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*Chapter 5*

## **INTERNET AND BROADBAND INFRASTRUCTURE**

**Abstract.** At the end of 2001, there were around 213 million subscribers to fixed Internet connections in OECD countries. There is also an increasing number of mobile Internet users. Broadband access is becoming more common, with more than 50 million subscribers using broadband access networks by the end of 2002. Both the pattern of growth in overall subscriber numbers and rapid adoption of broadband access among the more advanced countries suggest that even among OECD countries there continues to be a digital divide, in terms of both ability to access and the quality of access available. This chapter examines the Internet infrastructure and provides information on subscribers to fixed Internet and broadband connections, Internet hosts, and statistics on Web sites, secure servers and domain names.

The Internet continues to expand and the number of people using broadband access technologies is increasing rapidly. At the end of 2001, there were around 213 million subscribers to fixed Internet connections in OECD countries. During 2001, the number of subscribers grew by 22%. There are also an increasing number of mobile Internet users. Broadband access is becoming more common, with more than 50 million subscribers using broadband access networks by the end of 2002 – well over double the number at the beginning of 2001. Both the pattern of growth in overall subscriber numbers and rapid adoption of broadband access among the more advanced countries suggest that even among OECD countries there continues to be a digital divide, in terms of both ability to access and the quality of the access available.

The development of e-commerce, together with recently increased concerns about security, is underpinning rapid growth in the adoption and use of secure servers. In the four years to July 2002, the number of secure servers in OECD countries increased almost 70% per annum. Interestingly, while the majority of content continues to be in English, it appears to account for a lower share of Internet content than was formerly the case. Regionally, address allocations suggest that the Internet is growing somewhat faster in the Asia-Pacific region and Europe than in the Americas, but strong growth is evident almost everywhere.

### Internet subscribers

There is widespread interest in industry and government in the take-up and use of the Internet. The number of people accessing Internet is, therefore, a key indicator. However, as yet there is no single measure of adoption, some national statistical agencies report the number of “users” based on business and household surveys, and many private and public sector organisations report the number of “users”, “people” or “households” online. From an international perspective, the major drawback of these data is that there is no common definition of terms such as “users”.

An alternative approach is to compile information on Internet subscribers by country from major telecommunication carrier reports of the number of subscribers to their Internet services and their estimated market share. As these carriers manage connectivity via public switched telecommunication networks, they are often in the best position to know subscriber numbers on a nationwide basis. Moreover, the term “subscribers” has a more specific meaning for most carriers – namely, the number of active registered Internet accounts. Although the definition of “active” varies slightly from country to country (*e.g.* from accessing an account every 45 days to every 90 days), these data provide the best internationally comparable source of information on the take up and use of Internet services.

#### Box 5.1. Mobile Internet

Developments such as SMS, GPRS, WAP, third generation mobile and the popularity of handheld devices have encouraged a rapid increase in the number of mobile Internet subscribers wherever services are available. The FCC reported that there were 8 to 10 million mobile Internet subscribers in the United States at the end of 2001, up from 2 to 2.5 million at the end of 2000. There were reports of 7 million mobile Internet users in Europe by the end of 2001, and carrier reports suggest that subscriber numbers increase rapidly as new services are introduced. For example, KPN reported that within months of its launch it had 100 000 i-mode subscribers in Germany and the Netherlands. The Korean Ministry of Information and Communication reported more than 19 000 mobile Internet subscribers in Korea by April 2001. In Japan, there were more than 48 million mobile Internet subscribers at the end of 2001 – including NTT DoCoMo (30.2 million), J-Phone (9.3 million) and KDDI (9 million). The Telecommunication Carriers Association in Japan recently reported that by July 2002, the number had grown to more than 55 million mobile Internet subscribers.

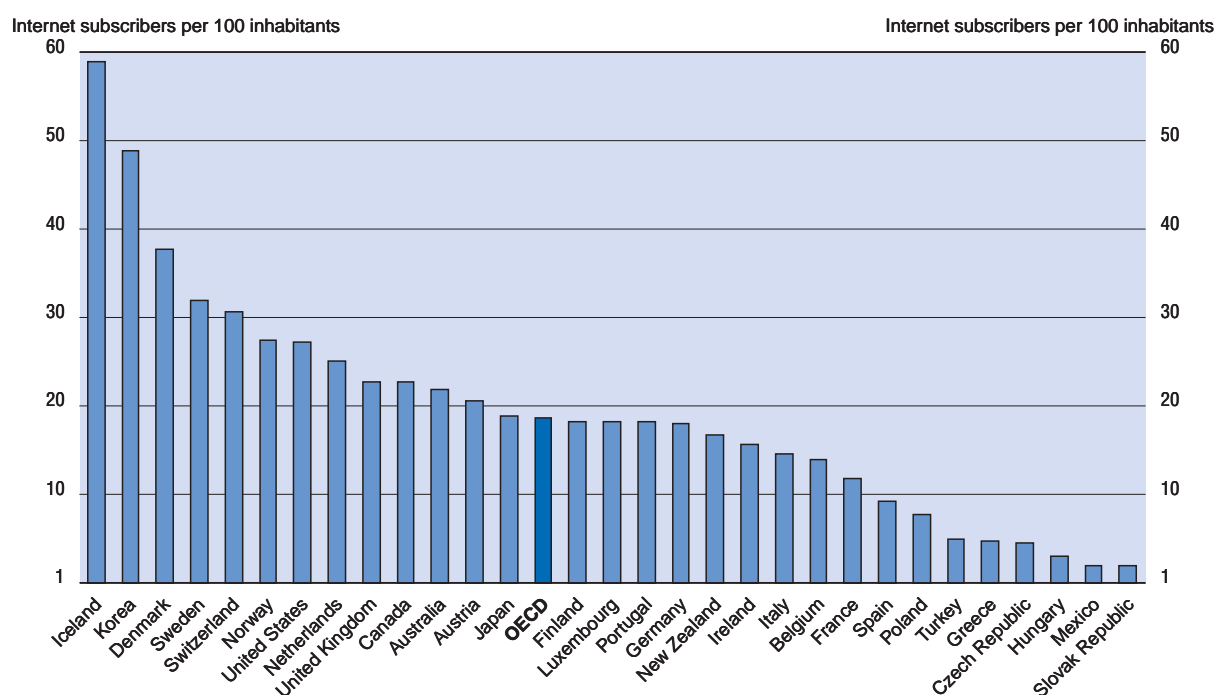
Major factors affecting subscriber numbers include the recent, now declining business model that encouraged the registration of “free” Internet accounts, and the recent rapid adoption of mobile Internet access. To date, however, mobile Internet access provides a more limited Internet experience, with tremendous price differences and more limited capabilities, such that a mobile Internet subscriber is not equivalent to a fixed line Internet subscriber. Moreover, at the end of 2001, the number of mobile Internet subscribers was relatively small. Japan was the exception, with more than 40 million. Korea had around 19 000 mobile Internet subscribers in April 2001, and there were 8 to 10 million in the United States. For these reasons mobile Internet subscriptions have been omitted, and the data presented refer to the number of active subscribers to fixed line Internet services.

### Fixed Internet subscribers

There were 213 million active Internet subscribers with fixed Internet connections in OECD countries at the end of 2001, up by 22% from 175 million a year earlier (Table 5.1). At the end of 2001, 77.5 million or 36% of all OECD Internet subscribers were in the United States and 64 million or 30% were in European Union countries, with almost 15 million Internet subscribers in Germany, 13.6 million in the United Kingdom, 8.3 million in Italy and around 7 million in France. Other countries with high Internet subscriber numbers included Japan with 24 million, Korea with 23 million, and Canada with around 7 million. The rate of increase in the number of Internet subscribers varies considerably from country to country. During 2001, there was an 86% increase in Greece, a 75% increase in Mexico, a 69% increase in Austria, and increases of 48% in Canada and the Slovak Republic. Single-digit increases were experienced in the Czech Republic, Ireland, Italy, the Netherlands, Norway and the United Kingdom.

On a per capita basis, the highest level of penetration of Internet at the end of 2001 was in Iceland, which had 59 subscribers per 100 inhabitants (Figure 5.1). Other countries with high levels of adoption included Korea (with 48.8 Internet subscribers per 100 inhabitants), Denmark (37.8), Sweden (32),

Figure 5.1. Internet subscribers per 100 inhabitants, December 2001



Source: OECD.

Switzerland (31), Norway (27.4), the United States (27.2), the Netherlands (25), the United Kingdom (22.7), Canada (22.6) and Australia (22). Countries with a level of Internet penetration significantly below the OECD country average of 18.8 subscribers per 100 inhabitants included the Slovak Republic (1.9 per 100), Mexico (2.0), Hungary (3.0), the Czech Republic (4.4), Greece (4.8) and Turkey (5.0). Despite some slowing of growth in countries that were early adopters, there remain significant differences in levels of adoption and use of the Internet.

### **Broadband access**

The level of use of Internet services, quality of online experience and capabilities of the services accessed are impacted by available bandwidth, and there is increasing interest in the development of broadband access networks and the pace of adoption of broadband access technologies.

#### ***Broadband connections to the Internet***

The development of broadband access networks is moving ahead rapidly in many OECD countries. During 2001, the number of subscribers in OECD countries using digital subscriber line (DSL) connections increased from 7.4 million to more than 16 million, at an annual rate of 116% (Table 5.2). Over the same period, the number of cable modem subscribers increased from 7.7 million to 15 million, at an annual rate of 94%. The total number of broadband and permanent connection subscribers in OECD countries increased from around 15 million at the end of 2000 to 33 million at the end of 2001, an annual increase of more than 118%.

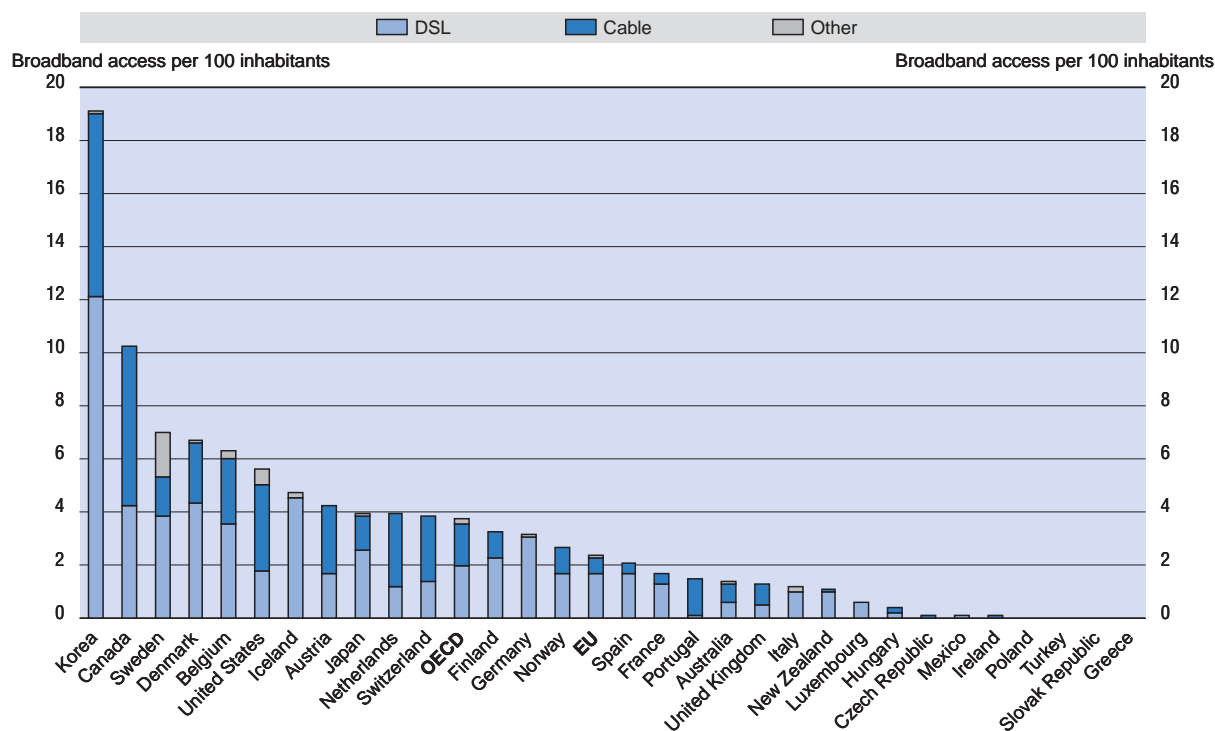
For the first time, the number of subscribers using DSL surpassed the number of subscribers using cable modems in late 2001. At the end of 2001, there were 1 million subscribers using broadband access technologies other than DSL and cable to access the Internet (*e.g.* Ethernet LANs, two-way direct satellite, fibre to the home, and fixed wireless). This is important because the initial market for some of these technologies tends to be business users. New entrants are using fixed wireless networks to connect business in metropolitan areas. Some new entrants are specialising in the use of Ethernet LANs to connect office buildings with some of the fastest broadband connections available. At the same time, satellites are being used to provide the first broadband access to business users in areas where networks have not been upgraded to provide DSL or cable modems.

On a per capita basis, Korea continues to be the clear leader in broadband access network development. At the end of 2001, there were 17.2 broadband subscribers per 100 inhabitants in Korea. Canada was next with 8.8 broadband subscribers per 100 inhabitants. Sweden, Denmark, Belgium and the United States were the other countries to have exceeded four broadband subscribers per 100 inhabitants at that time.

Korea is the leader in the development of DSL access networks, with almost 11 DSL subscribers per 100 inhabitants at the end of 2001. Iceland (3.5 per 100), Canada (3.4), Denmark (2.8), Sweden (2.7), Germany (2.3) and Belgium (2.2) were the other countries with more than two DSL subscribers per 100 inhabitants at that time. There was no commercial DSL or cable modem service available in Greece, Ireland and the Slovak Republic at the end of 2001. In Ireland, Eircom launched a commercial DSL service in May 2002. The launch of commercial services is occurring in the other countries without broadband during 2002. Korea also led in the adoption of cable modem access, with 6.2 cable modem subscribers per 100 inhabitants at the end of 2001. Canada (5.4), the United States and Netherlands (2.5), Austria (2.4) and Belgium (2.0) were the other countries with more than two cable modem subscribers per 100 inhabitants at that time.

So rapid is the development of broadband access networks that almost 10 million broadband subscribers were added in OECD countries during the first half of 2002, taking the total to 43 million by the end of June 2002 (Figure 5.2 and Table 5.3), a 23% increase in six months. Korea increased its broadband penetration to 19.1 subscribers per 100 inhabitants. Canada (10.2 per 100), Sweden (7.0), Denmark (6.7), Belgium (6.3), the United States (5.6), Iceland (4.7) and Austria (4.2) were the other countries to have achieved broadband penetration in excess of four subscribers per 100 inhabitants.

Figure 5.2. Broadband access per 100 inhabitants, June 2002



Source: OECD.

During the first half of 2002, access to broadband networks increased most rapidly in Ireland, Luxembourg, the United Kingdom, Switzerland, Japan, Spain and Finland. Japan also benefited from an expansion in fibre-to-the-home services which started in March 2001. The number of subscribers served by several operators, has increased from 12 337 (January 2002) to 138 000 (October 2002). Much slower growth in broadband access was experienced in Austria, Canada, the Czech Republic, Greece, Korea, the Netherlands, Poland, the Slovak Republic and the United States. Clearly, some countries are experiencing rapid growth in broadband access from a low base, while others are experiencing continued growth from already considerable bases. Equally, some countries are seeing somewhat slower growth from already high levels of penetration, while others have been slow to start broadband rollout.

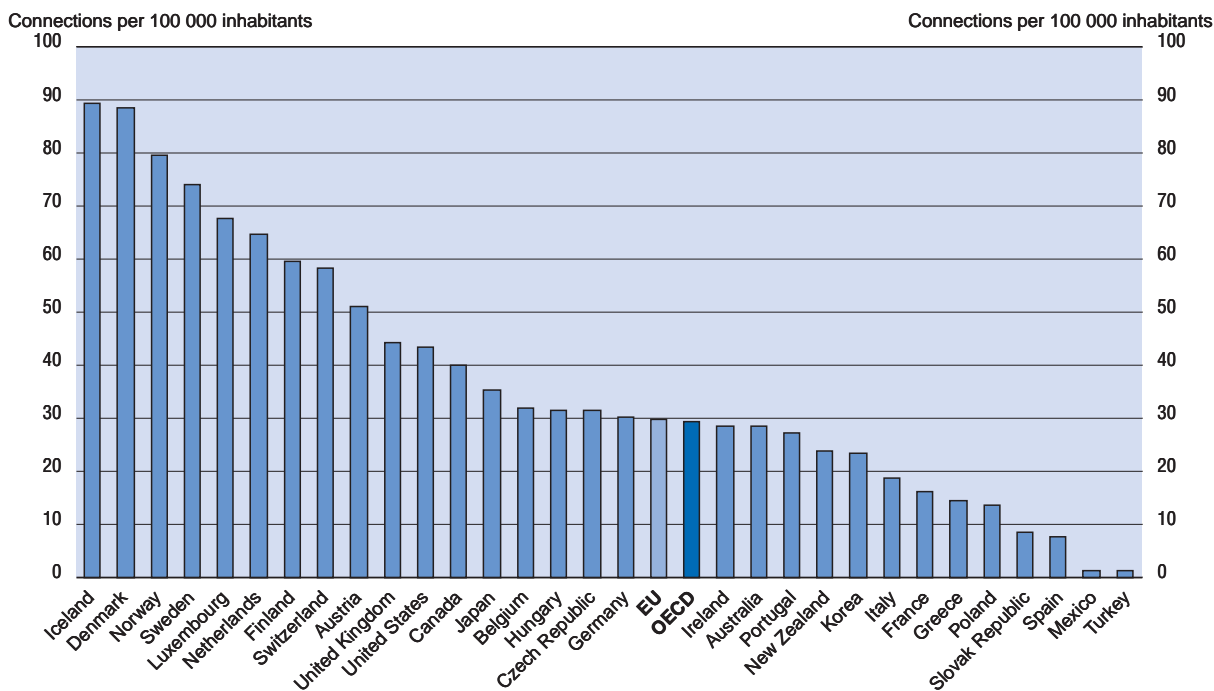
### **Leased lines connected to the Internet**

Few comparable data are available on the penetration and use of leased lines to access the Internet. Some telecommunication carriers and regulators report the number of leased lines by company or country, but generally do so without indicating the proportion used for providing permanent local access connections to the Internet. An alternative is to examine Netcraft's leased line survey, which uses a consistent methodology across countries. It should be noted, however, that some DSL connections are reported as leased line connections in the Netcraft data. This occurs where a user has a statically allocated IP address, which Netcraft counts as a permanent connection because it has the same characteristics as a leased line connection. Nevertheless, virtually all residential and many business DSL connections currently use dynamically assigned IP addresses, so potential double counting will be limited and the Netcraft survey results can be taken to be indicative of the development of lease line access networks.

At the end of 2001, there were more than 374 000 permanent leased line connections to the Internet around the world (Table 5.4), with a 26% increase during the year. Some 89% of leased line connections to the Internet were in OECD countries. At the end of 2001, the largest number of leased line connections was in the United States with 123 461, almost one-third of all connections in the world. Japan had the second highest number of leased line connections at 45 187 (12%), followed by the United Kingdom with 26 451 (7.1%), Germany with 24 719 (6.6%) and Canada with 12 445 (3.3%). Other countries with more than 10 000 leased line connections at the end of 2001 included Korea, Italy and the Netherlands. Over the year to the end of 2001, OECD countries experienced a 25% increase in the number of leased lines connected to the Internet. However, rates of growth varied from country to country. Strong growth in leased line connections was experienced in Australia (156%), Italy (54%), the United Kingdom (44%), Turkey (43%), Poland (42%), France (41%) and Denmark (40%).

On a per capita basis, Iceland had the highest penetration of leased line connections to the Internet at the end of 2001, with 89.4 per 100 000 inhabitants. Denmark (88.5), Norway (79.5), Sweden (74.1), Luxembourg (67.8), the Netherlands (64.8), Finland (59.6), Switzerland (58.2) and Austria (50.9) were the other countries with relatively high levels of leased line Internet connection (Figure 5.3). In looking at these data it is important to remember that leased lines are only one technology capable of providing permanent connection to the Internet. Taken in isolation they cannot be regarded as an indicator of Internet penetration. For example, Korea had a relatively low penetration of leased line connection (23.2 per 100 000 inhabitants at the end of 2001), but is a leader in the adoption of alternative technologies such as DSL and cable modems. This may be because business users prefer these other options. A further factor may be the pricing and availability of leased lines. It is notable that the Scandinavian countries, which have traditionally had some of the lowest prices for leased lines, have high penetration rates whereas Korea has had relatively high prices for leased lines and relatively inexpensive DSL and cable modem services.

Figure 5.3. Leased line connections per 100 000 inhabitants, December 2001



For medium and large business users in a growing number of OECD countries connections to the Internet are almost ubiquitous. For large corporate users leased lines provide most permanent connections. For small and medium-sized enterprises (SMEs), the majority of connections are still dial-up. Business demand for broadband access will, therefore, continue to be expressed in two ways. For large users high speed leased circuits continue to be in demand, and the most recent data bears this out. For SMEs, demand for broadband access can be expected as they convert from narrowband dial-up connections (including ISDN) to broadband access. Use of new broadband access technologies, such as DSL, is still not very common among businesses. Hence, there remains tremendous scope for connecting SMEs to broadband access networks and bringing the advantages of broadband access to them.

### Internet hosts

The number of Internet hosts is one of the most commonly used indicators of Internet development. A host is a domain name that has an IP address associated with it. This would include any computer or other device connected to the Internet via a full or part-time, direct or dial-up connection. Sometimes these devices are not accessible by automated survey techniques because of security devices such as firewalls. Consequently, host counts tend to be on the low side, and should be seen as an indicator of the minimum size of the Internet. Moreover, it should be noted that with recent increased concern over security, it is possible that comparisons of historical and recent data will somewhat underestimate growth in the number of hosts as more firewalls are installed.

In July 2002, there were 162 million hosts connected to the Internet worldwide (Table 5.5). The number of hosts has increased 45% per annum since 1998, when there were less than 37 million hosts connected to the Internet. More than 100 million of the hosts connected to Internet in July 2002 were under generic domains (gTLDs), of which **.net** (56 million hosts) and **.com** (44 million hosts) were the largest. The largest country code domain (ccTLD) in July 2002 was **.jp** (Japan) with 8.7 million hosts. However, if the various United States-related domains (*i.e.* **.edu**, **.mil**, **.gov** and **.us**) are combined, they totalled 14.3 million hosts. Other large ccTLDs included **.ca** (Canada) with 3.1 million hosts, **.it** (Italy) with 3 million, **.de** (Germany) with 2.9 million, **.uk** (United Kingdom) and **.au** (Australia) with 2.5 million, **.nl** (Netherlands) with 2.2 million and **.fr** (France) with 2.1 million.

The number of hosts connected under gTLDs increased by 54% per annum between July 1998 and July 2002, with connections under **.net** increasing somewhat faster than those under **.com**. The fastest growing ccTLD was **.mx** (Mexico), with the number of hosts connected increasing 86% per annum – from 83 949 in July 1998 to just over 1 million in July 2002. Other ccTLDs experiencing rapid growth over the period included **.it** (Italy, 74% p.a.), **.pl** (Poland, 65% p.a.), **.es** (Spain, 62% p.a.), **.jp** (Japan, 59% p.a.), **.tr** (Turkey, 56% p.a.) and **.pt** (Portugal, 56% p.a.). Some of the early adopters experienced significantly slower growth over the last four years, including the combined United States at 16% per annum, **.fi** (Finland, 18% p.a.), **.no** (Norway, 19% p.a.) and **.uk** (United Kingdom, 20% p.a.). Nevertheless, even these rates suggest that the Internet continues to grow rapidly.

### Web sites

Servers are computers that host World Wide Web content (*i.e.* Web sites). Netcraft conducts a survey of Web servers in order to provide information about the software used on computers connected to the Internet. In doing so they collect and collate data on as many host names providing Web content as their survey can find, and poll each one for the server name. These data can be used to estimate the number of active Web sites under each domain. When gTLDs and ccTLDs are distributed to countries according to the country allocation of IP address blocks, these data indicate the level of content development in each country.

In July 2002, the Netcraft survey found more than 35 million Web sites (servers) operating in OECD countries, up from 19 million in July 2000 and increasing by 36% per annum (Table 5.6). With more than 18 million servers operating in July 2002, the United States accounted for 50% of all Web sites in the OECD area. Other countries with a relatively large share of Web sites included Germany with 7 million, the United Kingdom with 3.9 million and Canada with just over 1 million.

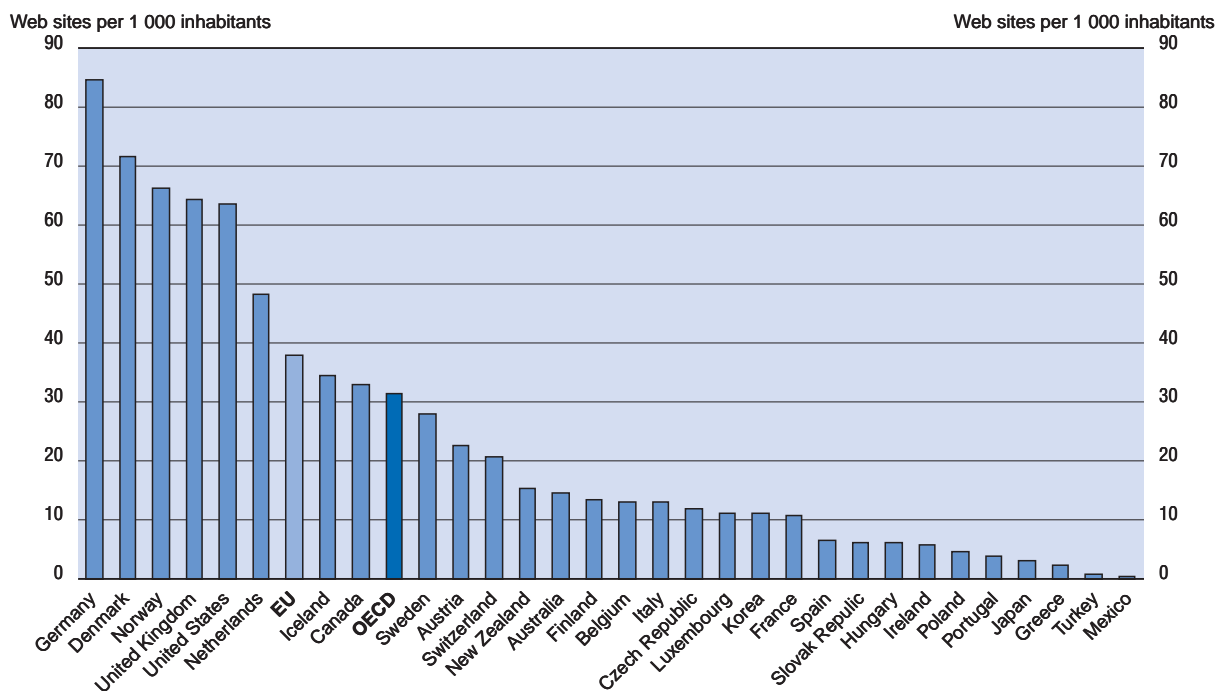
While the number of servers across the OECD area increased by 36% per annum between July 2000 and July 2002, growth rates varied considerably from country to country. Germany experienced an increase of almost 97% per annum, with strong growth also experienced by Denmark (86% p.a.), Netherlands (69% p.a.), Turkey (68% p.a.), the United Kingdom (64% p.a.), France (57% p.a.), Poland and Hungary (52% p.a.). Much slower growth was experienced in Switzerland (11% p.a.), Canada (17% p.a.), the United States (20% p.a.), Sweden and New Zealand (21% p.a.) – all of which were relatively early adopters.

A more accurate indicator of relative national content development is Web sites (servers) per 1 000 inhabitants. In July 2002, there was an average of 31.4 Web sites per 1 000 inhabitants across OECD countries, up from 17.2 per 1 000 in July 2000. Countries varied widely. Germany ranked first, with 84.7 Web sites per 1 000 inhabitants in July 2002. Other countries with a relatively high number of Web sites per 1 000 inhabitants included Denmark (71.7), Norway (66.4), the United Kingdom (64.2), the United States (63.7), the Netherlands (48.2), Iceland (34.4) and Canada (32.9). In contrast, Mexico had just one Web site for every 3 247 people. Turkey also had less than one Web site per 1 000 inhabitants. Other countries with relatively few Web sites per 1 000 inhabitants in July 2002 included Greece (2.4), Japan (2.9), Portugal (3.6), Poland (4.6), Ireland (5.8), Hungary (6.1), the Slovak Republic (6.3) and Spain (6.6).

### Secure servers

Netscape developed the secure socket layer (SSL) protocol for encrypted transmission over TCI/IP networks. Its most common use is to provide a secure end-to-end link for e-commerce transactions, with major e-commerce uses of secure server software including encrypted credit card transactions in retail applications 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

Figure 5.4. Web sites per 1 000 inhabitants, July 2002



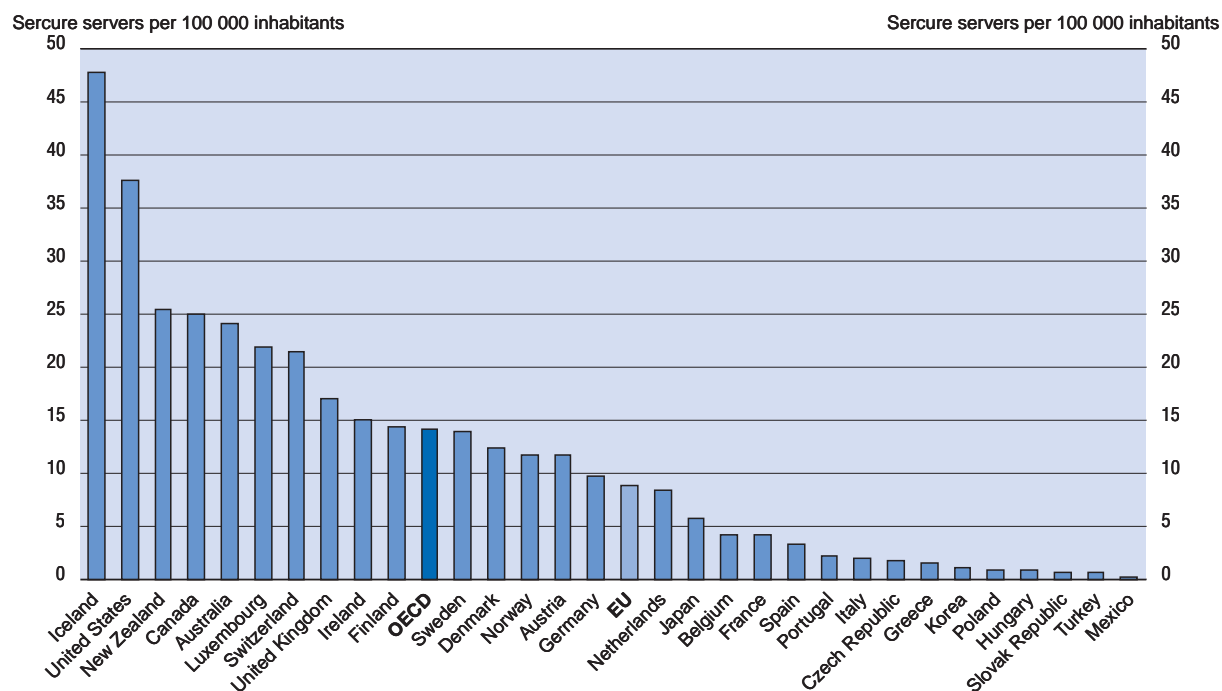
e-commerce. However, it should be noted that a change in methodology in October 2001 introduced a somewhat stricter definition for authenticated sites. Data from prior surveys have not been adjusted, such that comparing surveys over the period 1998 to 2002 may somewhat underestimate growth.

In July 2002, the Netcraft survey found 169 321 secure servers worldwide. More than 95% of them (161 392) were located in OECD countries (Table 5.7). Among OECD countries, the United States had the largest number of secure servers in July 2002, with 106 884. Other countries with a relatively large number of secure servers operating at that time included the United Kingdom (with 10 288), Germany (7 987), Canada (7 768) and Japan (7 179).

The number of secure servers in the world increased by 70% per annum between July 1998 and July 2002, as did the number in OECD countries. Among OECD countries, Germany, Greece, Japan, Poland and Turkey experienced annual growth in the number of secure servers in excess of 100%. Hungary, Italy, Portugal, the Slovak Republic and Spain experienced rates of growth in the number of secure servers below the OECD average, as did Australia and the United States albeit from a higher base.

There were 14.2 secure servers per 100 000 inhabitants across the OECD in July 2002, up from 1.8 per 100 000 in July 1998 (Figure 5.5). Countries with high levels of penetration of secure servers in July 2002 included Iceland (with 47.7 per 100 000 inhabitants), the United States (37.5), New Zealand (25.5), Canada (25.0), Australia (24.1), Luxembourg (22.0) and Switzerland (21.5). A wide range of adoption levels is apparent, with seven countries having more than 20 secure servers per 100 000 inhabitants in July 2002 and 13 countries having fewer than five per 100 000. This clearly suggests that while there is strong growth in the use of secure servers for e-commerce across OECD countries, there remain significant disparities between countries in levels of adoption and use.

Figure 5.5. Secure servers per 100 000 inhabitants, July 2002



Source: OECD.

Comparing growth in the use of secure servers with that of servers overall indicates the relative intensity of e-commerce development (Tables 5.6 and 5.7). Over the two years to July 2002, the total number of Web servers in OECD countries increased by 36% per annum, while the number of secure servers increased at the slightly slower rate of 32% per annum. Growth of secure servers was faster than overall Web sites (servers) in 14 of the 30 OECD countries and slower in 16. Much higher rates of growth in secure servers were experienced in Canada, New Zealand and Switzerland, while the number of secure servers found declined somewhat in the Czech Republic, Hungary and the Slovak Republic. Between July 2000 and July 2002, the ratio of secure servers to Web sites (servers) declined in 10 OECD countries, namely Belgium, the Czech Republic, Denmark, France, Germany, Hungary, Italy, Portugal, the Slovak Republic and Spain. In the other countries, the ratio of secure servers to Web sites increased. The total number of servers is increasing as quickly as the number of secure servers, suggesting an expansion of e-commerce activities but no obvious intensification of the use of the Internet for e-commerce.

### Links to secure servers

Another indicator of the level of development of e-commerce is the number of links that point from each domain to secure servers. It is not possible to produce a perfect count, but it is possible to use search engines, such as Google, to count the number of links under country code and generic top level domains that contain references to secure socket layer servers in the URL (*i.e.* to “https”). This is imperfect, because, in addition to direct links to secure servers, such counts will include some pages discussing the topic of secure socket layer servers that have “https” *within* the URL. However, these counts are indicative of the use of and interest in secure servers, and of the level of use of secure transactions for e-commerce.

### References to secure servers by domain

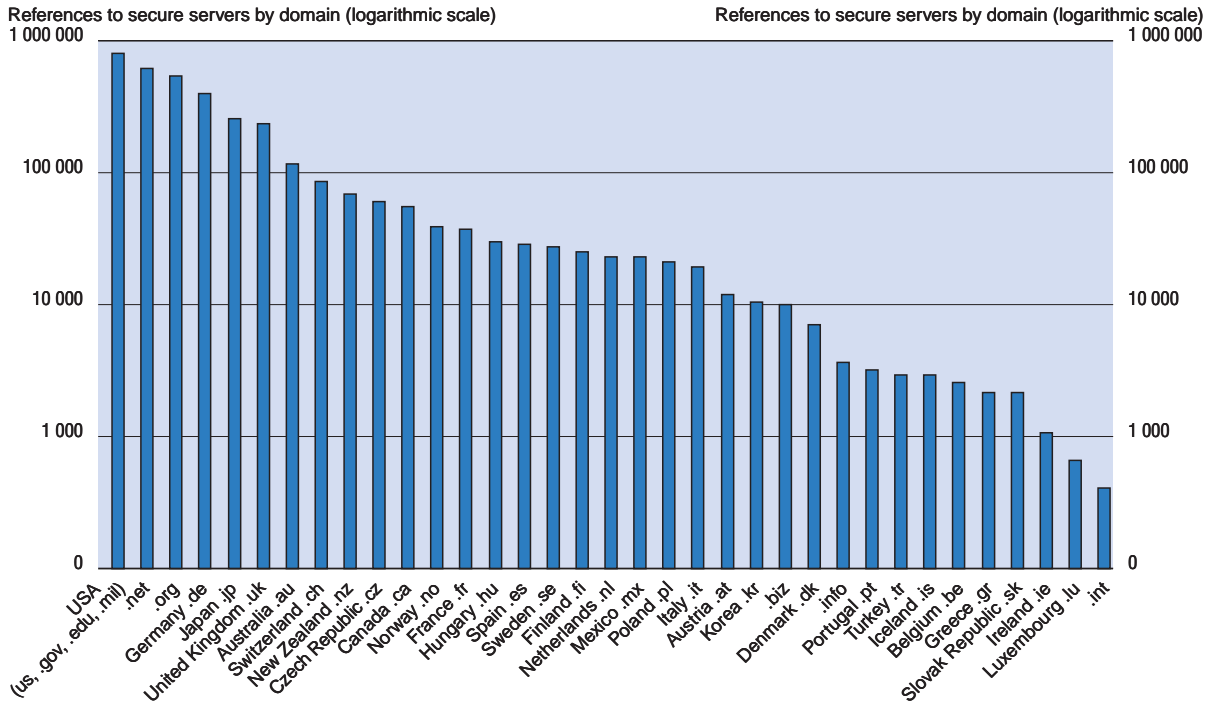
In August 2002, Google reported almost 7.4 million URL references to secure socket layer servers (Figure 5.6 and Table 5.8). This compares with around 2.8 million links found in a similar sample taken in July 2000. Almost 3.5 million links were under generic top level domains, and a further 2.4 million were under OECD country code top level domains. As might be expected, the **.com** domain contained by far the largest number of reported references to secure socket layer servers of any domain, with almost 2.3 million references in August 2002. The combined United States-related domains (**.us**, **.edu**, **.gov** and **.mil**) contained some 815 800, and the generic domains **.net** and **.org** contained 621 000 and 541 000, respectively. Other domains with a relatively large number of references to secure socket layer servers included **.de** (Germany), **.jp** (Japan), **.uk** (United Kingdom) and **.au** (Australia).

Of the 7.4 million URL references to secure socket layer servers found in August 2002, 47% were under generic top level domains, and 33% were under OECD country code top level domains. The combined United States-related domains (**.us**, **.edu**, **.gov** and **.mil**) accounted for 11%, and the generic domains **.net** and **.org** accounted for 8.4% and 7.4% respectively.

### References to secure servers by country

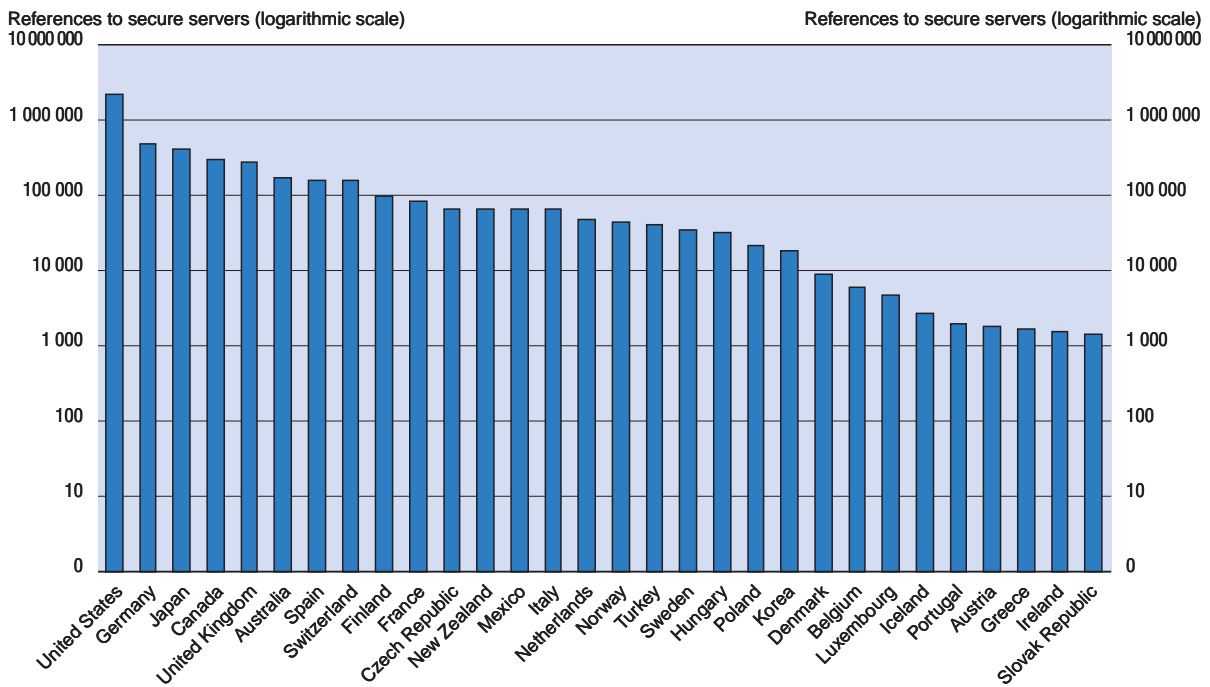
It is possible to produce a similar count of references to secure socket layer servers by country, rather than domain, based on ISP allocations of IP address blocks. Again, the count is imperfect for the reasons noted above, and because most ISPs operating in multiple countries use IP addresses outside their home country's. Nevertheless, it can be taken as indicative. A sample taken in August 2002 reported 4.8 million links (references) from OECD countries to secure socket layer servers (Figure 5.7 and Table 5.9). Of these, almost 45% or 2.15 million were found in United States-related ISP IP address blocks. Other address blocks relating to ISPs in certain countries reporting a relatively large number of references to secure socket layer servers included those relating to Germany, Japan, Canada and the United Kingdom.

Figure 5.6. References to secure servers by domain, August 2002



Note: Sample taken using Google, August 2002.  
Source: OECD.

Figure 5.7. References to secure servers by country, August 2002

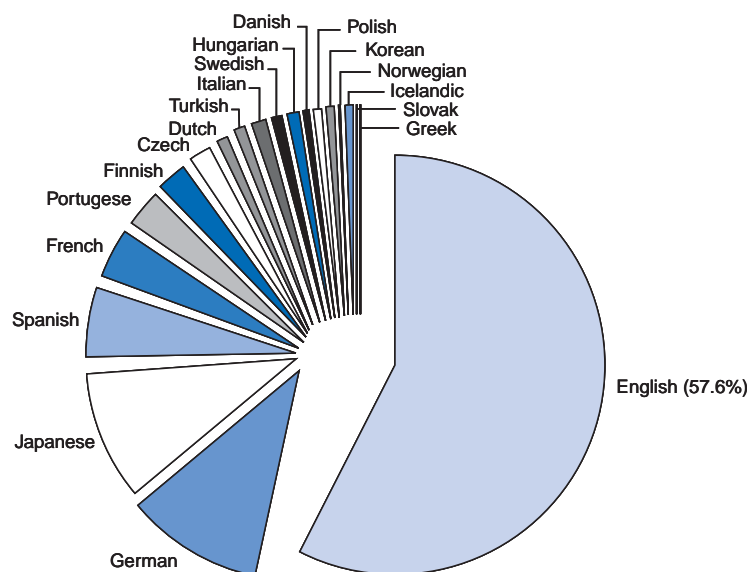


Note: Sample taken using Google, August 2002.  
Source: OECD.

Box 5.2. **The language of e-commerce**

English continues to be the language of e-commerce. Some 3.9 million of the secure socket layer server pages found by Google in August 2002 were in 20 of the most widely used languages in OECD countries – the remainder being in languages other than these 20, or pages with no discernible language (e.g. purely graphics pages). Of those in the 20 most widely used OECD languages, 2.3 million or 58% were in English. The other major languages were German (10.5%), Japanese (9.9%), Spanish (5.3%) and French (4.1%) (Figure 5.8). This breakdown accords with Google's reporting of languages used to access Google searches. For example, in January 2002 Google reported that 57% of its access was in English, 12% in German, 7% in Japanese, 6% in Spanish, 5% in French, 3% in Chinese and 2% in Italian.

Figure 5.8. **References to secure servers by language, August 2002**



Source: OECD.

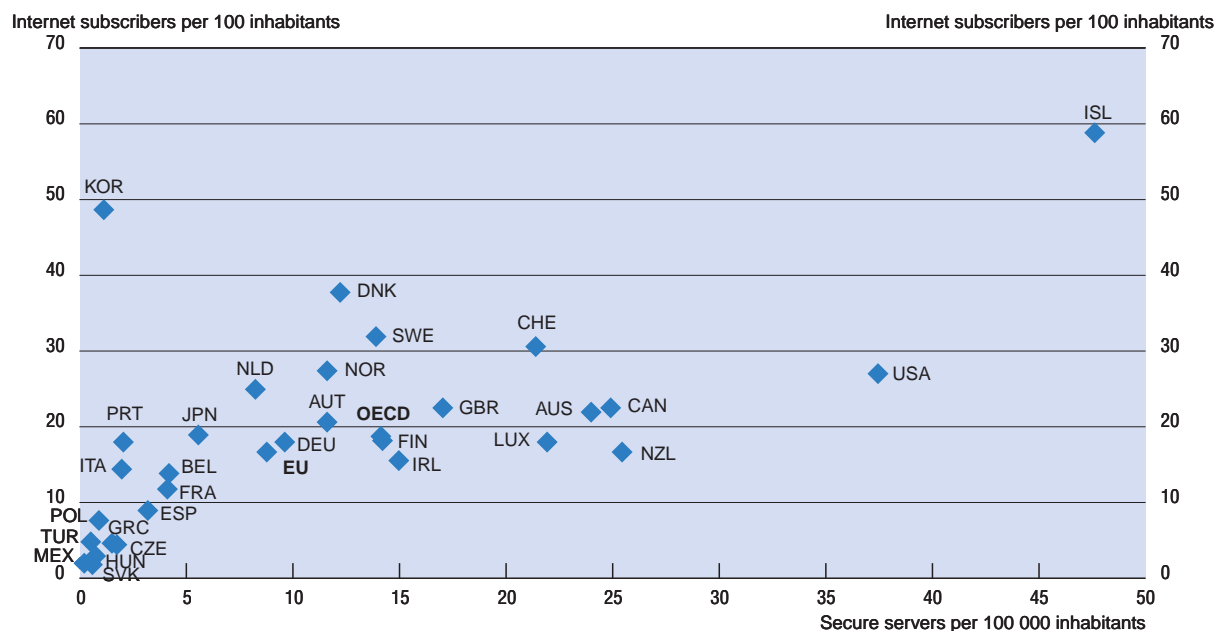
In a similar sample taken two years ago, more than 94% of the links to secure servers were in English, with less than 6% in all other languages combined. Clearly, while English remains the predominant language of e-commerce, it is much less so now than in the past.

**E-commerce access and supply**

Internet subscribers are one indicator of connectivity to the Internet. Secure servers represent one infrastructure used to conduct secure electronic transactions, and imply the provision of content for sale or commercial use. Together, they can be seen as indicators of e-commerce access and supply. Hence a scatter plot of subscribers and secure servers can show something of the distribution of e-commerce access and supply – the demand side and supply side of Internet-based commercial content.

Countries which rank high on both scales (subscribers and secure servers) are likely to be the most active in e-commerce. These include Iceland, the United States, Canada, Switzerland and Australia (Figure 5.9). Countries that rank high in terms of subscribers, but lower on secure servers, are likely to

Figure 5.9. Internet subscribers and secure servers



Source: OECD.

have active e-commerce access but lower levels of domestic supply. These include Korea, Denmark, Sweden, Norway and the Netherlands. Those countries that rank high in terms of secure servers, but lower on subscribers, are likely to be more active online suppliers but have somewhat less developed access. These include Luxembourg, Ireland and New Zealand. Those countries below the OECD average on both scales are the slower e-commerce adopters, with lower levels of both connectedness and e-commerce infrastructure per inhabitant. As well as Turkey, Mexico, the Slovak Republic, Poland, Greece, the Czech Republic, Portugal and Hungary, such countries as France, Spain, Italy and Belgium also fall into this category.

### Web hosting

Using the Google search engine it is possible to explore the internationalisation of Web hosting. Counting the number of Web pages reported by major search engines by domain *and* by country (*i.e.* country ISP-related IP address block) gives some indication, albeit imperfect, of the domestic *versus* foreign ISP location of hosted Web content. A variety of factors affect the location of Web content and the data presented in Table 5.10 should be interpreted with caution. Nevertheless, the counts reported are based on a sample of some 320 million Web pages.

Within a sample taken in August 2002, the share of ccTLD-related content hosted within domestic ISP IP address space (*e.g.* the share of pages in **.au** hosted in Australian ISP IP address blocks) varied from a high of 74% for pages in the **.us** domain to a low of 28% for pages in the **.de** domain. That is to say, 74% of Web pages reported by Google in the **.us** domain were hosted at United States-related ISP IP addresses, whereas only 28% of the pages reported in the **.de** domain were hosted at German ISP IP addresses. Other domains with a relatively high share of apparent “local hosting” included **.ca** (Canada), **.ch** (Switzerland) and **.se** (Sweden). Domains with a relatively low share of apparent local hosting included **.de** (Germany), **.jp** (Japan), **.cz** (Czech Republic), **.pl** (Poland) and **.is** (Iceland).

A country's content can be said to consist of content under its country ccTLD and content under generic top level domains gTLDs that is hosted within that country's ISP IP address spaces – effectively

### Box 5.3. Factors affecting the apparent location of Web content

A variety of factors affect the location of Web content, including:

- Multinational firms hosting country-oriented content sites in their country of origin, or at regional rather than national centres –for example, IBM Australia's Web page ([www.ibm.com.au](http://www.ibm.com.au)) is in the United States, not Australia.
- Multinational ISPs hosting their customers' Web sites in the ISP's country of origin, or at regional rather than national centre –for example, the Adobe customer forums page ([forums.adobe.co.jp](http://forums.adobe.co.jp)) hosted by WebCrossing is in the United States, not Japan.
- Multinational ISPs using IP address allocations to host content for clients from other countries of origin –for example, NTT/Verio ([www.verio.com](http://www.verio.com)).

Indeed, there are many reasons for content being hosted outside its apparent locale, and for the content not being where it appears to be from the search engine's examination of the ISP's IP address block. Consequently, the data presented in Table 5.10 is no more than indicative.

gTLD adjusting content. Looked at in this way, the proportion of a country's total content that appears to be hosted overseas is the ratio of ccTLD pages not under national ISP IP addresses to the sum of pages in the ccTLD and total gTLD pages found within the country's ISP IP address space. In August 2002, countries with relatively high levels of apparently domestic content hosting (*i.e.* share of Web pages hosted within national ISP IP addresses) included the United States (with 95%), Canada (91%), Luxembourg (90%), Spain and Switzerland (84%), Belgium (83%), Sweden (82%), the United Kingdom (81%) and Finland (80%). Countries with relatively low levels of apparently domestic content hosting included Germany (44%), Japan (50%), the Czech Republic and Poland (54%), the Slovak Republic (55%) and Hungary (59%).

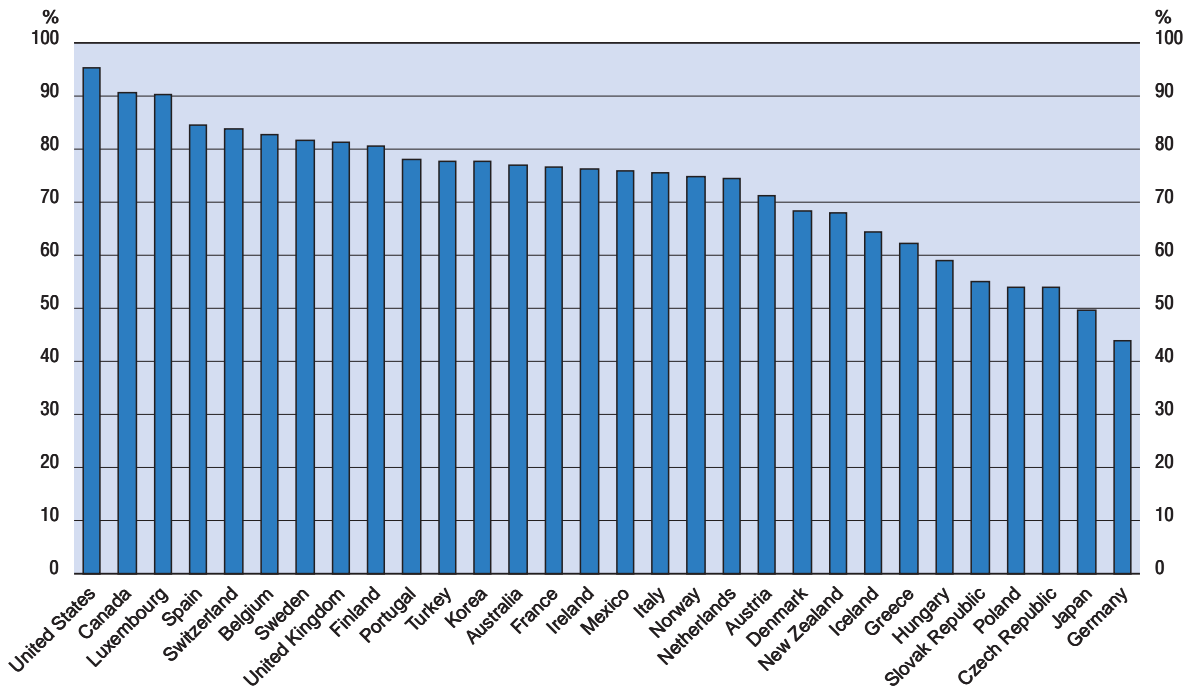
The share of "local" Web pages that are under gTLDs indicates something about national preferences for generic global addresses (gTLDs) over national addresses (ccTLDs) –a low share suggesting a preference for the country code domain and national recognition, and a high share a preference for generic or global identity. However, it should be noted that a high share of gTLDs could also indicate relatively high levels of hosting of non-country code domain related content, or relatively expensive or restrictive ccTLD domain name registration policy. Hence, Figures 5.10 and 5.11 should be looked at together.

Calculating the ratio of gTLD pages within national ISP IP address blocks to the sum of gTLD and ccTLD pages within those blocks in August 2002 revealed that 87% of Web pages hosted under domestic Luxembourg ISP IP addresses were under gTLDs, as were 86% of those under domestic United States ISP IP addresses, 73% of those under domestic Canadian ISP IP addresses, 71% of those under domestic Spanish ISP IP addresses and 70% of those under domestic Turkish ISP IP addresses. This may indicate some preference for global branding in those countries. In contrast, only 12% of Web pages hosted under domestic Slovak ISP IP addresses were under gTLDs, as were 22% of those under domestic Polish ISP IP addresses, 25% of those under domestic Hungarian ISP IP addresses, 28% of those under domestic Czech ISP IP addresses and 30% of those under domestic Greek ISP IP addresses. This may suggest a greater preference for national branding in these countries.

#### Domain names

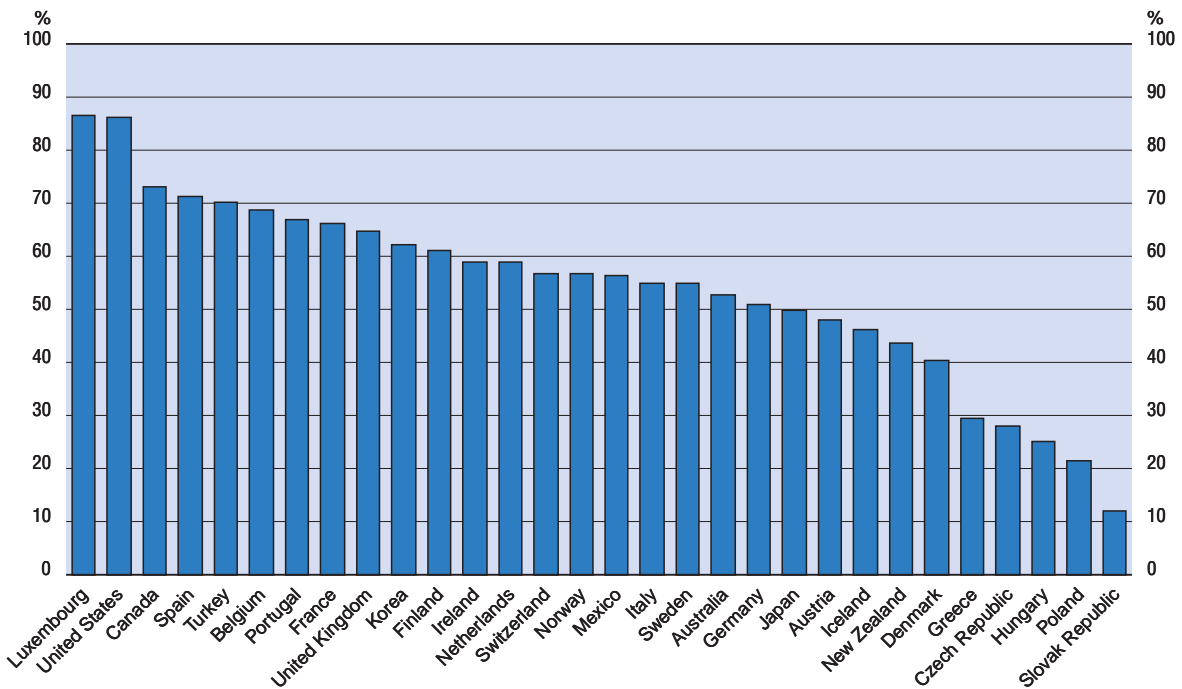
The domain name system (DNS) translates Internet addresses back and forth between domain names and IP numbers. Whereas an IP number is an address, a domain name is the online equivalent of a business or personal name. Domain names enable users to find and refer to a person or organisation

Figure 5.10. Share of Web pages hosted within domestic ISP IP address space, August 2002



Source: OECD.

Figure 5.11. Share of Web pages that are gTLDs, August 2002



Source: OECD.

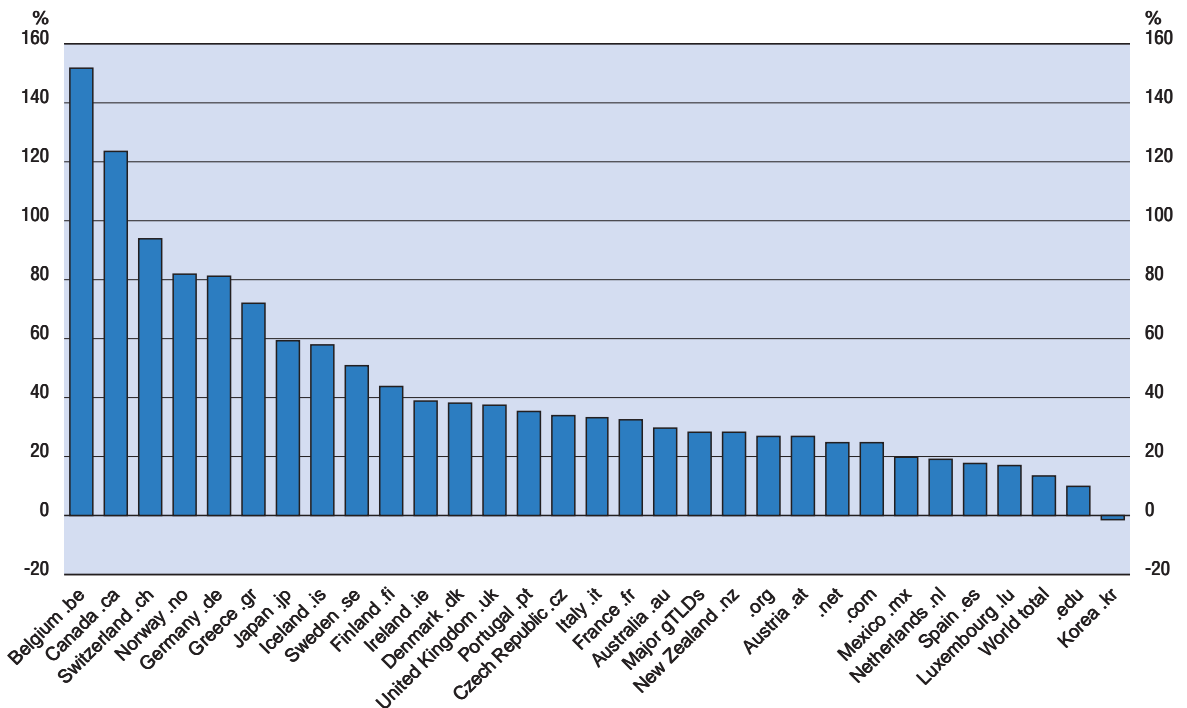
in a way that is easily recognisable, and allow businesses to use recognised business and brand names in the online world.

**Domain name registrations**

In July 2002, there were almost 31 million domain names registered worldwide, an increase of almost 7 million from 24 million in July 2000 (Table 5.11). Hence, the number of registered domain names worldwide has increased by 13% per year over the last two years. In July 2002, the major gTLDs accounted for 94% of total registered domain names, with 21 million domain names or 69% of the world total registered under **.com** and a further 5.9 million or 19% registered under **.net** and **.org**. The remaining gTLDs, **.biz**, **.info** and so forth make up the remaining 8%. There are incomplete data for **.mil** and **.us**. Hence, a total for domain name registrations under domains relating to the United States is not available. Data are also incomplete for **.hu** (Hungary), **.pl** (Poland) and **.tr** (Turkey). Among other OECD countries, the largest number of registered domain names occur under **.de** (Germany) with 5.7 million, **.uk** (United Kingdom) with 3.6 million, **.nl** (Netherlands) with 748 510 and **.it** (Italy) with 735 156.

Worldwide, the number of registered domain names increased by 13% per annum between July 2000 and July 2002. The major gTLDs have experienced somewhat stronger growth, with registrations under **.org** increasing 27% per annum, those under **.net** increasing 25% per annum and those under **.com** increasing 24% per annum (Figure 5.12). Registrations under ccTLDs exhibit wide variation in growth rates. Registrations under **.be** (Belgium) increased by more than 150% per annum and those under **.ca** (Canada) by 124% per annum, while registrations under **.mx** (Mexico), **.nl** (Netherlands), **.es** (Spain) and **.lu** (Luxembourg) increased by less than 20% per annum. The only OECD

Figure 5.12. **Growth in domain name registrations by domain, 2000-2002**



Note: ".ch" registrations relate to end 2001 rather than July 2002.  
 Source: OECD, compiled from country and generic NICs, August 2002.

ccTLD to have experienced a decline in the number of domain name registrations was .kr (Korea), which reported 494 074 registered domain names in July 2000 and 479 643 in July 2002.

### Regional development of the Internet

Tracking address space allocations reveals a good deal about the growth and regional development of the Internet. Internet address space allocation is handled by national Internet registries operating under three main regional Internet registries – ARIN (the Americas), RIPE NCC (Europe) and APNIC (the Asia-Pacific). These registries co-ordinate Internet address allocation for their regions. APNIC collects data, which provide a picture of the growth and regional distribution of Internet activity. APNIC's statistics are drawn from the Internet Protocol Version 4 (IPv4) routing table of the APNIC router located at WIDE in Japan (ASN 4777). Because of the use of routing aggregation the Internet will look somewhat different from different routers, but these data give an overview of the regional development. To date, there has been limited allocation of IPv6 address space. To the end of 2001, RIPE NCC had made 51 IPv6 allocations, APNIC 48 and ARIN only 20. Hence, IPv4 allocations still provide a reasonable overview of the regional development of the Internet.

During July 2002, an average of 114 575 routes were announced (*i.e.* entries in the routing table) (Table 5.12). Globally, an average of just over 31% of the possible publicly available IPv4 Internet address space was announced during July 2002. Of the IPv4 Internet address space that has been allocated to Internet registries, an average of almost 58% was being advertised (*i.e.* made available for public access). An average of 72% of the IP address space allocated to the Americas through ARIN was being advertised on the Internet during July 2002. A somewhat higher average level of almost 75% of the IP address space allocated to Europe through RIPE NCC was being advertised, and 59% of the space allocated to the Asia-Pacific through APNIC was being advertised.

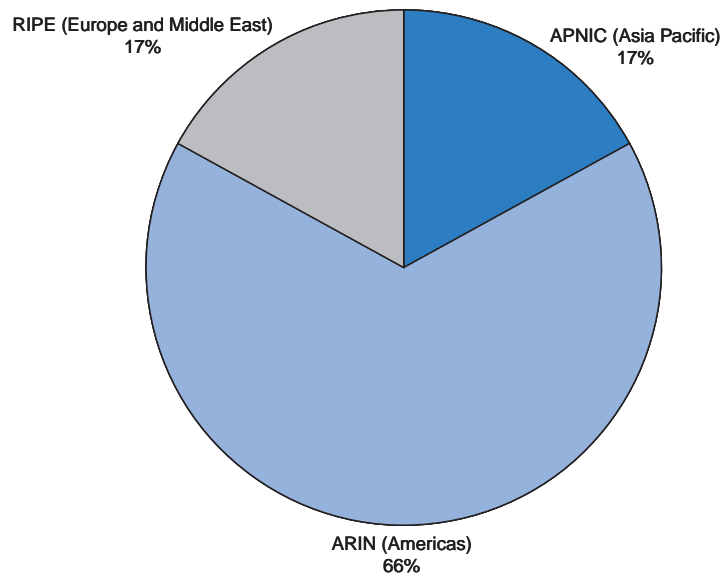
Autonomous system numbers (ASNs) identify autonomous systems (ASes), which are groupings of IP connected networks that share a common routing policy. In practice, ASNs and ASes refer to major networks, such as large international ISPs. Globally, there was an average of 13 458 ASes originating routes and 1 810 advertising transit routes in July 2002. An average of 5 164 ASes were advertising just one route. This gives some indication of the distribution of major national ISPs, international ISPs and international IP traffic carriers operating on Internet at that time.

In July 2002, the following regional characteristics could be observed:

- *Routes*: During July 2002, the largest regional share of routes being announced was the Americas (ARIN), with an average of 76 148 routes being announced –around 66% of all routes announced to Internet. Europe (RIPE NCC) showed an average of 19 458 routes or 17%, and the Asia-Pacific (APNIC) showed an average 18 969 routes, just less than 17% of all Internet routes announced (Figure 5.13).
- *Connecting networks*: The Americas (ARIN) also showed the largest share of networks originating routes (*i.e.* connecting networks to the Internet) at 7 918, or 59% of the average total of networks originating routes globally during July 2002. Europe (RIPE NCC) showed 3 917 or 29% of total, and the Asia-Pacific (APNIC) 1 573 or 12%.
- *International transit*: Europe (RIPE NCC) showed a somewhat higher relative share of international transit providers, at around 41% of monthly average during July 2002 –reflecting the geography of the region. The Americas (ARIN) accounted for 43%, and the Asia-Pacific (APNIC) for just 15%.
- *Local ISPs*: No less than 49% of the ASes advertising just one route were doing so from the Americas (ARIN). During July 2002, 41% of the average number of networks advertising just one route did so from Europe through RIPE NCC, and the remaining 10% did so through APNIC in the Asia-Pacific.

Comparing monthly averages for July 2002 with those from July 2000 indicates the rate of growth and the changing nature of Internet service provision. Despite the industry downturn of 2000 and the financial pressures on players in the industry through 2001, demand for IPv4 address space has remained strong. Between July 2000 and July 2002, the number of routes advertised increased by 35%,

Figure 5.13. **Regional share of routes announced to the Internet, July 2002**



Source: APNIC (<http://www.apnic.net/stats/bgp>)

with stronger growth in Asia and Europe (APINIC up 50% and RIPE up 48%) than in the Americas (ARIN up 33%). The number of ASes announcing routes increased significantly faster. The number of ASes advertising transit routes increased by 59% over the two-year period, with stronger growth in Europe and Asia than in the Americas. The number of ASes originating routes increased by 67%, and the number of ASes advertising one route increased by 92% –more than doubling in Europe.

These data show that the Internet is experiencing continuing growth. They also indicate the extent to which the Internet continues to reflect its North American roots, although the pace of development in Asia and Europe is faster. These data also suggest some increase in the number of service providers active in the provision of Internet networking services, despite recent consolidation in the industry.

Table 5.1. Internet subscribers to fixed networks, 1999-2001

	December 1999	December 2000	December 2001	Per 100 inhabitants 1999	Per 100 inhabitants 2001	Annual growth 1999-2001 %
Australia	2 407 407	3 849 000	4 273 000	12.7	21.9	33.2
Austria	486 364	992 000	1 675 000	6.0	20.6	85.6
Belgium	735 303	1 150 214	1 424 516	7.2	13.9	39.2
Canada	3 341 000	4 759 000	7 030 000	11.0	22.6	45.1
Czech Republic	199 000	418 448	457 016	1.9	4.4	51.5
Denmark	1 135 393	1 684 167	2 023 462	21.3	37.8	33.5
Finland	564 000	810 000	950 000	10.9	18.3	29.8
France	3 030 000	5 263 000	6 986 500	5.2	11.8	51.8
Germany	9 000 000	11 066 102	14 900 000	11.0	18.1	28.7
Greece	199 960	271 278	505 000	1.9	4.8	58.9
Hungary	137 014	220 395	301 828	1.4	3.0	48.4
Iceland	49 125	117 500	168 000	17.7	58.9	84.9
Ireland	405 000	583 636	600 000	10.8	15.6	21.7
Italy	5 200 000	7 800 000	8 300 000	9.1	14.5	26.3
Japan	10 590 000	18 126 945	24 061 695	8.4	18.9	50.7
Korea	10 860 000	19 040 000	23 114 431	23.3	48.8	45.9
Luxembourg <sup>1</sup>	11 411	24 500	80 000	..	18.1	..
Mexico	718 000	1 132 000	1 984 783	0.7	2.0	66.3
Netherlands	2 834 375	3 783 784	4 000 000	17.9	25.0	18.8
New Zealand	480 000	542 234	644 000	12.6	16.7	15.8
Norway	717 921	1 178 552	1 237 597	16.1	27.4	31.3
Poland	..	..	2 989 000	..	7.7	..
Portugal	474 389	1 299 465	1 823 529	4.7	18.1	96.1
Slovak Republic	46 813	67 661	100 099	0.9	1.9	46.2
Spain	2 241 092	3 222 400	3 673 959	5.7	9.1	28.0
Sweden	1 880 000	2 306 800	2 849 000	21.2	32.0	23.1
Switzerland	898 000	1 666 341	2 221 960	12.6	30.7	57.3
Turkey	1 500 000	2 500 000	3 400 000	2.3	5.0	50.6
United Kingdom	7 400 000	12 600 000	13 600 000	12.4	22.7	35.6
United States	49 723 100	68 481 217	77 500 000	18.2	27.2	24.8
OECD	117 264 667	174 956 639	212 874 375	10.5	18.7	34.7
EU	35 597 287	52 857 346	63 390 966	9.5	16.8	33.4

1. Only includes P&T Luxembourg subscribers for 1999-2000.

Source: OECD.

Table 5.2. **Broadband access, 2000-2001**

	DSL December 2000	Cable December 2000	Total December 2000	DSL December 2001	Cable December 2001	Other December 2001	Total December 2001	Growth 2000-01 %	Per 100 inhabitants 2001
Australia	10 000	64 000	74 000	65 000	110 000	5 000	180 000	143.2	0.9
Austria	39 000	99 000	138 000	101 000	192 000	..	293 000	112.3	3.6
Belgium	43 000	102 013	145 013	230 000	201 000	3 674	434 674	199.7	4.2
Canada	465 600	927 000	1 392 600	1 060 000	1 670 000	..	2 730 000	96.0	8.8
Czech Republic	0	10 000	10 000	100	12 000	..	12 100	21.0	0.1
Denmark	26 399	41 000	67 399	151 775	87 500	..	239 275	255.0	4.5
Finland	15 000	15 000	30 000	43 500	24 500	..	68 000	126.7	1.3
France	64 000	121 911	185 911	430 000	189 343	..	619 343	233.1	1.0
Germany	162 000	25 000	187 000	1 870 000	34 500	34 000	1 938 500	936.6	2.4
Greece	72	0	72	72	0	..	72	0.0	0.0
Hungary	400	1 904	2 304	6 200	17 419	2 460	26 079	1 031.9	0.3
Iceland	2 035	0	2 035	9 978	0	500	10 478	414.9	3.7
Ireland	300	0	300	300	100	..	400	33.3	0.01
Italy	114 900	0	114 900	390 000	0	25 000	415 000	261.2	0.7
Japan	9 732	625 000	634 732	1 524 348	1 303 000	12 000	2 839 348	347.3	2.2
Korea	3 870 293	1 556 072	5 426 365	5 178 323	2 936 280	31 398	8 146 001	50.1	17.2
Luxembourg	0	0	0	1 215	15	..	1 230	..	0.3
Mexico	0	15 000	15 000	29 854	15 000	..	44 854	199.0	0.05
Netherlands	10 000	320 000	330 000	138 000	400 000	200	538 200	63.1	3.4
New Zealand	9 676	658	10 334	25 579	2 000	..	27 579	166.9	0.7
Norway	943	16 344	17 287	36 137	45 339	6 379	87 855	408.2	1.9
Poland	0	0	0	1 796	10 000	..	11 796	..	0.03
Portugal	0	25 154	25 154	3 300	93 836	..	97 136	286.2	1.0
Slovak Republic	0	0	0	0	420	..	420	..	0.01
Spain	44 956	13 459	58 415	375 816	98 466	..	474 282	711.9	1.2
Sweden	49 000	56 300	105 300	242 100	115 500	126 600	484 200	359.8	5.4
Switzerland	4 416	56 475	60 891	35 124	98 753	..	133 877	119.9	1.9
Turkey	292	4 167	4 459	2 818	7 897	..	10 715	140.3	0.02
United Kingdom	38 000	19 693	57 693	140 000	208 000	2 000	350 000	506.7	0.6
United States	2 429 189	3 580 000	6 009 189	3 947 808	7 050 000	1 785 406	12 783 214	112.7	4.5
OECD	7 409 203	7 695 150	15 104 353	16 040 143	14 922 868	2 034 617	32 997 628	118.5	2.9
EU	606 627	838 530	1 445 157	4 117 078	1 644 760	191 474	5 953 312	311.9	1.6

Notes: "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 kbit/s).

Source: OECD.

Table 5.3. Broadband access to end June 2002

Country	DSL December 2001	Cable December 2001	Other December 2001	Total December 2001	DSL June 2002	Cable June 2002	Other June 2002	Total June 2002	Growth %	Per 100 inhabitants June 2002
Australia	65 000	110 000	5 000	180 000	111 800	140 900	8 400	261 100	31.1	1.3
Austria	101 000	192 000	0	293 000	136 000	207 800	..	343 800	14.8	4.2
Belgium	230 000	201 000	3 674	434 674	362 000	259 036	23 824	644 860	32.6	6.3
Canada	1 060 000	1 670 000	..	2 730 000	1 330 800	1 848 000	..	3 178 800	14.1	10.2
Czech Republic	100	12 000	..	12 100	100	12 000	..	12 100	0.0	0.1
Denmark	151 775	87 500	..	239 275	233 000	121 789	5 784	360 573	33.6	6.7
Finland	43 500	24 500	..	68 000	119 000	51 000	..	170 000	60.0	3.3
France	430 000	189 343	..	619 343	730 000	233 579	..	963 579	35.7	1.6
Germany	1 870 000	34 500	34 000	1 938 500	2 500 000	39 100	50 000	2 589 100	25.1	3.1
Greece	72	0	..	72	72	0	..	72	0.0	0.001
Hungary	6 200	17 419	2 460	26 079	18 781	19 200	..	37 981	31.3	0.4
Iceland	9 978	0	500	10 478	12 900	0	500	13 400	21.8	4.7
Ireland	300	100	..	400	1 200	800	..	2 000	80.0	0.1
Italy	390 000	0	25 000	415 000	585 000	0	100 000	685 000	39.4	1.2
Japan	1 524 348	1 303 000	12 000	2 839 348	3 300 926	1 626 000	87 100	5 014 026	43.4	3.9
Korea	5 178 323	2 936 280	31 398	8 146 001	5 734 690	3 287 464	36 363	9 058 517	10.1	19.1
Luxembourg	1 215	15	..	1 230	2 670	15	..	2 685	54.2	0.6
Mexico	29 854	15 000	..	44 854	51 786	15 000	..	66 786	32.8	0.1
Netherlands	138 000	400 000	200	538 200	192 000	432 400	..	624 400	13.8	3.9
New Zealand	25 579	2 000	..	27 579	39 000	4 500	..	43 500	36.6	1.1
Norway	36 137	45 339	6 379	87 855	75 000	46 300	..	121 300	27.6	2.7
Poland	1 796	10 000	..	11 796	4 000	10 700	..	14 700	19.8	0.04
Portugal	3 300	93 836	..	97 136	5 203	145 304	..	150 507	35.5	1.5
Slovak Republic	0	420	..	420	0	420	..	420	0.0	0.01
Spain	375 816	98 466	..	474 282	660 861	180 191	..	841 052	43.6	2.1
Sweden	242 100	115 500	126 600	484 200	344 000	127 600	150 000	621 600	22.1	7.0
Switzerland	35 124	98 753	..	133 877	101 177	180 000	..	281 177	52.4	3.9
Turkey	2 818	7 897	..	10 715	2 971	11 920	..	14 891	28.0	0.02
United Kingdom	140 000	208 000	2 000	350 000	299 000	452 994	..	751 994	53.5	1.3
United States	3 947 808	7 050 000	1 785 406	12 783 214	5 082 856	9 200 000	1 785 406	16 068 262	20.4	5.6
OECD	16 040 143	14 922 868	2 034 617	32 997 628	22 036 793	18 654 012	2 247 377	42 938 182	23.2	3.8
EU	4 117 078	1 644 760	191 474	5 953 312	6 170 006	2 251 608	329 608	8 751 222	32.0	2.3

Notes: "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 kbit/s).

Source: OECD.

Table 5.4. Leased lines connected to internet, 2000-2001

	End 2000	End 2001	Growth %	Per 100 000 inhabitants
Australia	2 157	5 517	155.8	28.3
Austria	3 025	4 138	36.8	50.9
Belgium	2 677	3 268	22.1	31.8
Canada	10 008	12 455	24.5	40.1
Czech Republic	2 645	3 219	21.7	31.3
Denmark	3 382	4 742	40.2	88.5
Finland	2 437	3 094	27.0	59.6
France	6 743	9 473	40.5	16.0
Germany	18 549	24 719	33.3	30.0
Greece	1 333	1 555	16.7	14.6
Hungary	2 810	3 219	14.6	31.6
Iceland	241	255	5.8	89.4
Ireland	855	1 089	27.4	28.4
Italy	6 833	10 681	56.3	18.6
Japan	39 210	45 187	15.2	35.5
Korea	10 046	11 000	9.5	23.2
Luxembourg	232	299	28.9	67.8
Mexico	1 169	1 427	22.1	1.4
Netherlands	8 208	10 358	26.2	64.8
New Zealand	856	923	7.8	24.0
Norway	3 124	3 590	14.9	79.5
Poland	3 674	5 214	41.9	13.5
Portugal	2 677	2 719	1.6	27.0
Slovak Republic	437	465	6.4	8.6
Spain	2 333	3 075	31.8	7.6
Sweden	5 305	6 589	24.2	74.1
Switzerland	3 263	4 211	29.1	58.2
Turkey	623	890	42.9	1.3
United Kingdom	18 315	26 451	44.4	44.1
United States	103 624	123 461	19.1	43.3
OECD	266 791	333 283	24.9	29.3
EU	82 904	112 250	35.4	29.7
World	295 962	374 124	26.4	..

Note: Data for Australia and Korea are adjusted for monthly fluctuation for December 2000 and include November 2000 leased lines.

Source: Netcraft ([www.netcraft.com](http://www.netcraft.com)), OECD.

Table 5.5. Internet hosts by domain, 1998-2002

	Domain	Hosts July 1998 (‘000)	Hosts July 2000 (‘000)	Hosts July 2002 (‘000)	Annual growth 1998-2002 %
Australia	.au	750	1 311	2 497	35.1
Austria	.at	132	350	721	52.8
Belgium	.be	154	361	833	52.6
Canada	.ca	1 028	1 815	3 130	32.1
Czech Republic	.cz	66	138	231	36.9
Denmark	.dk	190	370	872	46.3
Finland	.fi	514	704	986	17.7
France	.fr	431	983	2 053	47.7
Germany	.de	1 154	1 917	2 923	26.1
Greece	.gr	40	106	185	46.5
Hungary	.hu	74	130	228	32.5
Iceland	.is	21	38	65	33.2
Ireland	.ie	45	86	97	21.3
Italy	.it	321	1 574	2 959	74.3
Japan	.jp	1 352	3 413	8 714	59.3
Korea	.kr	175	476	412	23.9
Luxembourg	.lu	6	12	18	30.6
Mexico	.mx	84	496	1 005	86.0
Netherlands	.nl	515	1 082	2 150	43.0
New Zealand	.nz	178	310	420	23.9
Norway	.no	312	504	634	19.4
Poland	.pl	99	260	731	64.9
Portugal	.pt	45	117	267	56.0
Slovak Republic	.sk	14	32	77	52.8
Spain	.es	243	539	1 682	62.1
Sweden	.se	381	624	1 188	32.9
Switzerland	.ch	206	418	668	34.2
Turkey	.tr	28	108	165	56.0
United Kingdom	.uk	1 191	2 081	2 508	20.5
United States		7 786	11 817	14 296	16.4
	.us	1 302	2 251	1 875	9.5
	.edu	4 464	6 678	7 381	13.4
	.mil	1 359	1 916	1 919	9.0
	.gov	613	828	700	3.4
	.arpa	48	144	2 421	166.6
gTLDs		18 006	57 225	101 723	54.2
	.com	10 305	32 696	43 815	43.6
	.net	7 055	23 432	56 646	68.3
	.org	645	1 088	1 239	17.7
	.int	1	9	10	84.7
	.biz			8	
	.info			6	
World total		36 739	93 048	162 128	44.9

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

Table 5.6. **Web sites (servers) by country, 2000-2002**

	Web sites July 2000	Web sites July 2002	Sites per 1000 inhabitants (2000)	Sites per 1000 inhabitants (2002)	Annual growth %
Australia	176 505	282 139	9.2	14.5	26.4
Austria	87 485	183 783	10.8	22.6	44.9
Belgium	60 851	132 987	5.9	13.0	47.8
Canada	746 796	1 022 949	24.3	32.9	17.0
Czech Republic	59 926	121 552	5.8	11.8	42.4
Denmark	111 312	384 341	20.8	71.7	85.8
Finland	36 869	69 002	7.1	13.3	36.8
France	252 399	624 250	4.3	10.5	57.3
Germany	1 802 855	6 970 691	21.9	84.7	96.6
Greece	12 569	25 209	1.2	2.4	41.6
Hungary	27 109	62 425	2.7	6.1	51.7
Iceland	5 068	9 806	18.0	34.4	39.1
Ireland	12 050	22 260	3.2	5.8	35.9
Italy	346 903	740 946	6.1	12.9	46.1
Japan	199 332	371 794	1.6	2.9	36.6
Korea	309 807	521 388	6.6	11.0	29.7
Luxembourg	3 264	4 895	7.4	11.1	22.5
Mexico	16 289	30 526	0.2	0.3	36.9
Netherlands	269 546	770 259	16.9	48.2	69.0
New Zealand	40 133	58 879	10.5	15.3	21.1
Norway	134 773	299 657	30.0	66.4	49.1
Poland	75 993	176 065	2.0	4.6	52.2
Portugal	17 137	36 687	1.7	3.6	46.3
Slovak Republic	14 989	33 676	2.8	6.3	49.9
Spain	118 841	265 934	3.0	6.6	49.6
Sweden	170 929	249 132	19.3	28.0	20.7
Switzerland	120 134	148 218	16.7	20.5	11.1
Turkey	22 318	62 875	0.3	0.9	67.8
United Kingdom	1 436 313	3 852 471	24.0	64.2	63.8
United States	12 569 533	18 167 665	45.6	63.7	20.2
OECD	19 258 028	35 702 461	17.2	31.4	36.2
EU	4 739 323	14 332 847	12.6	37.9	73.9

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

Table 5.7. Secure servers in OECD countries, 1998-2002

	Secure servers July 1998	Secure servers July 2000	Secure servers July 2002	Per 100 000 inhabitants July 1998	Per 100 000 inhabitants July 2000	Per 100 000 inhabitants July 2002	Annual growth 1998-2002 %
Australia	632	2 828	4 693	3.4	14.7	24.1	65.1
Austria	98	447	949	1.2	5.5	11.7	76.4
Belgium	52	268	439	0.5	2.6	4.3	70.5
Canada	929	3 896	7 768	3.1	12.7	25.0	70.0
Czech Republic	19	194	185	0.2	1.9	1.8	76.6
Denmark	44	289	660	0.8	5.4	12.3	96.8
Finland	68	343	744	1.3	6.6	14.3	81.9
France	222	1 297	2 511	0.4	2.2	4.2	83.4
Germany	492	3 761	7 987	0.6	4.6	9.7	100.7
Greece	8	87	170	0.1	0.8	1.6	114.7
Hungary	18	90	86	0.2	0.9	0.8	47.8
Iceland	13	67	136	4.7	23.8	47.7	79.8
Ireland	56	245	579	1.5	6.5	15.1	79.3
Italy	167	795	1 167	0.3	1.4	2.0	62.6
Japan	429	2 900	7 179	0.3	2.3	5.6	102.3
Korea	38	243	562	0.1	0.5	1.2	96.1
Luxembourg	11	44	97	2.6	10.0	22.0	72.3
Mexico	26	176	324	0.0	0.2	0.3	87.9
Netherlands	127	541	1 332	0.8	3.4	8.3	80.0
New Zealand	90	482	983	2.4	12.6	25.5	81.8
Norway	55	273	528	1.2	6.1	11.7	76.0
Poland	23	188	373	0.1	0.5	1.0	100.7
Portugal	27	116	214	0.3	1.2	2.1	67.8
Slovak Republic	15	45	38	0.3	0.8	0.7	26.2
Spain	239	759	1 315	0.6	1.9	3.3	53.2
Sweden	145	811	1 246	1.6	9.1	14.0	71.2
Switzerland	152	854	1 555	2.1	11.9	21.5	78.8
Turkey	7	116	400	0.0	0.2	0.6	174.9
United Kingdom	714	4 404	10 288	1.2	7.4	17.1	94.8
United States	14 674	65 565	106 884	5.4	23.8	37.5	64.3
OECD	19 590	92 124	161 392	1.8	8.2	14.2	69.4
EU	3 004	16 588	33 442	0.8	4.4	8.8	82.7
World	20 455	96 585	169 321				69.6

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

Table 5.8. References to secure servers by domain, August 2002

	Domain	Https pages August 2002	Share of world total %
Australia	.au	118 000	1.6
Austria	.at	11 700	0.2
Belgium	.be	2 540	0.03
Canada	.ca	55 900	0.8
Czech Republic	.cz	61 200	0.8
Denmark	.dk	6 890	0.1
Finland	.fi	25 500	0.3
France	.fr	38 000	0.5
Germany	.de	402 000	5.5
Greece	.gr	2 200	0.03
Hungary	.hu	29 400	0.4
Iceland	.is	2 950	0.04
Ireland	.ie	1 070	0.01
Italy	.it	19 600	0.3
Japan	.jp	258 000	3.5
Korea	.kr	10 400	0.1
Luxembourg	.lu	652	0.01
Mexico	.mx	22 600	0.3
Netherlands	.nl	23 500	0.3
New Zealand	.nz	69 200	0.9
Norway	.no	38 400	0.5
Poland	.pl	20 800	0.3
Portugal	.pt	3 250	0.04
Slovak Republic	.sk	2 190	0.03
Spain	.es	28 100	0.4
Sweden	.se	28 000	0.4
Switzerland	.ch	86 400	1.2
Turkey	.tr	2 980	0.04
United Kingdom	.uk	232 000	3.2
United States		815 800	11.1
	.us	25 400	0.3
	.gov	29 400	0.4
	.mil	263 000	3.6
	.edu	498 000	6.8
Total gTLDs		3 456 039	47.0
	.com	2 280 000	31.0
	.net	621 000	8.4
	.org	541 000	7.4
	.int	409	0.01
	.biz	9 990	0.1
	.info	3 640	0.05
OECD ccTLD		2 419 222	32.9
EU ccTLD		1 215 230	16.5
World Total		7 360 000	100.0

Note: Sample taken using Google, August 2002.

Source: OECD.

Table 5.9. References to secure servers by country, August 2002

	Links to https	Share of OECD total %
Australia	167 000	3.5
Austria	1 830	0.04
Belgium	5 810	0.1
Canada	298 000	6.2
Czech Republic	68 000	1.4
Denmark	8 610	0.2
Finland	100 000	2.1
France	84 100	1.8
Germany	482 000	10.0
Greece	1 700	0.04
Hungary	31 900	0.7
Iceland	2 620	0.1
Ireland	1 600	0.03
Italy	64 600	1.3
Japan	403 000	8.4
Korea	17 800	0.4
Luxembourg	4 750	0.1
Mexico	65 100	1.4
Netherlands	48 800	1.0
New Zealand	67 100	1.4
Norway	42 800	0.9
Poland	21 300	0.4
Portugal	2 030	0.04
Slovak Republic	1 440	0.03
Spain	156 000	3.2
Sweden	34 000	0.7
Switzerland	155 000	3.2
Turkey	39 300	0.8
United Kingdom	279 000	5.8
United States	2 150 000	44.7
EU	1 274 830	26.5
OECD	4 805 190	100.0

Note: Taken as a sample from Google, August 2002.

Source: OECD.

Table 5.10. Web pages by domain and country, August 2002

Country	Domain	Web pages in ccTLD ('000)	ccTLD pages under national ISP IP address ('000)	ccTLD pages under foreign ISP IP address block ('000)	.com under domestic ISP IP address ('000)	.net under domestic ISP IP address ('000)	.org under domestic ISP IP address ('000)	.int under domestic ISP IP address ('000)	.biz under domestic ISP IP address ('000)	.info under domestic ISP IP address ('000)	Total gTLDs under domestic ISP IP address ('000)	Share of pages hosted outside domestic ISP IP address
Australia	.au	5 700	3 490	2 210	2 440	840	600	0	0	5	3 885	23.1
Austria	.at	4 010	2 260	1 750	1 020	330	688	1	7	28	2 073	28.8
Belgium	.be	1 890	1 130	760	1 320	337	567	263	1	1	2 489	17.4
Canada	.ca	5 850	4 240	1 610	6 030	2 940	2 450	5	14	129	11 568	9.2
Czech Republic	.cz	4 690	2 140	2 550	484	158	141	0	3	48	834	46.2
Denmark	.dk	4 080	2 290	1 790	862	243	424	9	2	5	1 544	31.8
Finland	.fi	2 570	1 580	990	1 290	941	244	1	0	8	2 485	19.6
France	.fr	8 340	4 370	3 970	4 270	1 860	2 320	0	4	83	8 537	23.5
Germany	.de	24 900	6 900	18 000	3 450	1 800	1 620	25	45	247	7 187	56.1
Greece	.gr	1 120	601	519	162	35	55	0	0	0	253	37.8
Hungary	.hu	2 120	1 100	1 020	239	54	78	0	0	1	371	40.9
Iceland	.is	536	264	272	61	58	106	0	0	0	225	35.7
Ireland	.ie	1 250	711	539	905	36	81	0	0	0	1 023	23.7
Italy	.it	7 510	4 370	3 140	2 400	1 330	1 450	97	16	61	5 354	24.4
Japan	.jp	20 000	6 610	13 390	3 500	1 760	1 160	2	17	107	6 546	50.4
Korea	.kr	5 030	2 860	2 170	2 570	1 370	646	0	72	53	4 710	22.3
Luxembourg	.lu	169	94	75	28	4	10	562	0	0	604	9.7
Mexico	.mx	1 250	726	524	704	80	146	0	0	2	933	24.0
Netherlands	.nl	6 110	3 330	2 780	2 240	1 320	1 170	4	9	40	4 782	25.5
New Zealand	.nz	2 180	1 190	990	672	201	54	0	0	1	928	31.9
Norway	.no	3 580	2 020	1 560	1 330	803	481	28	2	13	2 656	25.0
Poland	.pl	5 460	2 610	2 850	345	250	108	0	2	12	717	46.1
Portugal	.pt	1 290	700	590	365	181	135	738	0	0	1 419	21.8
Slovak Republic	.sk	1 360	703	657	69	16	7	0	0	4	95	45.1
Spain	.es	3 200	1 950	1 250	2 640	1 110	986	74	3	46	4 859	15.5
Sweden	.se	4 280	2 860	1 420	2 160	731	600	3	2	8	3 504	18.2
Switzerland	.ch	4 320	2 980	1 340	1 660	425	1 470	354	3	16	3 927	16.2
Turkey	.tr	1 180	603	577	936	281	199	2	1	0	1 419	22.2
United Kingdom	.uk	11 300	6 850	4 450	6 310	3 110	2 810	30	31	201	12 492	18.7
United States	.us	5 290	3 890	1 400	9 520	7 320	6 730	39	168	380	24 157	4.8

Table 5.10. **Web pages by domain and country, August 2002** (continued)

Country	Domain	Web pages in ccTLD ('000)	ccTLD pages under national ISP IP address ('000)	ccTLD pages under foreign ISP IP address block ('000)	.com under domestic ISP IP address ('000)	.net under domestic ISP IP address ('000)	.org under domestic ISP IP address ('000)	.int under domestic ISP IP address ('000)	.biz under domestic ISP IP address ('000)	.info under domestic ISP IP address ('000)	Total gTLDs under domestic ISP IP address ('000)	Share of pages hosted outside domestic ISP IP address
Non-OECD												
Argentina	.ar	1 050	614	436	976	150	109	0	0	2	1 237	19.1
Brazil	.br	4 170	2 470	1 700	818	348	196	0	0	0	1 363	30.7
China	.cn	5 840	3 000	2 840	2 860	1 370	435	1	13	17	4 696	27.0
Chinese Taipei	.tw	3 950	2 110	1 840	1 270	578	219	0	33	4	2 103	30.4
Hong Kong, China	.hk	986	524	462	2 050	536	369	0	2	1	2 959	11.7
Malaysia	.my	579	296	283	629	85	77	0	0	5	796	20.6
Russian Fed.	.ru	11 400	4 700	6 700	1 150	748	281	0	6	92	2 277	49.0
Singapore	.sg	893	518	375	1 480	107	98	0	1	0	1 686	14.5
South Africa	.za	1 040	575	465	679	62	63	0	1	5	810	25.1

Note: Taken as a sample from Google, August 2002.

Source: OECD.

Table 5.11. Domain name registrations under top level domains, 2000-2002

Country	Domain	Registrations July 2000	Registrations July 2002	Annual growth %
Australia	.au	148 539	250 000	29.7
Austria	.at	157 387	252 441	26.6
Belgium	.be	32 709	206 989	151.6
Canada	.ca	60 000	300 000	123.6
Czech Republic	.cz	66 555	119 145	33.8
Denmark	.dk	208 300	397 552	38.2
Finland	.fi	17 603	36 210	43.4
France	.fr	89 097	155 554	32.1
Germany	.de	1 732 994	5 666 269	80.8
Greece	.gr	18 670	55 000	71.6
Hungary	.hu	..	81 804	..
Iceland	.is	3 300	8 200	57.6
Ireland	.ie	15 506	29 920	38.9
Italy	.it	417 609	735 156	32.7
Japan	.jp	190 709	482 644	59.1
Korea	.kr	494 074	479 643	-1.5
Luxembourg	.lu	11 404	15 454	16.4
Mexico	.mx	49 947	71 590	19.7
Netherlands	.nl	532 596	748 510	18.5
New Zealand	.nz	67 777	111 000	28.0
Norway	.no	45,541	150 000	81.5
Poland	.pl	56 708	..	..
Portugal	.pt	14 394	26 158	34.8
Slovak Republic	.sk	..	57 091	..
Spain	.es	29 590	40 952	17.6
Sweden	.se	45 241	102 785	50.7
Switzerland <sup>1</sup>	.ch	112 912	422 907	93.5
Turkey	.tr	..	40 059	..
United Kingdom	.uk	1 938 740	3 635 585	36.9
United States				
	.gov	730	..	..
	.mil	..	..	..
	.us	..	269 233	..
	.edu	6 154	7 409	9.7
Major gTLDs		17 476 025	28 756 238	28.3
	.com	13 721 175	21 198 557	24.3
	.net	2 305 075	3 586 124	24.7
	.org	1 449 775	2 328 690	26.7
	.int	..	..	..
	.biz	..	700 962	..
	.info	..	864 457	..
	.name	..	77 448	..

1. ".ch" registrations at end of 2001 rather than July 2002.

Source: OECD, compiled from country and generic NICs, August 2002.

Table 5.12. Regional development of the Internet, 2000-2002

IPv4 space	APNIC (Asia-Pacific)	ARIN (Americas)	RIPE (Europe & Middle East)	Global
<b>2000 (July monthly average)</b>				
% of possible address space being advertised				31.2%
% of allocated address space being advertised	59.7%	86.8%	68.9%	63.5%
Announcements from ASNs	12 661	57 371	13 125	84 700
Originating ASNs	950	4 775	2 091	8 064
Transit ASNs	160	526	406	1 140
Advertising one route	333	1 296	981	2 685
<b>2002 (July monthly average)</b>				
% of possible address space being advertised				31.4%
% of allocated address space being advertised	59.0%	72.2%	74.7%	58.1%
Announcements from ASNs	18 969	76 148	19 458	114 575
Originating ASNs	1 572	7 918	3 917	13 458
Transit ASNs	275	782	737	1 810
Advertising one route	510	2 537	2 117	5 164
<b>Change (percent)</b>				
Announcements from ASNs	49.8%	32.7%	48.3%	35.3%
Originating ASNs	65.5%	65.8%	87.3%	66.9%
Transit ASNs	71.9%	48.7%	81.5%	58.8%
Advertising one route	53.2%	95.8%	115.8%	92.3%

Source: APNIC (<http://www.apnic.net/stats/bgp>).

## GLOSSARY

..	Data not available
2G	Second generation of mobile communications technology
3G	Third generation of mobile communications technology
ACA	Australian Communications Authority
ADSL	Asymmetric digital subscriber line
APNIC	Asia Pacific Network Information Centre
ARIN	American Registry for Internet Numbers
AS	Autonomous systems
ASN	Autonomous system numbers
ASR	Answer seizure ratio
BB	Broadband
BLS	Bureau of Labor Statistics (USA)
CAGR	Compound annual growth rate
ccTLD	Country code top level domain
CPE	Customer premise equipment
CPI	Consumer price index
CRTC	Canadian Radio-television and Telecommunications Commission
CWTA	Canadian Wireless Telecommunications Association
DNS	Domain name system
DSL	Digital subscriber lines
EPO	European Patent Office
EU	European Union
FCC	Federal Communications Commission (USA)
FTP	File transfer protocol
GDP	Gross domestic product
GFCF	Gross fixed capital formation
GPRS	General packet radio service
GSM	Global system for mobile communications
gTLD	Generic top level domain
HICP	Harmonised indices of consumer prices
HTML	Hypertext mark-up language
HTTP	Hypertext transfer protocol
IP	Internet protocol
ISDN	Integrated services digital network
ISP	Internet service provider
ITS	International trade statistics
ITU	International Telecommunication Union
JPO	Japanese Patent Office
Kbit/s	Kilobits per second (Kbps)
LAN	Local area network
LLU	Local loop unbundling
Mbit/s	Megabits per second (Mbps)
MIC	Ministry of Information and Communications (Japan)
MITT	Minutes of international telecommunication traffic
OBS	European Audiovisual Observatory
PC	Personal computer
PCB	Public call boxes
PCS	Personal communications service
PPI	Producers price index
PPP	Purchasing power parities
PSTN	Public switched telecommunication network

<b>PTO</b>	Public telecommunications operator
<b>R&amp;D</b>	Research and development
<b>RIPE NCC</b>	RIPE Network Coordination Centre
<b>SIC</b>	Standard industrial classification
<b>SITC</b>	Standard industrial trade classification
<b>SMEs</b>	Small and medium-sized enterprises
<b>SMS</b>	Short message service
<b>SNA</b>	Statistics of national accounts
<b>SSL</b>	Secure sockets layer
<b>TCBC</b>	Telus Communications British Columbia Inc. (Canada)
<b>TCP/IP</b>	Transmission control protocol/Internet protocol
<b>TLD</b>	Top level domain
<b>UMTS</b>	Universal mobile telecommunications system
<b>URL</b>	Uniform resource locator
<b>USPTO</b>	United States Patent Office
<b>VAT</b>	Value added tax
<b>VoIP</b>	Voice over Internet protocol
<b>WAP</b>	Wireless application protocol
<b>WiFi</b>	Wireless fidelity
<b>W-LAN</b>	Wireless local area network

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