlimited calling comes from the French competitive operator Free. Subscribers to the company's triple-play bundle receive free calling to fixed lines in France and to 22 other economies. The offer includes most countries in western Europe but also distant destinations such as China, Australia, Canada, the United States and Singapore.

Nomadic VoIP providers such as Skype have recently responded as well by temporarily offering free calls to the United States and to fixed lines in France without a monthly subscription. Such developments are putting pressure on traditional phone carriers to drop international prices. The move towards flat-rate PSTN calling has been adopted by competitive operators as a way to pull market share away from incumbent operators.

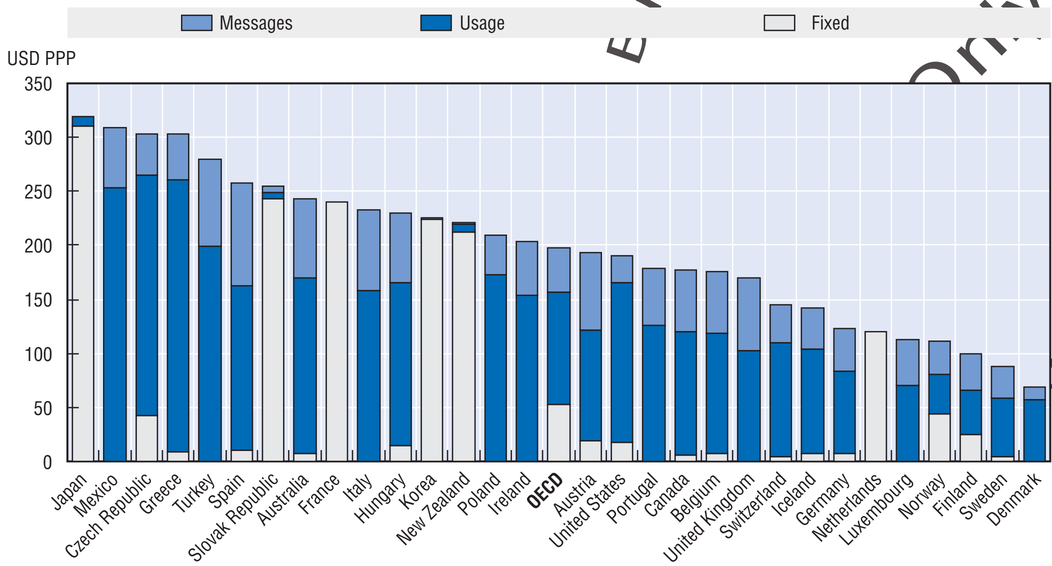
If current trends continue, the price of calling fixed telephones around the world will reach very low levels. In most countries, however, the cost of calling mobiles internationally is significantly higher.

Mobile pricing trends

There have been substantial changes in fixed-line calling patterns throughout the OECD with many former fixed-line calls moving onto mobile networks. The OECD has three mobile price baskets that can be used to follow pricing trends and each corresponds to a different level of usage. The low-usage basket includes 360 voice calls, 396 SMS messages and 8 MMS per year (Table 7.8). The medium usage basket includes 780 calls, 600 SMS messages and 8 MMS messages (Table 7.9). Finally, the high-usage basket increases to 1 680 voice calls, 660 SMS messages and 12 MMS messages (Table 7.10). The OECD basket distributes these between peak and off-peak hours and uses an average call duration to make the calculations. Calling patterns were all determined through extensive discussions with carriers across the OECD. It is worth noting that the base OECD calling patterns can be significantly different from a country's particular calling pattern. For example, the high-usage OECD basket includes 1 680 outgoing voice calls per year while users in the United States average 9 600 minutes of voice calls (combined incoming and outgoing) per year.

The least expensive mobile baskets for low usage are in Nordic countries such as Denmark, Sweden, Finland and Norway. Luxembourg, the Netherlands and Germany also have relatively low prices. Japan has the most expensive low-usage basket but the high prices are partially due to a lack of prepaid calling plans that allow use of a mobile phone without a set monthly subscription charge. The proportion of fixed to usage charges in the low-usage basket is interesting. In France and the Netherlands the subscription charge is the price of the entire basket. In Korea, Japan, New Zealand and the Slovak Republic the subscription charge encompasses over 90% of the basket's price. In contrast, a typical

Figure 7.10. **OECD mobile low-user basket, August 2006, tax included**



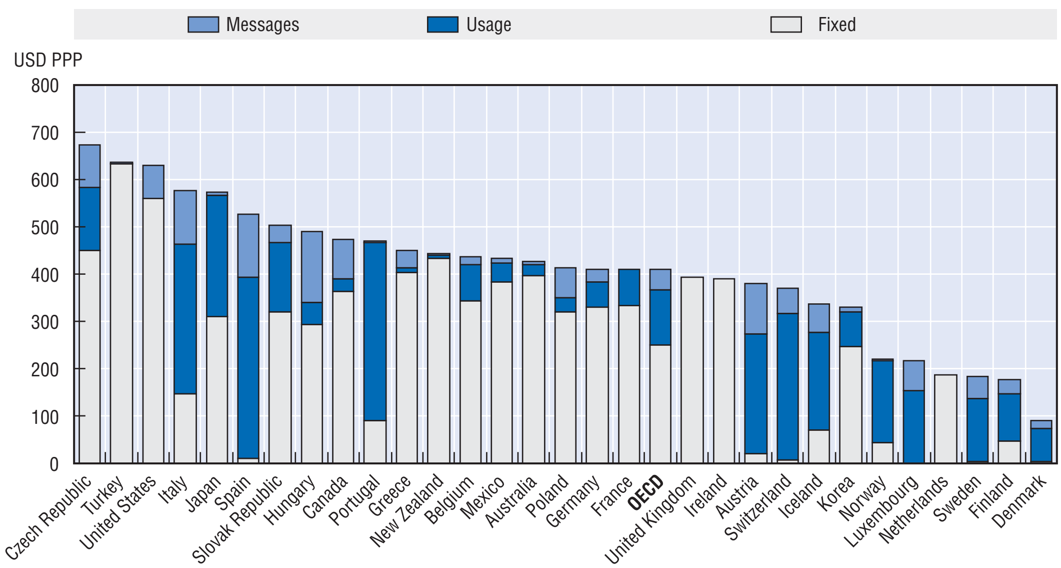
Note: Prepaid plans are included.

StatLink http://dx.doi.org/10.1787/002346358066

basket user in Denmark, Ireland, Italy, Luxembourg, Mexico, Poland, Portugal, Turkey and the United Kingdom has no monthly subscription charge on the chosen plan.

Nordic countries continue to lead the OECD in the price for the mobile medium-usage basket (Figure 7.11). Denmark's medium-usage basket is the least expensive in the OECD area and the price for one year of calling is roughly half the cost of the second least expensive country, Finland. A subscriber in Denmark making the calls defined in the basket would spend USD 89.16 (PPP) per year in PPP terms. The same basket of phone calls in the Czech Republic would cost USD 673.37 (PPP). The OECD average is USD 408.09 (PPP) per year.

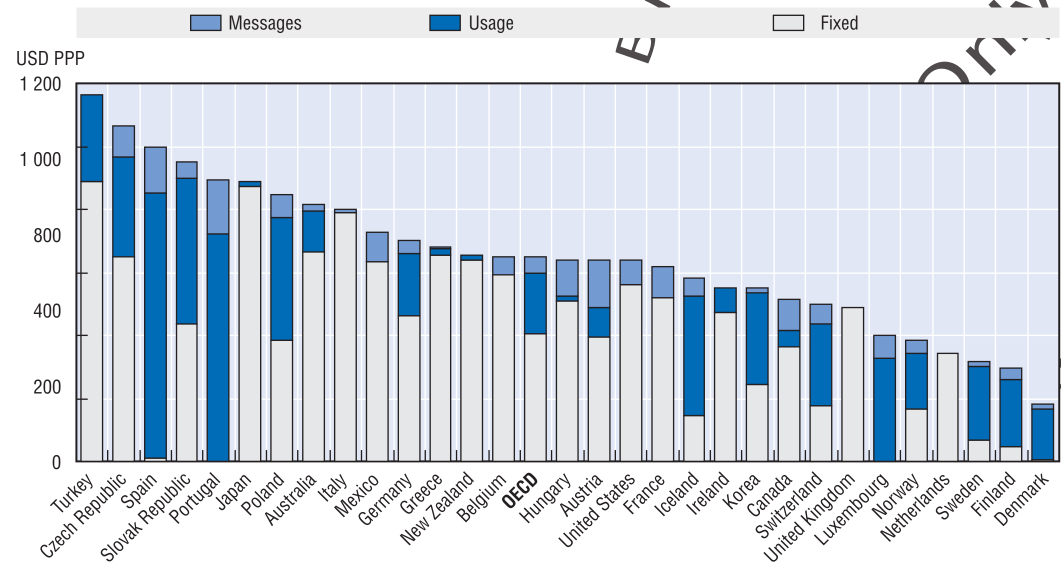
Figure 7.11. **OECD mobile medium user basket, August 2006, VAT included**



Note: Prepaid plans are excluded.

StatLink http://dx.doi.org/10.1787/002400356513

Figure 7.12. **OECD mobile high user basket, August 2006, VAT included**



Note: Prepaid plans are excluded.

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The OECD's high-usage basket is again the least expensive in the Nordic countries of Denmark, Finland and Sweden. Subscription fees make up an average of 63% of the price of the high-usage mobile basket in the OECD. However, Denmark, Luxembourg, Portugal and Spain have either a very small or no monthly subscription charge. By contrast, the subscription fee is more than 90% of the total price of the basket in Belgium, Greece, Italy, Japan, the Netherlands, New Zealand and the United Kingdom.

Domestic calling revenues are only one part of an operator's income sheet. Many mobile operators have data and specialised services that add to overall revenues.

Mobile operators eager to increase paid usage on their networks have turned to television services as a way to boost revenue. T-Mobile in Germany acquired the rights to the Bundesliga (the German national football league) for streaming to mobile phones. The MobileTV service provides live video and highlights to subscribers over 14 channels. For USD 9.55 (EUR 7.50) per month, 3G subscribers can have unlimited access to all 14 channels. Subscribers who do not buy a monthly package can also view channels for a flat rate of USD 2.55 (EUR 2) per day.[10]

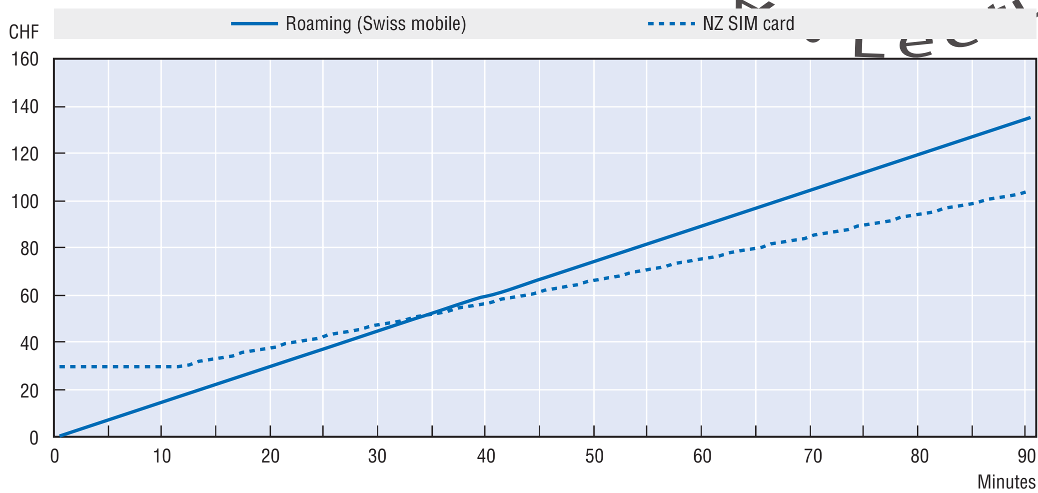
Telecommunications providers have also found other innovative ways to build revenue through video services. In October 2006, AT&T in the United States launched a remote video monitoring service that can relay live (and pre-recorded) security videos from the user's home to any IP-capable device (including mobile phones on AT&T's Cingular network). The system can send alerts when motion is detected in a home and either record activity or allow users to watch the camera live. After an initial installation fee of USD 200, users pay USD 9.99 per month for the service.[11]

Roaming

International roaming charges have also helped boost revenue of mobile operators in most OECD countries and these charges remain a significant expense for those who travel internationally. The widespread adoption of GSM-based mobile technologies has allowed operators around the world to enter into roaming agreements for their subscribers when travelling abroad. The ability to roam has benefited users as it allows them to remain in contact while out of the country.

This connectivity has, however, come at a cost to consumers. Roaming charges have been relatively high when compared with the costs of obtaining a local SIM card for the network. Travellers and vacationers commonly buy prepaid SIM cards when travelling abroad as a way to receive and place calls less expensively. In some countries, the cost of a local SIM pays for itself in less than 30 minutes of communication (Figure 7.13).

Figure 7.13. **Cumulative cost of local mobile to mobile calls in New Zealand, roaming *versus* local SIM card**



Note: Swisscom mobile (basic xtra-liberty) and Vodafone (Motormouth prepaid SIM card). New Zealand plan assumes a 50/50 breakdown of on-network and off-network calls. Prices valid as of 11 October 2006.

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Figure 7.13 shows how roaming charges in New Zealand for a Swisscom Mobile customer would be lower than purchasing a local SIM card if the user makes less than 35 minutes of total local calls. However, at the 36th minute, it becomes less expensive for a traveller to use a local SIM card. The break-even point is even lower for international calls (31st minute of communication) from New Zealand back to Swiss mobiles.

Policy makers and regulators are responding to consumer complaints about high international roaming charges. The European Commission released proposed roaming regulation in July 2006 which would limit wholesale charges that mobile operators charge each other for carrying foreign network calls. The Commission also proposes a cap on at the retail level of 30% above the wholesale price.[12] The European Commission and several European national regulatory authorities have taken important steps to promote transparent tariff information on international roaming. For example, the Commission and several national regulatory authorities have implemented websites that provide consumers with information on the tariff rules applied on international roaming calls.

VoIP over Wi-Fi-enabled handsets eventually may put downward pressure on roaming prices across the OECD. Currently however, Wi-Fi networks lack the coverage to offer a true substitute for a mobile network when abroad and may be expensive to join.

Broadband pricing trends

Since the publication of the previous *Communications Outlook* in 2005, the capacity (speeds) of top-range broadband offers have increased dramatically in many OECD countries while subscription costs have fallen. In some cases, ISPs have kept prices constant but increased broadband speeds.

An OECD analysis of 372 broadband offers in October 2006 shows that DSL broadband prices from the incumbent fell an average of 19% in one year from September 2005 to October 2006 (Table 7.12). The comparison looked at the same package, if available, or one that made the consumer better off one year later. At the same time, the comparable speeds of these packages increased 29% over the same period. Cable broadband prices followed a similar trend. The same broadband package from cable operators in October 2006 was 16% less expensive but 27% faster than just one year earlier (Table 7.13).

While prices fell and speeds increased in most countries, the incumbent DSL operators in Denmark and the Czech Republic introduced bitcaps for the first time on the specified plan. Cable providers in the Czech Republic also introduced new bitcaps which could offset price and speed gains for some high-bandwidth users.

Internet service providers in some countries increased the amount of data users could send before running into bitcaps. DSL providers in Austria, Ireland, Portugal and the United Kingdom increased the bitcaps on the compared plans between 2005 and 2006. Cable operators in Australia, Belgium, Canada, Luxembourg, New Zealand and Portugal increased their respective bitcaps as well.

Figures 7.14 and 7.15 show the changes in speed and price in the representative plans from year to year. Operators either reduced prices or held them constant for each of the offers spanning the one-year period, with the exception of one cable company in Turkey. In a few cases the previous lower speeds no longer exist and a higher speed was chosen. KPN in the Netherlands decreased the price of its similar broadband offering but also reduced the speed slightly. The Germany cable company Kabel Deutschland reduced the speed it was providing customers for the same price. Instances of dramatic increases in speed may represent an operator starting from a relatively low level and upgrading to standard OECD speeds.

The year-to-year price changes focus on one DSL and one cable Internet offering. However, much of the dynamism in the Internet access market can be seen by the range of offerings available in the market. The OECD research gathered pricing data in each country on all broadband offerings from the incumbent telecommunication operator, a key cable company and a third competitive provider (cable, fibre or ADSL) (Table 7.14).

Figure 7.16 shows the range of monthly subscription charges in USD PPP in October 2006 across all three providers in each country. The least expensive monthly subscription for always-on broadband access was in Sweden where USD 10.79 (PPP) pays for a 256 kbit/s connection from the cable provider Com Hem. The Danish fibre-to-the-home provider Dansk Bredbånd offers a 512 kbit/s symmetric connection for USD 11.11 (PPP) per month. The fastest low-end broadband connection was in France from Neuf Telecom where subscribers received 20 Mbit/s second for USD 16.36 (PPP) per month. The country with the most expensive "entry point" for broadband access was Mexico. In Mexico, the least expensive broadband plan surveyed was from Megacable for USD 52.36 (PPP) per month for 1 Mbit/s of connectivity.

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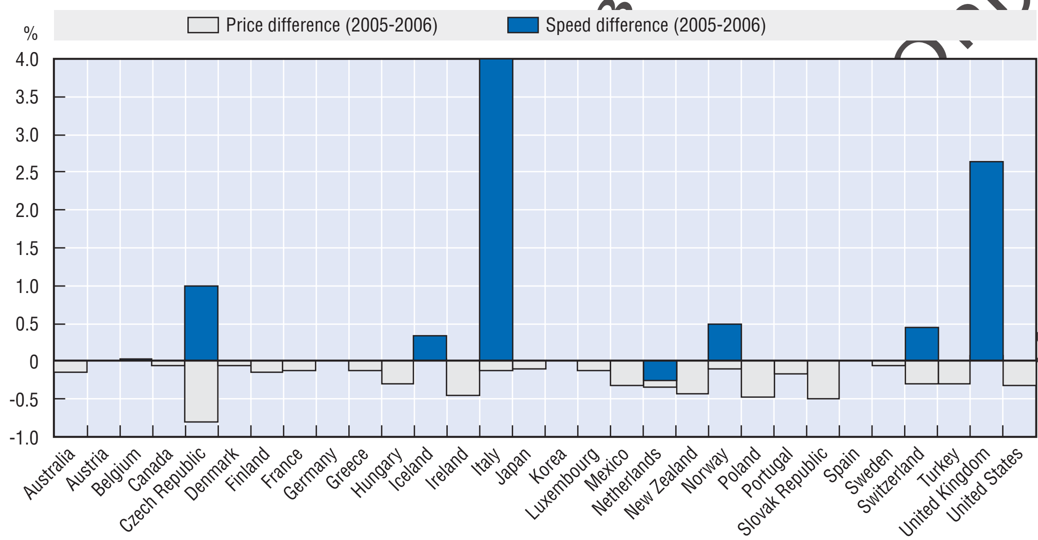
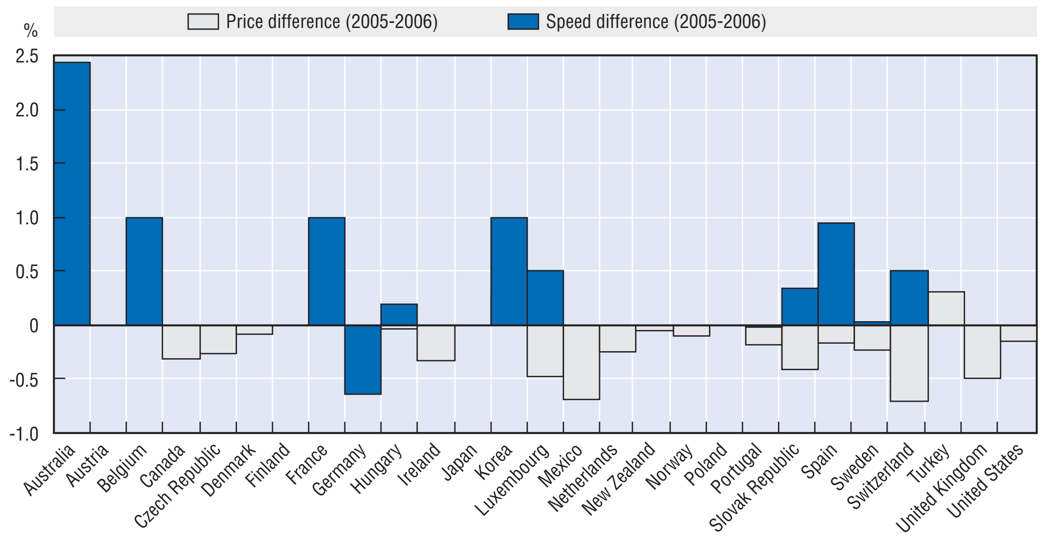
Figure 7.14. **Incumbent broadband prices and speeds, ADSL or fibre, September 2005 to October 2006**



Note: When identical offers were not available, a faster connection was selected. Bitcaps introduced in Denmark and the Czech Republic may affect comparisons.

StatLink http://dx.doi.org/10.1787/002488172832

Figure 7.15. **Cable broadband prices and speeds, September 2005 to October 2006**



Note: When identical offers were not available, a faster connection was selected. Greece, Iceland and Italy were not included in the cable comparisons.

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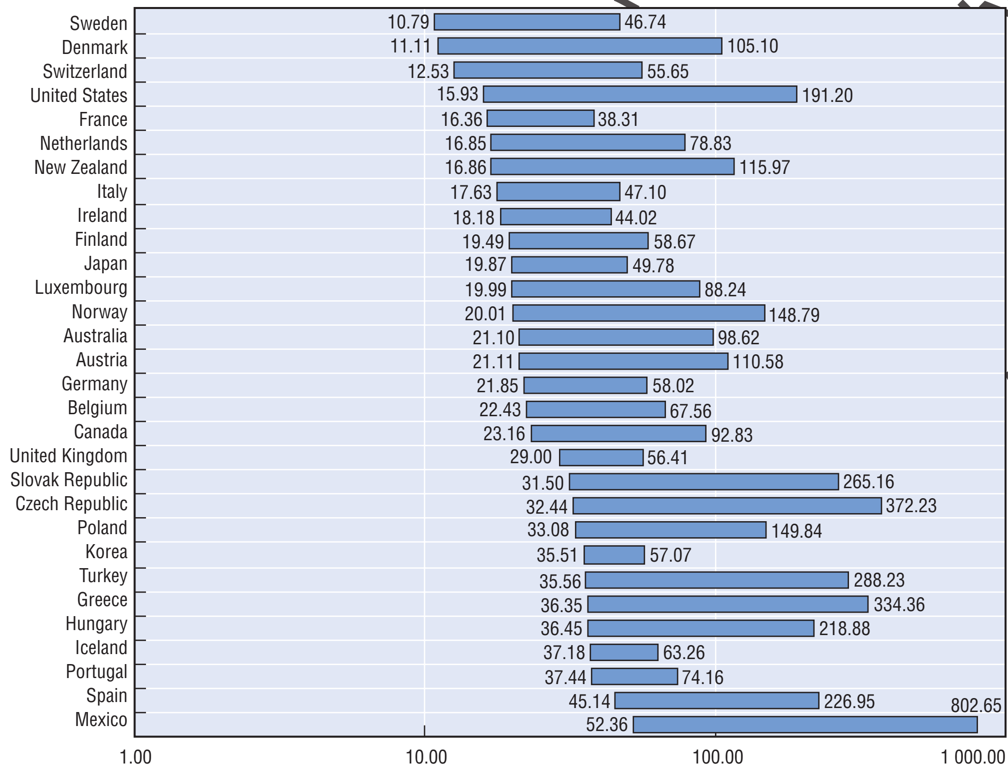
In addition to the lowest "entry point", Figure 7.16 highlights the most expensive offer put forward by the three surveyed firms in each of the 30 OECD broadband markets. Broadband monthly subscriptions in many countries range between USD 20 and USD 100 (PPP). France had the lowest broadband price ceiling. The most expensive broadband plan in France from Orange (France Telecom), Noos or Neuf Telecom was USD 38.31 (PPP) per month. The most expensive "top-end" offers were found in Mexico, the Czech Republic, Greece and Turkey.

Figure 7.16. **Range of broadband prices for a monthly subscription, October 2006**



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Evaluating monthly subscription ranges alone neglects the differences in prices for bandwidth. Countries can also be compared by the price per Mbit/s that users pay for connectivity. Figure 7.17 shows the range of per Mbit/s prices among the three companies surveyed for each OECD country. The least expensive per Mbit/s charges are typically over fibre. Japan, Sweden, Korea and Finland have the lowest prices per Mbit/s in the OECD area. Operators in each of these countries offer broadband speeds up to 100 Mbit/s over fibre and the prices per Mbit/s are between USD 0.22 and 0.59 (PPP). France has the least expensive bandwidth over ADSL for which subscribers pay USD 0.82 (PPP) per Mbit/s.

The most expensive entry-level charges per Mbit/s are in the Turkey, Greece, Mexico, Hungary and the Czech Republic. Turkey is by far the most expensive at USD 81.13 (PPP) per Mbit/s.

The range from lowest and highest observed price per Mbit/s can be quite large. In Japan, the lowest per Mbit/s price is from Yahoo!BB in an apartment complex at USD 0.22 (PPP) per Mbit/s (USD PPP 21.53/month for 100 Mbit/s). The most expensive in Japan is from the cable operator J:Com which offers an entry-level 256 kbit/s connection for USD 2 (PPP) more than the 100 Mbit/s offer from Yahoo!BB. The ranges are the smallest in Korea, the United Kingdom and Switzerland.

Bundled services

Broadband offers typically fall into two categories, those supplied as a communications bundle and those supplied as simple stand-alone services. ISPs often target different market segments with each type of offer. ISPs in countries such as the United States and France have

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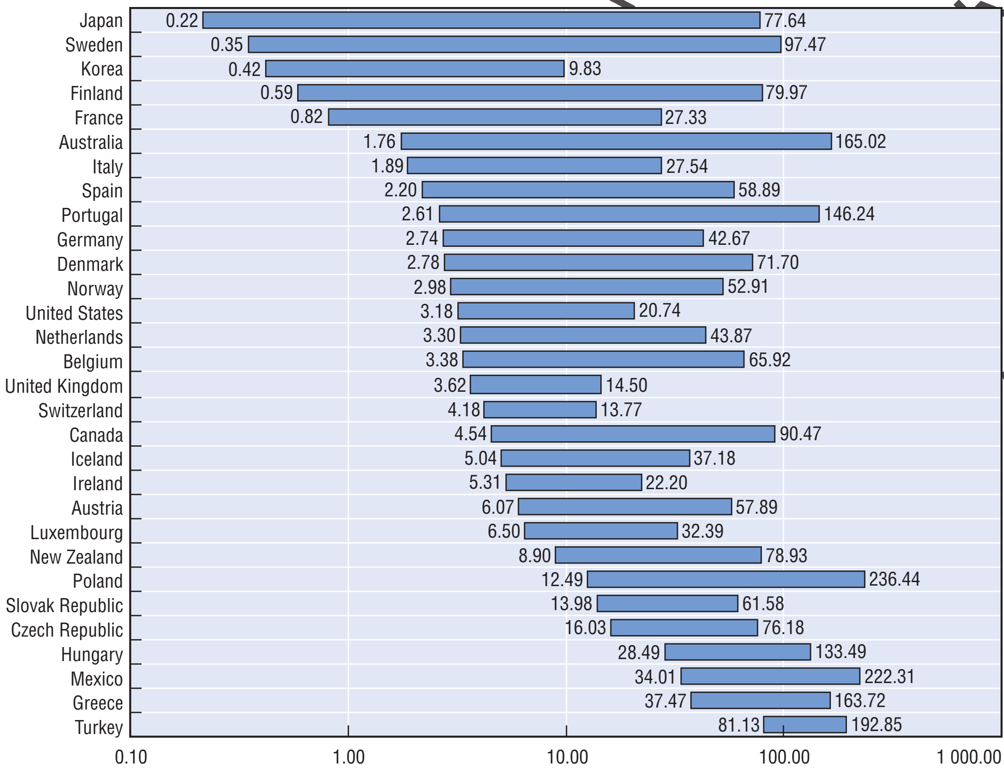
Figure 7.17. **Range of broadband prices per Mbit/s, October 2006, USD PPP**



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introduced very low-cost offers to encourage traditional dial-up customers to switch connections. Verizon in the United States introduced a broadband offer for USD 14.95 per month (768 kbit/s), only slightly higher than the common dial-up cost of USD 9.95 per month. In France, the operator Neuf Telecom offers a stand-alone broadband connection for USD 19.04 (EUR 14.95) per month with speeds up to 20 Mbit/s.

ISPs have also begun packaging video, voice and data services in a bundle with potentially higher margins. Neuf Telecom's bundle in France includes 63 television channels, broadband access up to 20 Mbit/s, and free calls to fixed lines in 30 countries.[13] Cable companies such as UPC have also introduced extensive multiple-play bundles across Europe that provide video, voice and data.

The bundles need not contain all three elements. For example, Bigpond, the ISP arm of the Australian incumbent Telstra, offers a USD 7.61 PPP (AUD 10) discount to broadband subscribers if they also subscribe to a "full service fixed phone". The discount is available if the subscriber takes a standard PSTN phone line along with local and long-distance charges billed directly to Telstra.[14]

Some of the key draws of ADSL and cable modem Internet connections for consumers are their "always-on" connections and flat-rate data plans. Users who paid per-minute charges for dial-up access often appreciate flat-rate, predictable pricing plans for broadband. Many analysts credit the flat-rate, "all-you-can-download" plans as a key driver of broadband growth. At the same time, it is worth noting that more operators across the OECD area have also introduced pay-as-you-surf broadband packages as a way to move low-users away from dial-up connections.

Broadband subscribers tend to gravitate toward flat-rate data plans but ISPs have grappled with how to deal with users that consume an inordinate amount of network capacity. Some ISPs have responded by implementing bitcaps on users. Other ISPs have written abusive data consumption into their acceptable use policies. Many of the bitcaps in the OECD have been low enough to stifle certain legitimate broadband uses such as podcast downloading and video streaming. In other countries, bitcaps are high enough not to interfere with most common uses.

In Australia, Bigpond subscribers can choose between plans with two types of data caps. They can select a hard cap after which point all data transmissions are billed on a per Megabyte basis. Subscribers can also choose from an "unlimited" plan which allows users still to send and receive traffic after the bitcap is reached at no extra charge but slows download speeds to 64 kbit/s (essentially dial-up speeds).

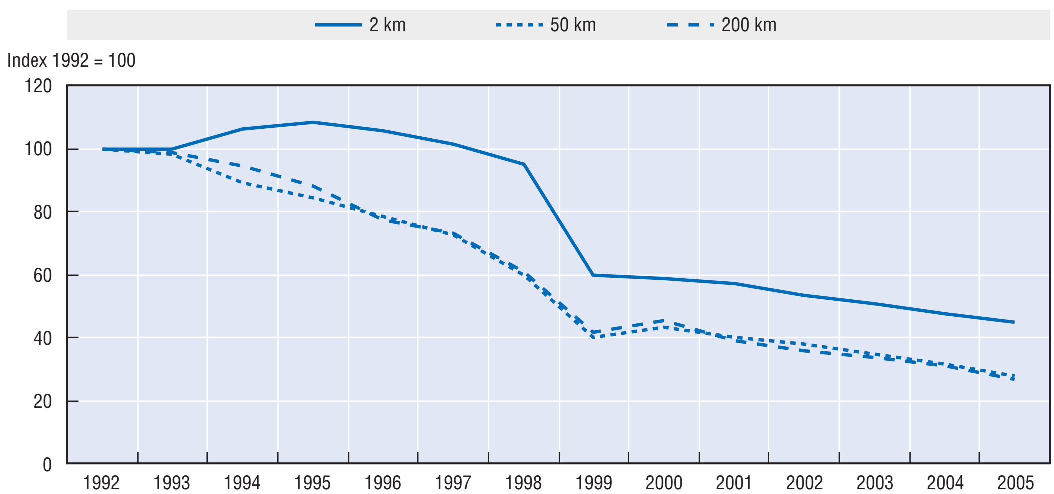
In Belgium, ISPs have found another way to tame very high bandwidth use. They too have instituted bitcaps on connections but allow users to buy additional data on a per Gigabyte basis. Both Belgacom (ADSL) and Telenet (Cable) sell additional traffic beyond the data cap at USD 1.27 (EUR 1) per Gigabyte (GB).

Leased lines

Leased lines are symmetrical transmission channels provided permanently for the duration of a contract. Leased lines are provided to businesses as a way to connect offices to each other or link back to a telecommunications provider. They are commonly used as a way for companies to manage their own telecommunication services. However, leased lines are also used by alternative carriers as an element in their own networks until they become full facilities-based operators.

The price for a 2 Mbit/s leased line has fallen dramatically over the past 14 years (Figure 7.18 and Table 7.15). A two-kilometre line in 2006 is 64% less expensive than it was 14 years ago in nominal terms. Longer-distance connections have fallen even further. The price of a 200 kilometre line in 2006 is only 27% of the price a company would pay in 1992.

Figure 7.18. **Trends in leased line pricing over different distances, 2 Mbit/s line, 1992-2006**



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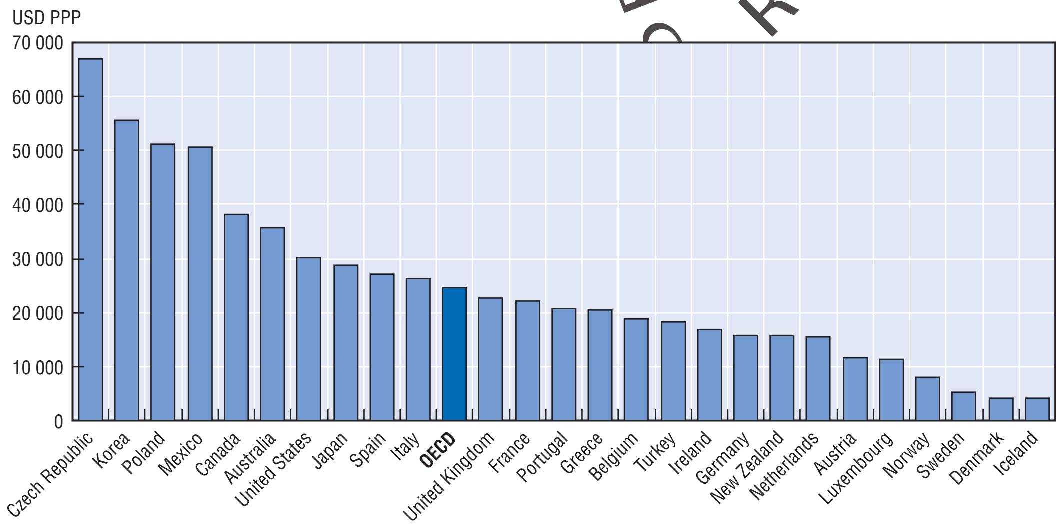
The northern European countries of Iceland, Denmark, Sweden and Norway continue to have the lowest prices in the OECD area for a 2 Mbit/s leased line (Figure 7.19 and Table 7.16). The yearly price of a 2 Mbit/s leased line in Iceland is USD 4 063 (PPP). The Czech Republic has the most expensive leased lines with a single 2 Mbit/s line price of USD 67 102 (PPP) for the year.

Figure 7.19. **Yearly price of national leased lines basket, 2 Mbit/s, August 2006, VAT excluded**



StatLink http://dx.doi.org/10.1787/002734242316

Notes

1. Free calling to three mobile phones is available on the calling plan "forfait Classique", *http://mobile.orange.fr/0/visiteur/PV*.
2. Vodafone's offer is part of the "Sharetime price plans", *www.vodafonebusinessshop.co.uk/index.cfm?fuseaction=PricePlans.shareTime&menuactive=1&mnuid=3&sbmid=3.2*.
3. France Telecom's new offer for flat-rate calling is called "Spécial illimité +240" and replaces the previous unlimited calling plan. Details were gathered on 15 September 2006, *www.agence.francetelecom.com/mx/?tp=F&ref=13321&IDCible=1&type=3&sv=5-186347_B&donnee_appel=FTASN&id=210911158569596*.
4. The total number of mobile broadband subscribers with connectivity faster than 200 kbit/s in one direction at the end of December 2005 was 3 125 781. Data are available from the FCC's report "High-Speed Services for Internet Access: Status as of 31 December 2005".
5. Data from T-Mobile's unlimited data plan was collected on 20 September 2006, *www.t-mobile.com/shop/plans/Default.aspx?plancategory=7#Internet+Only*.
6. Sprint's EVDO service prices were collected on 18 September 2006, *www.sprint.com/business/products/offers/offerHighSpeed_byProduct.html*.
7. T-Mobile's data plans data were collected on 19 September 2006, *http://t-mobile.cz/Web/Residential/TarifySluzby/TarifyCeny/CenikPripojeniKInternetu.aspx*.
8. The data for "Swisscom Together" were collected on 19 September 2006, *www.swisscom-fixnet.ch/fx/privatkunden/spezialangebote/together/familien/index.htm*.
9. "Orange launches unik: a new generation of telephone", Orange Press release, 25 September 2006, *www.orange-business.com/mnc/press/press_releases/2006/att00002271/cp_unik_en_06092500.pdf#search=%22unik%20orange%22*.
10. Data on T-Mobile's Bundesliga programming were collected on 20 September 2006, *www.t-mobile.de/mobiletv/0,12186,14135-_,00.html*.

11. "AT&T Launches Remote Home Monitoring Video Service Nationwide", AT&T Press Release, 26 October 2006, *http://att.sbc.com/gen/press-room?pid=4800&cdvn=news&newsarticleid=23003*.
12. "Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on roaming on public mobile networks within the Community and amending Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services", European Commission, 2006/0133(COD), 12 July 2006, *http://ec.europa.eu/information_society/activities/roaming/docs/regulation_en.pdf*.
13. Neuf Telecom pricing was valid as of 12 October and was obtained from *http://offres.neuf.fr/offres/internet/Nos-offres-ADSL/ADSL-100-Neuf-Box.html*.
14. Bigpond ADSL pricing was valid as of 12 October 2006, *http://my.bigpond.com/internetplans/broadband/adsl/plans/*.

Table 7.1. **Pricing structures for residential users in the OECD, 2006**

	Local telephony, fixed lines	DSL pricing structure	Cable Internet pricing structure	Bitcaps	Telephony from cable operators	National flat-rate fixed calling
Australia	Unmetered (flat rate)	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Austria	Metered (options for unmetered weekends and evenings)	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Belgium	Metered	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	Yes
Canada	Unmetered	Flat rate	Flat rate, data controlled	Yes	Yes	Yes
Czech Republic	Metered (Options for unmetered weekends and offpeak)	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Denmark	Metered	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	Yes
Finland	Metered	Flat rate	Flat rate	No	Yes	Yes
France	Metered/Unmetered	Flat rate	Flat rate	No	Yes	Yes
Germany	Metered/Unmetered	Flat rate	Flat rate	No	Yes	Yes
Greece	Metered	Flat rate	NA	No	NA	No
Hungary	Metered	Flat rate	Flat rate	No	Yes	No
Iceland	Metered	Data controlled	NA	Yes	NA	No
Ireland	Metered	Data metered, timed	Data metered	Yes	Yes	Yes
Italy	Metered	Flat rate, data controlled, timed	NA	No	NA	Yes
Japan	Metered	Flat rate	Flat rate	No	Yes	No
Korea	Metered	Flat rate	Flat rate	No	No	No
Luxembourg	Metered	Flat rate, data controlled	Data controlled	Yes	Yes	Yes
Mexico	Unmetered (first 100 calls free, then flat rate)	Flat rate	Flat rate	No	No	No
Netherlands	Metered	Flat rate	Flat rate	No	Yes	No
New Zealand	Unmetered	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Norway	Metered	Flat rate	Flat rate	No	Yes	Yes
Poland	Metered	Flat rate	Flat rate	No	Yes	No
Portugal	Metered/Unmetered	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Slovak Republic	Metered	Flat rate, data controlled	Flat rate, data controlled	Yes	Yes	No
Spain	Metered	Flat rate	Flat rate	No	Yes	Yes
Sweden	Metered	Flat rate	Flat rate	No	Yes	No
Switzerland	Metered	Flat rate	Flat rate	No	Yes	Yes
Turkey	Metered	Flat rate	Flat rate	No	No	No
United Kingdom	Metered	Flat rate, data controlled	Flat rate	Yes	Yes	Yes
United States	Metered/flat rate/unmetered	Flat rate	Flat rate	No	Yes	Yes

StatLink http://dx.doi.org/10.1787/012070568566

Table 7.2. **OECD time series for telephone charges**

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Residential																	
Fixed	100	109.2	112.7	112.8	112.8	122.4	125.9	113.0	115.5	119.3	132.0	129.1	133.3	132.2	145.2	145.6	165.0
Usage	100	104.2	98.4	96.8	94.1	98.6	90.1	81.3	78.7	70.5	60.6	55.8	57.5	53.5	55.7	53.2	39.0
Total	100	106.2	104.1	103.2	101.6	108.1	104.4	94.0	93.4	90.0	89.2	85.1	87.8	85.0	91.5	90.1	89.4
Business																	
Fixed	100	104.3	107.4	107.6	108.0	108.1	106.4	113.1	118.7	123.4	118.6	126.9	135.0	126.5	137.7	135.8	171.8
Usage	100	103.5	96.9	94.2	91.3	92.5	83.3	86.5	84.3	75.2	55.5	55.5	57.7	54.6	56.6	53.3	39.7
Total	100	103.7	99.0	96.9	94.6	95.6	87.9	91.8	91.2	84.8	68.1	69.8	73.2	69.0	72.8	69.8	66.1

StatLink http://dx.doi.org/10.1787/012452734385

Table 7.3. **OECD basket of residential telephone charges, low usage, August 2006**

Including tax

	Fixed		Usage		Discount		Total	
	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia	302.63	290.99	175.55	168.80			478.18	459.79
Austria	270.60	239.47	176.81	156.47			447.41	395.94
Belgium	288.26	259.70	214.24	193.01			502.50	452.70
Canada	290.43	259.31	43.66	38.98			334.09	298.29
Czech Republic	283.44	442.88	208.78	326.21	- 39.72	- 62.06	452.50	707.03
Denmark	280.96	192.44	184.03	126.05	- 32.84	- 22.50	432.15	295.99
Finland	236.68	183.48	253.07	196.18			489.75	379.65
France	243.70	211.91	215.22	187.14			458.91	399.05
Germany	255.71	222.36	171.25	148.91			426.96	371.27
Greece	234.87	249.86	199.93	212.69			434.80	462.55
Hungary	207.17	339.62	162.10	265.74			369.27	605.36
Iceland	237.91	165.22	187.32	130.08			425.23	295.30
Ireland	447.31	324.14	167.84	121.62	- 69.39	- 50.28	545.76	395.48
Italy	244.73	228.72	213.13	199.18	- 19.69	- 18.40	438.17	409.50
Japan	225.56	179.01	250.02	198.43			475.58	377.45
Korea	77.90	85.61	215.27	236.56			293.17	322.17
Luxembourg	296.43	262.33	136.46	120.76			432.89	383.09
Mexico	222.26	336.75	345.04	522.78	- 163.54	- 247.79	403.75	611.74
Netherlands	313.18	279.63	162.00	144.65	- 21.04	- 18.79	454.15	405.49
New Zealand	301.34	320.57	150.00	159.58			451.34	480.15
Norway	341.15	222.97	184.27	120.44			525.42	343.41
Poland	216.37	354.71	210.34	344.83			426.71	699.53
Portugal	347.12	408.37	215.98	254.09	- 92.07	- 108.32	471.02	554.14
Slovak Republic	165.10	262.06	202.05	320.71	- 50.76	- 80.58	316.38	502.19
Spain	330.98	341.22	203.39	209.68	- 94.08	- 96.99	440.30	453.91
Sweden	239.30	191.44	146.17	116.93			385.47	308.37
Switzerland	262.68	181.16	181.30	125.03			443.98	306.19
Turkey	82.34	132.80	219.30	353.72			301.64	486.52
United Kingdom	269.34	236.27	170.35	149.43			439.69	385.70
United States	224.46	224.46	86.18	86.18			310.64	310.64
OECD	258.00	254.31	188.37	197.83			426.93	428.62

Note: The OECD low usage basket of residential telephone charges includes fixed access and 600 calls [broken down according to distance, destination (fixed, mobile and international), and time of day] over a one-year period.

USD PPP: USD purchasing power parities (PPP) are used to aid in international comparisons.

Source: OECD and Teligen.

StatLink http://dx.doi.org/10.1787/012468405017

Table 7.4. **OECD basket of residential telephone charges, medium usage, August 2006**

Including tax

	Fixed		Usage		Discount		Total	
	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia	302.63	290.99	329.23	316.57			631.86	607.56
Austria	270.60	239.47	335.38	296.80			605.98	536.27
Belgium	288.26	259.70	397.66	358.25			685.93	617.95
Canada	314.87	281.13	63.52	56.72			378.39	337.85
Czech Republic	283.44	442.88	392.68	613.56	- 38.97	- 60.89	637.15	995.55
Denmark	406.13	278.17	331.51	227.06	- 160.83	- 110.16	576.81	395.08
Finland	236.68	183.48	482.65	374.15			719.33	557.62
France	243.70	211.91	417.78	363.29			661.48	575.20
Germany	316.96	275.62	304.95	265.17	- 49.35	- 42.91	572.56	497.88
Greece	234.87	249.86	360.59	383.61			595.45	633.46
Hungary	207.17	339.62	313.25	513.52			520.41	853.14
Iceland	237.91	165.22	330.67	229.63			568.58	394.85
Ireland	447.31	324.14	321.54	233.00	- 74.93	- 54.30	693.92	502.84
Italy	244.73	228.72	396.25	370.33	- 19.90	- 18.60	621.08	580.45
Japan	236.56	187.75	338.91	268.98			575.47	456.73
Korea	77.90	85.61	309.56	340.17			387.46	425.78
Luxembourg	296.43	262.33	256.36	226.87			552.79	489.20
Mexico	222.26	336.75	575.58	872.09	- 281.61	- 426.68	516.23	782.16
Netherlands	366.01	326.80	321.68	287.22	- 89.42	- 79.84	598.27	534.17
New Zealand	301.34	320.57	291.61	310.23			592.95	630.80
Norway	516.09	337.32	132.33	86.49			648.42	423.81
Poland	216.37	354.71	433.64	710.88			650.01	1 065.59
Portugal	408.37	480.43	387.88	456.33	- 151.73	- 178.51	644.51	758.25
Slovak Republic	165.10	262.06	394.78	626.63	- 52.92	- 84.00	506.95	804.69
Spain	330.98	341.22	403.26	415.73	- 204.98	- 211.31	529.26	545.63
Sweden	239.30	191.44	288.13	230.51			527.43	421.95
Switzerland	262.68	181.16	367.68	253.58			630.36	434.73
Turkey	82.34	132.80	463.85	748.14			546.19	880.94
United Kingdom	269.34	236.27	296.92	260.46			566.26	496.72
United States	224.46	224.46	177.99	177.99			402.45	402.45
OECD	275.03	267.75	340.59	362.46			578.13	587.98

Note: The OECD medium usage basket of residential telephone charges includes fixed access and 1 200 calls [broken down according to distance, destination (fixed, mobile and international), and time of day] over a one-year period.

USD PPP: USD purchasing power parities (PPP) are used to aid in international comparisons.

Source: OECD and Teligen.

StatLink http://dx.doi.org/10.1787/012512634181

Table 7.5. **OECD basket of residential telephone charges, high usage, August 2006**

Including tax

	Fixed		Usage		Discount		Total	
	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia	302.63	290.99	745.52	716.85			1 048.15	1 007.84
Austria	270.60	239.47	768.65	680.22			1 039.25	919.69
Belgium	593.75	534.91	600.22	540.74			1 193.97	1 075.65
Canada	339.31	302.96	72.88	65.07			412.19	368.02
Czech Republic	337.71	527.67	814.01	1 271.88	- 57.13	- 89.27	1 094.58	1 710.28
Denmark	440.84	301.95	481.33	329.68			922.17	631.63
Finland	236.68	183.48	1 077.07	834.94			1 313.76	1 018.42
France	243.70	211.91	893.10	776.61			1 136.80	988.52
Germany	561.20	488.00	352.03	306.12			913.23	794.12
Greece	446.19	474.67	824.24	876.85	- 245.95	- 261.65	1 024.48	1 089.87
Hungary	207.17	339.62	719.72	1 179.86			926.88	1 519.48
Iceland	237.91	165.22	801.43	556.55			1 039.34	721.76
Ireland	631.11	457.33	443.09	321.08			1 074.21	778.41
Italy	474.42	443.38	624.71	583.84			1 099.13	1 027.22
Japan	236.56	187.75	925.07	734.18			1 161.63	921.93
Korea	77.90	85.61	768.39	844.38			846.29	929.99
Luxembourg	296.43	262.33	610.51	540.28			906.94	802.60
Mexico	193.27	292.83	869.95	1 318.10	- 304.30	- 461.05	758.92	1 149.87
Netherlands	503.83	449.85	431.11	384.92			934.94	834.77
New Zealand	301.34	320.57	566.14	602.27			867.47	922.84
Norway	516.09	337.32	377.40	246.67			893.50	583.99
Poland	216.37	354.71	930.33	1 525.13			1 146.70	1 879.84
Portugal	347.12	408.37	875.67	1 030.20	- 92.73	- 109.09	1 130.06	1 329.48
Slovak Republic	246.29	390.94	752.23	1 194.01	- 62.47	- 99.17	936.04	1 485.78
Spain	330.98	341.22	894.75	922.43	- 290.22	- 299.19	935.52	964.45
Sweden	335.78	268.63	583.65	466.92			919.43	735.54
Switzerland	262.68	181.16	864.03	595.88			1 126.70	777.04
Turkey	142.70	230.16	901.29	1 453.69			1 043.99	1 683.85
United Kingdom	525.55	461.01	382.44	335.48			907.99	796.48
United States	224.46	224.46	293.62	293.62			518.08	518.08
OECD	336.02	325.28	674.82	717.61			975.74	998.91

Note: The OECD high usage basket of residential telephone charges includes fixed access and 2 400 calls [broken down according to distance, destination (fixed, mobile and international), and time of day] over a one-year period.

USD PPP: USD purchasing power parities (PPP) are used to aid in international comparisons.

Source: OECD and Teligen.

StatLink http://dx.doi.org/10.1787/012520320740

Table 7.6. **OECD business fixed-line basket: small office / home office, August 2006**

Excluding tax

	Fixed		Usage		Discount		Total	
	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia	367.04	352.92	603.61	580.39			970.64	933.31
Austria	311.00	275.22	322.31	285.23			633.30	560.45
Belgium	307.84	277.33	493.75	444.82	- 109.00	- 98.20	692.59	623.95
Canada	543.00	484.82	83.74	74.77			626.74	559.59
Czech Republic	292.37	456.83	357.33	558.33			649.70	1 015.16
Denmark	283.86	194.43	341.99	234.24	- 104.00	- 71.23	521.86	357.44
Finland	198.61	153.96	547.48	424.40			746.08	578.36
France	268.99	233.91	435.73	378.90			704.72	612.80
Germany	273.24	237.60	319.76	278.05	- 49.11	- 42.71	543.88	472.94
Greece	197.37	209.96	333.73	355.03			531.09	564.99
Hungary	178.52	292.66	265.08	434.55			443.60	727.21
Iceland	250.67	174.08	344.24	239.05			594.91	413.13
Ireland	414.32	300.23	340.04	246.40	- 89.76	- 65.04	664.60	481.59
Italy	321.59	300.55	428.59	400.55			750.18	701.11
Japan	309.13	245.34	447.70	355.32			756.83	600.66
Korea	70.82	77.83	309.83	340.47			380.65	418.30
Luxembourg	257.76	228.11	276.42	244.62			534.18	472.73
Mexico	207.78	314.81	407.70	617.73	- 25.61	- 38.81	589.86	893.73
Netherlands	243.88	217.75	346.17	309.08			590.05	526.83
New Zealand	376.32	400.34	315.84	336.00			692.16	736.34
Norway	412.88	269.85	177.94	116.30			590.82	386.15
Poland	177.34	290.72	421.38	690.79			598.72	981.51
Portugal	222.76	262.07	399.55	470.06			622.31	732.13
Slovak Republic	206.97	328.52	351.40	557.79	- 68.60	- 108.89	489.77	777.41
Spain	285.33	294.15	471.22	485.80	- 177.00	- 182.48	579.55	597.47
Sweden	210.95	168.76	410.95	328.76			621.90	497.52
Switzerland	235.07	162.12	489.39	337.51			724.46	499.63
Turkey	69.78	112.54	442.24	713.29			512.02	825.84
United Kingdom	371.56	325.93	395.36	346.81			766.92	672.74
United States	177.00	177.00	138.23	138.23			315.23	315.23
OECD	268.12	260.68	367.29	377.44			614.64	617.88

Note: The OECD small office / home office basket of telephone charges includes fixed access and 1 800 calls [broken down according to distance, destination (fixed, mobile and international), and time of day] over a one-year period.

USD PPP: USD purchasing power parities (PPP) are used to aid in international comparisons.

Source: OECD and Teligen.

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Table 7.7. **OECD business fixed-line basket: small & medium enterprises, August 2006**

Excluding tax

	Fixed		Usage		Discount		Total (30 lines)		Total (for each line)	
	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia	11 011	10 588	26 591	25 569			37 602	36 156	1 253	1 205
Austria	9 330	8 257	14 641	12 957			23 971	21 213	799	707
Belgium	14 721	13 262	13 266	11 951			27 987	25 213	933	840
Canada	16 290	14 545	5 729	5 115			22 018	19 659	734	655
Czech Republic	8 771	13 705	15 653	24 457			24 424	38 162	814	1 272
Denmark	9 747	6 676	15 905	10 894	- 5 236	- 3 586	20 416	13 984	681	466
Finland	5 958	4 619	25 818	20 014			31 776	24 633	1 059	821
France	8 070	7 017	19 256	16 744			27 326	23 761	911	792
Germany	10 173	8 846	10 117	8 797			20 290	17 644	676	588
Greece	14 414	15 334	15 990	17 010	- 13 596	- 14 464	16 807	17 880	560	596
Hungary	5 356	8 780	12 068	19 784			17 424	28 564	581	952
Iceland	7 520	5 222	16 244	11 280			23 764	16 503	792	550
Ireland	12 430	9 007	15 508	11 237	- 2 685	- 1 946	25 252	18 299	842	610
Italy	9 648	9 017	21 046	19 669			30 694	28 686	1 023	956
Japan	9 274	7 360	27 132	21 534			36 406	28 894	1 214	963
Korea	2 125	2 335	19 776	21 732			21 901	24 067	730	802
Luxembourg	7 733	6 843	12 259	10 849			19 992	17 692	666	590
Mexico	6 233	9 444	21 937	33 238	- 4 444	- 6 733	23 727	35 949	791	1 198
Netherlands	7 316	6 532	15 490	13 831			22 807	20 363	760	679
New Zealand	11 290	12 010	13 335	14 186			24 625	26 196	821	873
Norway	12 386	8 096	6 991	4 569			19 377	12 665	646	422
Poland	6 991	11 461	15 619	25 605			22 610	37 065	754	1 236
Portugal	6 683	7 862	20 179	23 740			26 862	31 602	895	1 053
Slovak Republic	6 209	9 856	15 733	24 973	- 2 079	- 3 299	19 864	31 530	662	1 051
Spain	10 489	10 814	21 009	21 659	- 14 995	- 15 459	16 504	17 014	550	567
Sweden	6 328	5 063	17 581	14 065			23 909	19 127	797	638
Switzerland	7 052	4 864	20 434	14 092			27 486	18 956	916	632
Turkey	2 093	3 376	18 391	29 663			20 484	33 039	683	1 101
United Kingdom	9 938	8 718	20 156	17 681			30 095	26 399	1 003	880
United States	5 310	5 310	7 957	7 957			13 267	13 267	442	442
OECD	8 696	8 494	16 727	17 162			23 989	24 139	800	805

Notes: The OECD small and medium enterprises basket of telephone charges includes fixed access and 84 000 calls (2 800 calls for each of 30 employees) broken down according to distance, destination (fixed, mobile and international), and time of day over a one-year period. USD purchasing power parities (PPP) are used to aid international comparisons.

Source: OECD and Teligen.

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Table 7.8. **OECD basket of mobile telephone charges, low usage, August 2006**

Including tax

		Fixed		Usage		Messages		Total		Contract type
		USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP	
Australia, Optus	Optus Pre-paid Free Calls Anytime	7.64	7.35	169.17	162.67	76.49	73.55	253.31	243.57	Pre-paid
Austria, Mobilkom	A1 Xcite Easy	20.84	18.44	117.14	103.67	80.60	71.32	218.58	193.43	
Belgium, Mobistar	Tempo Essential €50	8.51	7.66	123.54	111.30	62.77	56.55	194.82	175.51	Pre-paid
Canada, Rogers	Pay As You Go Evening & Weekend	6.11	5.46	127.73	114.04	64.56	57.65	198.40	177.14	Pre-paid
Czech Republic, O2	Start	26.95	42.11	142.57	222.76	24.39	38.11	193.91	302.98	
Denmark, TDC Mobil	MobilTid Online	0.00	0.00	82.93	56.80	17.55	12.02	100.48	68.82	Pre-paid
Finland, Elisa	Oiva	31.71	24.58	53.35	41.36	43.80	33.95	128.85	99.89	
France, SFR	Le Compte 18€	275.63	239.68	0.00	0.00	0.00	0.00	275.63	239.68	
Germany, T-Mobile	Xtra Click&Go	8.49	7.38	88.11	76.61	45.49	39.55	142.08	123.55	Pre-paid
Greece, Cosmote	What's Up	8.46	9.00	236.19	251.27	39.67	42.20	284.33	302.47	Pre-paid
Hungary, Pannon	djuice pre-paid	9.21	15.10	92.07	150.94	39.31	64.44	140.59	230.48	Pre-paid
Iceland, Siminn	Frelsi	11.45	7.95	138.92	96.47	54.99	38.18	205.35	142.61	Pre-paid
Ireland, Vodafone	Ready to Go Work & Leisure	0.00	0.00	211.83	153.50	68.24	49.45	280.07	202.95	Pre-paid
Italy, Vodafone	Easy Day	0.00	0.00	168.82	157.78	80.90	75.61	249.73	233.39	Pre-paid
Japan, KDDI au	Komi Komi One Economy Plan	391.15	310.44	10.56	8.38	1.13	0.89	402.84	319.71	
Korea, SK Telecom	Ting 100	203.49	223.62	0.00	0.00	1.82	2.00	205.31	225.62	
Luxembourg, Tango	Knock-out	0.00	0.00	79.38	70.25	48.13	42.60	127.51	112.84	
Mexico, Telcel	Amigo	0.00	0.00	167.12	253.22	37.02	56.09	204.14	309.30	Pre-paid
Netherlands, Vodafone	Vodafone 17.50 SIM only - 2 year	133.99	119.63	0.00	0.00	0.00	0.00	133.99	119.63	
New Zealand, Vodafone	Base 20	199.71	212.46	6.88	7.32	1.51	1.60	208.09	221.38	
Norway, Telenor	FriFiks	67.17	43.90	56.12	36.68	46.84	30.61	170.13	111.20	
Poland, Orange	Go	0.00	0.00	105.47	172.90	22.50	36.89	127.97	209.79	Pre-paid
Portugal, Vodafone	Vodafone Directo Com Carregamentos	0.00	0.00	107.24	126.17	44.43	52.27	151.67	178.44	Pre-paid
Slovak Republic, Orange	Pausal 299 Sk	105.65	243.51	40.50	5.76	14.75	6.12	160.90	255.40	
Spain, MoviStar	Contrato Empresas Tramos Horarios	10.38	10.70	147.54	152.10	92.36	95.22	250.28	258.02	
Sweden, Tele 2 Comviq	Kontant Knock-out	5.76	4.61	66.55	53.24	37.59	30.07	109.90	87.92	Pre-paid
Switzerland, Sunrise	Relax Pronto	5.41	3.73	154.85	106.80	50.14	34.58	210.40	145.11	Pre-paid
Turkey, Telsim	CepFlash	0.00	0.00	123.88	199.80	49.92	80.51	173.79	280.31	
UK, T-Mobile	Pay As You Go Everyone	0.00	0.00	117.57	103.13	76.83	67.40	194.40	170.53	Pre-paid
USA, Cingular	Pay As You Go 25c per minute	16.88	16.88	148.89	148.89	24.53	24.53	190.31	190.31	Pre-paid
OECD average		51.82	52.47	102.83	104.79	41.61	40.47	196.26	197.73	

Note: The OECD basket of mobile telephone charges (low usage) includes subscription and usage (360 voice calls, 396 SMS messages and 8 MMS, distributed between peak and off-peak hours and based on an average call duration)over a one-year period. Calling patterns were all determined through extensive discussions with carriers across the OECD. USD purchasing power parities (PPP) are used to aid international comparisons.

Source: OECD and Teligen.

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Table 7.9. **OECD basket of mobile telephone charges, medium usage, August 2006**

Including tax

		Fixed		Usage		Messages		Grand total	
		USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia, Optus	'yes' Business One 45	413.51	397.61	23.86	22.94	6.43	6.18	443.79	426.73
Austria, Mobilkom	A1 Xcite Easy	20.84	18.44	288.15	255.00	119.64	105.88	428.63	379.32
Belgium, Proximus	Freestyle Classic €25	382.82	344.88	82.34	74.18	20.54	18.51	485.70	437.56
Canada, Rogers	Weekend $20 Voicemail	408.42	364.66	27.80	24.82	95.72	85.47	531.95	474.95
Czech Republic, T-Mobile	T 80	289.04	451.62	84.16	131.50	57.75	90.24	430.96	673.37
Denmark, Sonofon	Kvantum 99	5.64	3.87	100.59	68.90	23.94	16.40	130.18	89.16
Finland, Elisa	Aito	61.72	47.84	125.62	97.38	42.16	32.68	229.50	177.91
France, SFR	Le Compte 25€	382.82	332.89	87.92	76.45	0.60	0.52	471.33	409.86
Germany, T-Mobile	Relax 100 Relax SMS 40	378.14	328.82	61.93	53.85	33.08	28.76	473.15	411.43
Greece, Cosmote	Cosmote 120 SMS 30	379.02	403.21	7.96	8.47	37.29	39.68	424.28	451.36
Hungary, T-Mobile	Relax 100	179.81	294.77	27.71	45.42	92.40	151.47	299.91	491.66
Iceland, Siminn	Almenáskrift	98.90	68.68	299.28	207.83	85.60	59.45	483.78	335.96
Ireland, O2	Active Life 150	535.95	388.37	0.00	0.00	2.55	1.85	538.50	390.22
Italy, Vodafone	Valore	155.58	145.40	341.40	319.06	119.95	112.10	616.93	576.57
Japan, KDDI au	Komi Komi One Economy Plan	391.15	310.44	321.47	255.14	11.03	8.76	723.66	574.33
Korea, SK Telecom	Ting Buddy	223.99	246.14	65.88	72.40	9.00	9.89	298.87	328.43
Luxembourg, Tango	Knock-out	0.00	0.00	172.89	153.00	71.56	63.33	244.45	216.33
Mexico, MoviStar	Superplan	252.18	382.10	27.49	41.65	6.77	10.26	286.45	434.01
Netherlands, Vodafone	Vodafone 27.50 SIM only - 2 year	210.55	187.99	0.00	0.00	0.00	0.00	210.55	187.99
New Zealand, Vodafone	Base 60	407.20	433.19	6.74	7.17	1.51	1.60	415.45	441.97
Norway, Telenor	djuce allstar	67.17	43.90	265.64	173.62	2.58	1.69	335.39	219.21
Poland, Era	Classic 70 Bis	194.19	318.35	18.70	30.65	39.87	65.37	252.77	414.37
Portugal, TMN	Plano Pos Pago Pakot 60 SMS	76.56	90.08	320.22	376.73	3.98	4.68	400.76	471.49
Slovak Republic, Orange	Pausal 50 + SMS	201.18	319.33	93.74	148.79	23.05	36.58	317.96	504.70
Spain, Vodafone	Contrato Autonomos 10	10.36	10.68	372.01	383.51	127.00	130.93	509.37	525.13
Sweden, Tele 2 Comviq	Comviq Knock-Out	4.56	3.65	167.18	133.74	59.14	47.31	230.88	184.70
Switzerland, Sunrise	Relax Libero	10.82	7.46	448.27	309.15	76.30	52.62	535.40	369.24
Turkey, Telsim	CepPAKET 120/50	392.32	632.78	0.00	0.00	1.42	2.29	393.74	635.07
UK, T-Mobile	Flext 20	447.58	392.61	0.00	0.00	0.00	0.00	447.58	392.61
USA, Verizon	America's Choice 450	559.27	559.27	0.00	0.00	69.78	69.78	629.04	629.04
OECD average		238.04	250.97	127.96	115.71	41.36	41.81	407.36	408.49

Notes: The OECD basket of mobile telephone charges (medium usage) includes subscription and usage (780 voice calls, 600 SMS messages and 8 MMS, distributed between peak and off-peak hours and based on an average call duration) over a one-year period. Calling patterns were all determined through extensive discussions with carriers across the OECD. USD purchasing power parities (PPP) are used to aid international comparisons. Prepaid plans are excluded.

Source: OECD and Teligen.

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Table 7.10. **OECD basket of mobile telephone charges, high usage, August 2006**

Including tax

		Fixed		Usage		Messages		Grand total	
		USD	USD PPP	USD	USD PPP	USD	USD PPP	USD	USD PPP
Australia, Optus	'yes' Business One 75	689.19	662.68	138.46	133.14	20.81	20.01	848.47	815.83
Austria, T-Mobile	Relax 200	445.77	394.49	103.30	91.41	174.57	154.48	723.63	640.38
Belgium, Proximus	Smile Anytime All Networks	658.45	593.20	0.00	0.00	64.68	58.27	723.13	651.47
Canada, Rogers	Anytime $20 Voicemail	408.42	364.66	59.88	53.46	106.93	95.47	575.23	513.59
Czech Republic, T-Mobile	T 160	416.72	651.13	200.80	313.75	64.93	101.45	682.45	1 066.33
Denmark, Sonofon	Kvantum 199	5.64	3.87	235.86	161.55	27.70	18.97	269.21	184.39
Finland, Elisa	Aito	61.72	47.84	273.21	211.79	47.93	37.15	382.86	296.79
France, SFR	Essentiel 3H +50% en plus	597.20	519.30	0.00	0.00	115.46	100.40	712.66	619.70
Germany, T-Mobile	Relax 200 Relax SMS 40	531.27	461.97	227.77	198.06	49.61	43.14	808.65	703.18
Greece, Cosmote	Cosmote 240 SMS 60	615.91	655.22	17.14	18.24	6.74	7.17	639.80	680.63
Hungary, Pannon	Pannon 300	309.05	506.63	11.56	18.96	70.46	115.51	391.07	641.10
Iceland, Siminn	Ásinnáskrift	212.64	147.66	540.34	375.24	83.65	58.09	836.63	580.99
Ireland, O2	Active Life 150 Evening & Weekend	650.79	471.59	107.84	78.14	3.83	2.77	762.46	552.50
Italy, TIM	Tutto Relax	844.65	789.39	0.00	0.00	9.19	8.59	853.84	797.98
Japan, NTT DoCoMo	Type L Voicemail	1 098.45	871.79	21.57	17.12	0.00	0.00	1 120.01	888.90
Korea, SK Telecom	Ting Buddy	223.99	246.14	264.64	290.81	10.63	11.68	499.25	548.63
Luxembourg, Tango	Knock-out	0.00	0.00	372.38	329.54	79.78	70.60	452.16	400.14
Mexico, MoviStar	Sin Límites 329	416.93	631.71	0.00	0.00	63.36	96.00	480.29	727.71
Netherlands, Vodafone	Vodafone 50.00 SIM only - 2 year	382.82	341.80	0.00	0.00	0.00	0.00	382.82	341.80
New Zealand, Vodafone	Choose 120 Your Time 100 + TXT 100	599.13	637.37	14.52	15.45	2.26	2.40	615.91	655.23
Norway, Netcom	SmartTalk Voicemail	258.26	168.80	266.55	174.21	66.95	43.76	591.76	386.77
Poland, Era	Komfort Komfort 120	233.03	382.02	238.28	390.62	44.28	72.58	515.59	845.22
Portugal, TMN	Plano Extra Pos Pago	0.00	0.00	612.12	720.14	145.87	171.61	757.98	891.74
Slovak Republic, Orange	Pausal 90 + SMS	275.69	437.60	291.96	463.42	31.70	50.32	599.35	951.35
Spain, Vodafone	Contrato Autonomos 10	10.36	10.68	816.91	842.18	142.55	146.96	969.82	999.81
Sweden, Tele 2 Comviq	Comviq Kompis	85.90	68.72	289.91	231.93	23.03	18.42	398.84	319.07
Switzerland, Sunrise	Relax Super	254.34	175.41	379.89	261.99	85.23	58.78	719.47	496.18
Turkey, Telsim	CepPAKET 180/75	552.36	890.91	168.39	271.60	2.13	3.43	722.88	1 165.94
UK, T-Mobile	Flext 25	559.47	490.76	0.00	0.00	0.00	0.00	559.47	490.76
USA, Verizon	America's Choice 450	559.27	559.27	0.00	0.00	77.65	77.65	636.92	636.92
OECD average		398.58	406.09	188.44	188.76	54.06	54.86	641.09	649.70

Notes: The OECD basket of mobile telephone charges (high usage) includes subscription and usage (1680 voice calls, 660 SMS messages and 12 MMS, distributed between peak and off-peak hours and based on an average call duration) over a one-year period. Calling patterns were all determined through extensive discussions with carriers across the OECD. USD purchasing power parities (PPP) are used to aid international comparisons. Prepaid plans are excluded.

Source: OECD and Teligen.

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Table 7.11. **OECD basket of international telephone calling charges per call, August 2006**

	Business (excluding VAT)		Residential (including VAT)	
	USD PPP	USD	USD PPP	USD
Australia	0.80	0.83	1.14	1.19
Austria	0.43	0.49	0.67	0.76
Belgium	0.70	0.78	0.83	0.92
Canada	0.53	0.60	0.21	0.24
Czech Republic	0.78	0.50	1.29	0.83
Denmark	0.47	0.68	0.74	1.08
Finland	0.83	1.07	1.05	1.35
France	0.47	0.54	0.87	1.00
Germany	0.24	0.27	0.36	0.41
Greece	0.97	0.91	1.48	1.39
Hungary	0.72	0.44	1.34	0.82
Iceland	0.58	0.83	0.91	1.31
Ireland	0.43	0.60	0.54	0.74
Italy	0.99	1.06	1.42	1.52
Japan	2.19	2.75	2.30	2.90
Korea	2.35	2.14	3.17	2.88
Luxembourg	0.32	0.37	0.59	0.67
Mexico	2.50	1.65	2.99	1.97
Netherlands	0.45	0.51	0.56	0.63
New Zealand	0.42	0.39	1.44	1.35
Norway	0.21	0.32	0.32	0.48
Poland	0.93	0.57	0.98	0.60
Portugal	1.25	1.06	1.52	1.29
Slovak Republic	0.73	0.46	1.12	0.70
Spain	0.72	0.70	1.02	0.99
Sweden	0.42	0.53	0.44	0.55
Switzerland	0.25	0.37	0.32	0.46
Turkey	0.68	0.42	1.03	0.64
United Kingdom	0.99	1.13	0.95	1.08
United States	0.56	0.56	0.50	0.50
OECD	1.06	0.97	1.46	1.29

Notes: Average call charge for one single call, weighted by traffic. USD purchasing power parities (PPP) are used to aid international comparisons.

Source: OECD and Teligen.

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Table 7.12. **DSL/fibre offerings changes (September 2005-October 2006)**

Country	Company	2006			Percent change		
		Down (kbit/s)	Up (kbit/s)	Bitcap (MB)	Price change (2005-2006)	Speed change (2005-2006)	Bit cap change (2005-2006)
Australia	Bigpond	1 500	256	10 000	-15%	0%	0%
Austria	AON	2 048	384	15 000	0%	0%	25%
Belgium	Belgacom	4 096	256	30 000	0%	2%	0%
Canada	Bell Canada	5 000			-6%	0%	
Czech Republic	O2	2 048	256	8 000	-80%	100%	New
Denmark	TDC	4 096	512	15 000	-5%	0%	New
Finland	Sonera	24 000	1 024		-14%	0%	
France	France Telecom	18 000	800		-13%	0%	
Germany	T-Com	6 016	576		0%	0%	
Greece	OTE	1 024	256		-13%	0%	
Hungary	T-Com	2 048	192		-30%	0%	
Iceland	Simmin	8 000	1 024		3%	33%	
Ireland	Eircom	2 048	248	20 000	-45%	0%	25%
Italy	Alice	20 000			-12%	400%	
Japan	NTT West	100 000	100 000		-11%	0%	
Korea	KT	100 000	100 000		0%	0%	
Luxembourg	EPT	3 000	192		-13%	0%	
Mexico	Telmex	1 024			-33%	0%	
Netherlands	KPN	6 000	768		-33%	-25%	
New Zealand	TCNZ	2 000	128	1 000	-43%	0%	0%
Norway	Telenor	6 000	500		-9%	50%	
Poland	TP	6 144			-46%	0%	
Portugal	Portugal Telecom	8 128	384	30 000	-17%	2%	275%
Slovak Republic	Slovak Telecom	1 024	256		-50%	0%	
Spain	Telefonica	1 000	320		0%	0%	
Sweden	TeliaSonera	24 000	1 000		-5%	0%	
Switzerland	Bluewin	3 500	300		-30%	46%	
Turkey	Turk Telecom	2 048	512		-30%	0%	
United Kingdom	BT	8 000		40 000	8%	264%	167%
United States	SBC (now AT&T)	3 000	512		-32%	0%	
OECD average		12 493	8 426		-19%	29%	

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Table 7.13. **Cable offerings changes (September 2005-October 2006)**

Country	Company	2006			Percent change		
		Down (kbit/s) (2005)	Up (kbit/s)	Bitcap (MB)	Price change (2005-2006)	Speed change (2005-2006)	Bit cap change (2005-2006)
Australia	Optus	9 900	128	20 000	7%	244%	67%
Austria	UPC	16 384	1 024		0%	0%	
Belgium	Telenet	20 000	512	35 000	0%	100%	17%
Canada	Cogeco	10 000	1 000	60 000	-31%	0%	100%
Czech Republic	UPC	4 096	512	50 000	-27%	0%	New
Denmark	Telia Stofa	4 096	512		-8%	0%	
Finland	Welho	6 000	500		0%	0%	
France	Noos	20 000			0%	100%	
Germany	Kabel Deutschland	2 200	220		0%	-65%	
Hungary	UPC	6 144	1 024		-4%	20%	
Ireland	ntl	3 000		30 000	-33%	0%	-25%
Japan	J:COM	30 000	2 000		0%	0%	
Korea	C&M	10 000	1 000		27%	100%	
Luxembourg	Coditel	6 000	256	25 000	-48%	50%	25%
Mexico	Megacable	1 024			-68%	0%	
Netherlands	UPC	20 480	2 048		-25%	0%	
New Zealand	TelstraClear	10 000	2 000	40 000	-6%	0%	300%
Norway	Get	26 000	1 500		-10%	0%	
Poland	UPC	12 000	1 024		0%	0%	
Portugal	TV Cabo	8 000	384	30 000	-19%	-2%	275%
Slovak Republic	UPC	4 096	384		-40%	33%	
Spain	Auna	4 000	300		-17%	95%	
Sweden	Com Hem	8 192	1 024		-23%	2%	
Switzerland	Cablecom	3 000	300		-70%	50%	
Turkey	Topaz	2 048	512		31%	0%	
United Kingdom	Telewest	4 000	384		-50%	0%	
United States	Comcast	6 000	384		-15%	0%	
OECD average		9 506	789		-16%	27%	

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Australia	Bigpond	ADSL		256	64	200	22.79	21.10	89.04	82.44
Australia	Bigpond	ADSL		256	64	10 000	45.62	42.24	178.22	165.02
Australia	Bigpond	ADSL		512	128	400	38.01	35.19	74.23	68.73
Australia	Bigpond	ADSL		512	128	10 000	60.84	56.34	118.84	110.03
Australia	Bigpond	ADSL		1 500	256	500	60.69	56.20	40.46	37.46
Australia	Bigpond	ADSL		1 500	256	10 000	83.68	77.48	55.78	51.65
Australia	Bigpond	ADSL		1 500	256	20 000	106.51	98.62	71.00	65.74
Australia	Internode	ADSL	HOME-256-Starter	256	128	500	22.79	21.10	89.04	82.44
Australia	Internode	ADSL	HOME-512-Starter	512	128	8 000	30.40	28.15	59.38	54.98
Australia	Internode	ADSL	HOME-512-Value	512	128	20 000	38.01	35.20	74.25	68.75
Australia	Internode	ADSL	HOME-512-Pro	512	128	40 000	53.23	49.29	103.97	96.27
Australia	Internode	ADSL	HOME-512-Elite	512	128	80 000	83.68	77.48	163.43	151.32
Australia	Internode	ADSL	HOME-1500-Starter	1 500	256	10 000	45.62	42.24	30.42	28.16
Australia	Internode	ADSL	HOME-1500-Value	1 500	256	20 000	53.23	49.29	35.49	32.86
Australia	Internode	ADSL	HOME-1500-Pro	1 500	256	40 000	68.46	63.38	45.64	42.26
Australia	Internode	ADSL	HOME-1500-Elite	1 500	256	80 000	98.90	91.57	65.93	61.05
Australia	Internode	ADSL	HOME-Extreme-Value	24 000	1 000	20 000	45.62	42.24	1.90	1.76
Australia	Internode	ADSL	HOME-Extreme-Pro	24 000	1 000	40 000	60.84	56.34	2.54	2.35
Australia	Internode	ADSL	HOME-Extreme-Elite	24 000	1 000	80 000	91.29	84.52	3.80	3.52
Australia	Optus	Cable	Easy Start	9 900	128	100	22.79	21.10	2.30	2.13
Australia	Optus	Cable	Light	9 900	128	300	30.40	28.15	3.07	2.84
Australia	Optus	Cable	Sprint	9 900	128	2 000	38.01	35.20	3.84	3.56
Australia	Optus	Cable	Advantage	9 900	128	7 000	45.62	42.24	4.61	4.27
Australia	Optus	Cable	Power	9 900	128	20 000	60.84	56.34	6.15	5.69
Australia				**5 660**	**269**	**21 625**	**54.50**	**50.46**	**55.14**	**51.05**
Austria	AON	ADSL	aonSpeed Einsteiger	384	128	400	25.34	22.23	65.99	57.89
Austria	AON	ADSL	aonSpeed Allrounder	1 024	256	800	38.07	33.40	37.18	32.62
Austria	AON	ADSL	aonSpeed Allrounder	1 024	256	2 000	50.81	44.57	49.62	43.52
Austria	AON	ADSL	aonSpeed Allrounder	1 024	256	5 000	57.18	50.15	55.84	48.98
Austria	AON	ADSL	aonSpeed Power User	2 048	384	15 000	69.91	61.32	34.14	29.94
Austria	AON	ADSL	aonPur	1 280	256	15 000	82.64	72.49	64.57	56.64
Austria	inode	ADSL	aDSL solo Privat 1280/256	1 280	256	20 000	76.28	66.91	59.59	52.27
Austria	inode	ADSL	aDSL Privat small 384/128	384	128	500	24.07	21.11	62.68	54.98
Austria	inode	ADSL	aDSL Privat medium 1024/256	1 024	256	1 000	34.25	30.05	33.45	29.34
Austria	inode	ADSL	aDSL Privat medium 2048/384	2 048	384	2 000	62.40	54.73	30.47	26.73
Austria	inode	ADSL	aDSL Privat large 3072/512	3 072	512	15 000	75.13	65.90	24.46	21.45
Austria	inode	ADSL	aDSL Privat large 4096/512	4 096	512	20 000	87.86	77.07	21.45	18.82
Austria	UPC	Cable	chello classic	4 096	512		62.40	54.73	15.23	13.36
Austria	UPC	Cable	chello plus	8 192	768		87.86	77.07	10.73	9.41
Austria	UPC	Cable	chello plus symmetric	4 096	4 096	20 000	126.07	110.58	30.78	27.00
Austria	UPC	Cable	chello extreme	16 384	1 024		113.33	99.41	6.92	6.07
Austria	UPC	Cable	chello light	400	128	1 000	25.44	22.32	63.61	55.79
Austria				**3 050**	**595**	**6 924**	**64.65**	**56.71**	**39.22**	**34.40**
Belgium	Belgacom	ADSL	ADSL Light	512	128	400	38.14	33.75	74.49	65.92
Belgium	Belgacom	ADSL	ADSL Go	4 096	256	10 000	50.87	45.02	12.42	10.99
Belgium	Belgacom	ADSL	ADSL Plus	4 096	256	30 000	69.97	61.92	17.08	15.12
Belgium	Belgacom	ADSL	VDSL	17 000	400	30 000	76.34	67.56	4.49	3.97
Belgium	Tele2	ADSL	ADSL 4Mb	4 000	256	10 000	38.07	33.69	9.52	8.42
Belgium	Tele2	ADSL	ADSL Light	512	256	250	25.34	22.43	49.49	43.80
Belgium	Telenet	Cable	ComfortNet	1 024	192	1 000	38.14	33.75	37.24	32.96
Belgium	Telenet	Cable	ExpressNet	10 000	256	12 000	53.42	47.27	5.34	4.73
Belgium	Telenet	Cable	ExpressNet Plus	15 000	512	18 000	66.15	58.54	4.41	3.90
Belgium	Telenet	Cable	ExpressNet Turbo	20 000	512	35 000	76.34	67.56	3.82	3.38
Belgium				**7 624**	**302**	**14 665**	**53.28**	**47.15**	**21.83**	**19.32**
Canada	Bell Canada	ADSL	High Speed Ultra	5 000			51.52	46.41	10.30	9.28
Canada	Bell Canada	ADSL	High Speed	5 000			48.38	43.58	9.68	8.72
Canada	Bell Canada	ADSL	Basic	1 000			36.06	32.49	36.06	32.49
Canada	Bell Canada	ADSL	Sympatico Optimax 16	16 000	1 000		103.04	92.83	6.44	5.80
Canada	Bell Canada	ADSL	Sympatico Optimax 10	10 000	1 000		72.13	64.98	7.21	6.50
Canada	Shaw	Cable	High-Speed Xtreme-I	10 000	1 000	100 000	50.44	45.44	5.04	4.54
Canada	Shaw	Cable	High-Speed Internet	5 000	512	60 000	40.13	36.16	8.03	7.23
Canada	Shaw	Cable	High-Speed Internet Lite	256	128	10 000	25.71	23.16	100.42	90.47
Canada	Rogers	Cable	Extreme	6 000	800		53.53	48.22	8.92	8.04
Canada	Rogers	Cable	Express	5 000	384		45.28	40.80	9.06	8.16
Canada	Rogers	Cable	Lite	1 000	128		32.92	29.66	32.92	29.66
Canada				**5 841**	**450**	**15 455**	**50.83**	**45.79**	**21.28**	**19.17**

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Czech Republic	O2	ADSL	Internet Expres 2048	2 048	256	8 000	31.97	49.19	15.61	24.02
Czech Republic	O2	ADSL	Internet Expres 512	512	128	1 000	21.30	32.76	41.60	63.99
Czech Republic	O2	ADSL	Internet Expres 3072	3 072	256	12 000	42.65	65.61	13.88	21.36
Czech Republic	O2	ADSL	Internet Expres 4096	4 096	512	20 000	64.00	98.46	15.62	24.04
Czech Republic	GTS Novera	ADSL	Fun 512/128 kbps	512	128	2 000	21.08	32.44	41.18	63.35
Czech Republic	GTS Novera	ADSL	Fun 2048/256 kbps	2 058	256	10 000	31.76	48.86	15.43	23.74
Czech Republic	GTS Novera	ADSL	Fun 4096/512 kbps	4 096	512	20 000	63.78	98.13	15.57	23.96
Czech Republic	UPC	Cable	Starter	512	128	5 000	25.35	39.00	49.52	76.18
Czech Republic	UPC	Cable	Easy	1 024	128	10 000	29.62	45.57	28.93	44.51
Czech Republic	UPC	Cable	Light	2 560	256	20 000	41.58	63.97	16.24	24.99
Czech Republic	UPC	Cable	Classic	4 096	512	50 000	65.33	100.51	15.95	24.54
Czech Republic	UPC	Cable	Plus	6 144	768	100 000	89.56	137.79	14.58	22.43
Czech Republic	UPC	Cable	Extreme	10 240	1 024	100 000	106.70	164.15	10.42	16.03
Czech Republic	UPC	Cable	Professional	12 288	1 024	100 000	241.95	372.23	19.69	30.29
Czech Republic				**3 804**	**421**	**32 714**	**62.62**	**96.33**	**22.44**	**34.53**
Denmark	TDC	ADSL		256	128		20.31	13.91	79.34	54.34
Denmark	TDC	ADSL		512	128		40.79	27.94	79.67	54.57
Denmark	TDC	ADSL		512	512		53.59	36.71	104.68	71.70
Denmark	TDC	ADSL		1 024	128		51.03	34.96	49.84	34.14
Denmark	TDC	ADSL		1 024	512		63.84	43.72	62.34	42.70
Denmark	TDC	ADSL		2 048	128		61.28	41.97	29.92	20.49
Denmark	TDC	ADSL		2 048	512		74.08	50.74	36.17	24.77
Denmark	TDC	ADSL		4 096	256	15 000	68.10	46.65	16.63	11.39
Denmark	TDC	ADSL		4 096	512	15 000	80.90	55.41	19.75	13.53
Denmark	TDC	ADSL		8 064	512	20 000	119.31	81.72	14.80	10.13
Denmark	TDC	ADSL		20 480	1 024		153.44	105.10	7.49	5.13
Denmark	Telia Stofa	Cable	Flatrate	256	64		25.43	17.42	99.34	68.04
Denmark	Telia Stofa	Cable	Flatrate	512	128		40.79	27.94	79.67	54.57
Denmark	Telia Stofa	Cable	Flatrate	1 024	256		49.33	33.79	48.17	32.99
Denmark	Telia Stofa	Cable	Flatrate	4 096	512		78.34	53.66	19.13	13.10
Denmark	Dansk Bredbånd	FTTx		25 000	25 000		101.56	69.56	4.06	2.78
Denmark	Dansk Bredbånd	FTTx		10 000	10 000		50.35	34.49	5.04	3.45
Denmark	Dansk Bredbånd	FTTx		2 000	2 000		33.28	22.80	16.64	11.40
Denmark	Dansk Bredbånd	FTTx		512	512		16.21	11.11	31.67	21.69
Denmark				**4 608**	**2 254**	**2 632**	**62.21**	**42.61**	**42.33**	**29.00**
Finland	Sonera	ADSL		256	256		26.10	20.08	101.97	78.44
Finland	Sonera	ADSL		512	512		29.16	22.43	56.95	43.81
Finland	Sonera	ADSL		1 000	512		30.43	23.41	30.43	23.41
Finland	Sonera	ADSL		2 048	512		43.17	33.21	21.08	16.21
Finland	Sonera	ADSL		8 000	1 024		55.90	43.00	6.99	5.38
Finland	Sonera	ADSL		12 000	1 024		66.22	50.94	5.52	4.24
Finland	Sonera	ADSL		24 000	1 024		75.13	57.79	3.13	2.41
Finland	Elisa	ADSL	256/256 kbit/s	256	256		26.61	20.47	103.96	79.97
Finland	Elisa	ADSL	512/512 kbit/s	512	512		29.16	22.43	56.95	43.81
Finland	Elisa	ADSL	1M /512 kbit/s	1 000	512		31.71	24.39	31.71	24.39
Finland	Elisa	ADSL	2M /512 kbit/s	2 000	512		44.44	34.19	22.22	17.09
Finland	Elisa	ADSL	8M/1M Full Rate	8 000	1 000		57.18	43.98	7.15	5.50
Finland	Elisa	ADSL	24M/1M Full Rate	24 000	1 000		63.54	48.88	2.65	2.04
Finland	Welho	Cable	Welho 10M	10 000	500		75.13	57.79	7.51	5.78
Finland	Welho	Cable	Welho 6M	6 000	500		57.30	44.08	9.55	7.35
Finland	Welho	Cable	Welho 2M	2 000	300		45.84	35.26	22.92	17.63
Finland	Welho	Cable	Welho 1M	1 000	300		31.83	24.49	31.83	24.49
Finland	Welho	Cable	Welho 525	525	200		25.34	19.49	48.27	37.13
Finland	Sonera	FTTx	Huoneisto Plus	100 000	10 000		76.28	58.67	0.76	0.59
Finland	Sonera	FTTx	Huoneisto Plus	10 000	10 000		55.90	43.00	5.59	4.30
Finland	Sonera	FTTx	Huoneisto Plus	1 000	1 000		31.71	24.39	31.71	24.39
Finland				**10 196**	**1 498**		**46.58**	**35.83**	**28.99**	**22.30**
France	France Telecom	ADSL	internet 1 mégamax	1 024	256		31.71	27.33	30.96	26.69
France	France Telecom	ADSL	internet 8 mégamax	8 000	800		38.07	32.82	4.76	4.10
France	France Telecom	ADSL	internet 18 mégamax	18 000	800		44.44	38.31	2.47	2.13
France	Neuf Telecom	ADSL		20 000	1 000		18.97	16.36	0.95	0.82
France	Noos	Cable	NET 1 Méga	1 000			31.71	27.33	31.71	27.33
France	Noos	Cable	NET 4 Méga	4 000			38.07	32.82	9.52	8.21
France	Noos	Cable	NET 20 Méga	20 000			44.44	38.31	2.22	1.92
France				**10 289**	**408**		**35.35**	**30.47**	**11.80**	**10.17**

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Germany	Arcor	ADSL	Paket 2000	2 000	384		57.11	49.23	28.56	24.62
Germany	Arcor	ADSL	Paket 6000	6 000			63.48	54.72	10.58	9.12
Germany	Arcor	ADSL	Paket 16000	16 000			67.30	58.02	4.21	3.63
Germany	Deutsche Telekom	ASDL	T-DSL 1000	1 024	128		34.36	29.62	33.55	28.92
Germany	Deutsche Telekom	ASDL	T-DSL 2000	2 048	192		38.18	32.91	18.64	16.07
Germany	Deutsche Telekom	ASDL	T-DSL 6000	6 016	576		44.54	38.40	7.40	6.38
Germany	Deutsche Telekom	ASDL	T-DSL 16000	16 000	1 024		50.91	43.89	3.18	2.74
Germany	Kabel Deutschland	Cable	Classic	512	512		25.34	21.85	49.49	42.67
Germany	Kabel Deutschland	Cable	Comfort	2 200	220		38.07	32.82	17.31	14.92
Germany	Kabel Deutschland	Cable	Professional	10 200	420		63.54	54.78	6.23	5.37
Germany				**6 200**	**346**		**48.28**	**41.62**	**17.91**	**15.44**
Greece	OTE	ADSL	Conn-x 768/ 192	768	192		33.81	36.35	44.02	47.34
Greece	OTE	ADSL	Conn-x 1024/ 256	1 024	256		42.82	46.05	41.82	44.97
Greece	OTE	ADSL	Conn-x 2048	2 048	256		71.37	76.75	34.85	37.47
Greece	Vivodi	ADSL	256/128	256	128		38.98	41.91	152.26	163.72
Greece	Vivodi	ADSL	384/128	384	128		44.72	48.08	116.45	125.22
Greece	Vivodi	ADSL	512/128	512	128		47.92	51.52	93.59	100.63
Greece	Vivodi	ADSL	1024/256	1 024	256		55.07	59.22	53.78	57.83
Greece	Vivodi	ADSL	2048/640	2 048	640		101.56	109.21	49.59	53.32
Greece	Vivodi	ADSL	4096/640	4 096	640		310.95	334.36	75.92	81.63
Greece				**1 351**	**292**		**83.02**	**89.27**	**73.59**	**79.13**
Hungary	T-Com	ADSL	T-DSL Favorit	512	96		41.69	68.35	81.43	133.49
Hungary	T-Com	ADSL	T-DSL Favorit Plusz 1M	1 024	128		63.07	103.40	61.59	100.97
Hungary	T-Com	ADSL	T-DSL Favorit Plusz 2M	2 048	192		72.35	118.60	35.33	57.91
Hungary	GTS-Datanet	ADSL	1024/128	1 024	128		39.27	64.37	38.35	62.86
Hungary	GTS-Datanet	ADSL	easy_C	512	96		22.24	36.45	43.43	71.20
Hungary	GTS-Datanet	ADSL	fair_C	1 024	128		32.28	52.91	31.52	51.67
Hungary	GTS-Datanet	ADSL	beginner	512	96		30.24	49.58	59.07	96.83
Hungary	GTS-Datanet	ADSL	basic	1 024	128		39.27	64.37	38.35	62.86
Hungary	GTS-Datanet	ADSL	advanced	2 048	192		46.84	76.78	22.87	37.49
Hungary	GTS-Datanet	ADSL	expert	3 008	384		58.19	95.39	19.34	31.71
Hungary	GTS-Datanet	ADSL	professional	6 144	512		118.26	193.88	19.25	31.56
Hungary	UPC	Cable	chello classic	3 072	512		53.38	87.51	17.38	28.49
Hungary	UPC	Cable	chello standard	1 536	384		44.06	72.23	28.68	47.02
Hungary	UPC	Cable	chello plus	6 144	1 024		133.52	218.88	21.73	35.63
Hungary				**2 117**	**286**		**56.76**	**93.05**	**37.02**	**60.69**
Iceland	Siminn	ADSL	Góður	1 000	256	4 000	56.88	37.18	56.88	37.18
Iceland	Siminn	ADSL	Betri	2 000	512	6 000	71.13	46.49	35.57	23.25
Iceland	Siminn	ADSL	Bestur	8 000	1 024		85.39	55.81	10.67	6.98
Iceland	Siminn	ADSL	Langbestur	12 000	1 024		92.52	60.47	7.71	5.04
Iceland	Vodafone	ADSL		1 000		2 000	56.88	37.18	56.88	37.18
Iceland	Vodafone	ADSL		2 000		2 000	71.13	46.49	35.57	23.25
Iceland	Vodafone	ADSL		4 000		4 000	85.39	55.81	21.35	13.95
Iceland	Vodafone	ADSL		6 000		4 000	96.79	63.26	16.13	10.54
Iceland				**4 500**	**352**	**2 750**	**77.01**	**50.34**	**30.09**	**19.67**
Ireland	Eircom	ADSL	broadband home starter	1 024	128	10 000	31.82	22.73	31.08	22.20
Ireland	Eircom	ADSL	broadband home plus	2 048	248	20 000	38.19	27.28	18.65	13.32
Ireland	Eircom	ADSL	broadband home professiona	3 000	384	30 000	61.63	44.02	20.54	14.67
Ireland	ntl	Cable	Broadband value	1 000		2 000	25.46	18.18	25.46	18.18
Ireland	ntl	Cable	Broadband starter	2 000		16 000	31.82	22.73	15.91	11.37
Ireland	ntl	Cable	Broadband	3 000		30 000	38.19	27.28	12.73	9.09
Ireland	ntl	Cable	Broadband Max	6 000		40 000	50.92	36.37	8.49	6.06
Ireland	Smart Telecom	FTTx	Smart broadband	6 000	256		44.57	31.83	7.43	5.31
Ireland				**3 009**	**127**	**18 500**	**40.33**	**28.80**	**17.53**	**12.52**
Italy	Alice	ADSL	Flat a 2 Mega	2 000	256		25.40	23.52	12.70	11.76
Italy	Alice	ADSL	20Mega	20 000			47.05	43.57	2.35	2.18
Italy	Tiscali	ADSL	4 mega flat	4 000			25.40	23.52	6.35	5.88
Italy	Tiscali	ADSL	12 mega flat	12 000			38.14	35.31	3.18	2.94
Italy	Tiscali	ADSL	24 mega flat	24 000			50.87	47.10	2.12	1.96
Italy	Fastweb	ADSL	Giorno e Notte	6 000	1 000		40.75	37.73	6.79	6.29
Italy	Fastweb	ADSL	Giorno e Notte	20 000	1 000		40.75	37.73	2.04	1.89
Italy	Fastweb	FTTx	Giorno e Notte	10 000	10 000		40.75	37.73	4.07	3.77
Italy	Alice	Sat	Sat	640	34		19.04	17.63	29.75	27.54
Italy				**10 960**	**1 366**		**36.46**	**33.76**	**7.71**	**7.14**

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Japan	NTT	ADSL	Residential ADSL	47 000	5 000		35.57	28.69	0.76	0.61
Japan	Yahoo! BB	ADSL	50M Revo	50 500	12 500		38.58	31.11	0.76	0.62
Japan	Yahoo! BB	ADSL	50M	50 000	3 000		35.89	28.94	0.72	0.58
Japan	Yahoo! BB	ADSL	26M	26 000	1 000		35.00	28.22	1.35	1.09
Japan	Yahoo! BB	ADSL	12M	12 000	1 000		32.31	26.05	2.69	2.17
Japan	Yahoo! BB	ADSL	8M	8 000	900		28.72	23.16	3.59	2.90
Japan	Yahoo! BB	ADSL	Reach DSL	960	960		28.72	23.16	29.92	24.13
Japan	J:COM	Cable	Premier	30 000	2 000		49.28	39.74	1.64	1.32
Japan	J:COM	Cable	Standard	8 000	2 000		44.62	35.99	5.58	4.50
Japan	J:COM	Cable	Light	256	128		24.64	19.87	96.27	77.64
Japan	NTT	FTTx	Apartment VDSL/LAN	100 000	100 000		30.82	24.86	0.31	0.25
Japan	NTT	FTTx	Residential fibre	100 000	100 000		49.01	39.53	0.49	0.40
Japan	Yahoo! BB	FTTx	Fiber (Home)	100 000	100 000		61.73	49.78	0.62	0.50
Japan	Yahoo! BB	FTTx	Fibre (Apartment)	100 000	100 000		26.70	21.53	0.27	0.22
Japan	NTT	VDSL	Apartment VDSL/LAN	100 000	100 000		35.30	28.47	0.35	0.28
Japan				**48 848**	**35 233**		**37.13**	**29.94**	**9.69**	**7.81**
Korea	KT	ADSL	Lite ADSL	4 000	460		34.62	38.05	8.66	9.51
Korea	KT	ADSL/VDSL	Premium	13 000	4 000		46.17	50.73	3.55	3.90
Korea	Hanaro	ADSL/VDSL	Pro	20 000	6 000		43.86	48.19	2.19	2.41
Korea	C&M	Cable	Speed	4 000			35.78	39.32	8.94	9.83
Korea	C&M	Cable	Max	10 000	1 000		39.87	43.81	3.99	4.38
Korea	Hanaro	Cable	Pro	20 000	768		39.24	43.12	1.96	2.16
Korea	Hanaro	Cable	Lite	10 000	10 000		32.32	35.51	3.23	3.55
Korea	KT	FTTx	Megapass Ntopia	100 000	100 000		41.55	45.66	0.42	0.46
Korea	Hanaro	FTTx	Lite	10 000	10 000		32.32	35.51	3.23	3.55
Korea	Hanaro	FTTx	광랜	100 000	100 000		38.09	41.85	0.38	0.42
Korea	KT	VDSL	Lite VDSL	4 000	4 000		34.62	38.05	8.66	9.51
Korea	KT	VDSL	Megapass VDSL - Special 1	20 000	4 000		48.47	53.27	2.42	2.66
Korea	KT	VDSL	Megapass VDSL - Special II	50 000	4 000		51.94	57.07	1.04	1.14
Korea	Hanaro	VDSL	Dream II	50 000	6 000		49.63	54.54	0.99	1.09
Korea	Hanaro	VDSL	Dream I	20 000	6 000		46.17	50.73	2.31	2.54
Korea				**29 000**	**17 082**		**40.98**	**45.03**	**3.46**	**3.81**
Luxembourg	EPT	ADSL	LuxDSL / SpeedSurf Junior	1 000	128	2 000	36.93	32.39	36.93	32.39
Luxembourg	EPT	ADSL	LuxDSL / SpeedSurf Run	2 000	192	15 000	59.85	52.50	29.92	26.25
Luxembourg	EPT	ADSL	LuxDSL / SpeedSurf Express	3 000	192		100.60	88.24	33.53	29.41
Luxembourg	Cegecom	ADSL	Basic	1 000	128	15 000	33.24	29.15	33.24	29.15
Luxembourg	Cegecom	ADSL	Standard	2 000	192	25 000	48.13	42.22	24.07	21.11
Luxembourg	Cegecom	ADSL	Advanced	2 000	192		53.86	47.25	26.93	23.62
Luxembourg	Cegecom	ADSL	Pro	3 000	192		90.54	79.42	30.18	26.47
Luxembourg	Coditel	Cable	Lightclick	1 000	128	1 000	22.79	19.99	22.79	19.99
Luxembourg	Coditel	Cable	Speedclick	6 000	256	25 000	44.44	38.98	7.41	6.50
Luxembourg	Coditel	Cable	Megaclick	10 000	512	35 000	94.23	82.66	9.42	8.27
Luxembourg				**3 100**	**211**	**11 800**	**58.46**	**51.28**	**25.44**	**22.32**
Mexico	Telmex	ADSL	Hasta 1024 kbps	1 024			42.03	60.91	41.04	59.48
Mexico	Telmex	ADSL	Hasta 2048	2 048			72.13	104.54	35.22	51.05
Mexico	Telmex	ADSL	Hasta 4096	4 096			553.83	802.65	135.21	195.96
Mexico	Megacable	Cable	1024Kbps	1 024			36.13	52.36	35.28	51.13
Mexico	Megacable	Cable	1500Kbps	1 500			41.78	60.55	27.85	40.37
Mexico	Megacable	Cable	2048Kbps	2 048			48.07	69.66	23.47	34.01
Mexico	Cablevision	Cable	256 kbps	256			39.27	56.91	153.39	222.31
Mexico	Cablevision	Cable	512 kbps	512			60.21	87.26	117.60	170.44
Mexico	Cablevision	Cable	1024 kbps	1 024			114.46	165.88	111.77	161.99
Mexico				**1 504**			**111.99**	**162.30**	**75.65**	**109.64**

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Netherlands	KPN	ADSL	Direct ADSL Lite	3 000	512		38.14	33.75	12.71	11.25
Netherlands	KPN	ADSL	Direct ADSL Go	1 500	256		27.95	24.74	18.63	16.49
Netherlands	KPN	ADSL	Direct ADSL Basic	6 000	768		63.61	56.29	10.60	9.38
Netherlands	Het Net	ADSL	Instap Surfen	1 500	256		25.40	22.48	16.94	14.99
Netherlands	Het Net	ADSL	Snel Surfen	4 000	256		31.77	28.12	7.94	7.03
Netherlands	Planet Internet	ADSL	Easy	1 000	128		25.40	22.48	25.40	22.48
Netherlands	Planet Internet	ADSL	Standard	3 000	512		44.44	39.33	14.81	13.11
Netherlands	Planet Internet	ADSL	Comfort	6 000	768		69.97	61.92	11.66	10.32
Netherlands	Casema	Cable	Midi	1 600	300		25.40	22.48	15.88	14.05
Netherlands	Casema	Cable	Multi	4 200	660		41.96	37.13	9.99	8.84
Netherlands	Casema	Cable	Maxi	6 400	880		63.03	55.78	9.85	8.72
Netherlands	Casema	Cable	Mega	12 500	1 050		89.07	78.83	7.13	6.31
Netherlands	UPC	Cable	chello starter	384	128		19.04	16.85	49.58	43.87
Netherlands	UPC	Cable	chello easy	1 536	256		29.22	25.86	19.03	16.84
Netherlands	UPC	Cable	chello light	3 072	1 024		41.96	37.13	13.66	12.09
Netherlands	UPC	Cable	chello classic	8 192	1 024		63.61	56.29	7.76	6.87
Netherlands	UPC	Cable	chello extreme	20 480	2 048		76.34	67.56	3.73	3.30
Netherlands				**4 963**	**637**		**45.67**	**40.41**	**15.02**	**13.29**
New Zealand	Telecom	ADSL	Xtra Broadband BASIC	256		200	19.60	20.21	76.56	78.93
New Zealand	Telecom	ADSL	Xtra Broadband GO	2 000	128	1 000	26.14	26.95	13.07	13.48
New Zealand	Telecom	ADSL	Xtra Broadband EXPLORER	3 500	128	5 000	32.69	33.70	9.34	9.63
New Zealand	Telecom	ADSL	Xtra Broadband ADVENTURE	3 500	128	10 000	39.23	40.45	11.21	11.56
New Zealand	Telecom	ADSL	Xtra Broadband PRO	3 500	512	10 000	52.32	53.94	14.95	15.41
New Zealand	Telecom	ADSL	Xtra Broadband PRO ADVANCED	3 500	512	20 000	65.41	67.43	18.69	19.27
New Zealand	Telecom	ADSL	Xtra Broadband PRO ULTRA	3 500	512	40 000	98.13	101.16	28.04	28.90
New Zealand	TelstraClear	Cable	HighSpeed 10G	4 000	2 000	10 000	53.60	55.25	13.40	13.81
New Zealand	TelstraClear	Cable	HighSpeed 20G	4 000	2 000	20 000	66.68	68.75	16.67	17.19
New Zealand	TelstraClear	Cable	LightSpeed 40G	10 000	2 000	40 000	86.32	88.99	8.63	8.90
New Zealand	TelstraClear	Cable	LightSpeed 80G	10 000	2 000	80 000	112.49	115.97	11.25	11.60
New Zealand	Woosh	Wireless	Entry	1 600	120	200	16.35	16.86	10.22	10.54
New Zealand	Woosh	Wireless	Elevate	1 600	120	500	19.63	20.23	12.27	12.65
New Zealand	Woosh	Wireless	Express 2	1 600	120	2 000	26.14	26.95	16.34	16.85
New Zealand	Woosh	Wireless	Express 5	1 600	120	5 000	32.69	33.70	20.43	21.06
New Zealand	Woosh	Wireless	Express 10	1 600	120	10 000	39.23	40.45	24.52	25.28
New Zealand				**3 485**	**658**	**15 869**	**49.17**	**50.69**	**19.10**	**19.69**
Norway	Telenor	ADSL	ADSL Mini	700	160		46.02	30.68	65.74	43.83
Norway	Telenor	ADSL	ADSL Basis	1 500	300		53.72	35.81	35.81	23.87
Norway	Telenor	ADSL	ADSL Pluss	3 000	350		64.49	42.99	21.50	14.33
Norway	Telenor	ADSL	ADSL Ekstra	6 000	500		76.80	51.20	12.80	8.53
Norway	Telenor	ADSL	ADSL Max	16 000	700		84.50	56.33	5.28	3.52
Norway	Get	Cable	Easy	512	128		30.01	20.01	58.62	39.08
Norway	Get	Cable	Easy	512	256		40.63	27.09	79.36	52.91
Norway	Get	Cable	Light	1 500	300		42.94	28.63	28.63	19.09
Norway	Get	Cable	Light	1 500	600		53.56	35.71	35.71	23.81
Norway	Get	Cable	Classic	3 000	512		58.33	38.89	19.44	12.96
Norway	Get	Cable	Classic	3 000	1 000		68.95	45.97	22.98	15.32
Norway	Get	Cable	Plus	6 000	768		73.73	49.15	12.29	8.19
Norway	Get	Cable	Plus	6 000	1 500		88.96	59.31	14.83	9.88
Norway	Get	Cable	Ultra	10 000	1 024		89.12	59.41	8.91	5.94
Norway	Get	Cable	Ultra	10 000	2 000		104.36	69.57	10.44	6.96
Norway	Get	Cable	Extreme	26 000	1 500		138.22	92.15	5.32	3.54
Norway	Get	Cable	Extreme	26 000	3 000		153.46	102.30	5.90	3.93
Norway	Lyse	FTTx	Internett Familie	6 000	6 000		69.11	46.07	11.52	7.68
Norway	Lyse	FTTx	Internett Ekspress	20 000	10 000		107.59	71.73	5.38	3.59
Norway	Lyse	FTTx	Internett 50/25	50 000	25 000		223.18	148.79	4.46	2.98
Norway				**9 861**	**2 780**		**83.38**	**55.59**	**23.25**	**15.50**
Poland	TP	ADSL	1 MB	1 024			24.38	38.09	23.81	37.20
Poland	TP	ADSL	2 MB	2 048			43.62	68.16	21.30	33.28
Poland	TP	ADSL	6 MB	6 144			50.03	78.18	8.14	12.72
Poland	TP	ADSL	512 KB	512			21.17	33.08	41.34	64.60
Poland	Dialog	ADSL	TelePakiet DSL 256 / 180	256	180		38.74	60.53	151.32	236.44
Poland	Dialog	ADSL	TelePakiet DSL 256 / 60	256	60		31.75	49.61	124.03	193.80
Poland	UPC	Cable	chello ultra	12 000	1 024		95.90	149.84	7.99	12.49
Poland	UPC	Cable	chello plus	6 000	1 024		79.86	124.78	13.31	20.80
Poland	UPC	Cable	chello easy	512	64		28.54	44.60	55.75	87.11
Poland	UPC	Cable	chello light	1 500	256		36.56	57.13	24.38	38.09
Poland	UPC	Cable	chello classic	3 000	384		54.20	84.69	18.07	28.23
Poland				**3 023**	**272**		**45.89**	**71.70**	**44.49**	**69.52**

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Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
Portugal	Portugal Telecom	ADSL	512kb	512	128	1 000	31.82	37.44	62.15	73.12
Portugal	Portugal Telecom	ADSL	4Mb	4 096	256	10 000	45.31	53.30	11.06	13.01
Portugal	Portugal Telecom	ADSL	8Mb	8 128	384	30 000	63.03	74.16	7.76	9.12
Portugal	TV Cabo	Cable	256	256	128	1 000	31.82	37.44	124.31	146.24
Portugal	TV Cabo	Cable	MEGA 4	4 096	256	10 000	45.32	53.32	11.06	13.02
Portugal	TV Cabo	Cable	MEGA 8	8 000	384	30 000	63.03	74.16	7.88	9.27
Portugal	Cabovisao	Cable	Internet até 2M	2 000		10 000	40.75	47.94	20.37	23.97
Portugal	Cabovisao	Cable	Internet até 4M	4 000		15 000	50.24	59.10	12.56	14.78
Portugal	Cabovisao	Cable	Internet até 8M	8 000		30 000	50.94	59.92	6.37	7.49
Portugal				**5 735**	**140**	**15 636**	**45.89**	**53.99**	**25.03**	**29.44**
Slovak Republic	Slovak Telecom	ADSL	Pohoda 600	1 024	256	600	20.16	31.50	19.69	30.76
Slovak Republic	Slovak Telecom	ADSL	Pohoda 1000	1 024	256	1 000	24.20	37.81	23.63	36.92
Slovak Republic	Slovak Telecom	ADSL	Pohoda 2000	1 024	256	2 000	28.24	44.12	27.57	43.09
Slovak Republic	Slovak Telecom	ADSL	Pohoda 5000	1 024	256	5 000	40.36	63.06	39.41	61.58
Slovak Republic	Slovak Telecom	ADSL	Maxi Klasik	1 024	256		32.28	50.43	31.52	49.25
Slovak Republic	Dial Telecom	ADSL	Dial mini flat	1 024	256		20.16	31.50	19.69	30.76
Slovak Republic	UPC	Cable	chello easy	1 024	128		27.11	42.35	26.47	41.36
Slovak Republic	UPC	Cable	chello light	2 048	256		37.33	58.32	18.23	28.48
Slovak Republic	UPC	Cable	chello classic	4 096	384		57.69	90.13	14.08	22.01
Slovak Republic	UPC	Cable	chello extreme	10 240	1 024		91.62	143.15	8.95	13.98
Slovak Republic	UPC	Cable	chello professional	8 092	512		169.70	265.16	20.97	32.77
Slovak Republic				**2 877**	**349**	**782**	**49.89**	**77.96**	**22.75**	**35.54**
Spain	Telefonica	ADSL	Linea ADSL 24 h	1 000	320		57.71	58.89	57.71	58.89
Spain	Telefonica	ADSL	Linea ADSL 24 h	2 000	320		110.76	113.02	55.38	56.51
Spain	Telefonica	ADSL	Linea ADSL 24 h	4 000	512		177.26	180.87	44.31	45.22
Spain	Telefonica	ADSL	Linea ADSL 24 h	8 000	640		222.41	226.95	27.80	28.37
Spain	Jazztel	ADSL	ADSL 1024 Módem	1 024	300		56.06	57.20	54.74	55.86
Spain	Jazztel	ADSL	ADSL hasta 6 Megas	6 144	512		48.67	49.67	7.92	8.08
Spain	Jazztel	ADSL	ADSL hasta 20 Megas	20 480	1 024		44.24	45.14	2.16	2.20
Spain	Auna	Cable	Banda Ancha ONO 24h (4 Megas)	4 000	300		51.70	52.76	12.92	13.19
Spain				**5 831**	**491**		**96.10**	**98.06**	**32.87**	**33.54**
Sweden	TeliaSonera	ADSL	24 Mbit/s	24 000	1 000		54.78	43.47	2.28	1.81
Sweden	TeliaSonera	ADSL	8 Mbit/s	8 000	800		50.66	40.21	6.33	5.03
Sweden	TeliaSonera	ADSL	2 Mbit/s	2 000	400		45.17	35.85	22.58	17.92
Sweden	TeliaSonera	ADSL	0,25 Mbit/s	256	128		31.44	24.95	122.81	97.47
Sweden	Glocalnet	ADSL	Bredband 2	2 000			34.18	27.13	17.09	13.57
Sweden	Glocalnet	ADSL	Bredband 8	8 000			38.30	30.40	4.79	3.80
Sweden	Glocalnet	ADSL	Bredband 24	24 000			41.05	32.58	1.71	1.36
Sweden	Bredbandsbolaget	ADSL	Bredband 24	24 000	1 000		47.91	38.03	2.00	1.58
Sweden	Bredbandsbolaget	ADSL	Bredband 8	8 000	1 000		43.79	34.76	5.47	4.34
Sweden	Bredbandsbolaget	ADSL	Bredband 2	2 000	1 000		38.30	30.40	19.15	15.20
Sweden	Com Hem	Cable	Small	256	128		13.59	10.79	53.09	42.14
Sweden	Com Hem	Cable	Medium	8 192	1 024		41.05	32.58	5.01	3.98
Sweden	Com Hem	Cable	Large	24 576	1 024		50.66	40.21	2.06	1.64
Sweden	Com Hem	Cable	Large	24 576	8 000		58.90	46.74	2.40	1.90
Sweden	Bredbandsbolaget	FTTx	Bredband 100	100 000	10 000		43.93	34.87	0.44	0.35
Sweden	Bredbandsbolaget	FTTx	Bredband 100	2 000	1 000		31.44	24.95	15.72	12.48
Sweden				**16 366**	**1 657**		**41.57**	**32.99**	**17.68**	**14.03**
Switzerland	Bluewin	ADSL	ADSL 2000	2 000	100		39.39	27.54	19.69	13.77
Switzerland	Bluewin	ADSL	ADSL 3500	3 500	300		55.46	38.78	15.85	11.08
Switzerland	Bluewin	ADSL	ADSL 5000	5 000	300		79.58	55.65	15.92	11.13
Switzerland	Tele2	ADSL	ADSL 2000/100	2 000	100		35.37	24.73	17.68	12.37
Switzerland	Tele2	ADSL	ADSL 3500/300	3 500	300		51.44	35.97	14.70	10.28
Switzerland	Tele2	ADSL	ADSL 5000/300	5 000	300		75.56	52.84	15.11	10.57
Switzerland	Cablecom	Cable	hispeed 3000	3 000	300		17.92	12.53	5.97	4.18
Switzerland	Cablecom	Cable	hispeed 4000	4 000	400		24.11	16.86	6.03	4.22
Switzerland	Cablecom	Cable	hispeed 6000	6 000	600		38.18	26.70	6.36	4.45
Switzerland				**3 778**	**300**		**46.33**	**32.40**	**13.03**	**9.12**
Turkey	Türk Telekom	ADSL	Toptan	256	64		24.18	35.56	94.44	138.89
Turkey	Türk Telekom	ADSL	Toptan	512	128		43.91	64.58	85.77	126.13
Turkey	Türk Telekom	ADSL	Toptan	1 024	256		68.59	100.86	66.98	98.50
Turkey	Türk Telekom	ADSL	Toptan	2 048	512		112.99	166.16	55.17	81.13
Turkey	Topaz	Cable		256	64		33.23	48.87	129.81	190.90
Turkey	Topaz	Cable		512	128		67.14	98.74	131.14	192.85
Turkey	Topaz	Cable		1 024	256		128.18	188.50	125.17	184.08
Turkey	Topaz	Cable		2 048	512		196.00	288.23	95.70	140.74
Turkey				**960**	**240**		**84.28**	**123.94**	**98.02**	**144.15**

StatLink http://dx.doi.org/10.1787/012315685844

Table 7.14. **Broadband pricing for residential users in the OECD area, 2006 (continued)**

October 2006

Country	Company	Type	Plan	Down	Up	Bit cap	Price USD	Price USD PPP	USD/MB	USD/MB PPP
United Kingdom	BT	ADSL	Option 3	8 000		2 000	33.92	29.00	4.24	3.62
United Kingdom	BT	ADSL	Option 2	8 000		6 000	43.35	37.05	5.42	4.63
United Kingdom	BT	ADSL	Option 1	8 000		40 000	50.90	43.50	6.36	5.44
United Kingdom	Homechoice	ADSL	Base pack	2 000	288		33.92	29.00	16.96	14.50
United Kingdom	Homechoice	ADSL	Base pack	4 000	416		43.35	37.05	10.84	9.26
United Kingdom	Homechoice	ADSL	Base pack	8 000	512		52.78	45.11	6.60	5.64
United Kingdom	Telewest	Cable	Broadband	2 000	256		33.92	29.00	16.96	14.50
United Kingdom	Telewest	Cable	Broadband complete	4 000	384		47.14	40.29	11.79	10.07
United Kingdom	Telewest	Cable	Broadband elite	10 000	384		66.00	56.41	6.60	5.64
United Kingdom				**6 000**	**249**	**5 333**	**45.03**	**38.49**	**9.53**	**8.15**
United States	att	ADSL	Basic	768	128		15.93	15.93	20.74	20.74
United States	att	ADSL	Express	1 500	384		21.24	21.24	14.16	14.16
United States	att	ADSL	Pro	3 000	512		26.55	26.55	8.85	8.85
United States	att	ADSL	Elite	6 000	608		37.18	37.18	6.20	6.20
United States	Verizon	ADSL	DSL power package	3 000			40.36	40.36	13.45	13.45
United States	Comcast	Cable		6 000	384		61.57	61.57	10.26	10.26
United States	Verizon	FTTx	FIOS	5 000	2 000		37.13	37.13	7.43	7.43
United States	Verizon	FTTx	FIOS	15 000	2 000		47.76	47.76	3.18	3.18
United States	Verizon	FTTx	FIOS	30 000	5 000		191.20	191.20	6.37	6.37
United States				**7 808**	**1 224**		**53.21**	**53.21**	**10.07**	**10.07**

StatLink http://dx.doi.org/10.1787/012337450526

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Table 7.15. **Trends in leased line pricing over different distances, 1992-2006**

OECD average	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
56/64 kbit/s															
2 km	100	97	121	129	132	114	113	77	73	67	65	56	55	57	56
50 km	100	99	100	91	84	72	63	39	42	37	36	31	31	31	12
200 km	100	99	105	103	73	68	59	39	40	36	35	32	31	30	30
2 Mbit/s															
2 km	100	100	106	108	106	101	95	60	58	57	54	50	46	43	44
50 km	100	98	89	85	78	72	60	40	43	40	38	35	31	28	28
200 km	100	99	95	88	77	73	61	42	45	39	36	33	31	26	27

Source: OECD/Teligen.

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Table 7.16. **OECD basket of national leased line charges, yearly price, August 2006**

Excluding tax

	64 kbit/s		2 Mbit/s		34 Mbit/s	
	USD PPP	USD	USD PPP	USD	USD PPP	USD
Australia	4 951	5 149	35 672	37 099		
Austria	4 198	4 744	11 662	13 178	77 435	87 502
Belgium	4 955	5 500	18 905	20 985	90 303	100 236
Canada	4 324	4 843	38 225	42 812	225 190	252 213
Czech Republic	12 184	7 798	67 012	42 887		
Denmark	1 829	2 671	4 174	6 095	46 856	68 410
Finland						
France	5 009	5 761	22 043	25 350	133 670	153 721
Germany	3 289	3 782	15 716	18 073	56 823	65 346
Greece	3 744	3 519	20 507	19 276	84 646	79 567
Hungary						
Iceland	1 163	1 675	4 063	5 851	14 308	20 603
Ireland	2 767	3 819	16 777	23 152	179 351	247 505
Italy	4 986	5 335	26 410	28 259	156 036	166 959
Japan	3 363	4 237	28 817	36 309	154 672	194 886
Korea	7 947	7 232	55 695	50 682	265 010	241 159
Luxembourg	2 317	2 618	11 376	12 855	44 698	50 509
Mexico	4 724	3 118	50 745	33 492	388 696	256 539
Netherlands	4 211	4 716	15 415	17 265		
New Zealand	6 445	6 058	15 652	14 713		
Norway	2 454	3 755	8 029	12 284	23 215	35 519
Poland	7 860	4 795	51 064	31 149		
Portugal	3 986	3 388	20 710	17 604	155 325	132 027
Slovak Republic						
Spain	5 307	5 148	27 056	26 245	189 219	183 543
Sweden	2 591	3 239	5 143	6 428		
Switzerland						
Turkey	2 694	1 670	18 261	11 322	108 175	67 069
United Kingdom	5 524	6 297	22 748	25 933	163 032	185 857
United States	5 260	5 260	30 200	30 200	101 574	101 574
OECD	4 542	4 466	24 695	23 442	132 912	134 537

Source: OECD and Teligen.

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Chapter 8

Trade in Telecommunication Equipment

Telecommunication trade continues its expansion in the OECD area and among OECD and non-member countries. Telecommunication trade, particularly with non-OECD member countries, is having a substantial impact on trade balances because of increasing imports from those countries. The chapter examines telecommunication trade in the OECD area and its place within the larger category of total information and communication technology equipment. It presents trade balance data from countries in the OECD area as well as key trends and growth patterns. Finally it examines revealed comparative advantages and the breakdown of intra-industry trade.

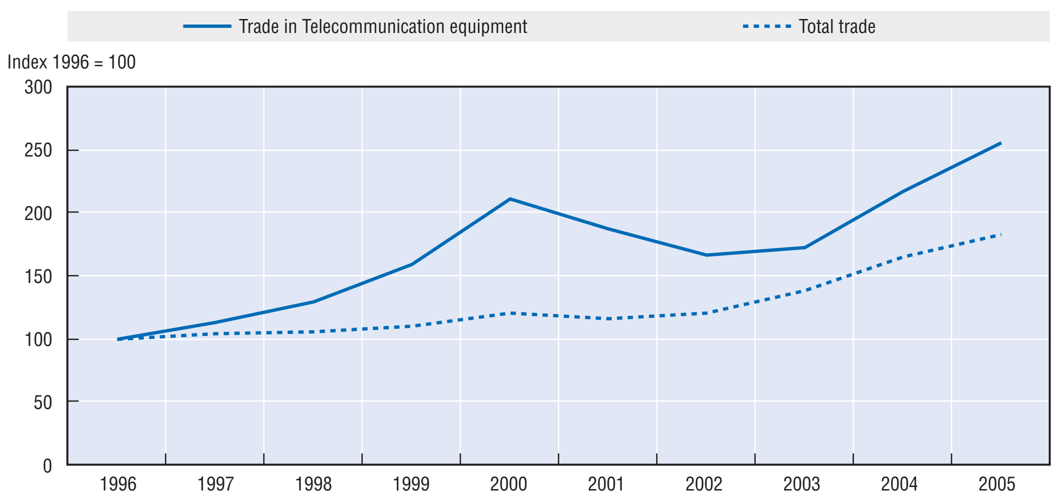
Introduction

Trade in goods and services in the telecommunications sector has been expanding continuously in OECD member countries. What had been an all-time high in 2000, before the "Internet bubble" burst, has again been reached, and even exceeded, in terms of the value of goods traded. Trade with non-OECD member countries is having an increasingly substantial impact on the trade balance because of faster-growing imports from those countries.

Worldwide trends in telecommunication equipment trade

The value of OECD countries' aggregate trade in goods has grown by 65% in the past eight years. More specifically, trade in telecommunication equipment rose in value by 117% between 1996 and 2004 and thus exceeded the level of growth attained in 2000 (Figure 8.1). Trade in telecommunication equipment accounted for 2.2% of the aggregate global trade of the OECD member countries and has increased by 31% since 1996. The increasing importance of information and communication technologies (ICTs) in daily life makes this a significant component of expenditure for OECD-area households (see Chapter 2) and businesses. The complexity of telecommunication markets is conducive to the development of international trade, both to offer consumers a steadily increasing variety of goods in the same market segments, and because of the specialisation of firms involved in the manufacture of these products which have recourse to extended networks of subcontractors.

Figure 8.1. **Growth indices for OECD member countries' total trade and trade in telecommunication equipment**



Source: OECD ITCS database.

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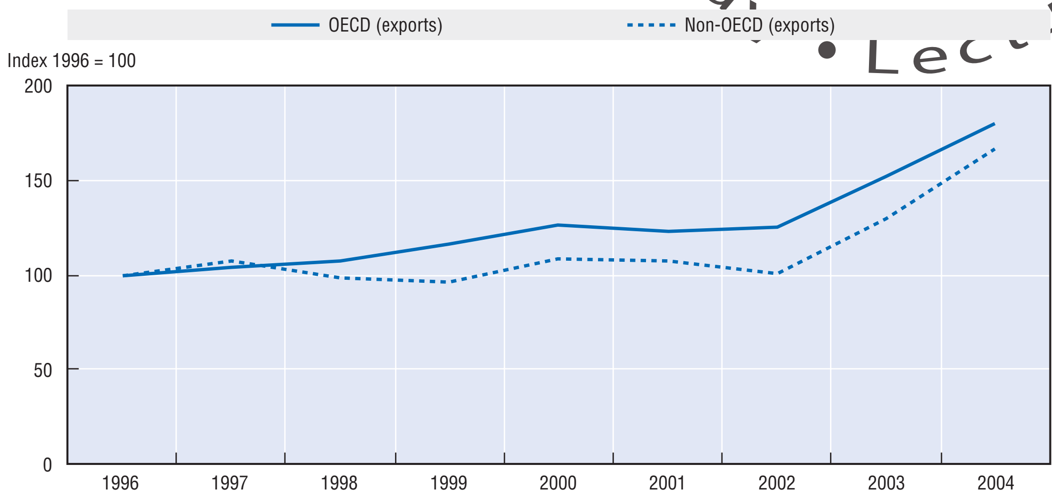
OECD member countries are major producers and consumers of telecommunication equipment, and exports within the area rose by just under 80% between 1996 and 2004. Exports from OECD countries to non-member countries also rose substantially, by 66%, over the same period (Table 8.7 and Figure 8.2). The expansion of the Chinese and Indian economies is reflected in the trend in imports, which is the reverse of that of exports. Imports from non-member countries are up sharply, by 112% since 1996, and seem to be gathering pace (Table 8.8 and Figure 8.3). Imports from OECD countries were up as well, but to a lesser extent, rising by 72% over the past eight years.

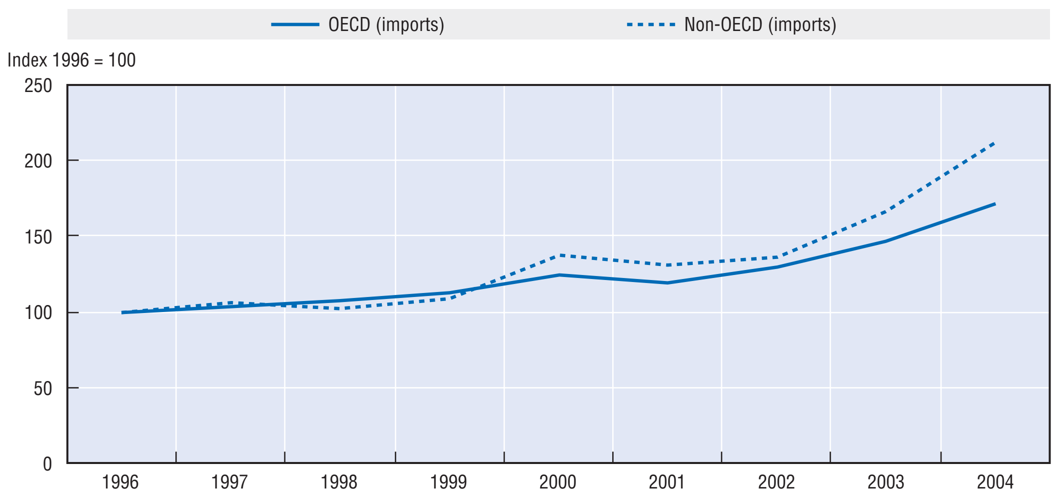
Figure 8.2. **Growth index for telecommunication equipment exports within the OECD member countries and to non-OECD countries**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002768480112

Figure 8.3. **Growth index for telecommunication equipment imports within the OECD member countries and from non-OECD countries**



Source: OECD ITCS database.

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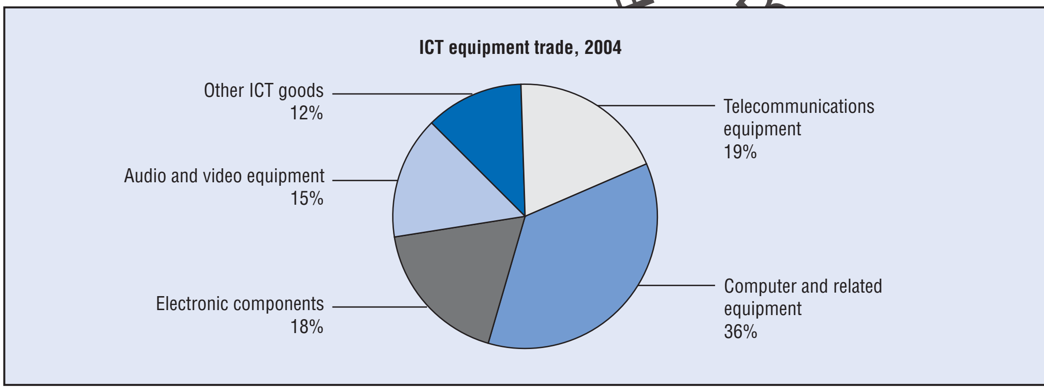
The share of total trade in telecommunication equipment in the category of ICT equipment has remained fairly modest, at 19% in 2004 (Figure 8.4). Nevertheless, when telecommunication equipment exports are compared with exports of ICT equipment, it can be seen that their growth rate (93% since 1996) is almost three times that of the ICT group as a whole (38% since 1996) (Figure 8.5).

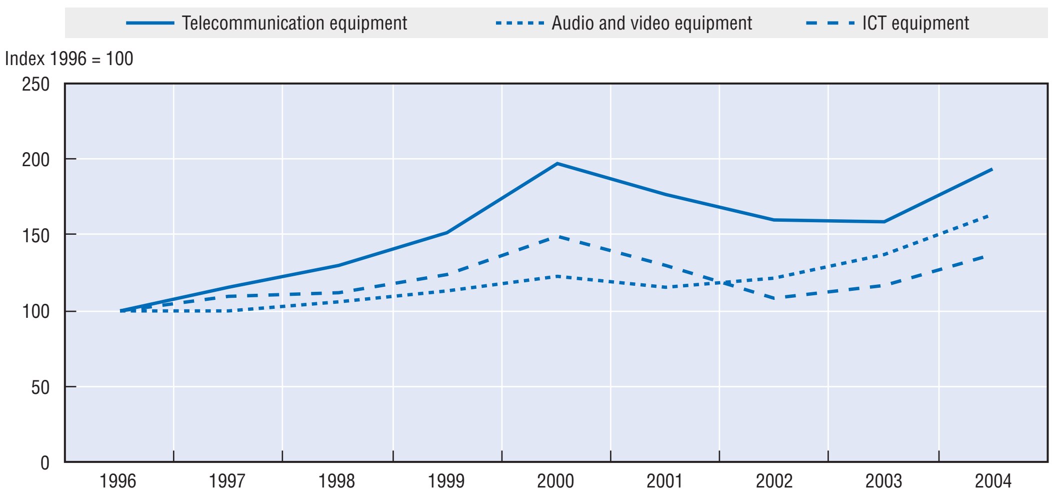
Figure 8.4. **Shares of select categories of goods in aggregate trade in ICT equipment, 2004**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002778875370

Figure 8.5. **Export growth index by category**

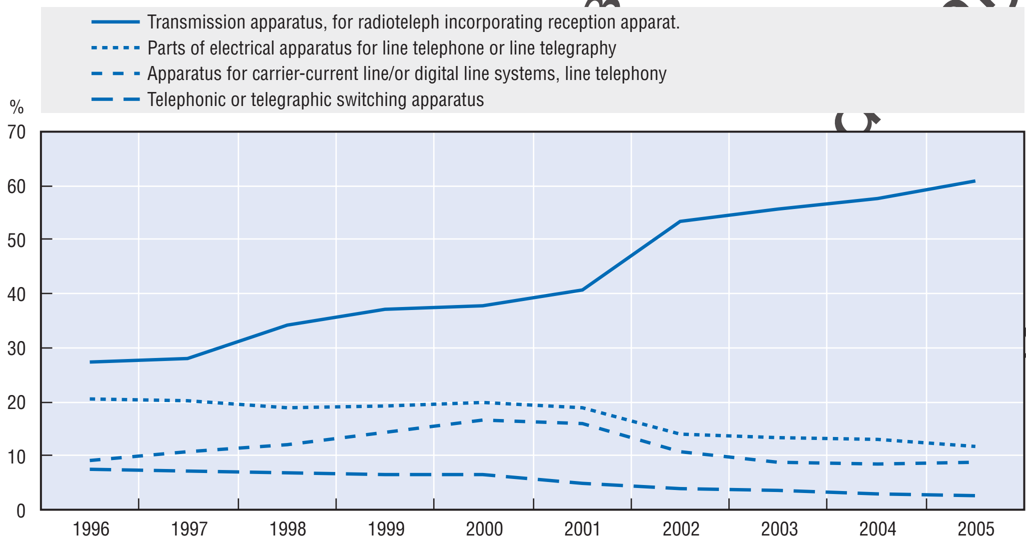


Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002782461545

Within telecommunication equipment, the product group that accounts for the most exports is "Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television incorporating reception apparatus" (HS 1996: 852520, see Box 8.1), corresponding to cell phone handsets (Table 8.10 and Figure 8.6). This group alone accounts for 61% of all telecommunication equipment exports and has contributed to export growth for the entire telecommunication equipment category by quadrupling the value of exports in eight years. This group alone accounts for 1.49% of the OECD countries' total

Figure 8.6. **Share of exports by group of articles making up the category of telecommunication equipment**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002818886465

worldwide exports. The three other groups of articles in Figure 8.6, which rank second (HS 1996: 851790), third (HS 1996: 851750) and fourth (HS1996: 851730) in terms of telecommunication equipment exports, are made up of articles used in building infrastructure for conventional and mobile telephone networks.

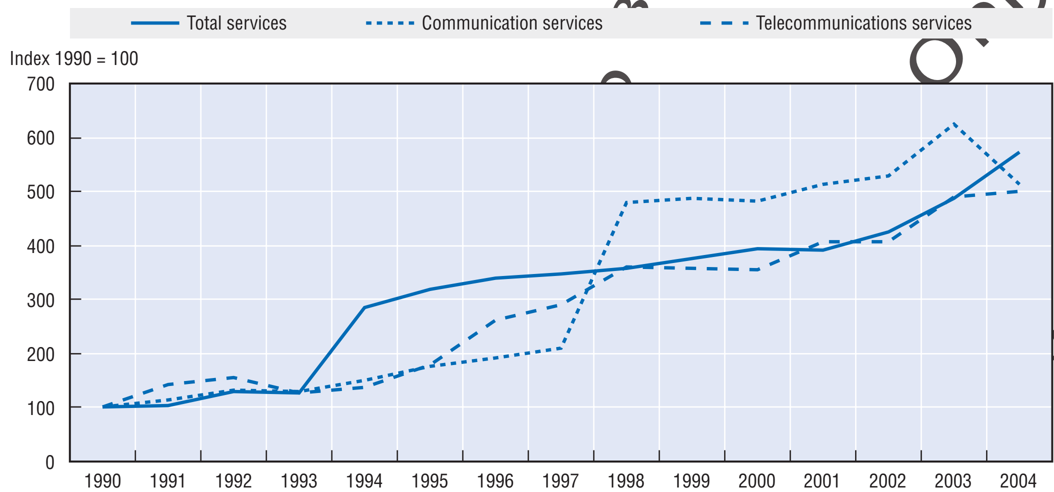
Trends in trade in communication services

Following the recent development of statistics on trade in services, it is now possible to measure volume and growth. In 2004, the share of trade in communication services in aggregate trade in services was at a fairly modest level – 1.61% – and the level of telecommunication services (a sub-category of communication services) was 0.66%. Growth in trade in communication services and telecommunication services has been fairly substantial for the past 14 years (Figure 8.7). On another scale, the category of computer services, which accounted for 3.26% of total services in 2004, is the top-ranking category in terms of growth in trade in services (Figure 8.8).

Communication services (245) are generally used here as an indicator rather than the sub-category telecommunication service (247), which would be better suited to the subject of this chapter. Given the current state of the trade-in-services database, however, the sub-category does not contain enough detailed data for all countries, nor are its time series long enough (Table 8.9). See Box 8.2 for the definition of communication services.

In absolute value, OECD member countries' exports of computer and information services total more than USD 140 billion and will continue to grow at an impressive pace in the years ahead (Figure 8.9). Exports of communication and telecommunication services, while growing at a more modest pace, are also expanding considerably. It is important to emphasise, however, that a substantial percentage of telephone traffic cannot be measured if it is carried over leased lines. These circuits, which are reserved for a particular group of users, do not pass through a single international gateway and thus are not counted in international traffic statistics. Moreover, telecommunication services increasingly make

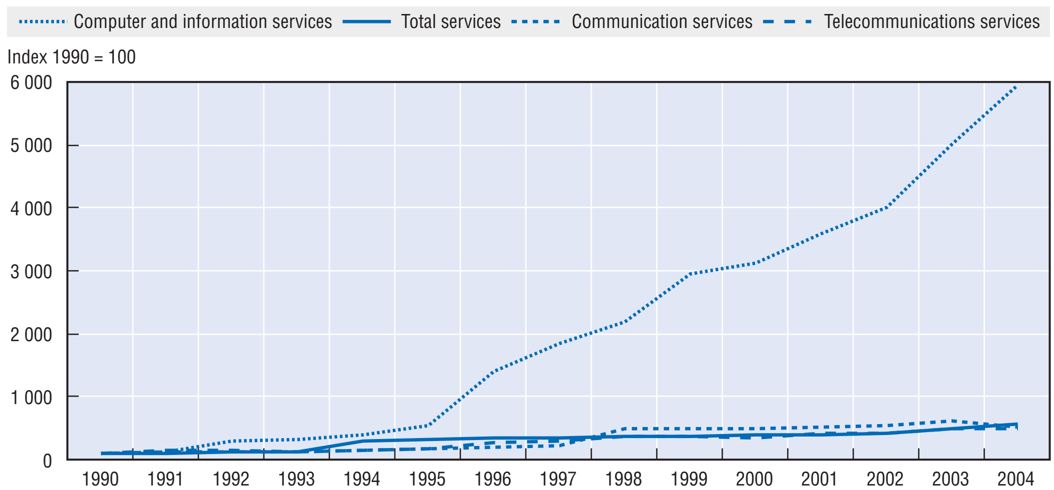
Figure 8.7. **Growth index for trade in services (excluding computer and information services)**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002870373032

Figure 8.8. **Growth index for trade in services (including computer and information services)**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/002874431871

use of technologies that use the Internet Protocol, such as voice over Internet Protocol (VoIP) whose transmissions are in the form of "IP packets" sent over the Internet and are not included in measurements of trade in services.

OECD countries' trade in telecommunication equipment with other economic blocs reveal a number of surprises (Figure 8.10). Trade of OECD countries has grown most strongly with the Commonwealth of Independent States (CIS), with the share of exports increasing by 345% over the past eight years. Mercosur imports posted record growth, followed by ASEAN imports. On the whole, OECD countries have markedly increased their imports from all economic blocs.

Box 8.1. **Components of the Telecommunications Equipment category according to the HS 1996 classification system**

851711: Line telephone sets with cordless handsets.

851719: Other telephone sets, video phones.

851721: Facsimile machines.

851722: Teleprinters.

851730: Telephonic or telegraphic switching apparatus.

851750: Other apparatus, for carrier-current line systems or for digital line systems.

851780: Other electrical apparatus for line telephony or line telegraphy.

851790: Parts for other electrical apparatus for line telephony or line telegraphy.

852020: Telephone answering machines.

852510: Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television not incorporating reception apparatus.

852520: Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television incorporating reception apparatus.

852530: Television cameras.

852610: Radar apparatus.

852790: Reception apparatus, n.e.c.

852910: Aerials and aerial reflectors of all kinds; parts suitable for use therewith.

853110: Burglar or fire alarms and similar apparatus.

854420: Co-axial cable and other co-axial electric conductors.

854470: Optical fibre cables made up of individually sheathed fibres.

Source: Guide to Measuring the Information Society, OECD, November 2005.

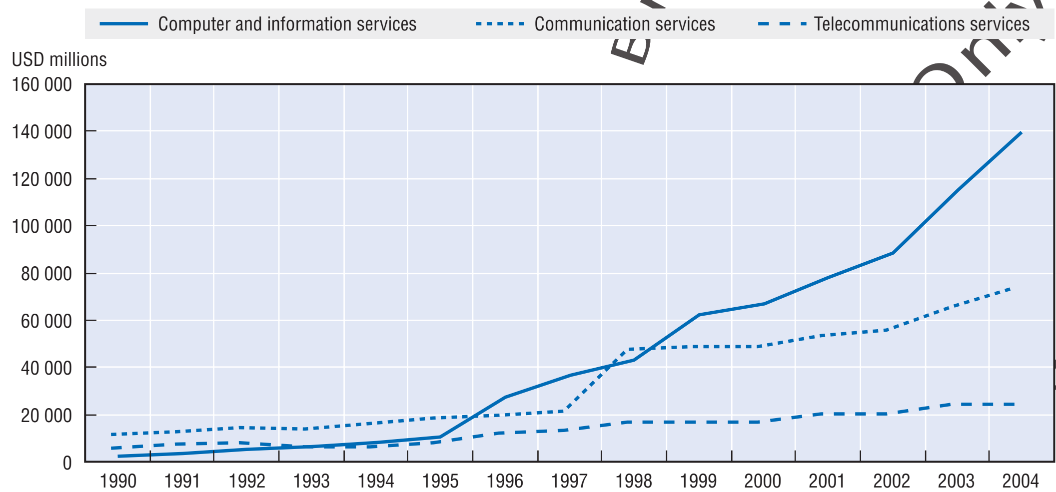
Box 8.2. **Definition of communication services (EBOPS 245)**

Communication services comprise two major categories of transactions relating to international communications between residents and non-residents:

a) Telecommunications (247), which include transmission of sounds, images or other information via telephone, telex, telegram, cable, radio or television, satellite, electronic mail, facsimile, etc., including network communications, teleconferences and support services.

b) Postal and courier services (246), including the collection, transport and distribution of post (letters, newspapers, periodicals, brochures and other printed matter) and parcels by national postal authorities or other operators, as well as postal window services and post box rentals.

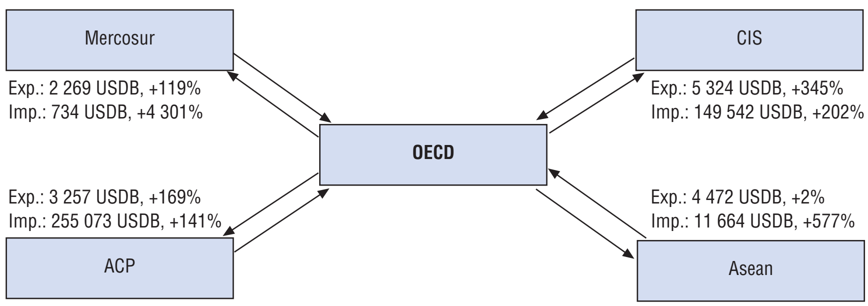
Figure 8.9. **Service exports of OECD countries**



Source: OECD International Trade in Services database.

StatLink http://dx.doi.org/10.1787/003036365632

Figure 8.10. **Trade in telecommunication equipment between European OECD countries and other economic blocs, 2004**



Note: From the OECD perspective: Exports from OECD to trade blocs/ import from trade blocs to OECD. Percentages of growth are for 1996-2004. Mercosur includes Argentina, Brazil, Paraguay and Uruguay. ACP includes African, Caribbean and Pacific countries, a group of 71 countries. ASEAN includes Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, Viet nam, Laos and Myanmar. CIS includes Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine.

Source: OECD ITCS database.

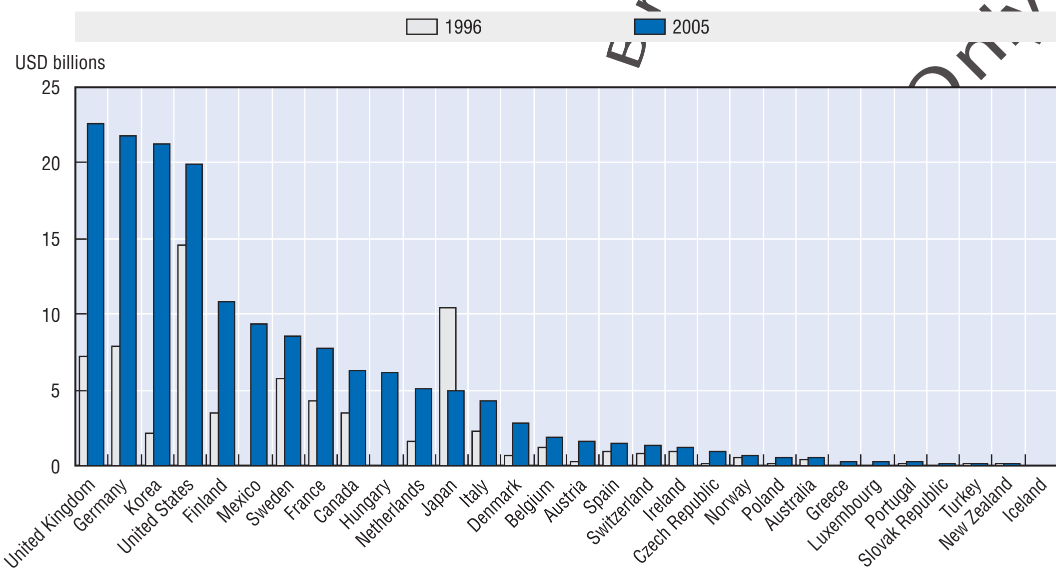
StatLink http://dx.doi.org/10.1787/003071400416

Trade among OECD member countries

Within the OECD area, the country exporting the most telecommunication equipment in absolute value is the United Kingdom, followed by Germany and Korea (Table 8.1 and Figure 8.11). Korea, which had been at a relatively low level in 1996, achieved spectacular export growth with a tenfold increase in aggregate value. For their part, the United Kingdom and Germany tripled and multiplied by 2.8, respectively, the value of their exports. The United States, which ranked number one in 1996, increased its exports by 36% and fell to fourth place. Lastly, Japan, which ranked second in 1996, saw the value of its exports recede by 53% and is now in twelfth place.

Most OECD member countries saw the value of their imports rise very significantly over the past eight years (Table 8.2 and Figure 8.12). The biggest importer of

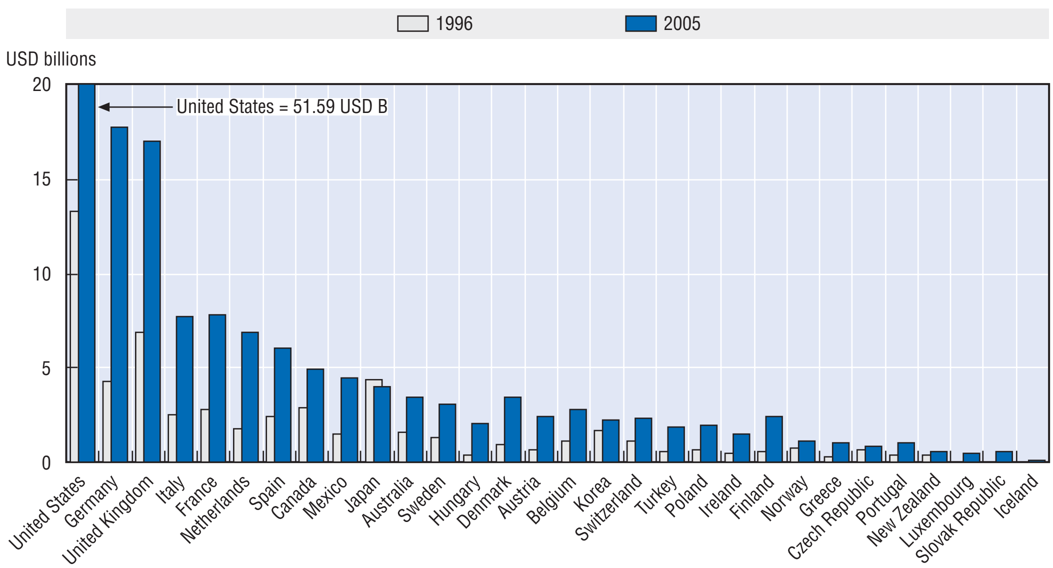
Figure 8.11. **OECD countries' worldwide exports of telecommunication equipment**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003080528630

Figure 8.12. **OECD countries' worldwide imports of telecommunication equipment**



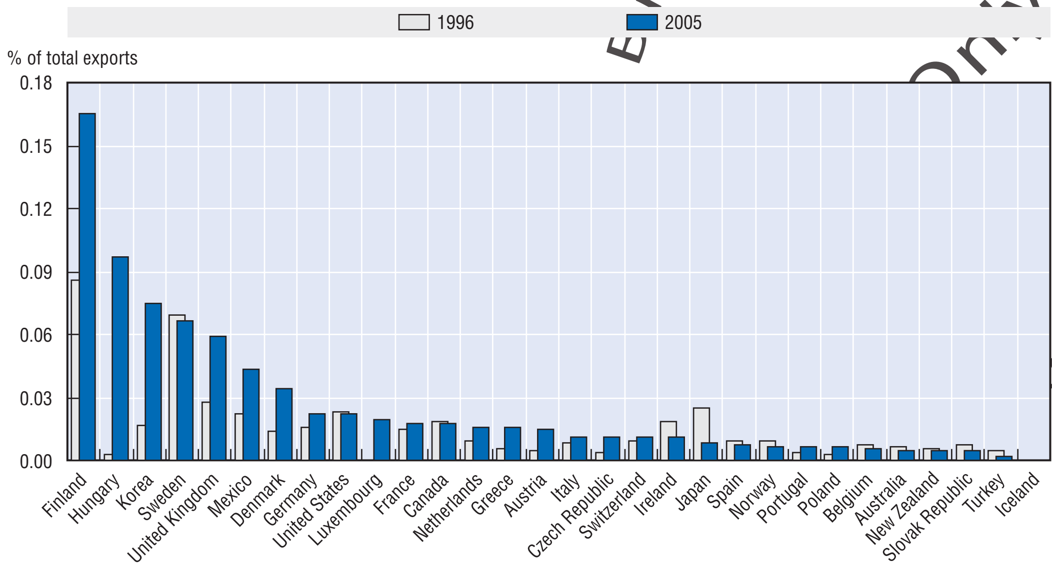
Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003157865167

telecommunication equipment is the United States, which accounts for almost a third of all OECD countries' aggregate imports. Between 1996 and 2005 US imports almost quadrupled. The other big importers are Germany, the United Kingdom, France and Italy.

Of all OECD member countries, Finland is the one whose telecommunication equipment exports account for the largest share of aggregate export value (Table 8.5 and Figure 8.13). Its economy is the most highly specialised in this sector, and it has kept its first-place ranking for the past eight years. The surprise is the second place occupied by

Figure 8.13. **Ratio of telecommunication equipment exports to total exports**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003162185052

Hungary. Hungary was at a very low level in 1996 and has developed a specialisation in the production of telecommunication equipment extremely quickly. Global demand for such equipment offers substantial opportunities for countries that want to restructure their industrial output and reorient their foreign trade.

It follows logically that an economy's intense specialisation in a given sector reflects the economic importance of that sector in its gross domestic product. This is the case for Hungary, where the value of telecommunication equipment exports rose to a record 12.6% of GDP (Table 8.6 and Figure 8.14). This sector of the Hungarian economy has expanded from insignificance in 1996 to its current very high level, making Hungary's economy highly dependent on global demand in the sector. Finland and Korea have also considerably increased the importance of telecommunication equipment in their economy in a matter of a few years.

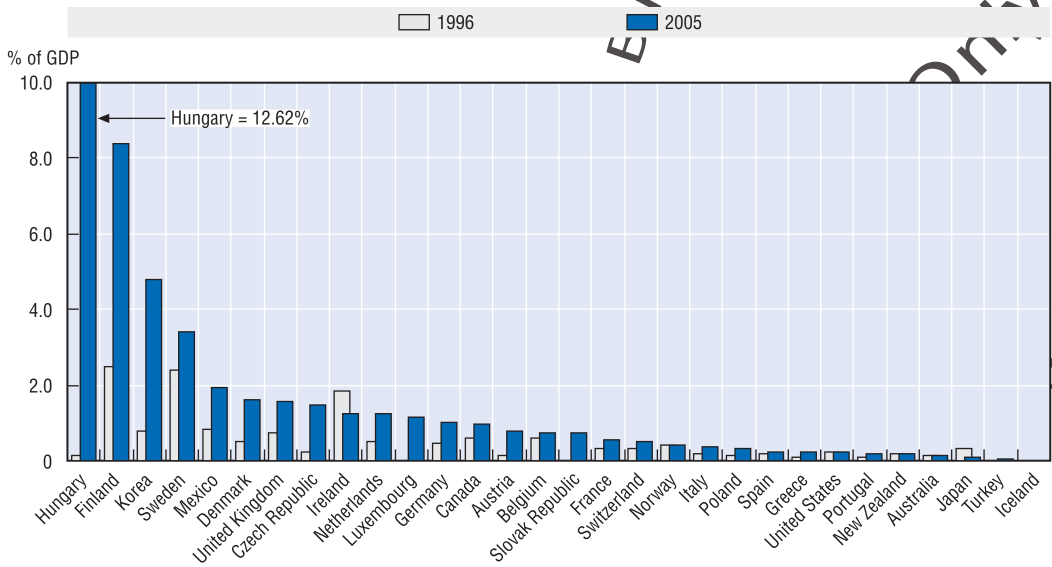
Unsurprisingly, growth in telecommunication equipment exports puts Hungary and Korea in the lead (Figure 8.15). It can be seen that Austria, Denmark and Mexico come next, and that Japan is the only country to record a decrease in its exports.

In 2004, a majority of OECD member countries ran deficits on their foreign trade in telecommunication equipment (Table 8.3 and Figure 8.16). The countries with the largest surpluses are the ones whose economies are most highly specialised in the production and export of telecommunication equipment, *i.e.* Korea, Finland, the United Kingdom, Sweden, Mexico, Hungary and Germany. Canada, Japan and the Czech Republic also run trade surpluses, whereas all of the other countries have deficits. The country with the largest deficit is the United States, which is also the largest importer, followed by Spain, Italy and Austria.

Trade in services between the OECD countries

Exports of communication services involve a more complex procedure than merchandise exports. The exporting economy has to have a substantial network of businesses with affiliates abroad, know-how and employees willing to work in other

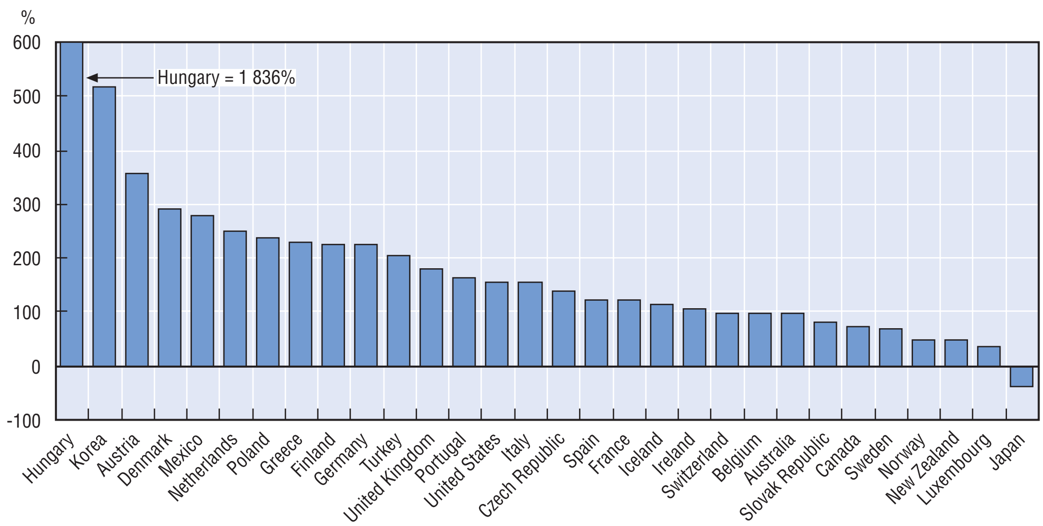
Figure 8.14. **Ratio of telecommunication equipment exports to GDP**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003236118143

Figure 8.15. **Growth of telecommunication equipment exports between 1996 and 2005**



Source: OECD ITCS database.

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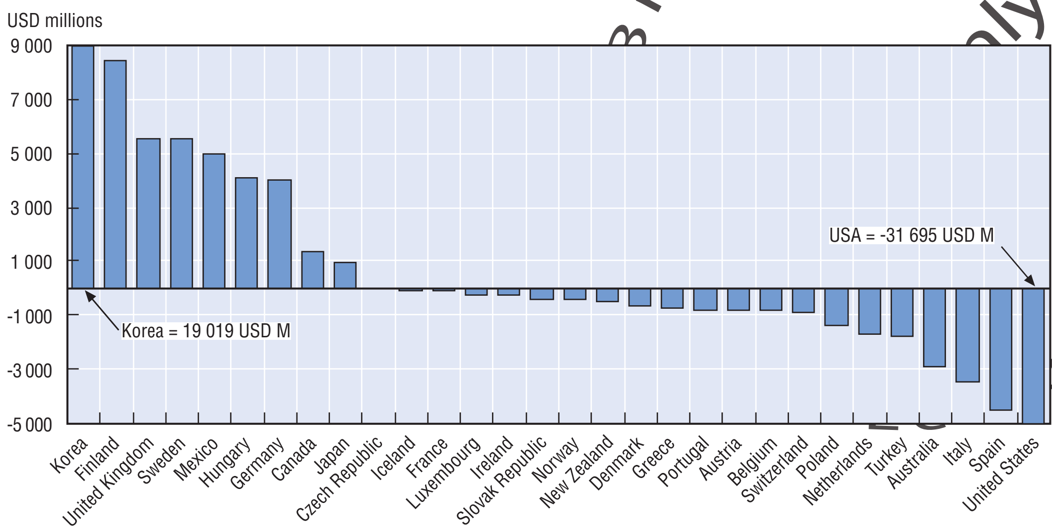
countries. The United States has been the leading exporter of communication services among the OECD member countries since 1996. Next in the ranking are the United Kingdom, the Netherlands and Germany (Figure 8.17).

With respect to imports of communication services, the same countries rank highest, beginning with the United States, which is the leading importer of services (Figure 8.18). The United States is also one of the few countries, along with Korea, Japan, Australia and Mexico, to have reduced its imports of communication services.

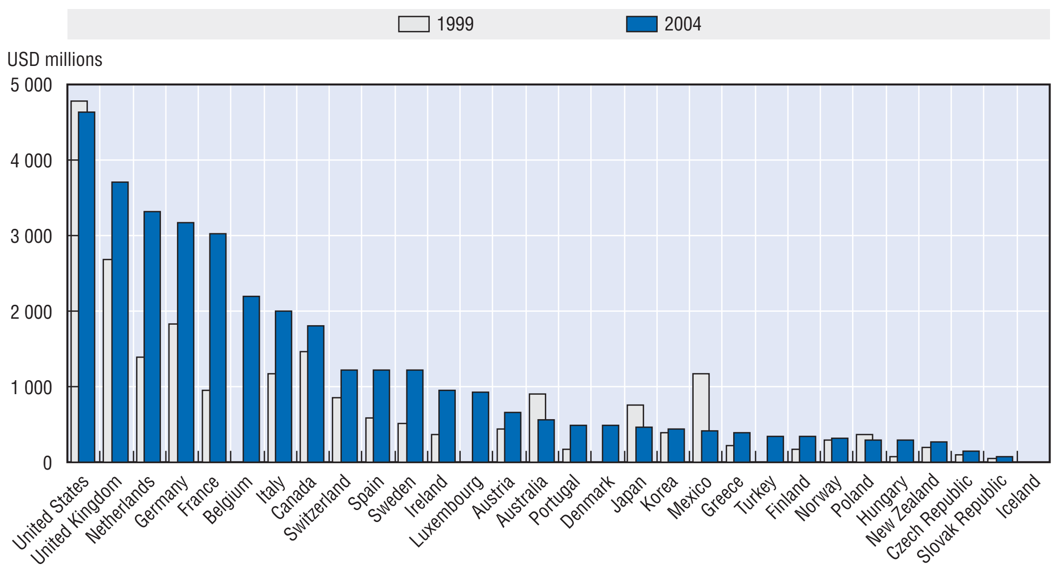
Figure 8.16. **Telecommunications equipment trade balance, 2005**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003244366525

Figure 8.17. **Exports of communication services for 1999 and 2004**



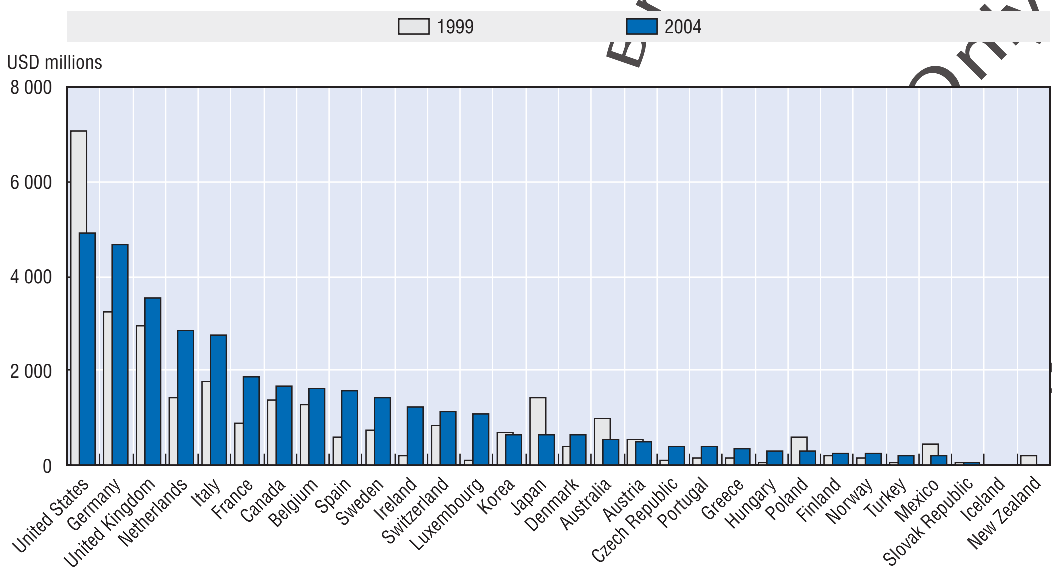
Source: OECD International Trade in Services database.

StatLink http://dx.doi.org/10.1787/003270571280

While it is not yet possible to use data on trade in telecommunication services, it is interesting to note that for the countries for which such a breakdown is possible, telecommunication services account for an average 85% of the value of aggregate communication services (Figure 8.19).

For exports of telecommunication services as a percentage of GDP, the Benelux countries rank first – Luxembourg, Belgium and the Netherlands – followed by Ireland and Sweden (Figure 8.20). The size of the banking sector in Luxembourg and the scope of the related information and communication technologies presumably foster extremely intense usage of outbound telephone services.

Figure 8.18. **Imports of communication services, 1999 and 2004**



Source: OECD International Trade in Services database.

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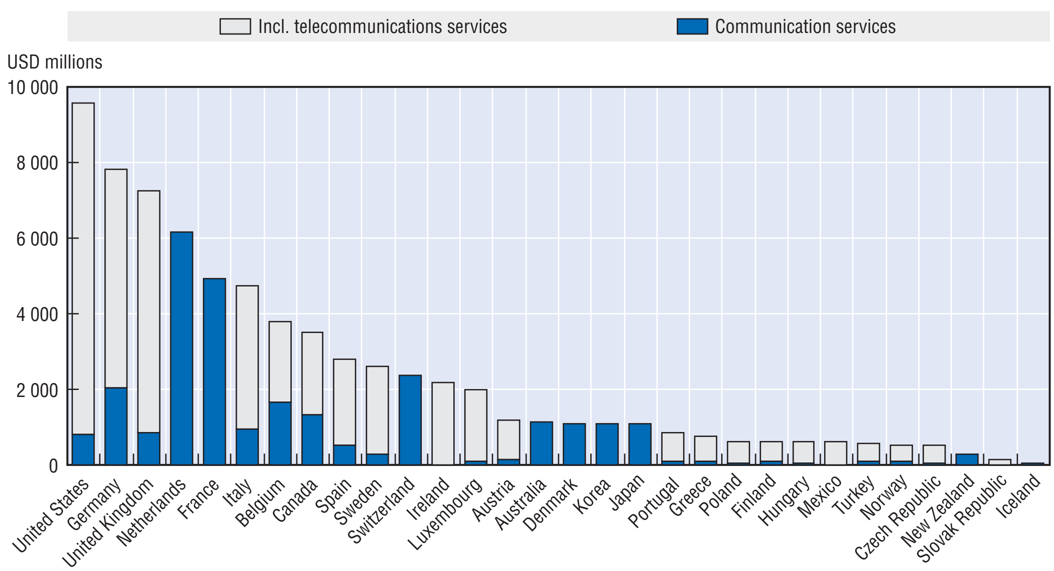
Figure 8.19. **Total trade in communication services showing the subcategory: telecommunication services (where available), 2004**



Source: OECD International Trade in Services database.

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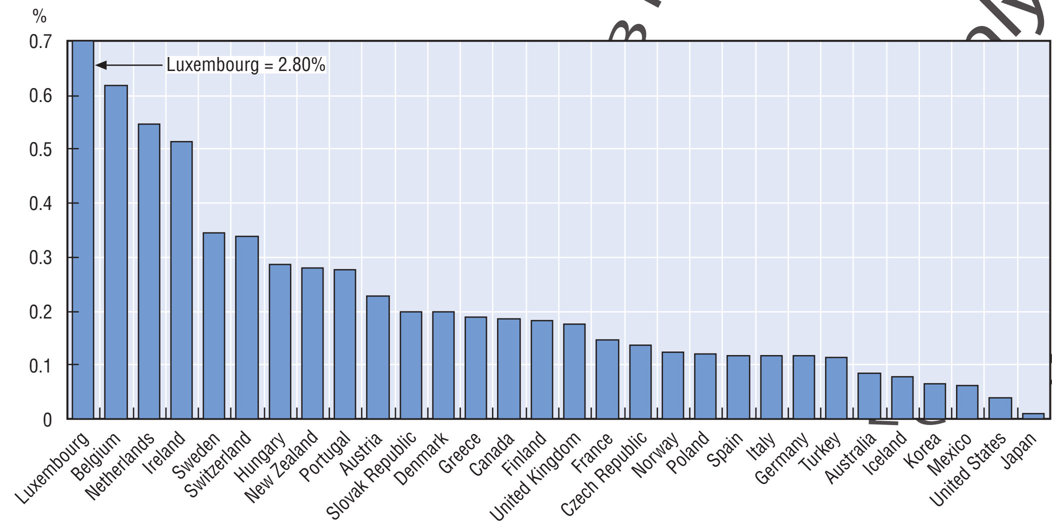
Comparative advantages

The above paragraphs reveal a number of changes in the structure of trade in communications equipment for selected OECD countries. Some countries have become specialised in the sector very quickly, while others seem to have lost the pre-eminence they had eight years ago. The levels of revealed comparative advantage for the various OECD countries are compared using the Lafay index of international specialisation.[1] This index

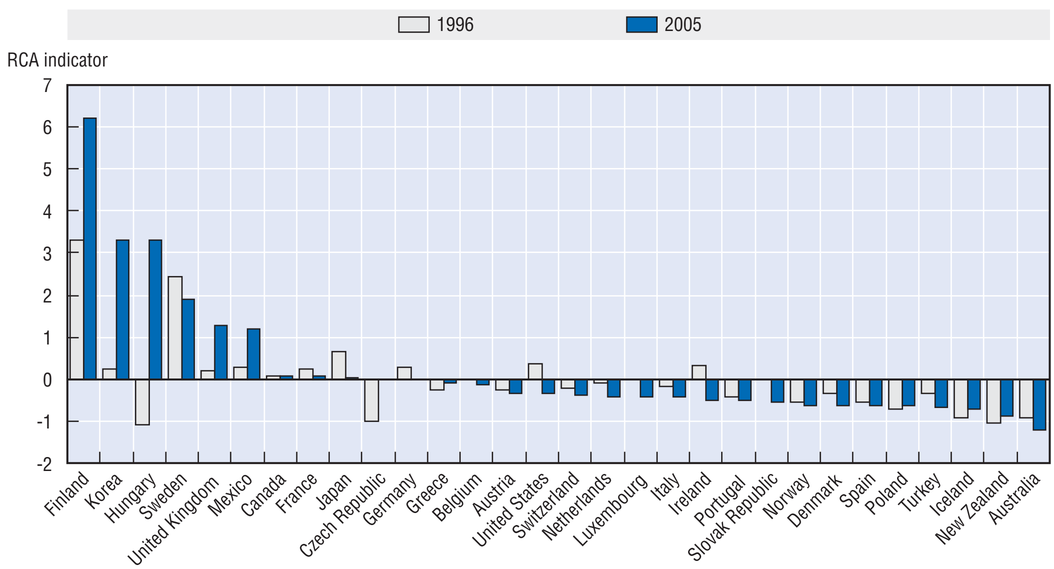
Figure 8.20. **Exports of communication services as a percentage of GDP, 2004**



Source: OECD International Trade in Services database.

StatLink http://dx.doi.org/10.1787/003400074738

Figure 8.21. **Revealed comparative advantages (Lafay index): Comparisons of the 1996 and 2005 levels**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003412100384

offers a number of advantages that make it preferable to Bala Balassa's classic index of revealed comparative advantages (1965).[2] One of these advantages is that it factors in exports and imports of the same items, incorporating intra-industry trade (see the next section).

Table 8.11 and Figure 8.2 put the Lafay indicators on the same plane, and compare the levels of comparative advantages of OECD member countries with regard to trade in telecommunication equipment. The calculations were performed using the HS 1996 classification system at a six-digit level of disaggregation for the entire telecommunication equipment sector.[3] A positive outcome denotes a comparative advantage and a negative one a comparative disadvantage.

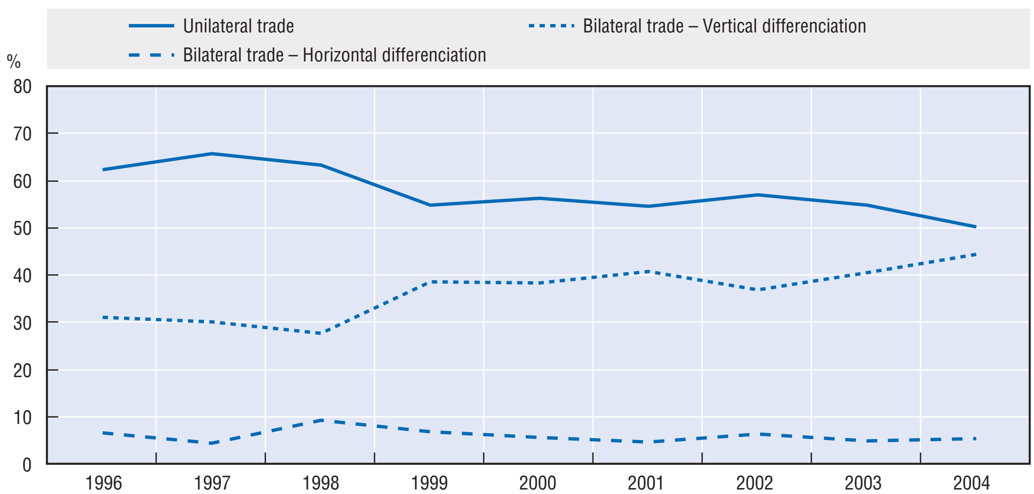
The results show that the countries with the highest indices of comparative advantage are Finland, Korea, Hungary and Sweden. Hungary transformed a high level of comparative disadvantage to a very high level of comparative advantage in just eight years. Hungary's exceptional success stems in great part from foreign direct investment in the telecommunication sector, and from the presence on its soil of foreign affiliates of multinational enterprises. In 1999, over 95% of the income from the electronic equipment sector was generated by foreign affiliates. Korea too went from a low level of comparative advantage to a high one over the same period. Countries like the Czech Republic substantially reduced their level of comparative disadvantage, and other countries, such as Japan, lost some of their comparative advantage over the past nine years. It should be noted that a comparative disadvantage in no way means that trade in telecommunication equipment is necessarily detrimental to the economy of the country in question.

Breakdown of intra-industry trade

Product innovations and innovations in production processes have prompted businesses in the industry to undertake greater industrial specialisation, thus fragmenting the production process. This fragmentation between contracting firms, which handle design, marketing and in many cases research, and a very large number of sub-contractors, has in fact led to a substantial increase in international trade in intermediate goods.

In order to assess the level of intra-industry trade generated by international fragmentation of production, the method proposed by Fontagné and Freudenberg (1997[4] and 2005[5]) is used. This method consists in breaking international trade down into three distinct types of trade: bilateral trade in similar products (horizontal differentiation); bilateral trade in vertically differentiated products; and unilateral trade.[6]

Figure 8.22. **Changes in types of trade in telecommunication equipment in OECD member countries between 1996 and 2004**



Source: OECD ITCS database.

StatLink http://dx.doi.org/10.1787/003425416312

The results show that unilateral trade between OECD countries dropped by over 12%, meaning that more countries are developing their telecommunication equipment industries (Figure 8.22). The 13% increase in trade in vertically differentiated goods means that trade in goods of different quality, and in intermediate goods, has increased. For its part, the curve for trade in horizontally differentiated products is very stable, but this says nothing about intra-industry trade. The convergence of the curves for unilateral trade and trade in vertically differentiated products reveals a higher level of integration of intra-industry trade within the OECD countries, as well as the development of production networks within the industry.

Notes

1. Modified Bela Balassa Index of Revealed Competitive Advantages, proposed by Gérard Lafay in: Lafay, G. (1992), "The Measurement of Revealed Comparative Advantages" in Dagenais, M.G. and P.A. Muet (eds.), *International Trade Modelling*, London: Chapman and Hill.
2. Balassa, B. (1965), "Trade Liberalization and 'Revealed' Comparative Advantages" in *Manchester School of Economic and Social Studies*, Volume 33, pp. 99-123.
3. The formula used is as follows, where *i* is the country; *j* the product; and *N* the number of products

$$LFI_j^i = 100\left(\frac{x_j^i - m_j^i}{x_j^i + m_j^i} - \frac{\sum_{j=1}^{N}(x_j^i - m_j^i)}{\sum_{j=1}^{N}(x_j^i + m_j^i)}\right)\frac{x_j^i + m_j^i}{\sum_{j=1}^{N}(x_j^i + m_j^i)};$$

   traded.
4. Fontagné, L. and M. Freudenberg (1997), "Intra-Industry Trade: Methodological Issues Reconsidered", *CEPII Working Papers,* No. 97-01.
5. Fontagné, L. and M. Freudenberg (2002), "Long-term Trends in Intra-Industry Trade", in Lloyd, P. J. and H. Lee (2002), *Frontiers of Research on Intra-industry Trade*, Palgrave.
6. The method consists of comparing trade by products at a six-digit level of disaggregation (HS 1996). First, this trade may be considered bilateral if one of the flows (imports or exports) amounts to at least 10% of the value of the other flow. If this is not the case, then the trade may not be considered bilateral, but rather unilateral. The following formula is used:

$$\frac{Min(X_{KK'it}, M_{kk'it})}{Max(X_{KK'it}, M_{kk'it})} > 10\%$$

   where *k* represents the reporting country; *k'* the partner country; *i* the product; and *t* the year.

   Next, bilateral trade is split into two groups by comparing the unit values (UV) of reciprocal exports and imports of the same good. To do so, Fontagné and Freudenberg (1997) established a threshold of 15% of the unit values (UV) of the goods traded. Accordingly, if the ratio of the unit values of a traded good or group of goods is greater than or equal to 15%, the trade will be considered trade in similar, horizontally differentiated goods (of like quality). If the ratio is less than 15%, the trade will be considered trade in vertically differentiated similar goods.

$$\frac{1}{1.15} \leq \frac{UV_{kk'it}^{X}}{UV_{kk'it}^{M}} \leq 1.15$$

Table 8.1. **Telecommunication equipment exports, 1996-2005**

USD millions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1996-2005
Australia	414	509	361	412	616	548	264	392	470	513	2.4
Austria	261	538	330	360	500	478	793	935	1 135	1 648	22.7
Belgium	1 209	1 246	1 693	1 624	2 459	2 999	1 633	1 567	1 605	1 922	5.3
Canada	3 526	4 090	4 246	5 836	10 825	5 196	4 023	3 799	4 758	6 230	6.5
Czech Republic	72	68	127	87	211	509	584	873	1 082	873	31.9
Denmark	681	985	1 231	1 349	1 478	1 387	2 308	1 710	1 691	2 796	17.0
Finland	3 477	4 164	5 676	6 131	8 504	7 029	7 345	8 360	7 934	10 800	13.4
France	4 245	5 450	7 331	8 359	10 764	8 491	7 362	6 718	7 806	7 712	6.9
Germany	7 888	9 648	9 397	11 232	13 446	14 068	13 925	13 375	19 234	21 777	11.9
Greece	64	103	140	156	310	226	210	236	325	277	17.7
Hungary	30	52	74	66	861	1 730	2 928	4 121	6 989	6 109	80.2
Iceland	0.00	0.03	0.10	0.16	0.65	0.46	0.51	0.45	0.83	1.04	83.6
Ireland	889	1 264	1 799	3 434	2 923	3 029	2 228	1 275	1 305	1 195	3.3
Italy	2 210	2 557	2 875	2 978	3 197	3 748	2 683	2 763	3 597	4 225	7.5
Japan	10 407	10 617	8 546	8 490	10 409	8 042	5 212	5 689	5 765	4 927	-8.0
Korea	2 099	2 481	2 832	5 073	7 138	9 044	11 269	15 170	21 045	21 254	29.3
Luxembourg*	..	..	..	220	454	730	540	272	234	244	1.1
Mexico	2 144	2 888	3 834	5 372	8 950	9 078	7 447	6 081	7 942	9 370	17.8
Netherlands	1 608	1 629	1 888	3 115	4 990	4 880	2 337	3 461	4 830	5 139	13.8
New Zealand	81	105	100	85	88	66	71	99	106	103	2.7
Norway	470	557	555	500	496	482	410	502	651	682	4.2
Poland	75	111	103	100	118	138	180	193	244	540	24.5
Portugal	81	83	86	115	119	136	128	161	195	237	12.7
Slovak Republic*	..	72	55	39	42	49	33	29	73	150	8.5
Spain	930	1 051	1 127	1 364	1 337	1 477	1 235	1 598	1 526	1 466	5.2
Sweden	5 752	7 143	8 200	10 052	10 933	5 145	5 702	6 283	8 535	8 613	4.6
Switzerland	767	806	813	765	833	795	641	658	840	1 378	6.7
Turkey	110	87	106	86	118	173	118	113	112	117	0.8
United Kingdom	7 224	5 818	11 269	11 381	14 963	15 623	16 180	11 807	9 637	22 580	13.5
United States	14 561	17 726	17 559	19 432	23 617	20 400	16 167	14 872	18 319	19 893	3.5
OECD	71 276	81 849	92 354	108 214	140 698	125 696	113 957	113 111	137 986	162 771	9.6

* CAGR for available years.

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012602317545

Table 8.2. **Telecommunication equipment imports, 1996-2004**

USD millions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1996-2005
Australia	1 568	1 528	1 454	2 495	3 188	2 312	1 989	2 396	3 152	3 422	9.1
Austria	642	691	1 240	1 663	1 665	1 310	1 461	1 806	2 054	2 461	16.1
Belgium	1 151	1 318	1 647	2 032	2 273	2 869	1 923	1 848	1 980	2 772	10.3
Canada	2 877	3 318	3 475	4 193	6 205	4 864	4 055	4 067	4 770	4 888	6.1
Czech Republic	647	623	555	568	907	752	718	894	1 136	857	3.2
Denmark	914	1 011	1 193	1 241	1 602	1 587	2 230	1 773	2 252	3 458	15.9
Finland	562	584	731	799	1 383	1 208	818	999	1 291	2 378	17.4
France	2 768	3 542	4 168	4 858	5 880	6 137	4 533	5 166	6 369	7 812	12.2
Germany	4 293	4 856	5 964	6 897	9 292	10 406	9 362	8 892	14 522	17 783	17.1
Greece	322	524	887	965	884	759	748	993	1 147	1 002	13.4
Hungary	391	397	434	488	721	764	1 076	1 861	2 575	2 044	20.2
Iceland	37	40	53	54	71	46	41	50	51	78	8.6
Ireland	419	641	991	1 762	1 964	2 490	1 613	1 079	1 332	1 483	15.1
Italy	2 476	3 518	4 217	4 773	5 493	4 745	4 286	4 936	7 855	7 683	13.4
Japan	4 343	3 936	3 840	4 191	5 663	4 712	3 677	3 436	3 668	3 958	-1.0
Korea	1 713	1 716	888	1 713	3 338	2 055	1 787	1 755	1 743	2 234	3.0
Luxembourg*	..	..	..	317	526	760	524	387	418	490	4.9
Mexico	1 488	2 133	2 743	3 380	4 986	4 536	3 002	3 059	4 008	4 430	12.9
Netherlands	1 805	2 083	2 593	4 680	6 262	6 587	3 497	4 166	6 227	6 849	16.0
New Zealand	392	375	342	450	495	354	279	365	499	591	4.7
Norway	750	787	870	896	951	830	738	893	1 164	1 125	4.6
Poland	662	951	1 108	1 310	1 477	1 415	1 291	1 413	1 530	1 939	12.7
Portugal	409	546	722	813	759	788	748	805	967	1 048	11.0
Slovak Republic*	..	305	267	154	153	207	257	311	413	526	6.3
Spain	2 448	1 986	2 500	4 013	4 367	3 519	3 004	3 732	5 149	6 019	10.5
Sweden	1 272	1 516	1 944	2 072	2 572	1 989	1 673	1 966	3 139	3 106	10.4
Switzerland	1 076	1 249	1 369	1 483	1 685	1 362	1 245	1 405	1 737	2 292	8.8
Turkey	536	778	1 172	1 971	2 456	911	733	937	1 553	1 861	14.8
United Kingdom	6 882	5 658	8 433	10 075	13 548	10 357	8 719	10 392	14 149	17 012	10.6
United States	13 339	14 540	17 085	23 588	37 753	32 204	31 265	34 046	41 890	51 589	16.2
OECD	56 182	61 151	72 884	93 895	128 519	112 836	97 292	105 827	138 742	163 190	12.6

* CAGR for available years.

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012682125703

Table 8.3. **Telecommunication equipment trade balance, 1996-2005**

USD millions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	- 6 515	- 7 086	- 6 860	- 8 324	- 9 333	- 7 203	- 7 355	- 8 797	- 2 682	- 2 908
Austria	- 2 337	- 2 227	- 2 998	- 3 383	- 2 425	- 2 073	- 1 507	- 1 764	- 920	- 813
Belgium	- 1 067	- 1 571	- 1 405	- 2 260	- 1 635	- 2 127	- 1 983	- 1 687	- 376	- 851
Canada	- 11 438	- 11 412	- 11 949	- 13 679	- 13 228	- 13 210	- 12 091	- 12 739	- 12	1 342
Czech Republic	- 2 002	- 1 747	- 1 656	- 1 792	- 2 102	- 1 825	- 362	- 198	- 53	16
Denmark	- 1 614	- 1 371	- 1 195	- 1 445	- 1 570	- 1 476	- 1 078	- 1 571	- 561	- 662
Finland	1 739	2 464	3 573	4 249	5 382	3 995	5 027	5 658	6 643	8 422
France	- 3 053	- 1 721	- 2 260	- 2 305	- 3 814	- 4 037	- 4 028	- 8 035	1 437	- 100
Germany	- 4 812	- 3 710	- 8 077	- 8 929	- 8 439	- 8 617	- 4 198	- 3 178	4 712	3 994
Greece	- 1 081	- 1 410	- 1 988	- 2 259	- 1 983	- 1 695	- 1 732	- 2 320	- 822	- 725
Hungary	- 821	- 270	38	110	190	- 514	1 250	2 620	4 414	4 064
Iceland	- 163	- 165	- 214	- 221	- 262	- 184	- 178	- 209	- 51	- 77
Ireland	3 973	5 320	5 085	8 984	9 131	13 374	8 573	7 371	- 28	- 288
Italy	- 5 393	- 7 029	- 8 264	- 9 832	- 10 619	- 8 649	- 9 065	- 11 388	- 4 258	- 3 458
Japan	55 218	57 662	52 597	52 341	56 474	36 234	35 816	40 389	2 098	969
Korea	8 218	11 278	14 626	17 006	22 617	16 595	24 016	31 244	19 303	19 019
Luxembourg	..	..	..	- 29	- 169	- 89	51	- 127	- 185	- 246
Mexico	1 529	2 212	3 092	3 300	1 722	1 461	4 782	3 773	3 934	4 941
Netherlands	5	- 680	- 1 256	- 3 162	- 831	- 1 718	1 169	1 572	- 1 397	- 1 710
New Zealand	- 1 387	- 1 349	- 1 091	- 1 452	- 1 571	- 1 277	- 1 295	- 1 496	- 393	- 488
Norway	- 1 905	- 1 946	- 2 119	- 2 082	- 2 210	- 2 030	- 2 128	- 2 489	- 513	- 443
Poland	- 2 341	- 2 654	- 3 085	- 3 435	- 3 683	- 3 341	- 2 722	- 2 965	- 1 285	- 1 399
Portugal	- 1 331	- 1 327	- 1 774	- 1 940	- 1 871	- 1 856	- 1 542	- 1 687	- 771	- 811
Slovak Republic	0	- 692	- 752	- 495	- 533	- 657	- 732	- 835	- 340	- 376
Spain	- 5 589	- 5 108	- 6 111	- 7 821	- 8 091	- 7 104	- 7 104	- 8 793	- 3 623	- 4 553
Sweden	2 183	3 006	2 421	4 721	4 799	303	2 070	1 620	5 396	5 508
Switzerland	- 3 113	- 3 212	- 3 700	- 4 228	- 4 440	- 3 874	- 3 774	- 3 949	- 897	- 914
Turkey	- 2 086	- 2 679	- 2 825	- 3 833	- 4 944	- 2 041	- 1 875	- 2 427	- 1 441	- 1 744
United Kingdom	- 3 765	- 3 022	- 4 170	- 6 698	- 11 812	- 1 931	- 1 136	- 10 236	- 4 512	5 568
United States	- 26 561	- 22 378	- 33 633	- 44 096	- 55 550	- 41 551	- 71 700	- 79 222	- 23 572	- 31 696
OECD	- 508 742	- 2 825	- 25 949	- 42 987	- 50 800	- 47 117	- 54 830	- 71 866	- 756	- 419

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012742754248

Table 8.4. **Telecommunication equipment total trade, 1996-2005**

USD millions

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1996-2005
Australia	1 982	2 037	1 815	2 908	3 804	2 859	2 253	2 788	3 634	3 935	7.9
Austria	902	1 229	1 571	2 023	2 165	1 788	2 253	2 741	3 296	4 110	18.3
Belgium	2 360	2 564	3 340	3 656	4 731	5 868	3 556	3 415	3 585	4 694	7.9
Canada	6 403	7 408	7 721	10 029	17 030	10 060	8 078	7 865	9 533	11 118	6.3
Czech Republic	719	691	682	655	1 118	1 261	1 302	1 767	2 218	1 729	10.2
Denmark	1 595	1 997	2 424	2 590	3 081	2 974	4 537	3 483	3 944	6 254	16.4
Finland	4 039	4 748	6 407	6 930	9 887	8 237	8 163	9 358	9 182	13 178	14.0
France	7 013	8 993	11 500	13 216	16 644	14 628	11 895	11 884	14 286	15 524	9.2
Germany	12 180	14 504	15 361	18 130	22 738	24 474	23 287	22 267	33 625	39 560	14.0
Greece	386	627	1 027	1 121	1 194	985	958	1 229	1 472	1 278	14.2
Hungary	421	449	508	555	1 582	2 494	4 004	5 982	9 564	8 153	39.0
Iceland	37	40	53	54	72	46	41	51	52	79	8.7
Ireland	1 308	1 905	2 790	5 196	4 887	5 519	3 841	2 354	2 637	2 677	8.3
Italy	4 686	6 076	7 092	7 750	8 690	8 494	6 969	7 700	11 354	11 908	10.9
Japan	14 750	14 553	12 386	12 681	16 072	12 754	8 889	9 125	9 433	8 885	-5.5
Korea	3 812	4 197	3 721	6 786	10 475	11 099	13 056	16 925	22 788	23 488	22.4
Luxembourg*	..	..	..	538	980	1 491	1 064	659	652	734	3.5
Mexico	3 632	5 021	6 576	8 751	13 936	13 614	10 449	9 140	11 950	13 800	16.0
Netherlands	3 413	3 712	4 481	7 795	11 251	11 467	5 834	7 627	11 055	11 987	15.0
New Zealand	473	479	443	535	583	420	350	463	606	694	4.3
Norway	1 220	1 345	1 425	1 396	1 447	1 312	1 148	1 395	1 815	1 807	4.5
Poland	737	1 062	1 211	1 410	1 595	1 553	1 471	1 606	1 774	2 479	14.4
Portugal	490	629	808	928	878	924	876	966	1 162	1 286	11.3
Slovak Republic*	..	377	322	193	195	256	290	340	470	677	6.7
Spain	3 378	3 037	3 627	5 377	5 705	4 995	4 239	5 330	6 675	7 484	9.2
Sweden	7 024	8 659	10 144	12 124	13 505	7 134	7 376	8 249	11 674	11 719	5.9
Switzerland	1 843	2 055	2 182	2 248	2 518	2 157	1 886	2 063	2 540	3 670	8.0
Turkey	645	865	1 278	2 056	2 574	1 084	851	1 050	1 665	1 979	13.3
United Kingdom	14 107	11 476	19 702	21 456	28 511	25 981	24 898	22 199	23 660	39 592	12.1
United States	27 900	32 266	34 644	43 020	61 370	52 605	47 432	48 918	60 209	71 482	11.0
OECD	127 458	143 000	165 238	202 109	269 218	238 532	211 249	218 938	276 509	325 961	11.0

* CAGR for available years.

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012743855854

Table 8.5. **Telecommunication equipment exports as a percentage of all goods exports, 1996-2005**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1996-2005
Australia	0.7	0.8	0.6	0.7	1.0	0.9	0.4	0.6	0.5	0.5	-3.8
Austria	0.5	0.9	0.5	0.6	0.8	0.7	1.1	1.0	1.1	1.5	13.7
Belgium	0.7	0.7	0.9	0.9	1.3	1.6	0.8	0.6	0.5	0.6	-2.3
Canada	1.9	1.9	2.0	2.4	3.9	2.0	1.6	1.4	1.5	1.7	-0.8
Czech Republic	0.3	0.3	0.4	0.3	0.7	1.5	1.5	1.8	1.6	1.1	14.3
Denmark	1.3	2.0	2.6	2.8	3.0	2.8	4.1	2.6	2.3	3.4	10.8
Finland	8.6	10.2	13.1	14.7	18.6	16.4	16.4	15.9	13.0	16.6	7.6
France	1.5	1.9	2.4	2.8	3.6	2.8	2.4	1.9	1.9	1.8	1.9
Germany	1.5	1.9	1.7	2.1	2.4	2.5	2.3	1.8	2.1	2.2	4.2
Greece	0.6	0.9	1.3	1.5	2.8	2.2	2.0	1.7	2.1	1.6	12.2
Hungary	0.2	0.3	0.3	0.3	3.1	5.7	8.5	9.6	12.6	9.7	51.3
Iceland	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.9
Ireland	1.8	2.4	2.8	4.9	3.8	3.9	2.5	1.4	1.3	1.1	-5.7
Italy	0.9	1.1	1.2	1.3	1.3	1.5	1.1	0.9	1.0	1.1	2.9
Japan	2.5	2.5	2.2	2.0	2.2	2.0	1.3	1.2	1.0	0.8	-11.7
Korea	1.7	1.8	2.1	3.5	4.1	6.0	6.9	7.8	8.3	7.5	18.0
Luxembourg*	..	..	..	2.8	5.8	8.8	6.3	2.7	1.9	1.9	-4.2
Mexico	2.2	2.6	3.3	3.9	5.4	5.8	4.7	3.7	4.2	4.4	7.7
Netherlands	0.9	0.9	1.1	1.8	2.8	2.8	1.3	1.5	1.7	1.6	6.7
New Zealand	0.6	0.8	0.8	0.7	0.7	0.5	0.5	0.6	0.5	0.5	-2.1
Norway	0.9	1.1	1.4	1.1	0.8	0.8	0.7	0.7	0.8	0.7	-4.0
Poland	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.6	7.8
Portugal	0.3	0.3	0.4	0.5	0.5	0.6	0.5	0.5	0.5	0.6	7.4
Slovak Republic*	..	0.7	0.5	0.4	0.4	0.4	0.2	0.1	0.3	0.5	-5.0
Spain	0.9	1.0	1.0	1.2	1.2	1.3	1.0	1.0	0.8	0.8	-1.9
Sweden	6.9	8.8	9.6	11.9	12.5	6.7	6.9	6.1	6.9	6.6	-0.5
Switzerland	1.0	1.1	1.0	1.0	1.0	1.0	0.7	0.7	0.7	1.1	1.4
Turkey	0.5	0.3	0.4	0.3	0.4	0.6	0.3	0.2	0.2	0.2	-11.3
United Kingdom	2.8	2.1	4.1	4.2	5.3	5.7	5.8	3.8	2.8	5.9	8.6
United States	2.3	2.6	2.6	2.8	3.0	2.8	2.3	2.1	2.2	2.2	-0.7
OECD	1.9	2.1	2.3	2.6	3.2	2.9	2.6	2.2	2.3	2.5	3.0

* CAGR for available years.

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012804137348

Table 8.6. **Telecommunication equipment exports as a percentage of GDP, 1996-2005**

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	CAGR 1996-2005
Australia	14.1	14.7	14.6	13.5	15.9	16.6	15.3	12.9	14.8	16.1	1.5
Austria	24.2	27.3	28.5	29.3	32.3	33.5	34.2	35.0	35.5	36.9	4.8
Belgium	62.2	68.7	70.3	70.6	80.2	82.3	85.5	82.8	86.2	89.6	4.1
Canada	31.4	34.2	35.3	36.8	39.0	37.1	34.9	31.8	32.4	36.8	1.8
Czech Republic	35.4	40.4	46.6	45.5	52.2	54.9	52.2	53.8	61.1	63.9	6.8
Denmark	27.5	28.3	27.6	28.2	31.0	31.2	32.0	30.2	30.5	31.9	1.7
Finland	31.4	33.0	33.1	32.5	38.1	35.1	33.6	32.5	33.0	33.6	0.7
France	18.0	19.9	20.4	20.8	22.4	22.4	20.9	20.0	20.1	20.3	1.3
Germany	21.0	23.8	24.9	25.4	29.1	30.3	30.4	30.8	33.3	34.8	5.7
Greece	8.9	9.0	8.7	8.4	9.4	8.7	8.0	7.8	7.3	7.7	-1.6
Hungary	28.9	41.5	48.5	51.7	59.7	58.3	52.3	51.7	55.0	57.9	8.0
Iceland	25.9	25.0	23.5	23.1	22.0	25.7	25.6	22.1	21.6	19.5	-3.1
Ireland	64.7	66.1	72.7	73.2	79.7	74.0	71.7	59.4	56.9	60.0	-0.8
Italy	20.1	20.0	20.0	19.6	21.9	21.9	20.8	20.0	20.6	21.1	0.5
Japan	8.9	9.9	10.1	9.6	10.3	9.8	10.7	11.2	12.3	13.0	4.3
Korea	22.3	26.4	38.3	32.3	33.7	31.2	29.7	31.9	37.3	36.1	5.5
Luxembourg*	..	..	..	36.9	39.0	41.0	37.9	34.6	36.4	34.7	-0.7
Mexico	28.8	27.5	27.9	28.4	28.5	25.3	24.7	25.8	27.5	31.4	1.0
Netherlands	41.9	44.4	40.8	41.1	46.8	43.9	39.9	42.5	48.2	51.0	2.2
New Zealand	21.0	20.4	21.6	20.6	24.2	25.3	22.8	20.4	20.7	22.1	0.6
Norway	31.2	30.9	26.9	28.8	35.9	34.7	31.3	31.5	32.4	35.1	1.3
Poland	15.9	16.8	16.6	16.7	19.0	19.4	21.4	25.6	30.6	37.0	9.8
Portugal	20.9	21.3	20.5	20.2	21.7	20.9	20.2	20.6	20.2	20.7	-0.1
Slovak Republic*	..	45.5	48.3	49.3	58.2	60.4	59.7	67.2	67.8	77.9	6.2
Spain	16.5	18.6	18.6	18.1	19.6	19.1	18.3	17.8	17.7	17.1	0.4
Sweden	30.4	32.6	34.0	33.4	36.1	34.4	34.1	33.7	35.2	36.4	2.0
Switzerland	26.4	29.0	29.3	30.3	32.7	32.8	31.8	31.3	33.0	35.0	3.2
Turkey	12.6	13.7	13.4	14.4	14.0	21.6	19.5	19.7	21.0	20.2	5.4
United Kingdom	21.7	21.2	19.1	18.5	19.6	18.9	17.9	17.0	16.5	17.5	-2.4
United States	8.0	8.3	7.8	7.5	8.0	7.3	6.7	6.6	7.0	7.7	-0.4
OECD	15.7	16.6	16.7	16.3	17.3	16.9	16.7	17.2	18.4	46.4	12.8

* CAGR for available years.

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012864404522

Table 8.7. **OECD telecommunication equipment exports to non-OECD and to OECD countries , 1996-2004**

USD millions

	1996		1998		2000		2002		2004	
	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD
Australia	223	165	175	144	177	220	116	187	189	219
Austria	77	199	83	293	117	425	10 722	61 236	17 407	92 496
Belgium	20 546	909	20 093	1 472	22 603	1 937	25 168	191 371	36 102	272 612
Canada	13 005	179 692	11 922	206 985	12 162	276 329	11 426	245 389	17 875	304 110
Czech Republic	16	63 600	27	65 039	37	67 680	3 905	72 840	6 662	96 178
Denmark	93	60	184	107	127	177	178	35 150	167	61 739
Finland	10 729	386 487	11 724	422 873	12 818	469 323	12 940	512 950	24 308	750 942
France	53 303	562	56 986	1 032	53 677	1 380	57 534	2 169	79 237	1 573
Germany	87 130	405	85 913	552	80 270	905	102 264	874	159 685	1 203
Greece	3 874	31 183	3 566	34 852	4 591	40 232	4 579	37 805	5 689	44 393
Hungary	2 803	207 471	3 308	224 468	3 254	251 441	4 590	253 533	9 629	342 360
Iceland	151	6 997	107	7 168	111	6 661	159	5 738	215	9 687
Ireland	4 704	9 800	5 199	19 283	6 428	25 806	6 490	32 868	8 351	52 899
Italy	57 381	40 531	52 573	55 483	48 613	71 595	56 025	82 715	78 812	96 638
Japan	186 028	1 720	158 498	1 795	200 654	1 791	183 925	2 071	276 470	2 625
Korea	69 845	188 482	65 771	184 447	81 839	190 314	87 992	193 509	145 593	269 383
Luxembourg	237	231 308	339	236 268	440	295 719	544	245 637	842	305 976
Mexico	7 043	56 202	8 545	68 076	7 377	96 704	8 162	85 331	11 482	127 882
Netherlands	16 937	190 064	15 842	218 892	17 090	251 935	20 978	253 084	35 906	293 773
New Zealand	4 276	6 340	3 381	7 082	3 568	7 808	3 920	8 491	6 026	11 460
Norway	3 739	89 815	3 027	112 375	3 132	166 375	4 557	158 913	5 270	183 937
Poland	5 099	122 536	5 304	117 954	4 793	154 755	6 519	153 251	12 354	258 357
Portugal	2 239	44 737	2 011	36 617	1 978	55 140	2 346	53 607	3 676	75 495
Slovak Republic	807	9 580	1 040	8 199	980	8 984	1 217	9 724	2 419	13 989
Spain	17 610	18 228	18 597	21 652	18 830	26 227	19 532	33 855	28 687	61 577
Sweden	14 511	21 286	15 121	20 974	15 980	22 368	15 344	23 500	23 681	32 004
Switzerland	209	5 919	12 957	9 696	13 839	10 847	15 906	13 280	21 870	25 238
Turkey	8 393	70 364	8 918	78 075	7 565	82 310	10 394	73 365	20 121	108 183
United Kingdom	43 106	13 983	47 870	16 356	45 260	18 390	43 113	23 414	63 891	40 530
United States	174 101	524 803	178 619	522 377	208 551	595 285	93 203	299 991	241 061	595 452
OECD	808 218	2 523 427	797 701	2 700 587	876 862	3 199 067	813 747	3 165 850	1 343 675	4 532 909

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/013016582322

Table 8.8. **OECD telecommunication equipment imports from non-OECD and from OECD countries , 1996-2004**

USD millions

	1996		1998		2000		2002		2004	
	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD	non-OECD	OECD
Australia	201	1 458	329	1 275	591	2 820	610	1 647	1 481	2 323
Austria	41	635	68	1 221	102	1 670	8 267	64 603	13 621	97 507
Belgium	20 778	1 143	21 863	1 651	26 101	2 135	28 296	171 988	42 192	245 765
Canada	17 502	155 943	20 933	184 070	28 149	218 483	28 990	198 005	46 909	232 178
Czech Republic	74	1 065	7 981	70 832	9 851	74 505	8 441	76 677	10 944	101 180
Denmark	65	545	39	402	85	848	7 883	33 588	13 089	56 421
Finland	74 076	331 485	74 977	362 051	91 483	397 794	90 144	391 478	145 817	562 911
France	5 035	38 977	109	1 118	5 725	40 008	5 817	45 458	10 693	58 301
Germany	23 721	2 324	24 530	2 400	34 588	4 109	37 013	2 919	60 117	5 144
Greece	5 303	24 550	5 739	25 916	8 170	26 411	8 150	26 153	15 145	36 334
Hungary	48 168	208 235	47 713	219 804	58 990	251 020	58 613	249 745	92 382	349 019
Iceland	6 238	20 066	5 579	24 476	8 020	22 705	9 305	24 018	14 144	39 827
Ireland	3 803	12 390	4 738	20 724	7 284	25 529	9 940	28 792	13 637	49 310
Italy	5 036	29 328	6 244	37 179	7 114	43 985	6 815	45 907	9 747	52 582
Japan	165	1 875	236	2 252	290	2 374	406	1 911	564	3 140
Korea	46 887	153 400	45 863	163 345	56 291	177 837	56 377	181 436	89 614	257 919
Luxembourg	171 629	179 919	134 677	148 702	208 636	177 836	191 993	150 333	276 865	183 895
Mexico	47 627	97 397	35 908	57 769	73 417	89 785	71 852	81 688	113 557	112 212
Netherlands	49 848	216 264	56 550	251 776	66 816	281 647	67 453	283 538	102 487	373 412
New Zealand	198	8 330	242	9 490	347	10 547	244	11 528	541	16 295
Norway	3 574	87 164	10 547	117 005	9 581	166 060	12 294	156 023	42 330	157 960
Poland	30 463	111 568	32 300	107 320	40 073	132 191	39 149	126 092	78 582	186 338
Portugal	4 499	30 974	5 096	32 415	5 154	29 541	5 827	29 132	8 496	40 127
Slovak Republic	2 795	12 211	2 732	10 000	3 667	10 749	4 103	11 244	6 953	16 842
Spain	7 029	29 093	7 765	38 182	10 266	39 338	11 692	43 859	21 028	68 787
Sweden	4 932	29 500	4 483	32 025	5 354	35 387	5 108	35 702	8 488	47 465
Switzerland	1 842	7 198	2 350	10 924	3 099	9 720	3 547	13 342	5 873	22 232
Turkey	6 092	56 767	6 638	63 952	8 985	66 805	8 024	60 903	13 230	90 750
United Kingdom	12 220	30 484	11 741	33 414	17 237	36 320	16 959	33 526	37 418	60 922
United States	307 474	722 074	354 047	753 918	446 019	854 494	437 237	801 301	624 786	949 487
OECD	907 314	2 602 361	932 017	2 785 611	1 241 486	3 232 655	1 240 549	3 382 535	1 920 733	4 476 585

Source: OECD, ITCS database.

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Table 8.9. **Trade in communication and telecommunication services, 1999 and 2004**

USD millions

	Export				Import			
	Communication services		Telecommunication services		Communication services		Telecommunication services	
	1999	**2004**	**1999**	**2004**	**1999**	**2004**	**1999**	**2004**
Australia	896	563	..	596	966	556	353	420
Austria	428	671	..	1 208	524	503	956	945
Belgium	..	2 198	941	1 091	1 298	1 597	910	1 063
Canada	1 464	1 809	48	135	1 398	1 678	53	358
Czech Republic	100	149	..	..	99	390	..	..
Denmark	..	487	124	251	401	621	152	236
Finland	163	336	788	..	183	268	768	..
France	955	3 028	1 558	2 447	890	1 879	2 903	3 345
Germany	1 825	3 166	207	356	3 247	4 651	126	326
Greece	211	393	..	264	132	364	..	277
Hungary	79	288	..	..	52	315	..	..
Iceland	10	10	..	945	7	21	475	1 223
Ireland	356	945	1 055	1 752	208	1 223	1 561	2 057
Italy	1 159	1 988	..	..	1 765	2 768	..	..
Japan	767	454	..	..	1 408	621	..	..
Korea	400	446	..	885	677	636	55	1 018
Luxembourg	..	934	1 169	423	96	1 072	436	176
Mexico	1 169	423	..	..	436	176	1 366	..
Netherlands	1 381	3 308	..	..	1 428	2 865	..	..
New Zealand	187	277	194	256	187	..	148	199
Norway	289	315	..	274	166	230	..	297
Poland	376	295	167	442	566	314	115	325
Portugal	181	489	..	64	134	370	39	68
Slovak Republic	53	82	466	1 083	29	72	537	1 198
Spain	584	1 217	440	1 040	577	1 592	600	1 292
Sweden	522	1 208	..	..	737	1 402	..	..
Switzerland	843	1 223	..	346	818	1 129	..	128
Turkey	..	346	2 432	3 279	72	207	2 456	3 080
United Kingdom	2 692	3 702	4 549	4 374	2 920	3 530	6 601	4 365
United States	4 777	4 632	..	..	7 058	4 925	..	..
OECD	21 867	35 381	..	..	28 482	35 972	..	..

Source: OECD,Trade in Services database.

StatLink http://dx.doi.org/10.1787/013073131276

Table 8.10. **Exports of telecommunication equipment by categories for total OECD**

USD millions

	1996	2000	2004	2005
Telecommunications equipment (HS 1996)				
851711 Line telephone sets with cordless handsets	1 327	1 685	1 515	1 303
851719 Other telephone sets, video phones	1 776	2 173	1 899	1 193
851721 Facsimile machines	1 857	1 138	647	381
851722 Teleprinters	16.1	15.4	4.2	3.0
851730 Telephonic or telegraphic switching apparatus	5 355	8 960	4 203	2 432
851750 Other apparatus, for carrier-current line systems or for digital line systems	6 548	23 231	11 797	10 236
851780 Other electrical apparatus for line telephony or line telegraphy	2 692	3 429	1 628	848
851790 Parts for other electrical apparatus for line telephony or line telegraphy	14 552	27 830	18 026	13 545
852020 Telephone answering machines	298	134	23	31
852510 Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television not incorporating reception apparatus	2 221	3 537	3 453	2 355
852520 Transmission apparatus for radio-telephony, radio-telegraphy, radio-broadcasting or television incorporating reception apparatus	19 500	53 163	79 613	58 990
852530 Television cameras	4 706	1 901	2 281	1 774
852610 Radar apparatus	1 137	1 047	1 671	1 297
852790 Reception apparatus for radio-telephony, radio-telegraphy or radio-broadcasting, whether or not combined, in the same housing, with sound recording or reproducing apparatus or a clock, n.e.s	1 727	1 815	767	476
852910 Aerials and aerial reflectors of all kinds; parts suitable for use therewith	2 712	3 691	4 806	3 460
853110 Burglar or fire alarms and similar apparatus	1 594	1 988	2 247	1 368
854420 Co-axial cable and other co-axial electric conductors	1 620	1 972	1 960	1 414
854470 Optical fibre cables	1 637	2 988	1 361	1 142

Source: OECD, ITCS database.

StatLink http://dx.doi.org/10.1787/012628710751

Table 8.11. **Revealed comparative advantages for telecommunication equipment trade**

Lafay index for international specialisation

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	-0.93	-0.83	-0.87	-1.53	-1.87	-1.46	-1.23	-1.12	-1.25	-1.19
Austria	-0.25	-0.07	-0.65	-0.92	-0.83	-0.58	-0.47	-0.46	-0.44	-0.34
Belgium	-0.01	-0.05	-0.03	-0.16	0.00	-0.01	-0.11	-0.09	-0.08	-0.15
Canada	0.09	0.11	0.13	0.25	0.65	-0.10	-0.12	-0.15	-0.12	0.09
Czech Republic	-1.00	-0.99	-0.68	-0.82	-1.04	-0.27	-0.12	0.02	-0.03	0.00
Denmark	-0.34	-0.11	-0.01	-0.02	-0.31	-0.41	-0.19	-0.25	-0.55	-0.63
Finland	3.31	4.06	5.33	5.95	7.11	6.20	6.87	6.67	5.19	6.23
France	0.25	0.30	0.49	0.55	0.85	0.41	0.46	0.23	0.21	0.07
Germany	0.28	0.39	0.23	0.30	0.28	0.16	0.17	0.15	0.04	-0.03
Greece	-0.26	-0.42	-0.64	-0.71	-0.05	-0.20	-0.13	-0.17	-0.01	-0.09
Hungary	-1.08	-0.79	-0.68	-0.74	0.41	1.70	2.83	2.83	4.16	3.30
Iceland	-0.91	-0.98	-1.04	-1.05	-1.32	-0.99	-0.88	-0.87	-0.68	-0.73
Ireland	0.33	0.35	0.27	0.52	-0.02	-0.46	-0.26	-0.29	-0.41	-0.49
Italy	-0.15	-0.31	-0.38	-0.45	-0.49	-0.24	-0.34	-0.37	-0.60	-0.43
Japan	0.64	0.67	0.41	0.33	0.34	0.32	0.08	0.15	0.11	0.03
Korea	0.25	0.32	0.58	1.04	1.03	2.28	2.88	3.42	3.74	3.30
Luxembourg	..	..	..	-0.09	0.40	1.00	0.85	-0.06	-0.28	-0.42
Mexico	0.29	0.34	0.54	0.78	1.25	1.51	1.42	0.95	1.09	1.19
Netherlands	-0.11	-0.19	-0.26	-0.48	-0.41	-0.55	-0.40	-0.24	-0.38	-0.41
New Zealand	-1.04	-0.91	-0.95	-1.21	-1.43	-1.08	-0.67	-0.68	-0.91	-0.88
Norway	-0.56	-0.51	-0.47	-0.75	-0.90	-0.78	-0.67	-0.68	-0.75	-0.62
Poland	-0.71	-0.86	-0.93	-1.17	-1.26	-1.18	-0.93	-0.85	-0.70	-0.65
Portugal	-0.40	-0.58	-0.76	-0.74	-0.66	-0.67	-0.65	-0.58	-0.58	-0.52
Slovak Republic	..	-0.92	-0.76	-0.50	-0.43	-0.51	-0.65	-0.62	-0.57	-0.53
Spain	-0.53	-0.30	-0.40	-0.73	-0.82	-0.49	-0.41	-0.37	-0.56	-0.63
Sweden	2.44	3.13	3.37	4.36	4.46	1.79	2.17	1.88	1.88	1.90
Switzerland	-0.21	-0.29	-0.34	-0.45	-0.50	-0.33	-0.38	-0.40	-0.42	-0.40
Turkey	-0.34	-0.58	-1.01	-2.16	-1.83	-0.81	-0.53	-0.54	-0.67	-0.68
United Kingdom	0.20	0.11	0.74	0.54	0.64	1.32	1.64	0.59	-0.13	1.26
United States	0.35	0.47	0.38	0.28	0.01	0.03	-0.12	-0.25	-0.23	-0.35
OECD	0.21	0.27	0.26	0.23	0.25	0.25	0.26	0.15	0.08	0.12

Source: OECD, ITCS database.

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Chapter 9

Communications in the Emerging BRICS Economies

The emerging economies often referred to as BRICS (Brazil, Russia, India, China and South Africa) have a number of important common features in terms of telecommunications development, although policy responses have sometimes been different. They are among the fastest-growing ICT markets in the world and are developing as large consumers and producers of ICT goods. This chapter examines and compares development and communication policies in each of the five countries.

Introduction

The emerging economies often referred to as BRICS (Brazil, Russia, India, China and South Africa) have a number of important common features in terms of telecommunications development, although policy responses have sometimes been different. All are characterised by a significant urban/rural divide, with major urban areas often approaching developed country levels of communications access while rural areas lag far behind. This is sometimes overlaid by cultural divides, such as remote tribal areas in South Africa and Brazil, which add a further layer of complexity to the provision of access. Not surprisingly, therefore, universal service and universal access have been a feature of policy responses, and have sometimes led to the establishment of subsidies and special funds, development targets and conditions, monitoring and regulatory bodies. For example, mandatory targets have been set in Brazil, India and South Africa. South Africa also created special under-served area licences (USALs) and a Universal Service Agency (USA), Brazil a Universal Service Fund (USF) and India a Universal Service Obligations (USO) Fund.

Some of the BRICS economies saw their inherited communications networks as a barrier to economic development (*e.g.* China) while others saw information and communications technologies (ICTs) as an opportunity to enable and foster economic and social development in general, and in remote and tribal areas in particular (*e.g.* South Africa and Brazil). Nevertheless, a policy focus on ICT in general, and communications in particular, has been common to all. Policy responses, however, have been quite different. Some of the BRICS economies have adopted a very pro-market approach to communications development (*e.g.* Brazil and India), while others have taken a more cautious regulated and interventionist approach (*e.g.* Russia, South Africa and, to a greater extent, China).

Comparisons of network development relative to levels of gross domestic product (GDP) per capita do not map directly to these approaches. Nevertheless, key accelerants and retardants are apparent. Competition is clearly important, with much more progress made in competitive mobile markets than in monopoly fixed line markets. Monopoly fixed markets also retard the development of the Internet and repress subscriber growth (*e.g.* South Africa and, to a lesser extent, Russia). The delayed introduction of fixed network competition in South Africa and Russia has hampered network development and the ability to achieve economic and social development goals. The separation of regulatory authorities from regulated service providers is also important, with the BRICS case studies making apparent the importance of complementing this with genuine operational separation – South Africa's failure to separate regulation from ministerial veto and Russia's difficulties in establishing explicit and functional mechanisms being cases in point. Nevertheless, it is also apparent that China has prospered with its own uniquely centralised and integrated approach, wherein government control and ownership loom large, leavened by the competing interests of various ministries.

It is also apparent that progress can be accelerated by dealing in a timely fashion with critical issues, such as clearly defining services markets, interconnect and unbundling, and establishing the regulatory environment for certainty, while failing to do so creates delays and confusion. Interconnection plays an important role in the rapid development of mobile communications – with take-off often delayed when interconnection issues remain unresolved (*e.g.* Brazil, China and South Africa). In South Africa, lack of clarity in definitions of value added services and failure to define and separate such services, together with long delays in the licensing of a second network operator while juggling competing economic and social priorities are also instructive.

Perhaps the other lesson is the importance of technological neutrality, with technologies emerging to fill the special needs of remote communities, areas with limited existing physical or legacy infrastructure, and to overcome the barriers of price and access. Hence, mobile, especially pre-paid, wireless local loop (WLL) and Internet telephony have played important roles in the various BRICS economies.

Once having established regulatory independence and certainty, and processes for dispute resolution and settlement that work, governments have begun to turn their attention to convergence. Some are now pursuing policy and regulatory convergence (*e.g.* South Africa and India). Convergence in the sense of relatively seamless policy and regulatory oversight of "switched" and IP networks is a common goal of countries around the world. In developing and emerging economies, pooling policy and regulatory skills and resources can bring significant economies. However, attempts to pursue convergence of telecommunications and broadcast media legislation and regulation should, perhaps, be treated with some caution – given the risk of political interference in the regulatory process in broadcast media content regulation, and the potential of that interference to compromise the independence and credibility of telecommunication regulation (Henten *et al.,* 2003). How the BRICS economies tackle convergence will be an important determinant of the pace of network development in coming years.

Emerging economies

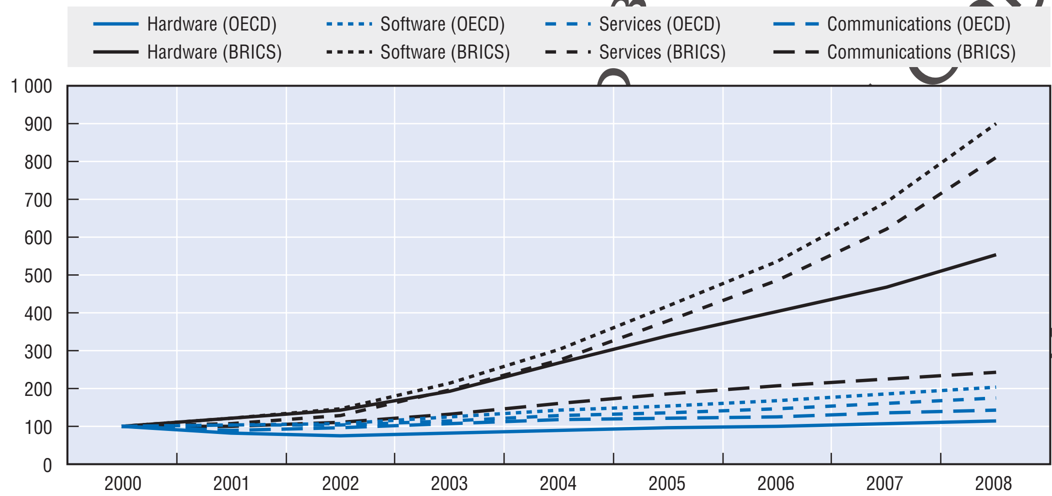
The BRICS economies have attracted the attention of analysts and investors around the world. They are among the most populous and largest economies in the world, and are enjoying strong economic growth. In most, ICT is playing an important role in the economy and is a focus of development efforts – either directly as a producing sector (*e.g.* China and India) or as an enabler of economic and social development (*e.g.* South Africa).

Emerging markets

With strong economic growth the emerging BRICS economies are among the fastest growing ICT markets. Between 2000 and 2005, ICT spending in the BRICS economies increased by more than 19% a year from USD 114 billion to USD 277 billion, while worldwide ICT spending increased by just 5.6% a year and OECD country spending by 4.2% a year (Table 9.1). ICT spending increased by 22% to 25% a year in Russia, China and India over the period, by 18% a year in South Africa and 13% a year in Brazil. Such is the speed of development that over the period 2000-06 the BRICS economies doubled their share of worldwide ICT spending from 5% to 10%. Their spending on software and IT services has increased somewhat faster than spending on IT hardware, and significantly faster than spending on communications equipment and services owing, in part perhaps, to relative price changes (Figure 9.1, Table 9.1).

Figure 9.1. **ICT market expenditure, 2000-08**

USD current prices, indexed 2000 = 100



Note: 2006 to 2008 forecast.

Source: WITSA, OECD analysis.

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The BRICS economies are also major communications markets. Russia's spending on communications equipment and services increased by more than 25% a year in the five years to 2005, compared with an increase in OECD country spending of just 4.2% a year. Over the same period, communications equipment and services spending increased by 18% a year in India, 13% in South Africa, 12% in China and 8.3% in Brazil. During 2005, the BRICS economies accounted for around 9.5% of the worldwide market for communications equipment and services, up from 6.5% in 2000 and forecast to rise above 10% during 2006. China accounted for the largest share of BRICS expenditure on communications equipment and services during the year at USD 52 billion, with Brazil and India both spending around USD 30 billion, Russia USD 19 billion and South Africa USD 13 billion. Communications equipment and services account for a larger share of total ICT market expenditure in Russia, India and South Africa than in OECD countries, but a smaller share of total expenditure in China (Figure 9.2).

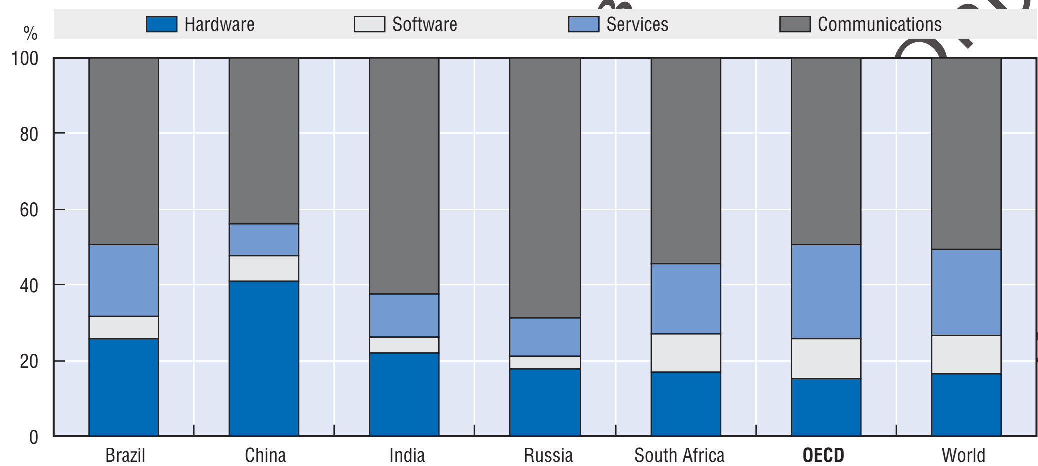
Emerging producers

The BRICS economies also increasingly produce and trade ICT equipment and services. The BRICS economies accounted for around 11% of worldwide imports of ICT equipment during 2003, including 12% of world imports of telecommunication equipment. Telecommunication equipment accounts for a larger share of ICT equipment imports into Russia, India, South Africa and Brazil than it does worldwide, with China's imports comparable to the world average. This probably reflects differences in the capacity of local production to meet demand, as well as differing levels of network infrastructure investment.

The emerging BRICS economies are also becoming major producers and exporters of ICT equipment, accounting for around 12% of world ICT equipment exports during 2003. Exports of most categories of ICT equipment from China have grown strongly, and exports of television receivers and telecommunication equipment from Brazil have also grown rapidly. China became the world's largest exporter of ICT equipment during 2004, surpassing Japan and the European Union during 2003 and overtaking the United States

Figure 9.2. **ICT market shares by segment, 2005**

Percentage



Source: WITSA, OECD analysis.

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during 2004. China's exports of ICT equipment increased by 32% a year between 1995 and 2004, compared with 7% a year worldwide (OECD, 2006). Brazil, Russia and South Africa exhibit a high share of telecommunication equipment in their ICT exports, while China's share is comparable to the world average and India's is smaller.

China and Brazil are also major importers of IT services, while India has played a pivotal role in the globalisation of IT and IT-enabled business services. China's exports of IT services are also substantial, and China, Russia and India are among the countries experiencing the most rapid growth in IT services exports. Brazil's reported exports of IT services have not grown over recent years and no data are reported for South Africa. Reflecting an increasing role in services offshoring, India, China and Russia are also among the countries with the strongest growth in exports of combined business services and computer and information services (Houghton 2006, p. 43).

Network dimensions

This growth of ICT production and use in the BRICS economies is enabled by, and is driving rapid development of, communications and Internet infrastructures. Networks are developing and being extended, and subscriber numbers have grown (Box 9.1).

Box 9.1. **Network dimension in the BRICS economies, 2005**

Millions

	Main telephone lines	Mobile subscribers	Internet users (estimated)	Internet hosts
Brazil	39.9	86.2	25.9	5.1
China	350.4	393.4	123.0	0.2
India	48.8	75.9	60.0	0.8
Russia	40.0	126.3	23.7	1.6
South Africa	4.7	33.0	5.1	0.5

Source: OECD, compiled from various country sources.

Investment and revenues

Annual telecommunication investment in the BRICS economies has been increasing. In China, investment increased by 14% a year from USD 8 billion in 1994 to USD 27 billion during 2003, and has been USD 25 billion a year and more since 2000. Investment increased 5 to 7% a year in Brazil, India and Russia, while South Africa's investment in telecommunications has been more uneven, ranging from around USD 700 million to USD 3 billion a year since the mid-1990s (Table 9.2). In China, investment in telecommunications has been as high as 2 to 2.5% of GDP in recent years. Something closer to 1% of GDP has been typical of Brazil, India and South Africa, while Russian investment in telecommunications has typically been no more than 0.2 to 0.4% of GDP. Where data are available, it appears than close to half of all telecommunications investment in recent years has gone into mobile communications.

Reflecting that investment, mobile communications revenues have grown rapidly in the BRICS, with annual growth ranging from 30 to 60% (Table 9.2). Both China and Brazil have experienced mobile revenue growth rates of 40% a year, with annual revenue now exceeding USD 35 billion in China. Mobile revenues in the BRICS are equivalent to 1.5 to 3% of GDP, with the exception of India where they are equivalent to a significantly lower 0.3%. Fixed telecommunication services revenue data are more limited, but revenues have grown strongly in China, Brazil and, to a lesser extent, India, while Russia and South Africa have experienced lower growth. By the end of 2005, fixed line revenues exceeded USD 21 billion in China.

Subscribers

There has also been rapid growth in subscriber numbers in many areas, with mobile subscriptions growing most rapidly (Table 9.3). Total telephone subscriber numbers have been increasing by 20 to 35% a year across the BRICS. China experienced a 34% annual increase in subscribers during the decade to 2005, to 744 million. Growth was slowest in Russia, at 19% a year. There were more than 50 subscribers per 100 inhabitants in the BRICS by the end of 2005, with the exception of India with just 11.4 per 100. By the end of 2005, there were between 22 and 28 main telephone lines in operation per 100 inhabitants in Brazil, China and Russia, compared with around 10 per 100 in South Africa and 4.5 per 100 in India (Table 9.4). This compares with an average 39 per 100 inhabitants in OECD countries.

All the BRICS economies have seen mobile subscriber numbers increase by more than 50% a year over the last decade, with growth rates in Russia and India of 100% a year or more. By the end of 2005 there were 393 million mobile subscribers in China, 126 million in Russia, 86 million in Brazil, 76 million in India and 33 million in South Africa. Penetration levels ranged from just seven mobile subscribers per 100 inhabitants in India to 88 per 100 in Russia and 72 per 100 in South Africa (Table 9.4). This compares with an average 80 mobile subscribers per 100 inhabitants in OECD countries.

China is now the world's largest telecommunication services market, with more than 350 million main telephone lines in operation at the end of 2005, compared with 104 million in the United States and 51 million in Japan. Similarly, China's 393 million mobile subscribers dwarf the United States' 213 million and Japan's 96 million. With penetration rates still relatively low outside the major cities in China there is scope for further substantial growth.

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The Internet

Growth in the availability of personal computers in the BRICS economies has also been strong, ranging from a high of 39% a year since the mid-1990s in China to a low of 16% a year in South Africa. At the end of 2004 there were an estimated 13.2 personal computers per 100 inhabitants in Russia, 10.8 per 100 in Brazil, 8.1 in South Africa, 4.1 in China and just 1.2 in India.

Estimated Internet users increased by 120 to 140% a year in India and China over the decade to 2004, 80% a year in Brazil, 67% a year in Russia and a slower 43% a year in South Africa (Table 9.5). By mid-2006, there were an estimated 123 million Internet users in China, 60 million in India, 26 million in Brazil, 24 million in Russia and just over 5 million in South Africa. Penetration is higher in Russia and Brazil, at 16 and 14 Internet users per 100 inhabitants, respectively, compared with 11 per 100 inhabitants in South Africa, 9.4 in China and 5.5 in India (Table 9.4).

The number of Internet subscribers in China increased by 88% a year to the end of 2004, to 72 million. Internet subscriptions have been increasing by 50% to 70% a year in India, Brazil and Russia, but by a slower 29% a year in South Africa. Broadband subscriptions have become more common, with an estimated 26 million broadband subscribers in China at the end of 2004, 2.3 million in Brazil, 675 000 in Russia, 235 000 in India and 60 000 in South Africa. By the end of 2005, there were 73 million Internet subscribers and 37.5 million broadband subscribers in China – approximately 3% of the population (OECD, 2006, p. 164). In absolute terms, China's Internet subscription numbers are approaching the United States' 93 million and the EU15's 95 million. In relative terms, of course, penetration levels lag considerably.

Internet infrastructure development reflects subscriber growth. Since the end of the 1990s, international Internet bandwidth has increased by 100 to 200% a year in all the BRICS except South Africa, which has experienced a much slower 38% a year increase. Nevertheless, international bandwidth is still limited. Brazil had an international bandwidth capacity of 1.25 Mbps per 1 000 Internet users at the end of 2004, Russia had 0.90 Mbps, China 0.79 Mbps, India 0.35 Mbps and South Africa 0.25 Mbps. However, current growth is rapid, with China's international bandwidth increasing from less than 75 000 Mbps at the end of 2004 to more than 214 000 Mbps by mid-2006.

Internet use is also increasing rapidly. There were more than 5 million Internet hosts in the .br domain (Brazil) at the beginning of 2006, up 76% a year from just 5 896 in 1994. There were 1.6 million hosts in .ru (Russia), 838 139 in .in (India), 496 642 in .za (South Africa) and 208 277 in .cn (China). Growth in the number of hosts has been fastest in India, where they increased by 91% a year between 1994 and 2006. The number of Internet hosts increased by 76% a year in Brazil, 64% a year in China, 58% a year in Russia and a slower 27% a year in South Africa. These rates compare with worldwide growth in hosts of around 38% a year.

By October 2006, there were more than 3.3 million domain names associated with China (*i.e.* registered under .cn or under gTLDs by purchasers in China), of which 1.3 million were registered under .cn and just over 2 million under gTLDs (including 1.7 million under .com). There were more than 1.1 million domain names associated with Brazil, of which 993 504 were under .br and 145 641 under gTLDs (including 112 698 under .com); 890 979 associated with Russia, of which 660 280 were under .ru and 230 699 under gTLDs; 629 587 associated with India, of which around 200 000 were under .in and 430 000 under gTLDs; and more than 325 000 associated with South Africa, of which some 48 000 were under gTLDs and the remainder under .za.

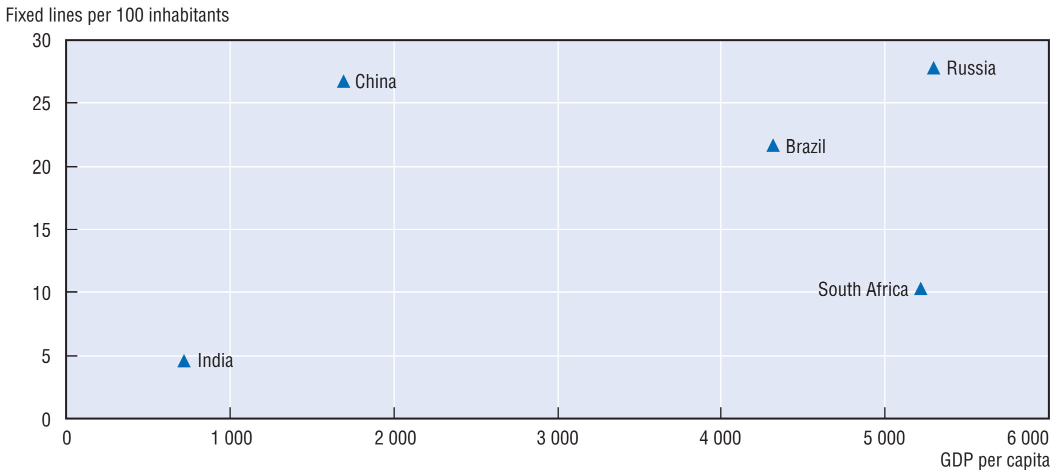
Comparative position

Subscriber numbers relative to per capita GDP give an indication of countries' relative performance on network and service development. From a communications perspective, countries with a relatively high number of subscribers for their level of GDP per capita are doing better than those with a lower number at comparable or higher levels. While there many reasons for variation in performance, policy and regulatory structures are likely to be significant determinants.

At the end of 2005, Russia, China and Brazil has 22 to 28 mainlines in operation per 100 inhabitants, while South Africa had 10 per 100 and India 4.5. GDP per capita ranged from a low of USD 719 in India to USD 5 296 in Russia. Relative to GDP per capita, China's fixed line communications infrastructure was more developed than that in the other BRICS economies, while South Africa's lagged significantly (Figure 9.3).

Figure 9.3. **Fixed telephone line penetration and GDP per capita, 2005**

Per 100 inhabitants and GDP per capita



Source: ITU and country sources, OECD analysis.

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A similar picture emerges from a comparison of mobile subscriptions and GDP per capita levels, although there is much less disparity of mobile performance than fixed line performance – probably owing to greater competition in mobile communications. At the end of 2005, Russia had 88 mobile subscribers per 100 inhabitants, South Africa had 72, Brazil 47, China 30 and India 7 (Figure 9.4).

At the end of 2005, Russia had an estimated 16 Internet users per 100 inhabitants, Brazil had 14, South Africa had 11, China 9 and India 5. Relative to GDP per capita, however, South Africa lagged substantially (Figure 9.5).

These comparisons suggest that South Africa's communications development is lagging the other BRICS economies relative to GDP per capita. China performs quite well in all areas, with communications infrastructure developments exceeding those of other BRICS relative to GDP per capita. Russia, Brazil and, to a lesser extent, India all exhibit some strengths and some weaknesses relative to average GDP per capita levels.

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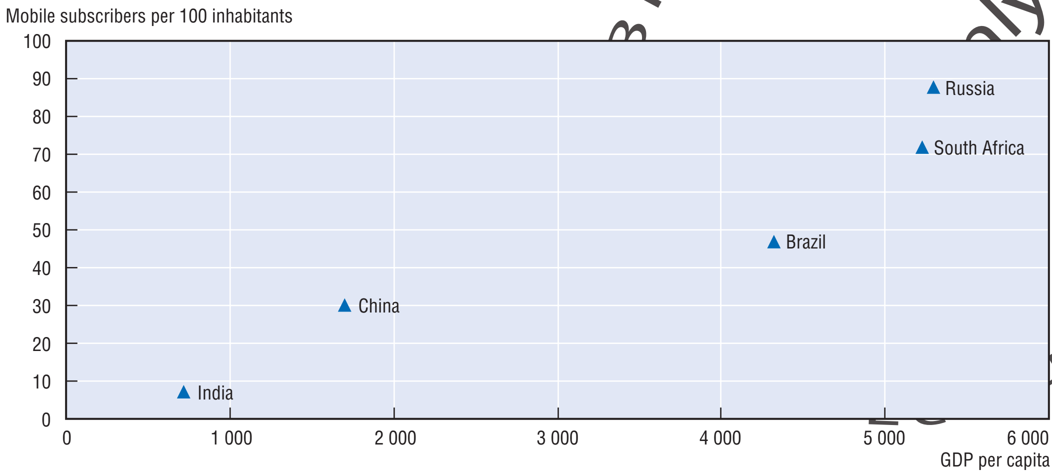
Figure 9.4. **Mobile penetration and GDP per capita, 2005**



Source: ITU and country sources, OECD analysis.

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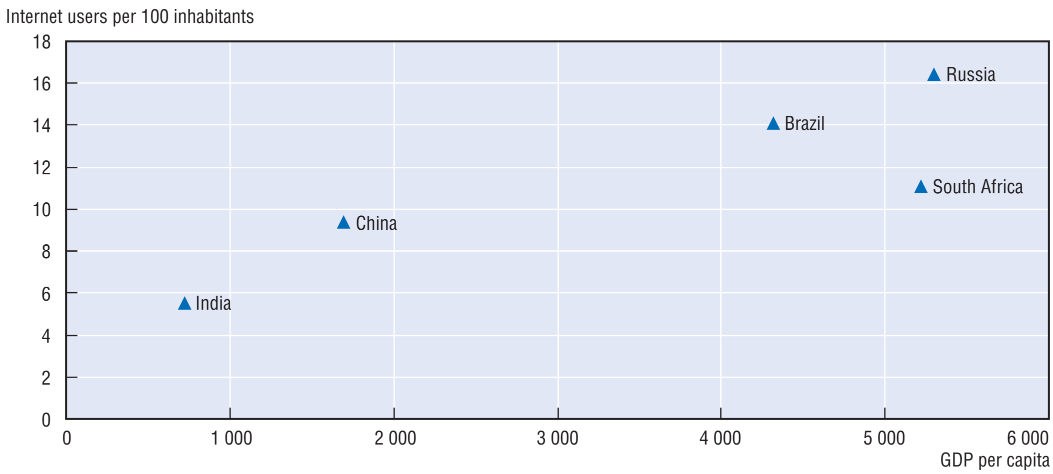
Figure 9.5. **Internet penetration and GDP per capita, 2005**

Per 100 inhabitants and GDP per capita



Source: ITU and country sources, OECD analysis.

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Policy contexts, structures and developments

This section explores regulatory and market structures in the BRICS, highlighting, where relevant, links between regulation, market developments and these comparative performances, bearing in mind that market developments lag legislation as it may take time for regulatory changes to influence investment and market behaviour. Each of the BRICS economies is examined in turn.

Brazil

Brazil has a population of around 180 million and with GDP of USD 794 billion in 2005 ranks among the top ten economies in the world. GDP growth is around 2% a year. With gross national income of USD 1 433 billion in 2004 (in purchasing power parity [PPP] terms), per capita income exceeded USD 8 000 (World Bank, 2006). Brazil had a long history of state intervention in the economy. It was only with the passage of a new competition law in 1994 that Brazil moved from general price control to competition policy (SEAE, 2002).

Telecommunications regulation in Brazil

In the mid-1990s, the government identified ICT as central to the country's long-term economic and social development. Today, Brazil's telecommunication legislation and regulation are widely regarded as highly progressive. Brazil has established a separate regulator, privatised the incumbent fixed line operator and introduced competition in fixed, mobile and Internet markets. Quality of service has been improving and prices falling.

Universal service and competition constitute the two fundamental principles upon which the existing Brazilian telecommunications model is founded. Competition was first introduced in mobile telephony and then extended to fixed telephony, including the domestic and international long distance segments (Guerreiro, 2003). Liberalisation began with the passage of the 1996 *Minimum Law* which liberalised mobile services. This was followed by the adoption of the *General Telecommunications Law* of 1997, which called for the creation of an independent regulator, the *Agência Nacional de Telecomunicações* (Anatel). It also established guidelines for the privatisation of the monopoly incumbent telecommunications provider, Telebrás. This effectively ended the state's role in the provision of telecommunication services, changing its role from supplier to policy maker and regulator of services. Telebrás was subsequently broken up into 12 separate holding companies, and in 1998 the government sold off its interest in Telebrás (Shaw, 2002).

Until 2002, Brazil was divided into three telecommunication operating regions. So-called mirror companies were licensed to compete with fixed line Telebrás companies in the defined regions, with Embratel licensed to provide long distance and international calls alongside Intelig. The mirror companies pursued a new technology strategy combining fixed and wireless via WLL. WLL is cheaper to install, since it does not require a cable network, but has the disadvantage of not being as mobile as mobile phones. Geographic restrictions have now been relaxed, with carriers allowed to compete outside their regions.

A regulatory regime focused on providing wide access led to the creation of regional development targets, such as fixed line penetration levels, price caps and subsidies, in order to simultaneously encourage network development and maintain affordability. Subsidies were managed through the Universal Service Fund (USF) (Marinzoli, 2001). Access targets included such things as the provision of at least one public telephone in all localities with more than 100 inhabitants, including in tribal lands. These targets, which were enshrined in the General Plan of Universal Service Goals, together with those of the General Plan of Quality Goals, were important instruments in network development as the fulfilment of targets by all licensed companies was made mandatory.

The privatisation of the Telebrás System in 1998 injected more than USD 20 billion, with the winning bidders paying some 60% more than the minimum prices set by the government (Maisonnave, 2000). Following liberalisation and privatisation, new carriers began to invest in fibre optic networks, submarine cables and other communications infrastructure, and they adopted ambitious programmes to expand and improve their networks (Shaw, 2002). As a result, a further USD 40 billion poured into Brazil's telecommunications sector during 1998 as it geared up to provide a variety of services and products in the newly competitive market (Maisonnave, 2000). More recent developments

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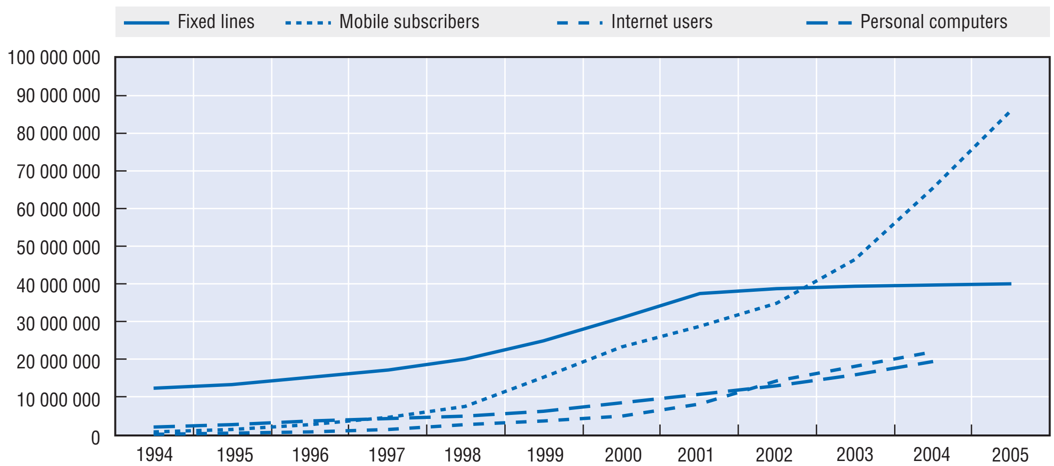
in mobile regulation have included new interconnect regulation and rates, with a fully allocated cost model for interconnection charges, and number portability, due to be implemented in 2008.

The Brazilian telecommunications market

Liberalisation, the introduction of competition and privatisation have resulted in rapid market development in Brazil since 1998, with mobile communications proving particularly popular (Figure 9.6). There are currently 60 fixed line operators, 39 mobile licence holders and seven fixed wireless operators in the Brazilian telecommunications market. The mobile market is served by five major operators: VIVO Group (50% Telefonica and 50% Portugal Telecom) with almost 30 million subscribers, TIM Group (Telecom Italia) with 20 million, Claro Group (American Mobile) with 18.7 million, TNL Group with 10.3 million and BrT Group with 2.2 million. Telemar accounts for around 38% of local fixed access lines and Telesp for around 35% of DSL subscribers.

Figure 9.6. **Network development in Brazil, 1994-2005**

Numbers



Source: ITU and various country sources. OECD analysis.

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The genesis of the Brazilian Internet can be traced back to 1988 when Brazilian researchers first obtained international network access. It remained an academic network until 1995, when commercial Internet activity began. Embratel was the first operator of a commercial Internet backbone network in Brazil. Telefónica built an IP network covering the state of São Paulo and interconnecting all the states included in its concession area, to its own Internet backbone. Although Embratel previously dominated the Brazilian Internet backbone, a number of new providers, network access points and the meshing of infrastructure have added to the backbone during the last few years (Shaw, 2002). The first ".br" country code domain (ccTLD) was registered in 1989 (Shaw, 2002), and with some 993 000 domain names registered, Brazil is now one of the largest ccTLD registries in the world. The .br ccTLD boasted more than 5 million hosts in January 2006, ranking eighth among ccTLDs worldwide. Brazil's ccTLD registry also hosts the Latin American and Caribbean Regional Registry (LACNIC), which administers IP address space and Autonomous Systems Numbers (ASNs) for the region.

China

China has a population of around 1.3 billion, making it the world's most populous country. With GDP of just over USD 2 trillion in 2005 China ranks among the largest economies in the world and enjoys GDP growth of around 9% a year. With gross national income of USD 7 170 billion in 2004 (in purchasing power parity terms), per capita income exceeded USD 5 500 (World Bank, 2006). China has not had an independent regulator, has only partially privatised fixed line operations and has limited competition in all but mobile markets. State intervention and ownership remains high, but communications network development and adoption have been strong.

Telecommunications regulation in China

When China began its reform process in 1978, telecommunications was identified as one of the major obstacles to modernisation. From the early 1980s telecommunications became a focus of aggressive development policies. Until 1994 the Ministry of Posts and Telecommunications (MPT) was the sole provider of telecommunication services, through its operational arm China Telecom. Since then, there have been three major changes:

- The 1994 decision to establish China Unicom (a joint venture of the Ministry of Electronic Industry, Ministry of Electrical Power, Ministry of Railways and 13 other state-owned companies) as a competitor to China Telecom, albeit a very much smaller competitor, and, with regulation still in the hands of MPT, at a disadvantage to MPT's operational arm (China Telecom) in such areas as interconnection.
- The 1999 split of China Telecom's fixed line, mobile and satellite operations into China Mobile, China Satellite, Gao Xin Paging and the remainder of China Telecom, which continued to be the monopoly provider of fixed line services.
- The 2002 regional break-up of China Telecom into northern and southern operators and the emergence of China Netcom (CNC) from the merger of China Netcom and Jitong Communications, with CNC taking 30% of the network resources and the new China Telecom 70%.

A key part of these changes has been the introduction of competition and separation of regulation from the market. There are now six network infrastructure providers, four fixed line operators, two mobile operators and two fixed wireless access providers (Box 9.2). However, government ownership remains and market competition is still somewhat limited, although China's entry into the World Trade Organization (WTO) has provided impetus for further competition and private and foreign investment.

Box 9.2. **China's telecommunication market structure**

	Fixed	Mobile	Satellite Transmission	IP Telephony
China Telecom	*	*		*
China Unicom	*	*		*
China Mobile		*		*
China Netcom	*	*		*
China Tietong (China Railcom)	*			*
China Satcom			*	

Source: ITU (2006a); OECD.

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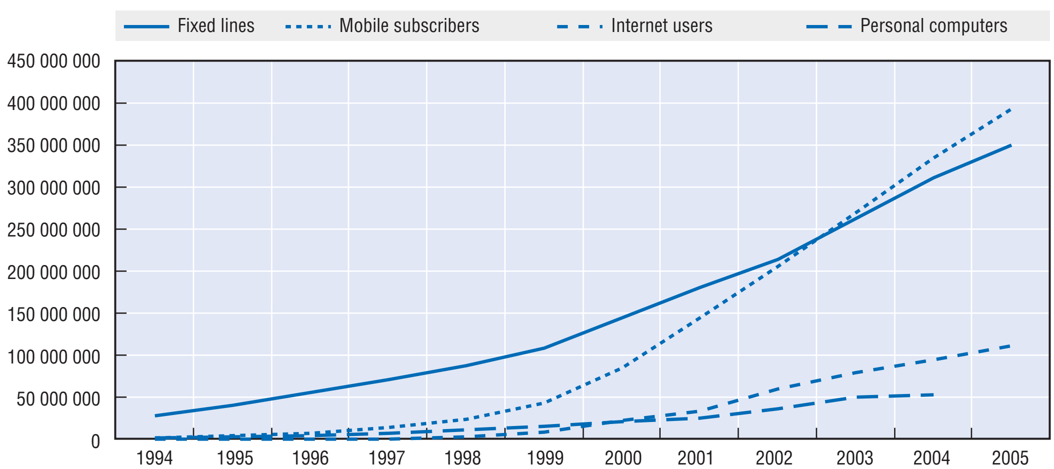
The Ministry of Information Industry (MII) emerged in 1998, with responsibility for developing regulations, allocating resources, granting licences, supervising competition, promoting R&D and service quality, and setting tariffs. Regulatory functions operated through Provincial Telecommunications Administrations (PTAs). As the main government body overseeing state-owned enterprises (SOEs), the State Economic and Trade Commission (SETC) was also influential. Since its accession to the WTO China has accelerated the establishment of a legal framework, adopting a *Telecommunications Law* and setting up an independent regulatory and arbitration body. In its WTO accession negotiations, China committed to "separate relevant regulatory authorities from, and not make them accountable to, any service suppliers they regulate, except for courier and railway transportation services" (USITO, 2002). Since 2005 there has been a relaxation of restrictions on foreign ownership, with foreign investors allowed to establish joint ventures investing up to 50% in Internet service providers (ISPs), 49% in mobile carriers in the major cities, and up to 25% in fixed line carriers in the three largest cities (Uria-Recio, 2006). However, there remain strong links between operators and government.

The Chinese telecommunications market

The 1998 changes were pivotal, with the introduction of a regulatory regime that enabled the rapid expansion of mobile services. China Mobile and China Unicom now share the mobile market, the former having 264 million mobile subscribers at the end of 2005 and the latter 129 million (a third mobile operator, China Great Wall Network, was established in 1995, but was acquired by China Unicom in January 2001). The two fixed line operators, China Telecom and China Netcom, both provide PHS (personal handyphone system) service, which provides less mobility and no roaming compared to mobile service. China had approximately 93 million PHS subscribers in October 2006. Competition between the two has underpinned rapid expansion of services (Figure 9.7). China Unicom has benefited from the government's commitment to strong competition, including a degree of preferential treatment and favourable regulation (OECD, 2003, p. 35). Customers have also benefited from the competition between China Telecom and China Unicom through reduced handset price

Figure 9.7. **Network development in China, 1994-2005**

Numbers



Source: ITU and various country sources, OECD analysis.

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and installation fees, shortened waiting lists and improved quality of service. The introduction of competition has also advanced the technological level of the infrastructure (ITU, 2006b). China Telecom and China Netcom share the fixed line market, while China Satcom and China Railcom are minor players. China Unicom is the only full service provider. China Telecom operates the largest fixed phone network in the world, while China Mobile operates the world's largest mobile network (ITU, 2006a). Internet and IP telephony licences were granted to China Telecom, China Unicom, Jitong, China Netcom and China Mobile in late 1999. Lower prices than fixed line services have encouraged rapid take-up, and the focus of much investment has been on building an IP network.

The Chinese Academy of Science (CAS) established the Internet in China in 1988, and registered the "cn" domain name in 1990. Early development depended upon academic and scientific use, with commercialisation of the Internet only beginning in 1995 (ITU, 2001). The government maintains a clear distinction between network service providers (NSPs), which operate the interconnecting network and have direct access to the Internet, and ISPs, which operate the access network. The NSPs and many of the larger ISPs are state-owned companies or have substantial state ownership shares. Dial-up Internet access has been the most common, but broadband access has enjoyed rapid growth in recent years. In mid-2006, around 30% of users used dial-up access, while the remainder were using broadband and leased lines.

China Telecom and China Netcom dominate the broadband Internet market, with a combined share of more than 85%: the remainder is shared among China Tietong, China Unicom and a number of smaller cable operators (Tan, 2006). DSL subscriptions account for around 70% of the broadband market and Ethernet-based LAN access for around 25%. In mid-2006, China Telecom had 23.5 million DSL subscribers, more than the entire United States and, of course, more than any other provider. China Netcom's 13.5 million DSL subscribers made it the second-largest DSL provider in the world (Burstein, 2006).

India

With a population of more than 1 billion and a GDP approaching USD 790 billion in 2005, India is the second most populous country and the world's fourth largest economy (in purchasing power parity terms). GDP is growing by more than 6% a year. Gross national income was USD 3 347 billion in 2004 (PPP), and per capita income USD 3 100 (World Bank, 2006).

Telecommunications regulation in India

Since 1990, successive Indian governments have pursued economic reforms aimed at reduced government control and liberalisation of the economy – including telecommunications. India has created a separate regulator and partially privatised fixed line operators and there is now competition in the mobile and Internet markets.

In 1994, the government announced its National Telecom Policy (NTP), which included such objectives as the availability of telephony on demand, the provision of world-class services at reasonable prices, ensuring India's emergence as major manufacturing and export base for communications equipment and universal availability of basic telecommunication services to all villages. It also set a series of specific targets to be achieved by 1997. The government recognised that the required resources for achieving these targets would not be available from government sources alone, and that private investment would be required. It invited private-sector participation in a phased manner,

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initially in value-added services, such as paging and mobile, and later in fixed line services. However, private-sector entry was slower than expected and the government recognised the need to take another look at the policy framework. This resulted in the New Telecommunications Policy of 1999 (Sinha, 2002).

The Telecommunications Regulatory Authority of India (TRAI) was established in January 1997 as an autonomous body with quasi-judicial powers to regulate telecommunication services. The principal functions of TRAI included setting tariffs, ensuring compliance with the terms and conditions of licences, fixing the terms and conditions of interconnection arrangements, and establishing and ensuring standards of quality of service. The *TRAI Act* was amended in 2000, with the TRAI's powers to adjudicate disputes transferred to the Telecom Disputes Settlement and Appellate Tribunal (TDSAT). The TDSAT was given the power to adjudicate any dispute between a licensor and a licensee, between two or more service providers, and between a service provider and a group of consumers (Sinha, 2002).

A *Communications Convergence Bill* was passed in 2001 "to promote, facilitate and develop, in an orderly manner, the carriage and content of communications (including broadcasting, telecommunications and multimedia), for the establishment of an autonomous Commission to regulate carriage of all forms of communications (*i.e.* the Communications Commission), and for establishment of an Appellate Tribunal" (CCB, 2001). A complementary *Competition Bill* was also passed in 2001, which updated competition regulation. In 2002, a Universal Service Obligation (USO) fund was established to fund universal service targets set in 1999, with a levy of 5% on revenue providing the support. To date, only fixed line services have been supported. TRAI has also recommended support for financial incentives to service providers in the form of coverage of partial cost of network expansion in under-served areas. In October 2006, the government decided to extend financial support from the universal service fund to mobile operators to support the build out of infrastructure in rural and remote areas.

During 2004, a Broadband Policy (and amendments) was promulgated. Recognising the potential for ubiquitous broadband access to contribute to economic development, its aim is to raise India's Internet and e-commerce capabilities. However, VoIP calls within India are restricted to IP equipment and cannot be made from a PC or VoIP handset to a telephone, a restriction that does not apply outside India. The licensing, in 2001 of wireless local loop technologies, which had limited mobility, led to controversy with mobile operators who claimed that they were subject to unfair competition. This led eventually to a Unified Licensing Regime in order to introduce technological-neutrality in licensing. This Unified Licensing Regime was extended in 2005 when TRAI issued a recommendation allowing a licensee to be able to provide any or all telecommunication services by acquiring a single licence. The Recommendation on Unified Licensing would be initially be optional and become mandatory after five years of implementation. During 2005 and early 2006 quality of services standards were reviewed and updated for basic and mobile services, with a proposal to lay down quality of service standards for broadband currently being considered. Regulated access charges were also reviewed and revised, making them independent of distance. For rural fixed line services, TRAI continues to specify a standard tariff package that operators must offer customers, although they are free to offer alternative packages in national roaming and leased line services, subject to price caps.

The Indian telecommunications market

Historically, India maintained one state-owned international long distance monopoly operator (VSNL) and another state-owned local and national long distance monopoly operator (BSNL). Another state-owned local operator provided services in Mumbai and Delhi (MTNL). As the country progressively liberalised the market it licensed new entrants to compete in these markets, issuing separate licences for each of the nation's telecommunication licensing areas. By the late 1990s two or three service providers were established in each of the 21 fixed service licensing areas, with licences permitting the provision of WLL(M) services. In the mobile market, four operators were established in most of the 25 licensing areas, while in the national and international long distance segments four active service providers were established. In 2001, a fifth mobile operator was established and the long distance market was opened to multiple licensees, with the international market opened to an unrestricted number of operators the following year. During 2002 the government sold its majority stake of VSNL to the private operator Tata (Bruce and Macmillan, 2003).

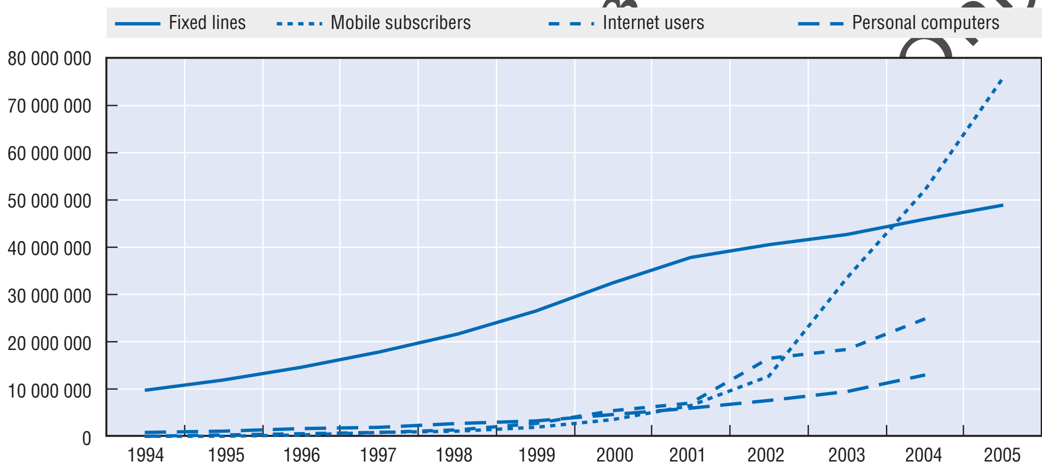
By the end of 2004-05, India had the tenth largest telecommunication network in the world (measured in terms of number of phones). By April 2005, the network comprised more 99 million telephone connections and over 2 million public call offices. There were more than 42 million mobile subscribers, with the mobile customer base growing at the rate of over 1 million a month (Table 9.3). In basic telecommunication services, there were 31 private licences and two public sector licences at the end of March 2004. After the introduction of the unified access service licence regime in November 2003, 27 licences were converted to unified access service licences. Eighteen more licences were issued for unified access service during 2005. In mobile, there were a total 78 licences, of which 55 in the private sector and 23 in the public sector. Of the total roll-out of telephone connections (fixed and mobile), the private sector accounted for about 47% and public sector 53% in mid 2005 (NPI, 2006).

There are now seven operators providing basic services, four national fixed line operators and four international, and more than 150 mobile operators, including BSNL, which is wholly government-owned, and MTNL, which is 56% government-owned. At the end of 2005, BSNL had 36.7 million fixed lined subscribers (75% of the total market), with the remainder shared among the six other carriers. No mobile carrier had more than 22% of the total subscriber base; Bharti was the largest carrier with just over 16 million subscribers out of the total of 76 million. Reliance and BSNL both had close to 15 million subscribers at that time, Hutchison 11.4 million and Idea 6.5 million. Mobile subscriber growth is running at around 15 million additions per quarter (TRAI, 2006).

In August 1995 the then totally state-owned VSNL launched Internet services in India, and for the first four years VSNL was the sole provider. In late 1998, the government ended VSNL's monopoly and allowed provision of Internet services by private operators. The terms and conditions of the ISP licence were unusually liberal, with no licence fee and an unlimited number of players. ISPs were also allowed to set their own tariffs. Any Indian registered company is eligible for an ISP licence and no prior experience is required. Foreign equity of up to 100% is permitted for ISPs without gateways, and up to 74% is permitted for ISPs with gateways. During the first three years of VSNL's monopoly, the Internet subscriber base grew very slowly. By the end of March 1998 it had barely reached 140 000 subscribers. With the entry of private players and the drop in access charges there was a surge in subscriber numbers. Between March 1999 and March 2001, subscribers increased by more than 200% a year, from 280 000 to 3 million (Bruce and Macmillan, 2003).

Figure 9.8. **Network development in India, 1994-2005**

Numbers



Source: ITU and various country sources, OECD analysis.

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In March 2006, there were 153 ISPs with a total of 6.9 million subscribers, of which just over 1.3 million (19%) were broadband subscribers. BSNL had 2.9 million subscribers (42% of the total Internet subscriber market). Thirty-two ISPs were offering Internet telephony at the end of March 2006, with 996 million minutes of Internet telephony traffic recorded in the quarter, compared with just 58 million in the previous quarter. Broadband subscriptions increased 49% in the first quarter of 2006, and by the equivalent of 636% during the year to March 2006 (TRAI, 2006).

Russia

Russia's evolution from its Soviet past has been swift, with much progress made. Nevertheless, there remain many concerns about Russia's economic, social and political development (EBRD, 2006). Russia's population is around 145 million, and its GDP is USD 582 billion and growing by more than 6% a year. However, the population is declining, and according to the World Bank, could decline by a further 30% by 2050. In 2004, gross national income reached USD 1 374 billion (PPP) and per capita income USD 9 620 (World Bank, 2006).

Telecommunications regulation in Russia

The European Bank for Reconstruction and Development (EBRD) recently reported that in contrast to the country's solid macroeconomic performance, Russia's progress in structural and institutional reforms has remained modest. Russia is the only large economy to remain outside the WTO framework. An independent regulator has yet to be established, and there is limited competition in Russia's fixed line market.

Prior to 2003, laws governing telecommunications were seen as outdated. During the Soviet period the state controlled all means of communication, but during the 1980s the network failed to keep pace with information demands. By the mid-1990s Russia's telecommunication system had been privatised through a voucher system, with employees receiving around 25% of shares, the government retaining some shares and the remainder sold at public auction. Under the 1995 *Law on Communications*, the Ministry of Communications was the principal regulator and policy agency. The sector has since undergone major changes, with the key drivers being liberalisation and privatisation (EBRD, 2006).

Telecommunications in Russia are now regulated by the Ministry of Communications and Informatisation (MCI) and its Federal Communications Agency, under the *Federal Communications Law* of 2003. The MCI was created in 2000 to administer government responsibilities in the sector. Such things as local tariff setting are also subject to regulation by the Federal Anti-monopoly Service and local administrations. The liberalisation agenda is being driven, in part, by Russia's desire to accede to the WTO, and a framework to support this liberalisation is now being implemented by the MCI (EBRD, 2006).

Rostelecom was the fixed-line domestic long distance and international telecommunications service monopoly in Russia until 2006, and continues to hold a dominant position. Nevertheless, several regulations enacted in 2005 and 2006 are expected to lead to restructuring and liberalisation, as they allow telecommunication operators to apply for domestic and international long distance service licences and radically restructured Rostelcom's relationships with independent regional carriers (IRCs), local operators and subscribers (Rostelecom, 2006).

While telecommunication reforms have been significant, implementation of the practical machinery that underpins these reforms (*e.g.* secondary legislation, regulatory mechanisms and institutional reform) has been slow, with many of the enabling secondary legislation and mechanisms only now being put into place. Critical enabling reforms such as rebalanced tariffs, a functioning non-discriminatory interconnection framework and transparent licensing procedures have yet to be fully implemented. In addition to the slow pace of implementation, failure to bring the institutional structure into line with international best practice continues to have a negative impact on investors' perceptions. Most notable is the failure to establish an independent regulatory authority, with the MCI acting as policymaker, regulator and holder of state telecommunication assets (EBRD, 2006).

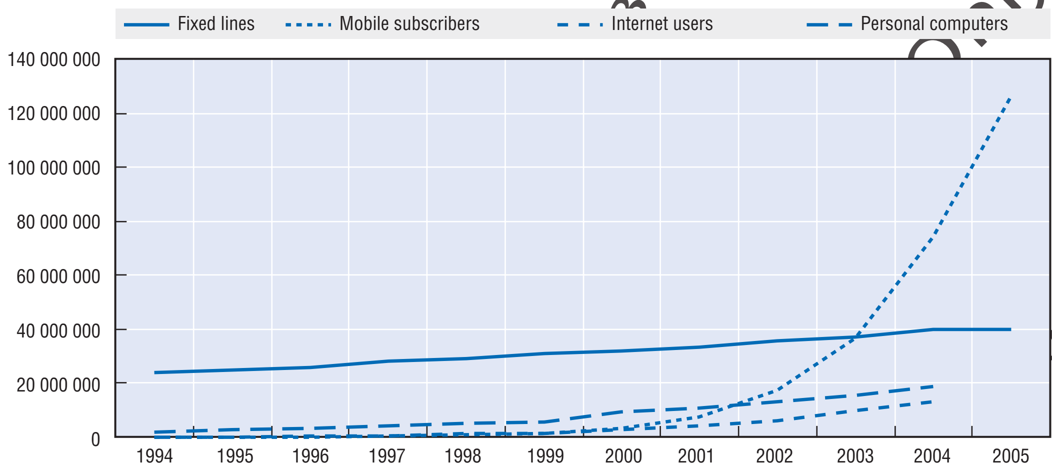
The Russian telecommunications market

Elements of the Russian telecommunications market have been liberalised for a number of years and, after some delay, full formal liberalisation came into effect at the beginning of 2006 with the lifting of the monopoly of the long distance fixed line state-controlled incumbent Rostelecom. While Rostelecom still dominates its market, real competition is expected from new competitors. Local fixed line operations are dominated by the regional subsidiaries of Svyazinvest, the state-controlled local incumbent. While the fixed penetration level for the entire country is close to 28%, as in the other BRICS economies there are major disparities in coverage between urban and rural areas. The mobile sector has recorded healthy growth in recent years, with three leading operators competing for market share – MTS, VimpelCom and MegaFon (ERDB 2006). Hence, the mobile sector has gone ahead, while, with limited or no competition, other market segments stagnated (Figure 9.9).

Following major changes there are now more than 1 000 companies licensed to provide communication services in Russia, with an estimated 40 million fixed lines and 126 million mobile subscribers at the end of 2005. The mobile market continues to boom. In October 2006, one analyst reported that there were 145 million mobile subscribers at the

Figure 9.9. **Network development in Russia, 1994-2005**

Numbers



Source: ITU and various country sources, OECD analysis.

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end of August 2006, with MTS reporting 49.6 million subscribers (34% of total subscribers), VimplelCom 47.5 million (33%) and MegaFon 27.5 million (19%) (Telecompaper, 2006).

South Africa

South Africa's population is around 46 million and its GDP more than USD 240 billion. GDP growth is a somewhat slower, but a still respectable 3.2% a year. In 2004, Gross national income reached USD 500 billion (PPP) and per capita income USD 10 960 (World Bank, 2006).

Telecommunications regulation in South Africa

Until 1990, the Department of Posts and Telecommunications regulated and operated all communications networks. In 1991, the government formed two state-owned companies, the telecommunication corporation Telkom, and the South African Post Office. Telkom was both sole licence holder and regulator. The *Telecommunications Act* of 1996 established the South African Telecommunications Regulatory Authority (SATRA), which was charged with regulating telecommunications in the public interest. This established a three-tier separation of policy, regulation and implementation functions. The Ministry of Communications retained various policy-making functions and certain licensing functions, including a veto on all regulations (Gillwald, 2001). The 1996 Act also established the Universal Service Agency (USA) to promote the goals of universal services and universal access. A major weakness of the regulatory structure created was the retention of a link between the Minister and the regulator, with the Minister required to approve regulations. This has resulted in long delays and uncertainty in such key areas as interconnection (Gillwald and Kane, 2003).

Limited liberalisation and competition began in 1993 when two mobile licences were issued, to Mobile Telephone Networks (MTN) and Vodacom, to provide national mobile services. A third mobile licence was granted to Cell C in 2001. Under the 1996 Act, Telkom had a legislated monopoly over fixed lines, with its PSTN licence giving Telkom an exclusive right to provide national, international and local telephony services, including public pay phones, for a period of five years (to May 2002). Partial privatisation came in 1997 when Thintana Communications, a consortium comprised of SBC Communications and Telekom Malaysia, acquired 30% of Telkom (Gillwald, 2001).

In 2000, the Independent Communications Authority of South Africa (ICASA) was established as the sole regulator of the country's broadcasting and telecommunications sectors. ICASA's primary role was as set out in the legislation establishing the former SATRA (and the broadcasting regulator IBA), and included issuing licences for broadcasting and managing the frequency spectrum for optimal use, as well as a range of economic and social development objectives (Gillwald and Kane, 2003).

A second phase of managed liberalisation was initiated with the *Telecommunications Amendment Act* of 2001, with the introduction of a Second Network Operator consisting of the communication networks of Transtel and Eskom (South Africa's transport and power network agencies), a 19% "empowerment" partner (Nexus), and a 51% strategic equity partner. Although this competitor to Telkom could theoretically have been operating from May 2002, when Telkom's monopoly expired, licensing delays lasted until late 2003. Another competing international gateway was also introduced through the carrier-of-carrier and multimedia licences granted to Sentech, the state broadcasting signal distributor. However, with conditions on its licence, including prohibitions on connecting directly with subscribers and on offering voice services, Sentech's ability to respond to the demands of users was limited (Gillwald and Kane, 2003).

The 1996 Act also introduced a more competitive environment for under-serviced areas, through the creation of under-serviced area licences (USALs). The Minister of Communications declared 27 areas as under-serviced in December 2001. USAL licences provide for telecommunication services, including voice over Internet protocol (VoIP), fixed mobile services, public pay telephones and long distance calls to be transported through the trunk networks of any operator licensed to carry international traffic (ICASA, 2006). However, by mid-2006, just seven USAL licences had been allocated.

In September 2004, the Minister for Communications announced policy changes aimed at further liberalising the market. These included the carrying of voice by value-added network service providers, self-provision of links by mobile operators and the resale of spare capacity by private network operators (ICASA, 2006). The second national operator, Neotel, is expected to commence activities in the wholesale market by the end of 2006. India's Tata-backed VSNL is the majority stakeholder in Neotel. Meanwhile, the government is establishing a broadband infrastructure company, InfraCo, based on the fibre optic network developed by Eskom and Transnet. VSNL also has a stake in Infraco (Tata, 2006).

The *Electronic Communications Act* (a "convergence bill") came into effect in July 2006. All existing licences are to remain in force until converted to new licences in line with the new licensing regime. The regulations made under the *Telecommunications Act* are due to remain in force until the necessary new regulations are in place. The *Electronic Communications Act* aims to stimulate competition and will have an impact on price controls, terms and conditions of access, interconnection and facilities leasing. The Act also aims to change the market structure from a vertically integrated, infrastructure-based market structure, to a horizontal service-based technology-neutral market structure with a number of separate licences being issued for different areas. It also clarifies the roles of ICASA and the Minister of Communications in policy development, licensing and regulation (Telkom, 2006).

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The South African telecommunications market

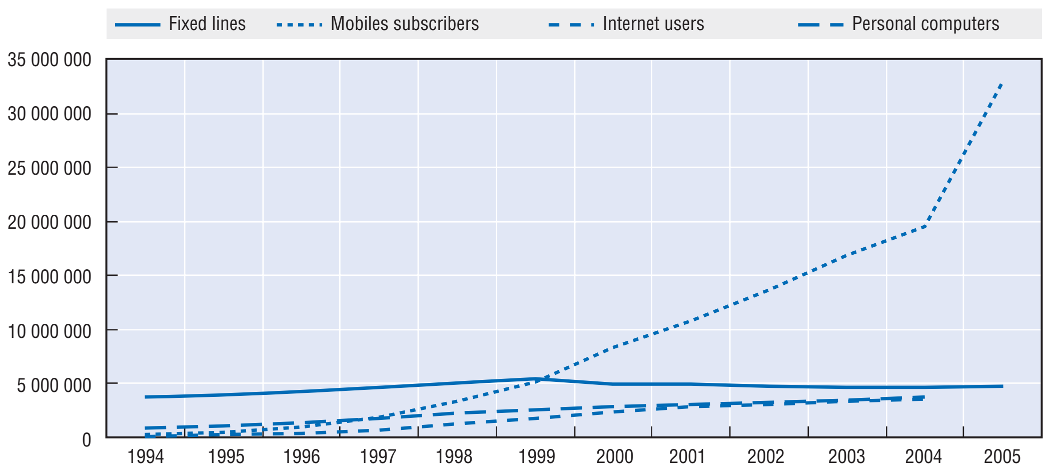
With limited competition in key areas, South Africa's communications market has not developed as quickly as might otherwise have been the case. Take-up of mobile communications, especially pre-paid, has been strong. Elsewhere, growth rates have been slower – including in Internet and broadband subscriptions. A lack of competition in fixed line and value-added services has been particularly telling.

During the period of extended monopoly Telkom made strong gains, with revenues increasing by 500% from 1992 to 2001. However, by 2002 the mobile competitors had gained more than 30% of total market share and had three times as many subscribers as the fixed network. Reflecting the lack of competition, South Africa slipped from thirteenth place in the world in terms of Internet users in 1996 to twenty-sixth place in 2001 (Gillwald and Kane, 2003). By 2004, Telkom's fixed network accounted for 44% of the total telephone subscriber market, with the remaining 56% in the hands of the mobile operators – Vodacom 31%, MTN 21% and Cell C 4% (Gillwald and Esselaar, 2004).

In mid-2006, Telkom still controlled the fixed line market and fixed line penetration was around 10% at the end of March 2006. Mobile penetration increased from an estimated 2.4% in March 1997 to an estimated 72% in March 2006, with the industry growing by around 43% in the last year (Figure 9.10). South Africa had over 33 million mobile subscribers in March 2006; Vodacom was the largest mobile communications network operator, with an estimated market share of approximately 58%. Its network covers approximately 97.5% of South Africa's population and approximately 69.4% of the total land surface area (Telkom, 2006).

Figure 9.10. **Network development in South Africa, 1994-2005**

Numbers



Source: ITU and various country sources, OECD analysis.

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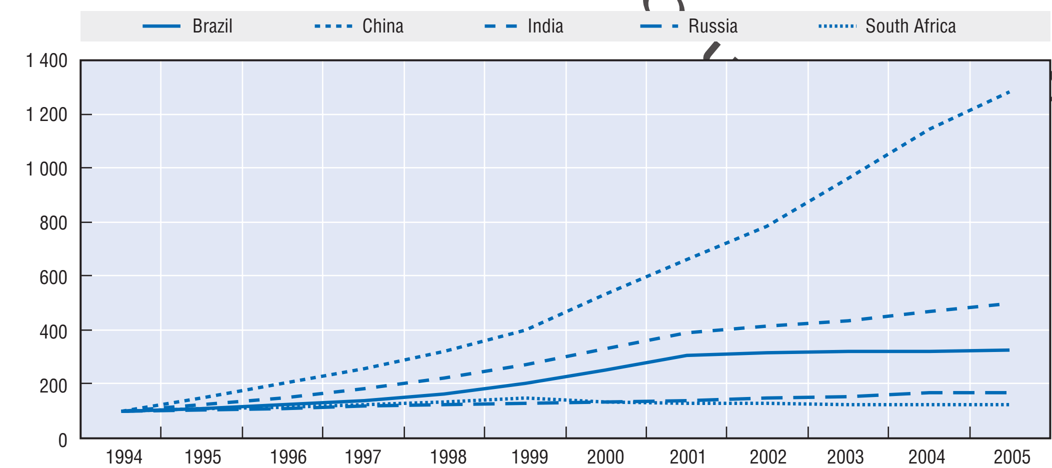
Internet development has been slow in South Africa. Telkom commenced commercial ADSL trials in 2002, and phased roll-outs in 2003. By the end of December 2005, Telkom announced 120 000 ADSL subscribers. Although there are many ISPs, the industry is dominated by the big five first-tier ISPs (Telkom, 2006). The liberalisation of VoIP, the accelerating roll-out of ADSL broadband services and other IP-based infrastructure in South Africa are enabling some ISPs to turn into converged service providers. Nevertheless, the Annual Report of the Department of Communications noted frankly that "the South African Internet is falling behind that of peer countries on most measures. In particular, dial-up penetration and usage is growing slowly, if at all. Broadband has made little progress, especially in the residential market. Again, high cost is clearly a major factor in this stagnation." (DoC, 2005, p. 38). The recently passed *Convergence Bill* is a major part of the government's response.

Figure 9.11. **Fixed network development, 1994-2005**

Subscribers, indexed 1994 = 100



Source: ITU and various country sources, OECD analysis.

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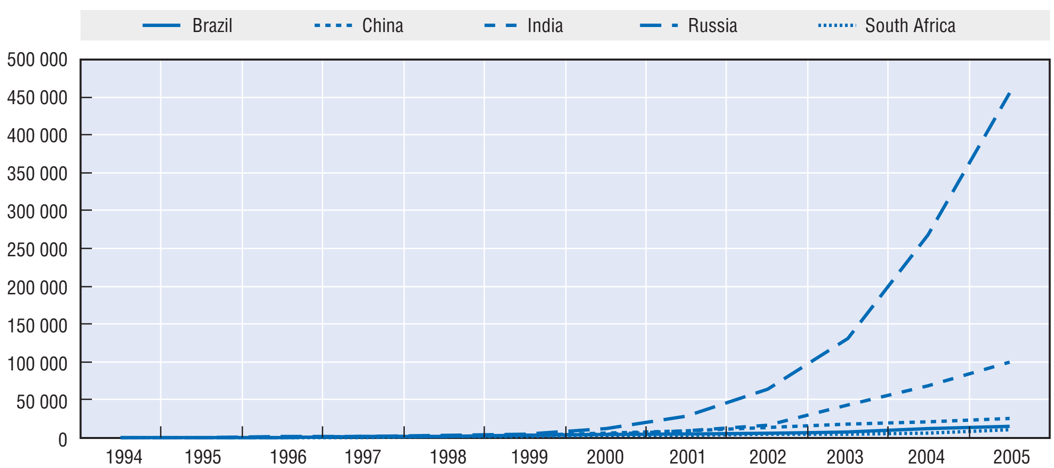
Figure 9.12. **Mobile network development, 1994-2005**

Subscribers, indexed 1994 = 100



Source: ITU and various country sources, OECD analysis.

StatLink http://dx.doi.org/10.1787/003826586461

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Table 9.1. **ICT market expenditure, 2000-2008**

USD millions

	2000	2001	2002	2003	2004	2005	*2006*	*2007*	*2008*	CAGR 2000-2005	CAGR 2000-2008
Hardware											
Brazil	6 263	6 404	7 031	9 905	12 407	15 946	*17 316*	*17 454*	*17 861*	20.6	14.0
China	12 507	16 639	20 357	27 027	39 057	47 927	*57 813*	*68 303*	*81 739*	30.8	26.4
India	2 257	2 764	3 457	5 013	7 204	10 264	*13 630*	*17 910*	*23 938*	35.4	34.3
Russia	1 816	2 107	2 345	2 881	3 900	4 852	*5 574*	*6 078*	*6 650*	21.7	17.6
South Africa	1 661	1 707	1 698	2 503	3 457	4 024	*4 412*	*4 646*	*5 150*	19.4	15.2
OECD	398 488	325 333	302 735	325 390	360 929	377 547	*402 346*	*433 459*	*459 076*	-1.1	1.8
World	440 912	374 883	359 311	396 603	455 255	493 164	*537 523*	*588 246*	*639 756*	2.3	4.8
Software											
Brazil	1 602	1 698	1 787	2 469	2 877	3 566	*3 828*	*3 803*	*3 785*	17.4	11.3
China	1 085	1 658	2 253	3 344	5 295	7 940	*11 376*	*16 328*	*23 002*	48.9	46.5
India	358	456	588	948	1 350	1 908	*2 519*	*3 336*	*4 378*	39.8	36.8
Russia	343	395	450	570	742	923	*1 056*	*1 182*	*1 313*	21.9	18.3
South Africa	627	724	800	1 328	1 965	2 369	*2 781*	*3 159*	*3 716*	30.4	24.9
OECD	169 439	177 463	182 760	211 061	241 381	261 653	*283 672*	*313 539*	*346 173*	9.1	9.3
World	178 086	187 792	194 634	226 734	262 304	288 807	*317 567*	*356 211*	*400 295*	10.2	10.7
Services											
Brazil	4 937	4 792	5 101	7 353	9 040	11 911	*13 530*	*14 238*	*15 011*	19.3	14.9
China	851	1 389	2 155	3 591	6 203	10 006	*15 539*	*24 081*	*36 721*	63.7	60.1
India	1 120	1 386	1 787	2 859	3 876	5 243	*6 607*	*8 356*	*10 465*	36.2	32.2
Russia	891	979	1 158	1 537	2 099	2 747	*3 299*	*3 881*	*4 529*	25.3	22.5
South Africa	1 293	1 351	1 486	2 440	3 632	4 408	*5 206*	*5 951*	*7 046*	27.8	23.6
OECD	453 777	462 018	466 182	525 938	587 996	621 625	*661 820*	*729 732*	*795 838*	6.5	7.3
World	472 814	482 679	489 766	557 614	630 025	676 656	*730 407*	*815 394*	*904 296*	7.4	8.4
Communications											
Brazil	20 609	17 691	17 757	21 491	24 006	30 642	*33 996*	*34 240*	*34 748*	8.3	6.7
China	29 917	32 129	37 612	41 437	47 102	51 759	*57 586*	*63 668*	*70 138*	11.6	11.2
India	12 841	12 239	14 166	16 873	23 734	29 023	*32 549*	*35 978*	*39 864*	17.7	15.2
Russia	6 064	7 508	9 134	11 566	14 798	18 806	*21 695*	*24 017*	*26 381*	25.4	20.2
South Africa	6 896	5 845	5 772	8 947	11 709	12 825	*13 073*	*12 792*	*12 987*	13.2	8.2
OECD	995 737	898 249	955 545	1 052 269	1 163 805	1 221 699	*1 258 579*	*1 345 052*	*1 424 302*	4.2	4.6
World	1 167 377	1 066 508	1 139 537	1 263 752	1 408 076	1 504 906	*1 569 731*	*1 680 770*	*1 786 605*	5.2	5.5
Total ICT											
Brazil	33 410	30 585	31 675	41 217	48 330	62 065	*68 670*	*69 734*	*71 405*	13.2	10.0
China	44 359	51 815	62 376	75 400	97 658	117 632	*142 313*	*172 380*	*211 599*	21.5	21.6
India	16 575	16 844	19 997	25 692	36 164	46 438	*55 304*	*65 580*	*78 644*	22.9	21.5
Russia	9 114	10 989	13 088	16 554	21 539	27 327	*31 624*	*35 158*	*38 872*	24.6	19.9
South Africa	10 477	9 627	9 756	15 217	20 763	23 625	*25 471*	*26 549*	*28 899*	17.7	13.5
OECD	2 017 442	1 863 062	1 907 222	2 114 657	2 354 110	2 482 523	*2 606 417*	*2 821 782*	*3 025 389*	4.2	5.2
World	2 259 190	2 111 861	2 183 248	2 444 703	2 755 660	2 963 532	*3 155 228*	*3 440 621*	*3 730 952*	5.6	6.5

Note: Data for 2006 to 2008 are forecasts.

Source: WITSA.

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Table 9.2. **Network dimensions: investment and revenue, 1994-2005**
USD millions

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Annual telecommunication investment												
Brazil	3 742	4 394	6 767	6 930	10 599	6 630	8 852	6 525	5 205	9 074	5 630	10 120
China	7 921	11 917	10 960	12 738	18 127	19 387	26 858	30 836	25 040	26 782	26 569	25 345
India	2 172	2 533	2 375	2 381	2 290	2 911	3 512	3 512	..	..	..	..
Russia	641	985	1 311	1 537	1 071	730	594	732	1 015	..	..	..
South Africa	986	1 131	1 116	1 790	3 039	1 948	1 744	1 394	712	871	..	..
Mobile communication investment												
Brazil	..	..	..	..	..	2 099	2 295	2 331	2 192	..	3 276	..
China	..	..	..	..	..	..	12 323	14 988	11 566	11 837	12 366	12 281
India	..	..	..	..	..	..	..	..	..	..	..	..
Russia	..	..	..	..	..	..	..	..	..	..	..	..
South Africa	..	..	372	377	633	559	550	587	331	360	..	..
Total telecommunication service revenue												
Brazil	7 201	9 367	12 647	15 024	19 948	17 210	22 219	20 428	..	..	..	..
China	6 634	13 603	16 844	18 119	25 335	29 284	38 489	44 917	50 994	55 527	69 149	71 270
India	3 449	4 128	4 664	5 492	6 312	6 519	7 129	7 645	7 959	..	14 389	..
Russia	2 532	3 465	5 260	5 502	6 721	4 112	5 153	6 956	..	..	..	..
South Africa	3 323	4 330	4 840	5 950	6 136	6 432	6 830	6 197	5 826	8 917	..	..
Telephone service revenue												
Brazil	6 062	7 190	9 519	10 894	12 641	10 122	12 339	11 886	16 938	21 062	31 052	40 710
China	4 984	10 616	13 518	13 595	17 742	18 996	17 558	19 763	22 545	17 826	19 517	21 461
India	3 281	3 922	4 288	5 046	5 210	5 140	5 483	5 665	6 135	..	..	..
Russia	2 352	3 255	4 984	5 249	3 507	1 844	..	..	..	..	..	..
South Africa	2 837	3 415	3 451	3 934	3 491	3 342	3 236	2 715	2 295	3 290	..	..
Mobile communication revenue												
Brazil	323	1 163	1 937	3 043	5 937	5 928	7 541	6 542	6 130	7 078	9 317	..
China	..	1 813	3 330	5 641	7 307	9 255	15 224	18 742	24 867	26 333	30 693	35 471
India	0	..	..	..	510	795	1 039	1 338	1 354	1 784	..	..
Russia	..	..	156	200	161	156	1 329	..	2 957	..	..	..
South Africa	268	662	1 047	1 584	2 044	2 537	3 026	2 950	3 043	4 905	..	..

Source: ITU and country sources, OECD analysis.

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Table 9.3. **Network dimensions: subscribers and lines, 1994-2005**

Millions

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total telephone subscribers												
Brazil	12.8	14.5	17.6	21.6	27.4	40.0	54.1	66.2	73.7	85.6	108.0	126.1
China	28.9	44.3	61.8	83.5	111.3	152.0	230.1	325.2	420.2	532.7	647.3	743.9
India	9.8	12.1	14.9	18.7	22.8	28.4	36.0	45.0	54.1	68.2	91.3	124.7
Russia	24.1	25.1	26.1	28.7	30.0	32.3	35.3	41.0	53.1	73.5	..	166.3
South Africa	4.1	4.5	5.2	6.5	8.4	10.7	13.3	15.7	18.5	21.7	..	37.7
Cellular mobile telephone subscribers												
Brazil	0.6	1.3	2.5	4.6	7.4	15.0	23.2	28.7	34.9	46.4	65.6	86.2
China	1.6	3.6	6.9	13.2	23.9	43.3	85.3	144.8	206.0	270.0	334.8	393.4
India	0.0	0.1	0.3	0.9	1.2	1.9	3.6	6.4	12.7	33.6	52.2	75.9
Russia	0.0	0.1	0.2	0.5	0.7	1.4	3.3	7.8	17.6	36.5	74.4	126.3
South Africa	0.3	0.5	1.0	1.8	3.3	5.2	8.3	10.8	13.7	16.9	19.5	33.0
Main telephone lines in operation												
Brazil	12.3	13.3	15.1	17.0	20.0	25.0	30.9	37.4	38.8	39.2	39.6	39.9
China	27.3	40.7	54.9	70.3	87.4	108.7	144.8	180.4	214.2	262.7	311.8	350.4
India	9.8	12.0	14.5	17.8	21.6	26.5	32.4	37.9	40.6	42.6	45.9	48.8
Russia	24.1	25.0	25.9	28.3	29.2	30.9	32.1	33.3	35.5	37.0	40.0	40.0
South Africa	3.8	4.0	4.3	4.6	5.1	5.5	5.0	4.9	4.8	4.7	4.7	4.7
Personal computers												
Brazil	1.8	2.7	3.4	4.2	5.0	6.1	8.5	10.8	13.0	15.6	19.4	..
China	2.0	2.8	4.5	7.5	11.2	15.5	20.6	25.0	35.5	50.4	53.0	..
India	0.8	1.2	1.5	2.0	2.7	3.3	4.6	6.0	7.5	9.4	13.0	..
Russia	1.7	2.6	3.5	4.4	5.1	5.5	9.3	11.0	13.0	15.4	19.0	..
South Africa	0.9	1.1	1.4	1.8	2.3	2.6	2.9	3.1	3.3	3.5	3.7	..

Source: ITU and country sources, OECD analysis.

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Table 9.4. **Network penetration in the BRICS economies per 100 inhabitants**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Fixed lines												
Brazil	8.0	8.5	9.6	10.7	12.1	14.9	18.2	21.8	22.3	22.2	23.7	21.7
China	2.3	3.3	4.4	5.6	7.0	8.6	11.2	13.7	16.7	20.3	24.1	26.7
India	1.1	1.3	1.5	1.9	2.2	2.7	3.2	3.7	3.9	4.0	4.2	4.5
Russia	16.3	16.9	17.6	19.2	19.9	21.0	21.8	22.7	24.2	25.3	27.7	27.7
South Africa	9.8	10.1	10.6	11.3	12.0	12.8	11.4	11.1	10.5	10.2	10.2	10.3
Mobile subscribers												
Brazil	0.4	0.8	1.6	2.8	4.4	8.9	13.7	16.7	20.1	26.3	36.7	46.9
China	0.1	0.3	0.5	1.1	1.9	3.4	6.6	11.0	16.0	20.9	25.8	30.0
India	0.0	0.01	0.03	0.1	0.1	0.2	0.4	0.6	1.2	3.2	4.8	7.0
Russia	0.02	0.1	0.2	0.3	0.5	0.9	2.2	5.3	12.0	24.9	51.6	87.6
South Africa	0.9	1.4	2.4	4.5	7.9	12.0	19.1	24.2	30.1	36.4	42.4	71.7
Internet users												
Brazil	0.04	0.1	0.5	0.8	1.5	2.1	2.9	4.7	8.2	10.2	12.3	14.1
China	0.001	0.005	0.01	0.03	0.2	0.7	1.7	2.6	4.6	6.2	7.3	9.4
India	0.001	0.03	0.05	0.1	0.1	0.3	0.5	0.7	1.6	1.7	2.3	5.5
Russia	0.1	0.1	0.3	0.5	0.8	1.0	2.0	2.9	4.1	6.8	9.1	16.4
South Africa	0.3	0.7	0.9	1.7	3.0	4.2	5.5	6.5	6.8	7.2	7.8	11.1

Source: ITU and country sources, OECD analysis.

StatLink http://dx.doi.org/10.1787/013148800717

Table 9.5. **Network dimensions: Internet indicators, 1994-2005**

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Internet users (estimated)												
Brazil	60 000	170 000	740 000	1 310 000	2 500 000	3 500 000	5 000 000	8 000 000	14 300 000	18 000 000	22 000 000	..
China	14 000	60 000	160 000	400 000	2 100 000	8 900 000	22 500 000	33 700 000	59 100 000	79 500 000	94 000 000	111 000 000
India	10 000	250 000	450 000	700 000	1 400 000	2 800 000	5 500 000	7 000 000	16 580 000	18 481 044	24 868 268	..
Russia	80 000	220 000	400 000	700 000	1 200 000	1 500 000	2 900 000	4 300 000	6 000 000	10 000 000	13 122 200	..
South Africa	100 000	280 000	355 000	700 000	1 266 000	1 820 000	2 400 000	2 890 000	3 100 000	3 325 000	3 566 000	..
Internet subscribers												
Brazil	..	..	..	..	1 200 000	1 700 000	2 250 000	3 500 000	7 900 000	..	..	..
China	..	7 000	34 000	200 000	676 755	3 014 518	9 021 717	17 364 000	55 763 000	67 746 496	71 713 000	73 200 000
India	..	..	..	87 130	200 470	770 000	2 970 000	3 470 000	3 640 000	4 140 000	5 450 000	6 700 000
Russia	..	..	..	..	..	400 000	492 187	1 027 491	1 890 500	..	..	..
South Africa	..	..	..	..	366 235	522 000	711 526	937 526	1 000 000	..	..	..
DSL Internet subscribers												
Brazil	..	..	..	..	0	0	12 946	218 134	363 815	530 947	1 924 226	2 708 476
China	0	0	0	0	0	0	5 600	300 570	5 367 000	8 184 000	17 203 000	26 540 000
India	..	..	..	..	..	..	0	20 000	37 952	53 073	105 000	..
Russia	..	..	..	..	..	..	0	0	0	..	125 000	..
South Africa	..	..	..	..	..	0	0	0	2 669	20 313	60 000	120 000
Cable modem Internet subscribers												
Brazil	..	..	..	..	..	..	3 149	6 129	34 797	70 924	110 583	155 162
China	..	..	..	..	..	0	0	3 230	..	2 400 000	8 850 000	..
India	..	..	..	..	..	..	0	30 000	36 380	87 289	130 000	..
Russia	..	..	..	..	..	..	0	0	0	..	..	..
South Africa	..	..	..	..	..	..	0	0	0	..	..	..
Internet hosts												
Brazil	5 896	20 113	77 148	117 200	215 086	446 444	876 596	1 644 575	2 237 527	3 163 349	3 485 773	..
China	569	2 146	19 739	16 322	17 255	71 769	70 391	89 357	156 531	160 421	162 821	..
India	359	788	3 138	7 175	13 253	23 445	35 810	82 979	78 595	86 871	143 654	..
Russia	6 537	21 940	58 091	152 619	182 680	91 430	326 523	354 339	409 229	617 730	854 310	..
South Africa	27 040	48 277	99 284	122 025	144 445	167 635	187 649	238 462	198 853	288 633	350 501	..
International Internet bandwidth (Mbps)												
Brazil	..	..	2	..	..	500	801	6 069	9 341	18 511	27 449	..
China	0	0	1	19	143	351	2 799	7 598	9 380	27 216	74 429	..
India	..	0	12	66	159	267	840	1 475	1 870	3 000	6 500	12 500
Russia	..	..	..	..	..	337	3 018	3 909	5 316	6 604	14 365	..
South Africa	..	3	16	31	102	175	348	475	565	626	882	..

Source: ITU and country sources, OECD analysis.

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Glossary

. .	Data not available
2G	Second generation of mobile communications technology
3G	Third generation of mobile communications technology
ACMA	Australian Communications and Media Authority
ACCC	Australian Competition and Consumer Commission
ADSL	Asymmetric digital subscriber line
AFRINIC	African Network Information Centre
ANACOM	National Communications Authority (Portugal)
APNIC	Asia-Pacific Network Information Centre
ARIN	American Registry for Internet Numbers
AS (ASes)	Autonomous systems
ASEAN	Association of Southeast Asian Nations
ASN	Autonomous systems numbers
ASR	Answer seizure ratio
ATVoD	Association for Television on Demand
AV	Audio-visual
BB	Broadband
BGP	Border Gateway Protocol
BIPT	Belgian Institute for Postal Services and Telecommunications
BLS	Bureau of Labor Statistics (United States)
BRICS	Group of countries including Brazil, Russia, India, China and South Africa
CAGR	Compound annual growth rate (expressed as a percentage)
ccTLD	Country code top level domain
CDMA	Code division multiple access
CIS	Commonwealth of Independent States
CPE	Customer premises equipment
CPI	Consumer price index
CPP	Calling party-pays
DBS	Direct broadcast satellite
DNS	Domain name system
DOCSIS 3.0	Data over cable service interface specification
DSL	Digital subscriber lines
DTT	Digital terrestrial television
DTV	Digital television
DVB	Digital video broadcasting
DVB-H	Digital video broadcasting – handheld
EAO	European Audiovisual Observatory

EBOPS	Extended Balance of Payments Services Classification
EC	European Commission
EDGE	Enhanced data rates for GSM evolution
ENUM	Electronic number mapping
EPG	Electronic programming guide
EPO	European Patent Office
EU	European Union
FCC	Federal Communications Commission (United States)
FTA	Free-to-air
FTP	File transfer protocol
FTTN	Fibre-to-the-node
FTTP	Fibre-to-the-premises
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GPRS	GSM packet radio service
GSM	Global system for mobile communications
gTLD	Generic top level domain
HDTV	High definition television
HFC	Hybrid fibre coaxial
HICP	Harmonised indices of consumer prices
HS	Harmonised system
HTML	Hypertext mark-up language
HTTP	Hypertext transfer protocol
ICANN	Internet Corporation for Assigned Names and Numbers
ICT	Information and communication technology
IEEE (802 Standards)	Institute of Electrical and Electronics Engineers
IMT-2000	International Mobile Telecommunications 2000
IP	Internet protocol
IP-PBX	Internet protocol – private branch exchange
IPTV	Internet protocol television
IPv4	Internet protocol version 4
IPv6	Internet protocol version 6
IR	Internet registries
ISDN	Integrated services digital network
ISO	International Organization for Standardization
ISP	Internet service provider
IT	Information technologies
ITCS	International trade by commodity statistics
ITU	International Telecommunication Union
Kbit/s	Kilobits per second (Kbps)
LACNIC	Latin American and Caribbean Internet Addresses Registry
LAN	Local area network
LLU	Local loop unbundling
Mbit/s	Megabits per second (Mbps)
MDF	Main distribution frames
MiTT	Minutes of international telecommunication traffic
MMS	Multimedia messaging service

MVNO	Mobile virtual network operators
NVoD	Near video on demand
NRAs	National regulatory authorities
OCN	Open computer network
OFCOM	Office of Communications (United Kingdom)
P2P	Peer-to-peer
PBX	Private branch exchange
PC	Personal computer
PCB	Public call boxes
PCS	Personal communications service
PDA	Personal digital assistant
PPI	Producers price index
PPP	Purchasing power parities
PPV	Pay-per-view
PSB	Public service broadcasters
PSP	Public service publisher
PSTN	Public switched telecommunication network
PTO	Public telecommunications operator
PVR	Personal video recorder
R&D	Research and development
RIPE NCC	Réseaux IP Européens Network Co-ordination Centre
S-DMB	Satellite digital media broadcasting
SDTV	Standard definition television
SETC	State Economic and Trade Commission (China)
SIC	Standard industrial classification
SIM (card)	Subscriber identity module
SITC	Standard industrial trade classification
SMEs	Small and medium-sized enterprises
SMP	Significant market power
SMS	Short message service
SNA	Statistics of national accounts
SOE	State-owned enterprises
SOHO	Small offices/home offices
SSL	Secure sockets layer
TCP/IP	Transmission control protocol/Internet protocol
T-DMB	Terrestrial digital media broadcasting
TLCS	Television licensable content service
TLD	Top level domain
TRAI	Telecom Regulatory Authority of India
TVHH	Television households
TWF	European Union Television without Frontiers Directive
UMTS	Universal mobile telecommunications system
URL	Uniform resource locator
USO	Universal service obligations
USPTO	United States Patents and Trademark Office
VAT	Value-added tax
VDSL	Very high data rate digital subscriber line

VoD	Video on demand
VoBB	Voice over broadband
VoIP	Voice over Internet protocol
W-CDMA	Wideband code division multiple access
WIDE	Widely integrated distributed environment
Wi-Fi	Wireless fidelity
WiMAX	Wireless interoperability for microwave access
WLAN	Wireless local area network
WLL	Wireless local loop

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OECD Communications Outlook 2007

Annex Tables

Annex Table A.1. **Average annual exchange rates**

In national currency units per USD

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	1.36	1.47	1.37	1.35	1.28	1.35	1.59	1.55	1.72	1.93	1.84	1.54	1.36	1.31
Austria	0.80	0.85	0.83	0.73	0.77	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Belgium	0.80	0.86	0.83	0.73	0.77	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Canada	1.21	1.29	1.37	1.37	1.36	1.38	1.48	1.49	1.49	1.55	1.57	1.40	1.30	1.21
Czech Republic	28.37	29.15	28.79	26.54	27.14	31.70	32.28	34.57	38.60	38.04	32.74	28.21	25.70	23.96
Denmark	6.04	6.48	6.36	5.60	5.80	6.60	6.70	6.98	8.08	8.32	7.89	6.59	5.99	6.00
Finland	0.75	0.96	0.88	0.73	0.77	0.87	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
France	0.81	0.86	0.85	0.76	0.78	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Germany	0.80	0.85	0.83	0.73	0.77	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Greece	0.56	0.67	0.71	0.68	0.71	0.80	0.87	0.90	1.07	1.12	1.06	0.89	0.81	0.80
Hungary	78.99	91.93	105.16	125.68	152.65	186.79	214.40	237.15	282.18	286.49	257.89	224.31	202.75	199.58
Iceland	57.55	67.60	69.94	64.69	66.50	70.90	70.96	72.34	78.62	97.42	91.66	76.71	70.19	62.98
Ireland	0.75	0.86	0.85	0.79	0.79	0.84	0.89	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Italy	0.64	0.81	0.83	0.84	0.80	0.88	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Japan	126.65	111.20	102.21	94.06	108.78	120.99	130.91	113.91	107.77	121.53	125.39	115.93	108.19	110.22
Korea	781	803	803	771	804	951	1 401	1 189	1 131	1 291	1 251	1 192	1 145	1 024
Luxembourg	0.80	0.86	0.83	0.73	0.77	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Mexico	3.09	3.12	3.38	6.42	7.60	7.92	9.14	9.56	9.46	9.34	9.66	10.79	11.29	10.90
Netherlands	0.80	0.84	0.83	0.73	0.77	0.89	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
New Zealand	1.86	1.85	1.69	1.52	1.45	1.51	1.87	1.89	2.20	2.38	2.16	1.72	1.51	1.42
Norway	6.21	7.09	7.06	6.34	6.45	7.07	7.55	7.80	8.80	8.99	7.98	7.08	6.74	6.44
Poland	1.36	1.81	2.27	2.42	2.70	3.28	3.48	3.97	4.35	4.09	4.08	3.89	3.66	3.24
Portugal	0.67	0.80	0.83	0.75	0.77	0.87	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Slovak Republic	0.00	30.77	32.04	29.71	30.65	33.62	35.23	41.36	46.04	48.35	45.33	36.77	32.26	31.02
Spain	0.62	0.76	0.81	0.75	0.76	0.88	0.90	0.94	1.09	1.12	1.06	0.89	0.81	0.80
Sweden	5.82	7.78	7.72	7.13	6.71	7.63	7.95	8.26	9.16	10.33	9.74	8.09	7.35	7.47
Switzerland	1.41	1.48	1.37	1.18	1.24	1.45	1.45	1.50	1.69	1.69	1.56	1.35	1.24	1.25
Turkey	6 872	10 985	29 609	45 845	81 405	151 865	260 724	420 000	630 000	1 230 000	1 510 000	1 500 000	1 430 000	1.34
United Kingdom	0.57	0.67	0.65	0.63	0.64	0.61	0.60	0.62	0.66	0.69	0.67	0.61	0.55	0.55
United States	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Notes : Data for EMU member countries are given in euros (EUR). Data relating to years prior to year of Euro Zone accession (1999) has been converted from national denomination into EUR denomination by applying the irrevocable EUR/national currency conversion rate. The Turkish new lira (TRY) was introduced on January 1st 2005, it is equivalent to 1 000 000 Turkish old lira.

Source: OECD Main Economic indicators.

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Annex Table A.2. **Purchasing power parities**

In national currency units per USD

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	1.36	1.34	1.33	1.32	1.32	1.32	1.31	1.30	1.32	1.34	1.36	1.42	1.40	1.39
Austria	0.94	0.94	0.95	0.95	0.94	0.94	0.94	0.93	0.93	0.93	0.94	0.89	0.89	0.88
Belgium	0.92	0.93	0.93	0.92	0.92	0.93	0.93	0.94	0.93	0.91	0.91	0.92	0.91	0.90
Canada	1.24	1.23	1.22	1.22	1.22	1.21	1.19	1.19	1.21	1.20	1.19	1.28	1.26	1.25
Czech Republic	7.85	9.28	10.31	11.13	11.79	12.61	13.78	14.08	14.14	14.32	14.77	14.98	15.06	14.83
Denmark	8.74	8.65	8.63	8.59	8.56	8.56	8.53	8.41	8.51	8.47	8.66	9.07	8.94	8.88
Finland	0.96	0.96	0.96	0.98	0.97	0.96	0.97	0.98	0.99	0.99	1.01	1.09	1.07	1.05
France	0.97	0.97	0.96	0.96	0.95	0.93	0.93	0.93	0.93	0.91	0.91	0.95	0.95	0.94
Germany	1.01	1.02	1.03	1.03	1.01	1.01	1.01	1.00	0.99	0.99	0.99	0.91	0.90	0.89
Greece	0.44	0.49	0.54	0.58	0.61	0.64	0.66	0.68	0.69	0.70	0.70	0.74	0.75	0.75
Hungary	35.36	41.88	49.03	60.25	71.12	83.39	92.76	99.85	108.60	111.76	118.63	128.07	133.39	133.56
Iceland	74.91	74.71	74.67	75.17	75.27	76.50	79.06	81.03	84.30	90.05	95.39	103.46	103.46	102.18
Ireland	0.79	0.81	0.81	0.82	0.83	0.83	0.87	0.92	0.97	1.00	1.01	1.09	1.08	1.06
Italy	0.73	0.74	0.75	0.78	0.80	0.81	0.80	0.81	0.82	0.83	0.85	0.90	0.91	0.90
Japan	188.42	185.00	181.44	176.70	171.97	169.22	166.95	162.04	155.66	149.67	145.56	157.34	152.31	146.92
Korea	632.00	660.83	697.02	730.77	744.67	753.33	781.73	754.89	731.19	731.99	735.69	881.58	888.80	885.01
Luxembourg	0.95	0.99	1.00	1.00	1.01	1.02	1.01	0.98	1.00	1.01	1.02	0.90	0.90	0.90
Mexico	1.92	2.05	2.18	2.94	3.77	4.35	4.96	5.63	6.19	6.43	6.65	7.61	7.90	7.93
Netherlands	0.91	0.90	0.90	0.90	0.90	0.90	0.91	0.93	0.94	0.93	0.95	0.93	0.91	0.90
New Zealand	1.47	1.48	1.47	1.47	1.48	1.45	1.46	1.43	1.44	1.47	1.46	1.52	1.50	1.48
Norway	9.16	9.15	8.95	9.01	8.94	9.08	9.35	9.21	9.13	9.25	9.44	9.85	9.72	9.62
Poland	0.53	0.67	0.91	1.13	1.31	1.48	1.63	1.73	1.84	1.88	1.88	2.08	2.07	2.07
Portugal	0.55	0.58	0.60	0.61	0.63	0.64	0.65	0.65	0.66	0.67	0.68	0.75	0.75	0.74
Slovak Republic	9.84	11.09	12.32	13.25	13.47	14.23	14.79	15.63	16.23	16.51	16.63	18.22	18.89	18.68
Spain	0.66	0.68	0.69	0.71	0.72	0.73	0.73	0.73	0.75	0.76	0.77	0.77	0.78	0.79
Sweden	9.23	9.29	9.31	9.42	9.32	9.38	9.47	9.34	9.31	9.47	9.65	9.73	9.57	9.39
Switzerland	2.03	2.04	2.03	2.01	2.02	1.94	1.91	1.95	1.94	1.94	1.91	1.89	1.86	1.82
Turkey	3 785	6 201	12 542	22 979	39 815	71 529	124 109	191 716	274 412	430 136	618 281	850 000	900 000	0.97
United Kingdom	0.62	0.62	0.62	0.62	0.63	0.62	0.63	0.64	0.64	0.63	0.63	0.63	0.61	0.61
United States	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Notes : Data for EMU member countries are given in euros (EUR). Data relating to years prior to year of Euro Zone accession (1999) has been converted from national denomination into EUR denomination by applying the irrevocable EUR/national currency conversion rate. The Turkish new lira (TRY) was introduced on January 1st 2005, it is equivalent to 1 000 000 Turkish old lira.

Source: OECD Main Economic indicators.

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Annex Table A.3. **Gross domestic product**

USD millions

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	313 406	303 640	343 188	371 301	412 495	414 177	370 816	402 233	388 620	369 549	412 036	545 640	659 241	737 381
Austria	189 789	188 559	203 546	240 447	236 197	208 024	213 760	212 793	193 020	192 494	205 975	254 206	291 135	306 379
Belgium	224 611	215 194	234 988	276 889	268 751	243 984	250 257	250 727	227 453	226 922	246 343	308 519	355 665	372 725
Canada	569 679	554 722	554 071	582 701	605 913	629 695	608 345	649 336	712 109	704 603	726 387	866 720	992 914	1 133 409
Czech Republic	29 701	37 171	43 631	55 263	61 188	56 313	60 796	59 050	55 701	60 864	73 753	91 354	108 212	123 967
Denmark	146 998	138 913	151 842	180 314	182 912	169 140	172 449	173 030	158 287	159 316	172 460	212 548	243 639	258 661
Finland	109 344	86 545	99 875	130 496	128 096	123 023	129 234	127 644	119 399	120 954	132 343	163 975	188 080	196 453
France	1 341 180	1 281 020	1 345 085	1 555 064	1 554 074	1 405 801	1 450 946	1 441 598	1 302 879	1 317 486	1 440 397	1 791 926	2 048 173	2 137 530
Germany	2 016 500	1 946 118	2 090 964	2 467 534	2 381 429	2 102 921	2 143 778	2 104 894	1 862 385	1 851 786	1 988 019	2 428 652	2 724 938	2 801 250
Greece	99 713	93 840	100 425	117 540	123 734	121 544	121 578	125 207	113 739	117 269	133 492	220 901	262 635	285 195
Hungary	37 603	38 960	41 896	44 669	45 162	45 723	47 050	48 043	46 680	51 834	64 913	84 417	102 157	110 366
Iceland	6 830	6 002	6 163	6 861	7 162	7 253	8 022	8 427	8 419	7 639	8 502	10 828	13 040	16 072
Ireland	53 379	50 278	54 709	66 494	73 289	79 730	87 170	95 167	94 555	103 065	120 747	156 113	182 184	201 454
Italy	1 224 647	996 743	1 028 808	1 098 871	1 228 054	1 166 233	1 192 243	1 178 717	1 070 228	1 087 978	1 189 083	1 500 398	1 714 654	1 771 551
Japan	3 793 858	4 354 621	4 794 103	5 283 034	4 688 215	4 305 623	3 930 910	4 452 851	4 745 870	4 162 325	3 972 422	4 229 225	4 606 049	4 549 107
Korea	332 660	365 403	425 444	517 118	557 644	516 283	345 432	445 399	511 658	481 896	546 934	608 148	680 491	787 624
Luxembourg	13 406	13 771	15 339	18 103	18 088	17 406	18 897	19 935	19 522	19 661	21 514	28 772	33 328	36 745
Mexico	364 186	402 627	420 166	286 140	332 313	400 792	420 826	480 511	580 418	622 200	647 659	638 739	682 825	767 821
Netherlands	333 090	325 288	346 406	414 018	409 168	374 972	393 549	397 947	369 074	383 344	419 962	535 893	604 758	632 058
New Zealand	40 470	44 055	51 669	60 973	67 061	66 715	54 794	57 444	52 201	52 062	60 134	80 780	98 334	109 778
Norway	127 262	117 125	123 712	147 862	159 213	157 192	149 952	158 082	166 940	169 770	190 749	222 704	254 738	295 627
Poland	90 406	92 062	106 070	136 185	153 491	153 699	169 357	164 362	166 411	185 965	191 449	216 483	251 955	302 219
Portugal	98 176	86 484	90 287	107 769	111 987	106 913	112 180	114 926	106 007	109 420	122 224	154 520	177 133	184 734
Slovak Republic	..	13 369	15 470	19 404	20 830	21 198	22 181	20 409	20 288	20 886	24 237	32 980	42 011	47 425
Spain	595 137	502 300	501 247	583 716	610 857	561 523	586 639	601 510	560 129	583 863	656 800	879 248	1 037 168	1 131 819
Sweden	262 780	198 463	213 185	248 282	270 513	247 475	248 034	251 395	239 625	219 666	241 575	304 007	348 987	357 503
Switzerland	248 799	242 112	268 415	315 466	301 607	262 478	269 097	265 263	245 875	249 991	276 323	322 047	360 733	364 475
Turkey	159 095	180 422	130 652	169 319	181 465	189 878	200 307	184 858	199 264	145 573	184 162	239 842	301 057	363 584
United Kingdom	1 071 674	957 748	1 046 832	1 140 290	1 191 578	1 328 095	1 431 027	1 456 721	1 440 244	1 441 028	1 558 425	1 820 157	2 139 140	2 226 293
United States	6 286 800	6 604 300	7 017 500	7 342 300	7 762 300	8 250 900	8 694 600	9 216 200	9 764 800	10 075 900	10 434 800	10 908 000	11 657 300	12 397 900
OECD	20 181 178	20 437 854	21 865 689	23 984 424	24 144 784	23 734 702	23 904 224	25 164 676	25 541 802	25 295 306	26 463 820	29 857 742	33 162 676	35 007 105

Source: OECD Main Economic Indicators.

StatLink http://dx.doi.org/10.1787/013301547352

Annex Table A.4. **Total population**

Thousands

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Australia	17 495	17 766	17 961	18 196	18 420	18 606	18 812	19 036	19 270	19 527	19 752	19 980	20 204	20 474
Austria	7 884	7 992	8 030	7 948	7 959	7 968	7 977	7 992	8 012	8 043	8 084	8 118	8 175	8 233
Belgium	10 045	10 086	10 116	10 137	10 155	10 180	10 203	10 223	10 246	10 281	10 330	10 373	10 417	10 474
Canada	28 377	28 703	29 036	29 302	29 611	29 907	30 157	30 404	30 689	31 021	31 373	31 669	31 974	32 271
Czech Republic	10 318	10 330	10 334	10 331	10 315	10 304	10 295	10 283	10 273	10 224	10 201	10 202	10 207	10 234
Denmark	5 171	5 189	5 206	5 230	5 262	5 285	5 303	5 321	5 338	5 357	5 376	5 390	5 403	5 419
Finland	5 042	5 066	5 089	5 108	5 125	5 140	5 153	5 165	5 176	5 188	5 201	5 213	5 227	5 245
France	57 240	59 006	59 221	59 419	59 624	59 831	60 047	60 336	60 714	61 120	61 530	61 933	62 324	62 702
Germany	80 595	81 179	81 422	81 661	81 896	82 052	82 029	82 087	82 188	82 340	82 482	82 520	82 501	82 464
Greece	10 322	10 558	10 606	10 634	10 709	10 777	10 835	10 883	10 918	10 950	10 988	11 024	11 062	11 104
Hungary	10 324	10 294	10 261	10 329	10 311	10 291	10 267	10 238	10 211	10 188	10 159	10 130	10 107	10 088
Iceland	261	264	266	267	269	271	274	277	281	285	288	289	293	296
Ireland	3 549	3 574	3 586	3 601	3 626	3 661	3 711	3 751	3 800	3 859	3 926	3 991	4 059	4 149
Italy	56 859	57 049	57 204	57 301	57 397	56 890	56 907	56 916	56 942	56 978	57 157	57 605	58 175	58 530
Japan	124 430	124 670	124 960	125 570	125 864	126 011	126 349	126 587	126 832	127 149	127 445	127 718	127 761	127 773
Korea	43 748	44 195	44 642	45 093	45 525	45 954	46 287	46 617	47 008	47 354	47 615	47 849	48 082	48 294
Luxembourg	395	398	404	410	416	421	427	433	439	442	446	450	453	457
Mexico	84 902	87 797	89 352	90 164	92 159	93 938	95 786	97 199	98 658	100 051	101 398	102 708	104 000	105 300
Netherlands	15 182	15 290	15 381	15 460	15 526	15 607	15 703	15 809	15 922	16 043	16 147	16 223	16 276	16 316
New Zealand	3 514	3 598	3 648	3 707	3 762	3 783	3 816	3 837	3 860	3 886	3 942	4 010	4 063	4 101
Norway	4 287	4 312	4 337	4 358	4 381	4 405	4 432	4 462	4 491	4 513	4 539	4 565	4 591	4 622
Poland	38 365	38 459	38 544	38 596	38 625	38 650	38 666	38 654	38 256	38 251	38 232	38 195	38 180	38 161
Portugal	9 833	9 974	9 998	10 030	10 058	10 091	10 129	10 172	10 226	10 293	10 368	10 441	10 502	10 549
Slovak Republic	5 307	5 325	5 347	5 363	5 374	5 384	5 391	5 396	5 401	5 403	5 379	5 380	5 382	5 387
Spain	39 011	39 096	39 166	39 223	39 279	39 583	39 722	39 927	40 264	40 721	41 314	42 005	42 692	43 398
Sweden	8 668	8 719	8 781	8 827	8 841	8 846	8 851	8 858	8 872	8 896	8 925	8 958	8 994	9 030
Switzerland	6 875	6 989	7 037	7 081	7 105	7 113	7 132	7 167	7 209	7 285	7 343	7 405	7 454	7 501
Turkey	58 401	59 491	60 573	61 646	62 695	62 480	63 459	64 345	67 461	68 618	69 626	70 712	71 789	72 065
United Kingdom	58 006	57 672	57 797	57 928	58 043	58 314	58 475	58 684	58 886	59 113	59 322	59 554	59 835	60 218
United States	255 410	260 011	263 194	266 588	269 714	272 958	276 154	279 328	282 429	285 371	288 253	291 114	293 933	296 677
OECD	1 059 816	1 073 052	1 081 498	1 089 509	1 098 046	1 104 700	1 112 747	1 120 386	1 130 270	1 138 750	1 147 141	1 155 722	1 164 116	1 171 532

Source: OECD Annual Labor Force Statistics.

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