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LOCAL ACCESS PRICING AND E-COMMERCE

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FOREWORD

In May 2000, this report was presented to the Working Party on Telecommunications and Information Services Policy (TISP) and was recommended to be made public by the Committee for Information, Computer and Communication Policy (ICCP).

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MAIN POINTS

The price of access to the Internet, and the structure of this pricing, is one of the key factors in explaining the relative development of electronic commerce across the OECD area. This document examines the performance of different OECD countries, in the development and usage of the Internet, in relation to the pricing of access. The available evidence suggests that there is a growing 'international digital divide' emerging between OECD countries. This conclusion is contrary to a widespread view that the gaps between countries in the development of electronic commerce are narrowing.

The term 'digital divide' is commonly used to refer to those individuals with and without access to information and communication technologies, such as those needed to access the Internet and engage in electronic commerce. This paper, however, incorporates a more expansive definition of the 'digital divide' in order to take into account and evaluate a range of factors, such as the deployment of key infrastructures, that contribute to differences in Internet and electronic commerce development within and across OECD countries. Access to and development of the information and communication resources, that these technologies enable, is increasingly viewed as critical for economic and social development. However the digital divide could also be said to exist between different countries, with the ability of individuals to take advantage of the Internet varying significantly across the OECD area. The level, and structure, of pricing for Internet access is one of the major constraints facing users and potential users. The document reviews new pricing structures that are emerging to facilitate increasing access and use of the Internet. The document concludes that the key to greater tariff innovation to support electronic commerce is to increase competition. Where competition is most advanced, at the local level, the benefits of pricing innovation are increasingly evident.

In order to set a context the document reviews and develops indicators related to Internet development and usage. For example, the penetration rate of Internet hosts for the United States is three times the average for the OECD area, seven times that of the EU area and just over eight times that of Japan. In March 2000, the United States added three times more secure servers than the rest of the OECD in total. This meant, on a per capita basis, that the United States added 10 times more secure servers, for that month, than the rest of the OECD. At the same time usage of the Internet in the United States and a small number of other countries with pricing structures favourable to Internet access, as reflected in average online times, is far longer than counterparts in other OECD countries. This is encouraging the development of new content and services, including multimedia services supporting electronic commerce, at a much faster rate than in countries where pricing is not favourable to electronic commerce.

For policy makers or regulators the preferable response to the challenges of the international digital divide, would not be to mandate particular tariff structures (*e.g.* unmetered access), even if the evidence is mounting that they are more appropriate for electronic commerce. This would be a retrograde step in that it would return policy makers to setting telecommunication tariffs. Rather the document highlights other policy options that are available, including:

- High level policy support for a greater range of tariff options, in particular pricing favourable to 'always-on' capabilities necessary to support electronic commerce.

- Policy support for infrastructure competition.
- Policy support for unbundling local loops.
- Policy support for the competitive development of high-speed access options.

GROWTH OF INTERNET AND LOCAL LOOP

The 'international digital divide', in the OECD area, is much greater than has previously been thought. While available indicators continue to show the Internet is growing in all countries, some countries are forging ahead of others. In times past, in terms of policy, this would have been noted only by those policy makers concerned with communications infrastructure. In the new environment, however, the differing performance in the development of the Internet has assumed centre stage, providing the platform for electronic commerce. Indeed, one of the most critical challenges facing governments is how to better understand the relationship between electronic commerce, the 'new economy' it is generating, and economic growth.

The United States, for example, is experiencing the longest run of economic growth in its history and is observed to be leading in Internet developments. But before policy makers can explore what impact the Internet may be having on economic growth it is necessary to have indicators of Internet developments in relation to specific economies. Indicators are also necessary to be able measure and compare Internet development across different countries.

The United States has, of course, been among the leaders in all indicators in relation to the Internet since its inception. What is new, however, is that the United States is further ahead, in respect to developing and using Internet infrastructure for electronic commerce, than it has been previously possible to conclude from the available data. The most recent indicators show that, contrary to widespread belief, the gap between the development and diffusion of electronic commerce is increasing. This gap -- the international digital divide -- is evident from key indicators. For example:

- Between September 1999 and March 2000, the United States added an additional 25.1 Internet hosts per 1 000 inhabitants. This compares to an additional 5.5 Internet hosts for the United Kingdom, 4.1 for Japan, 3.0 for Germany and 2.7 for France. In March 2000, the United States had 185 Internet Hosts per 1 000 inhabitants. This compared with 41 for the United Kingdom, 23 for Germany and Japan, 16 for France.
- In March 2000, the United States added three times more secure servers than the rest of the OECD in total. This meant, on a per capita basis, that the United States added 10 times more secure servers, for that month, than the rest of the OECD. In March 2000, the United States had 170.4 secure servers per one million inhabitants. This compared with 55.2 for the United Kingdom, 34.5 for Germany, 18 for France and 15.4 for Japan.

For analysts working on economic policy these developments may prove an important element for their consideration of growth questions. For policy makers, concerned with the development and use of communications infrastructure, it adds to the need to examine why the United States is leading developments.

The varying rates of Internet development across the OECD area prompt important questions. Why, for example, are the Internet penetration rates of some countries, with seemingly all the necessary

attributes for successful development, being surpassed by other countries? More compelling for another group of countries is why their development of the Internet is progressing so slowly relative to the leaders.

In the recent past these questions have been examined in relation to the infrastructure used for business-to-business electronic commerce.[1] In this document the focus shifts to 'local access' developments. While the availability and pricing of leased lines continue to be critical to the 'supply side' of electronic commerce, issues surrounding the pricing of the 'local loop' are just as critical for the 'demand side' of electronic commerce. This is why the European Union set as a concrete proposal, at the Lisbon Summit, to reduce the cost of using the Internet at the local level by the end of 2000.[2]

The major infrastructures currently used to access the Internet at the local level are the public switched telecommunication networks (PSTNs). Other networks are being developed, such as access via networks formerly dedicated to cable television, new fixed wireless networks, and PSTNs themselves are being upgraded to provide high speed options for Internet access. PSTNs are also being modified to bring the point of separation, between circuit switched traffic and traffic using the Internet protocol, closer to the user. This process ranges from telecommunication carriers installing modems at local exchanges through to ISPs co-locating equipment and using unbundled local loops. This is leading to different pricing structures for local telephony calls and Internet access via local loops (**Table 1**). But as with leased lines, debates continue in respect to the availability and pricing of existing and new local access infrastructures.

This document has the following structure. It begins by mapping the latest Internet infrastructure indicators and comparing performance across the OECD area. The international digital divide, which emerges from this analysis, inevitably raises the question of what impact the pricing and availability of local loops has had on these developments. Among the most pressing questions are those that relate not only to the level of actual prices but to the structure of prices for accessing the Internet. In this respect the experience of the United States in relation to local loop pricing is an obvious candidate for analysis. But so too are the performance levels of countries, which share similar PSTN pricing, and service availability, such as Australia, Canada, and New Zealand.

These four countries have two common telecommunication attributes that most obviously set them apart from the rest of the OECD. Australia, Canada, New Zealand and the United States have high telecommunication penetration rates and 'unmetered' local loops. Mexico also has 'unmetered' local loops but has a low penetration of access lines per capita in relation to the other four countries. Many other OECD countries have high telecommunication penetration rates but predominantly have metered local loops. Accordingly, this document sets out to examine Internet growth in metered and unmetered environments. This is important not just in terms of informing policy makers about the pricing of current infrastructures but also of future local access infrastructures including high speed networks.

A Foreword on policy options

While this document focuses on pricing, and the development of the Internet in different countries relative to tariff structures, it is not a call for governments to engage in setting prices or mandating certain pricing structures. The OECD has advised, for several decades, that governments should disengage themselves from setting telecommunication tariffs. This was in line with reforms, which separated the management and operation of telecommunication carriers from Ministries of Communication and regulatory authorities. The aim of this reform was to enable the management of telecommunication carriers to operate efficiently and for governments to be more transparent in regard to social objectives in the communications field. This does not, of course, mean that regulatory safeguards on incumbents are not needed where there is insufficient competition in setting prices.

Based on the inheritance of more than a century of legal monopolies, incumbent operators provide almost all the local telecommunication lines, used for Internet access. These operators have shown a marked reluctance to offer a variety of pricing options, even though there is patently increasing demand by the market for tariff innovation. Simply put, the absence of competition in the local loop enables dominant operators to disregard or delay meeting the changing needs of business and users in relation to electronic commerce. Nevertheless direct intervention by governments to impose tariff options that appear to be more favourable to electronic commerce, runs counter to allowing telecommunication carriers to manage tariff structures and should be avoided.

To be fair, it is also necessary to point out that local access infrastructures need to be upgraded to efficiently manage and supply interconnection between the PSTN and the Internet. This will require major new investments by infrastructure providers. The introduction of new tariff options, such as unmetered access, will fundamentally change usage patterns, especially in countries with a tradition of metered access, even more than has already occurred. The impact of such changes goes beyond local access networks. For example, unless change is co-ordinated with policies that increase liberalisation, in areas such as leased lines and backbone networks, it is questionable whether the networks of telecommunication carriers, with dominant national positions in backbone markets, will be able to cope. One of the reasons the model of unmetered local access has succeeded in the United States in driving electronic commerce, is because of the dynamic nature of that country's backbone networks. In other words, as demand has increased at the local level, rapid increases in capabilities have been made by the infrastructure providers at the national level. Without an increase in competition at all levels, the necessary innovation in pricing structures and networks, needed to support electronic commerce, will occur at a pace dictated by dominant operators rather than the market.

The key to greater tariff innovation to support electronic commerce is to increase competition. Where competition is most advanced, at the local level, the benefits of pricing innovation are increasingly evident. Of the group of countries that inherited a pricing structure most unsuitable to electronic commerce, the United Kingdom is most advanced in addressing these issues. One of the main advantages the United Kingdom has, over many other countries, is that reform is being built on nearly a decade of local infrastructure competition. The benefits of having multiple local operators have been manifested in several ways. One of the most underestimated benefits is the power of example. In the United Kingdom the fact that some telecommunication carriers could offer unmetered pricing showed that there was little validity in arguments that introducing a wider range of options was not possible. In many other OECD countries the power of such examples does not yet exist.

At the same time, the role of infrastructure competition needs to be recognised in the United Kingdom. Some of the first offers for unmetered Internet access have been from new entrants such as Telewest and NTL, both cable communications companies. While much attention has been drawn to the expressions of political, media and public support for tariff reform it should also be noted that the rate at which customers transferred to companies, such as Telewest, during the first weeks of operation are unprecedented in local telecommunication markets. It was reported that Telewest's service had more than 100 000 subscribers just over a fortnight after its launch, many of whom were willing to change their network provider to access the new Internet pricing offer.[3] Established ISPs and telecommunication carriers can not afford to lose customers in this manner. Accordingly, in the weeks following the launch of the Telewest service there was a surge of announcements, in the United Kingdom, for increasingly attractive Internet access pricing.

A fundamental factor driving new entrants to provide innovative tariff structures are their plans for electronic commerce. Telewest, for example, has called on the people of the United Kingdom to become 'a nation of e-shopkeepers' and the company's plans involve integrating electronic commerce into all the communication services they offer.[4] An important element of this plan was research, undertaken for

Telewest, that indicated that 32% of those users not yet online in the United Kingdom would be less 'worried' about going online if unmetered rates were available.[5] Similar research was undertaken in Ireland prior to the launch of the first unmetered access option. When Esat Clear launched an unmetered Internet access option, the company cited research that indicated that 55% of people planing to use the Internet over the following six months, wanted unmetered access for a fixed monthly fee.[6]

Dominant telecommunication carriers, of course, also have plans for electronic commerce. However all available indicators suggest that their timetables are not synchronised with the aims and objectives governments, business and users have for electronic commerce. This is clear from the growing international digital divide. Accordingly, the challenge for many governments is to create an environment where the same competitive momentum that is building in the United Kingdom can be brought to bear in addressing developments in their countries.

For policy makers or regulators the preferable response to the challenges of the international digital divide, would not be to mandate particular tariff structures, even if the evidence is mounting that they are more appropriate for electronic commerce. This would be a retrograde step in that it would return policy makers to setting telecommunication tariffs. Other policy options are available, including:

- High level policy support for a greater range of tariff options, in particular pricing favourable to 'always-on' capabilities necessary to support electronic commerce.
- Policy support for infrastructure competition.
- Policy support for unbundling local loops.
- Policy support for the competitive development of high-speed access options.

Each of the foregoing options has the potential to increase the range of available tariff options and encourage innovation. However, by themselves each policy may have a weakness that can only be overcome by a combination of these options. For example, an expression of support for innovative tariff options is a good first step but would be ineffective, in markets with a low level of competitive alternatives, if the dominant telecommunication carrier did not respond. Accordingly, policy settings supporting infrastructure competition are necessary.

For the future, **the key element in addressing the international digital divide is support for infrastructure competition**. Such initiatives are fundamental to providing a framework that encourages tariff innovation and responsiveness to user demands. Notwithstanding this, the drawback of solely relying on this policy is the significant time it takes to roll out competitive infrastructure in local access networks. Some commentators suggest that the major 'winners' in developing electronic commerce will be the early adopters and innovators. Accordingly, some governments may wish to increase the pace at which infrastructure becomes available from different players to support these developments. The key option in this case is the unbundling of local loops and other initiatives in the area of interconnection.

Support for unbundling local loops has the advantage of offering a fast track to the competitive provision of local access service. At the same time, policies that mandate favourable interconnection rates, which encourage innovation in retail tariffs, can also be an option. Some countries view as a potential drawback of both these options that they may discourage investment in alternative infrastructure. For this reason a number of OECD governments are tackling this issue by offering phased withdrawal of incentives to enter the market while new entrants build their own infrastructure. Other countries believe there will not be any drawback as long as unbundled elements of networks or interconnection are correctly priced. There is only a problem if pricing is below cost.

Finally, policies encouraging the deployment of high-speed Internet access options hold out tremendous promise for improving Internet access. However, relying on the development of high-speed infrastructure, without competitive provision, may not expand access to electronic commerce. Without competitive pressure infrastructure providers will charge premium prices and ration service. One reason for this is that incumbent telecommunication carriers are generally operating in all market segments. Providing high-speed services means upgrading networks and a consequent demand for investment capital. This upgrade needs to be set against other areas of business, which are also competing for capital, such as upgrading and expanding wireless networks, foreign acquisitions, bidding for licences, etc. In the absence of competition for the provision of high speed infrastructure telecommunication carriers will tend to invest at a slower rate. In any event the major weakness of solely relying on this policy is the time it takes to upgrade networks and, at least initially, the high cost of access needed to recoup this investment. This means that for the next several years the traditional local loop service will continue to be the way most users access the Internet. Accordingly, without a combination of the above policies many countries will find themselves falling on the wrong side of the international digital divide.

Measuring the international digital divide

The following sections deal with infrastructure indicators of Internet development and electronic commerce. These include Internet hosts, secure servers, Web Servers, Internet multi-media applications, and patterns of online usage. Each of these indicators are important because they assist policy makers in better understanding the dimensions of the international digital divide, which is holding back economic and social development. This is not to say that they are the only relevant indicators. Other key indicators are the penetration rates of the underlying fixed and wireless telecommunication networks. However, with a few exceptions, most OECD countries enjoy high penetration rates for these networks.

In addition, some indicators taken out of context have the potential to mislead policy makers. An example is the claim by some countries to be leading mobile communication developments based on higher penetration rates. From this, it is argued, some countries will be able to leap ahead of their present capabilities, in respect to Internet access, as third generation mobile services become available. While advancements in wireless services do, indeed, promise tremendous possibilities for increasing Internet access there are caveats. One major caveat is the challenge for mobile operators to price Internet access in ways that will encourage adoption and use. The challenges for doing this effectively are far more daunting than they have proved to be on fixed networks. An obvious factor here will be spectrum limitations and its implications for pricing high speed Internet access.

It should also be noted that the difference in the starting points for prices on mobile networks and local call prices on fixed networks are huge. And this is precisely why high mobile penetration rates for voice services need to be carefully analysed in relation to short term Internet developments. In some countries with high penetration rates the majority of 'subscribers' are using prepaid cards. Prepaid cards have proved extremely popular with budget conscious users for numerous reasons.[7] However, they also include some of the most expensive pricing for any telephony calls. The structures and level of pricing of prepaid cards would have to change radically to make them 'Internet friendly'. Accordingly, the emphasis here is on those indicators for infrastructure and usage patterns that overlay fixed networks. Recent work has discussed mobile developments in greater depth.[8]

Internet hosts: Connection divides

The most fundamental indicators of Internet infrastructure developments are metrics based on Internet hosts. Surveys of Internet hosts are undertaken by several entities. Network Wizards, on behalf of

the Internet Software Consortium (ISC), undertake the longest running host survey. This survey is carried out every six months. Alternatively, RIPE conduct a survey of Internet hosts every month for countries in their region. A third source of statistics is Telcordia Technologies (formerly Bellcore).

Telcordia's 'NetSizer' provides daily updates of the number of Internet hosts based on daily random samples of IP addresses. Because NetSizer collects and analyses the data continuously, estimates are provided on a real time basis.[9] In this report the data of ISC and Telcordia are examined because of their wider coverage of OECD countries.

The ISC survey indicates that between July 1999 and January 2000 the number of Internet hosts in the OECD area increased from 52 million to 70 million. Telcordia's daily reporting, for January 2000, concurred with ISC in terms of the overall size of the Internet. The challenge for analysts, however, has always been to relate the results of Internet host surveys to developments in different countries. The main obstacle to the interpretation of host data is that surveys are undertaken in relation to the domain name system. As some top-level domain names are generic (gTLDs such as .com, .net and .org) the hosts under these domains need to be allocated to different countries. Without such a reallocation, this indicator is much less useful for enabling comparisons of performance.

Two methodologies have been suggested for the reallocation of hosts under gTLDs. One methodology is to take data for the registration of gTLDs and reallocate hosts in proportion to the number of registrations from a particular country. If 4% of registrations under **.com** are made from Canada, then the same proportion of hosts found under **.com** are reallocated to Canada. More recently, Telcordia has undertaken weighting of Internet hosts under gTLDs based on a sample of IP addresses, and their assignments.[10] Telcordia provides hosts by country as well as by top level and second level domains. The former is computed by redistributing the hosts with three letter domains *(e.g.* com, net, etc.) to individual countries and then adding them to the hosts by two letter country domains. The Telcordia methodology appears to provide a more robust reflection of actual deployment of Internet hosts throughout the OECD area.

For the purpose of comparison, data from the ISC survey, weighted by overall domain name registrations, are shown in **Table 2**. This indicator -- the number of Internet hosts per 1 000 inhabitants -- provides a traditional ranking of Internet development in OECD countries. The results of Telcordia's survey, weighted using their methodology, are in **Table 3**. While the two methodologies do not markedly change the order of rankings of countries, they do impact radically on the relative weightings of gTLDs. **The overall impact of Telcordia's methodology is to significantly increase the proportion of hosts, under gTLDs, allocated to the United States. All other OECD countries witness reductions in the number of hosts, under gTLDs, allocated to them. As a result the Internet host penetration rate rises for the United States and falls for all other countries.**

The Telcordia data may indicate that while foreign users register significant numbers of **.com** addresses, they prefer to locate hosts under country code TLDs or utilise foreign hosting services. In September 1999, apart from Canada and the United States, the number of hosts under gTLDs did not exceed 17% of the total number of hosts in any country. The only potential caveat here is if the Telcordia methodology were to give greater weighting to infrastructure providers than end-user registrations. In other words if Telcordia's survey, starting from IP addresses, is weighted toward infrastructure providers rather than end users, it may influence the outcome. If this were the case, it may also reflect the fact that United States companies are providing services such as 'hosting' under foreign registered gTLDs, for foreign users. This question is taken up in a following section on Web Servers.

Under either of the above interpretations of Telcordia's data the international digital divide across the OECD appears to be more serious than previously thought. Previous metrics indicated that

the United States and Finland were 'neck and neck' in their respective penetration rates for Internet hosts. The Telcordia data indicates that during 1999 the United States shot ahead, not only of Finland, but also of all other OECD countries. In September 1999, the host penetration rate for the United States was three times the average for the OECD area, seven times that of the EU area and just over eight times that of Japan.

In March 2000 the United States had 185 Internet Hosts per 1 000 inhabitants (**Table 3**). This compared with 41 per 1 000 for the United Kingdom, 23 per 1 000 for Germany and Japan, and 16 per 1 000 for France. Before turning to the question of how these differences may relate to local communication pricing it is also useful to consider other infrastructure indicators of electronic commerce development.

Secure servers: Commerce divides

Due to the nascence of electronic commerce there are few official indicators of its relative development in different OECD countries. In the area of infrastructure one of the few 'hard' measures by which to compare performance is the number of secure socket layer (SSL) servers. Netscape developed the SSL protocol for encrypted transmission over TCP/IP networks. It sets up a secure end-to-end link over which http or any other application protocol can operate. The most common application of SSL is 'https for ssl-encrypted http', which enable common forms of electronic commerce to take place.[11]

The major electronic commerce uses of secure server software are for encrypted credit card transactions over the Internet. The most common non-retail uses of SSL are subscription access to privileged information. For example many of the leading United States investment banks disseminate research over SSL, and there are some applications for virtual private networks or closed access communities. By excluding sites without third party certification it is possible to get an indication of the number of electronic commerce sites in each OECD country. Netcraft, a company based in the United Kingdom, undertakes a monthly SSL survey.

In March 2000, the monthly Netcraft survey found 67 000 secure servers in the OECD area. On a per capita basis Iceland had the most secure servers followed by the United States (**Table 4**). In absolute numbers, of course, the difference is huge with the United States having more than 47 000 and Iceland having just 54 secure servers. Notwithstanding this, data weighted by population do give a good indication of those countries leading developments in electronic commerce. They reinforce the notion, drawn from examining Internet host data, that there are huge differences in the rate of Internet infrastructure development. For example in March 2000:

- On a per capita basis the United States has six times as many secures servers than the European Union area.
- The international digital divide is even greater for some G7 countries, with the United States having nine times the number of secure servers as France, 11 times more than Japan and 16 times more than Italy.
- The Nordic countries, traditionally a leader in communication infrastructure indicators, are just below the OECD average (albeit Iceland is leading this measure on a per capita basis).

The differences noted are very large but, at the same time, may understate the international digital divide in terms of infrastructure placement. One of the advantages of Netcraft's SSL survey, over surveys of the Internet hosts and the general Netcraft Web Server survey, is that it does not rely on the domain name system to allocate secure servers. The Netcraft survey uses the SSL certificate to categorise

the location of a secure server by that user's business address. For example, the certificate for www.amazon.com gives Seattle, United States as the location of Amazon.com Inc. This means that the SSL survey can generally provide a firmer link to a national economy than relying on the domain name system. But this does not mean that the placement of infrastructure will necessarily be in the country concerned. For example, the Web site www.amazon.co.uk is also located in the United States. At the same time, Netcraft report that a significant number of secure servers under the top level domain name for France (**.fr**) are physically located in the United States. The raises the role of the hosting of Internet content and services in trying to more accurately assess relative rates of Internet development.

Web Servers: Content location divides

The Netcraft Web Server Survey is a survey of Web Server software used on computers connected to the Internet. Netcraft collect and collate as many hostnames providing an http-service as their survey can find, and systematically poll each one with an HyperText Transfer Protocol (HTTP) request for the server name. A host name is the first part (before the first dot) of a host's domain name (*e.g.* www). In February 2000, Netcraft received responses from more than 11 million sites.

The Internet's domain name system (DNS) can sometimes provide indications of the ownership of a Web site and the market content providers are aiming at. The DNS can also be a starting point for examining the location of Internet infrastructure and content. However not all infrastructure and content under a certain domain are necessarily located in that country. The server for the Web site www.made-in-wales.co.uk is physically located in the United States. So are the servers hosting www.golfireland.ie and www.japanweb.ne.jp.

This is true not only of small Web sites but the large Web sites that can swing traffic patterns in certain directions. For example, four of the top ten most accessed Web sites under the **.fr** top level domain name are physically located in Sweden, Germany and the United States. These same countries host five of the top ten Web sites under **.uk**. Thus, while the bulk of content under a country code TLD is generally thought to be located in that country, significant amounts may be hosted in a foreign country. In measuring Internet developments this presents two possibilities. The first is to ignore physical location. For example, the Web site www.british-airways.co.uk is physically located in the United States. Notwithstanding this, the company is British, the Web site is aimed at British users (a separate **.com** site is tailored for global users) and the network provider is British (*i.e.* Cable and Wireless). Accordingly, for some measurements of economic activity the physical location of a webserver may be of little importance. On the other hand, for analysts wanting to compare the development of infrastructure supporting electronic commerce between countries, taking into account physical location can be an important factor. If a significant portion of Internet content, services and infrastructure are physically located in a foreign country this needs to be highlighted.

The Internet enables content providers to physically locate their product where they find the best available prices, services and network performance. This means that the location of sites can be an indication of how the Internet infrastructures, in a certain country, stand in competitive terms against those of other countries. The cost of having web content hosted, and delivering this content to users, is much less expensive for business users in the United States than Europe (**Box 1**). Accordingly, a significant amount of European content is hosted in the United States. The relative difference in prices may, moreover, have an impact on the development of domestic content. For example, an SME in a country with high Web Hosting charges may be deterred from creating a Web site and is unlikely to have sufficient knowledge about the alternative hosting opportunities.

Telcordia's host data suggest a significant number of Web sites utilising gTLDs, registered by foreign users, are physically located in the United States. Systematic data on the foreign hosting of ccTLDs is harder to locate. One approach is to look at major Web Hosting companies such as Verio's Rapidsite subsidiary (**Box 2**). But this approach may only give an indication of foreign hosting of ccTLDs for one company. One of the few attempts to systematically analyse how much foreign hosting takes place under a ccTLD has been undertaken by the Australian Taxation Office (ATO). In August 1999, the ATO found that 6.5% of Web sites under **com.au** were hosted offshore -- mostly in the United States (an earlier survey had found 9% of **com.au** sites to be hosted offshore). There is no indication that Australia is exceptional in this respect. Judging by the low proportion of **.au** Web sites hosted by Rapidsite, relative to that company's larger share in other ccTLDs, other countries may have similar or higher proportions of Web sites under their ccTLDs hosted in the United States. While the adjustment for most OECD countries might be no more than 10% of their ccTLDs, the overall impact is to significantly increase the development of Internet infrastructure in the United States.

Placing the issue of Web Hosting to one side it is possible to gain a good insight into the relative development of Web sites in each country by those under each country code Top Level Domain (ccTLD). The main exceptions are Canada and the United States where businesses have preferred to use gTLDs. Under ccTLDs the countries with the most Web Servers per 1 000 inhabitants are the United Kingdom (14.2), Switzerland (13.1) and Denmark (11.9). These countries have also recorded the highest growth under ccTLDs. However to get a fuller understanding of comparative development it is necessary to include sites under gTLDs.

There are two ways to weight Web sites under gTLDs by country. One is to use the same weightings as Netsizer for Internet hosts. This is likely to give a better indication of the physical location of Web sites by country. The alternative is to weight the data by the proportion of gTLD registrations. The number of sites in each country is likely to fall between the two. Under either methodology the United States is a leader. Moreover the extent of the gap between the United States and many other OECD countries is extremely large (**Table 5**). The United States has between two to three times more sites per capita than the OECD average. On the most favourable estimates for other G7 countries, the United States has between five times as many sites per capita as France, eight times more than Italy and 14 times more than Japan.

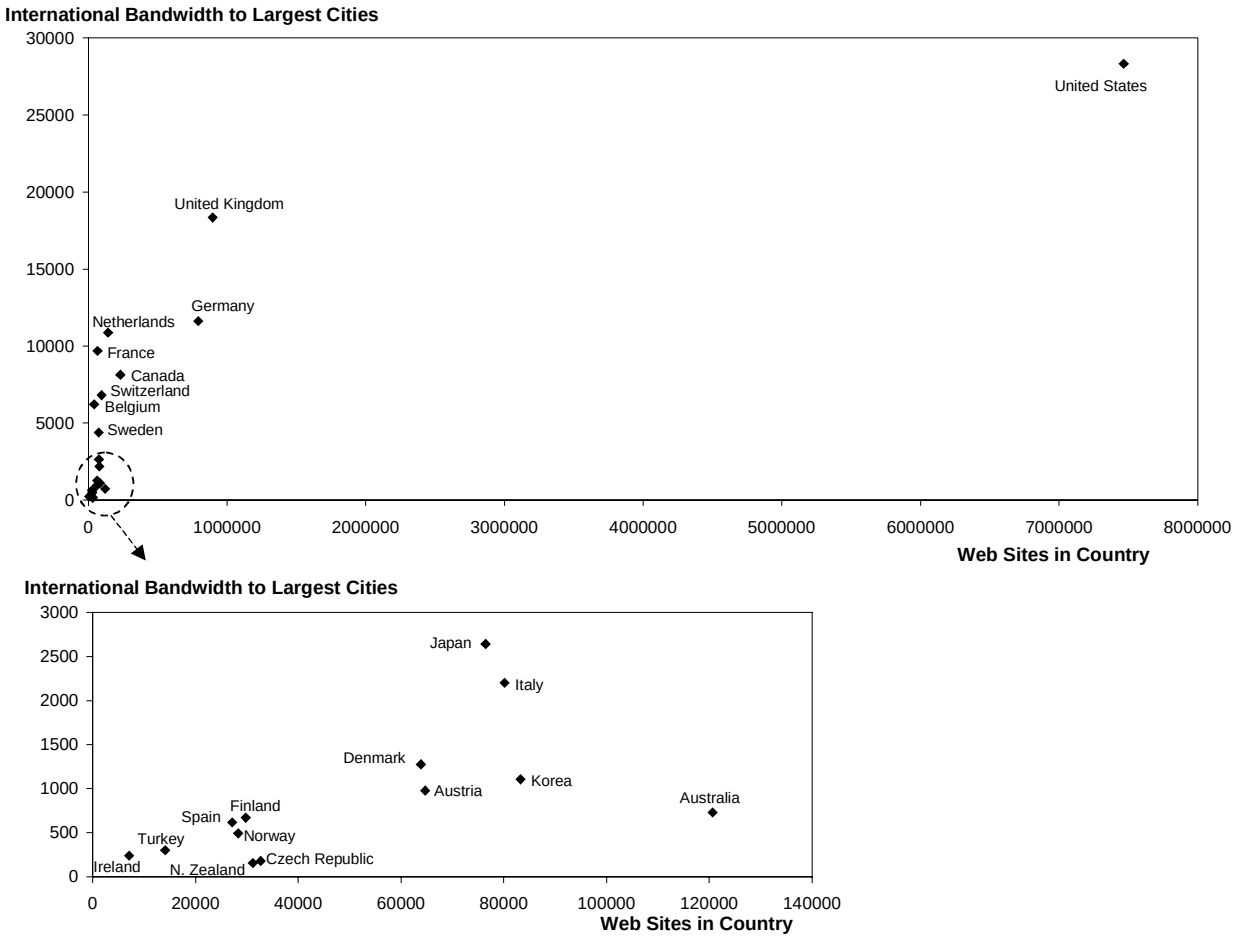
The countries coming closest to the performance of the United States are the United Kingdom and Switzerland. But even in these three countries the range of possible performance levels is great. This distribution of sites widens the international digital divide, even without consideration of the impact of hosting. There are, no doubt, many reasons for such distribution patterns. One factor, on the demand side of the equation, is content producers being encouraged to go online because their customers have access to the Internet. In other words those countries with more users online are more likely to stimulate the creation of domestic content and services online. The data may also indicate that more favourable conditions exist for small business to access the Internet in the United States. It is difficult to explain the gaps in performance between OECD countries without concluding that the United States' leadership on this indicator stems from the ease and cost with which small businesses can create and maintain sites on the World Wide Web. Both demand factors which may have stimulated the United States lead in the number of sites -- small business access and consumer access -- are closely related to the pricing and availability of the local loop for Internet access.

On the supply side, some factors already mentioned include content providers being able to physically locate their product where they find the best available prices, services and network performance. In terms of the latter factors the availability and pricing of international bandwidth has played a key role in these developments. Data are available, from *Telegeography*, on the amount of international Internet bandwidth related to the largest cities in OECD countries.[12] For example, London has the largest amount

of international bandwidth, allocated to the Internet, followed by New York. By aggregating this bandwidth at the national level, for the largest cities in OECD countries, it is possible to rank countries by international Internet bandwidth (**Table 6**).

These data can be compared with the number of Web sites in each country (**Figure 1**). The R-squared for these two sets of data is 0.6357 suggesting a link between the two. The link would probably be even stronger if pricing was taken into account. The London-New York route not only has the most bandwidth of any international route but also the most competitive intercontinental prices. In other words, the availability of bandwidth is a prerequisite for increasing performance in this area but the bandwidth also needs to be priced competitively. These data have not been weighted by population because the services in question are international in nature. What counts in this context is how competitive national markets are in a global context.

Figure 1. Bandwidth and Web sites



Source: *Telegeography*.

The United States position as the global hub of the Internet is clearly reflected in the data. However this need not continue to be the case. The cost of storing content is falling, although the prices for storage in many countries are lagging behind this development. The bottleneck is the price of bandwidth. If one company can maintain high bandwidth prices in a national market, it raises the overall cost of web-hosting. The result is that content gravitates to where bandwidth is least expensive. The main policy implication of these data is for policy makers to check whether the pricing of local, national and

international bandwidth from their country has held back the growth in the number of sites or encouraged producers to physically locate content and services in other countries.

Box 1. Web Hosting prices

The cost of hosting content with a major telecommunication carrier in Europe can be two to three times more expensive than with a major carrier in the United States. Consider, for example a small business wanting to lodge 50 Mbytes to create an e-commerce Web site. The cost for this service per month would be USD 0.83 per Mbyte from AT&T, USD 1.69 per Mbyte from BT and USD 2.88 per Mbyte from France Telecom (Table 7). However the cost of storage is not the only consideration. The business user in question would also take into account how much data transfer was included in the hosting offer from the three companies. This is an important factor because it determines how much data customers can download from the business user's Web site before the business user incurs additional charges.

In the case of AT&T, the hosting offers for 40 Mbytes, 60 Mbytes and 100 Mbytes include monthly traffic allowances of 2 000 Mbytes, 4 000 Mbytes and 6 000 Mbytes. By way of contrast the two European telecommunication carriers cap data transfer at much lower levels. For its 'professional plan' aimed at small businesses, France Telecom caps data transfer at 50 Mbytes per month and users pay USD 14.39 for every additional 10 Mbytes transferred.

How this might work in practice can be illustrated in the following example:

For a small business wanting to store 60 Mbytes, and whose customers download 60 Mybtes per month, the cost of using AT&T would be USD 50.00, the cost from BT would be USD 101.00 and the cost of using France Telecom would be USD 158.27. If this Web site transferred 150 Mbytes per month the AT&T and BT users would pay no more but the France Telecom user would pay USD 287.11 per month. At a certain point the user of France Telecom would shift to the 'enterprise plan'. This would allow their users to download up to 500 Mbytes per month for USD 359.71. But even at this price they still fall short of what is on offer to the AT&T user for USD 50.00 per month.

This is not to imply that better offers are not available in France, the United Kingdom -- or the United States. Telecommunication carriers tend to charge more because of their brand recognition. However the large differences in price provide some examples of the difference in price between Europe and the United States. The result is that small business users either bear a higher cost if they want to physically locate content in Europe or they have their content hosted in the United States.

Box 2. Web Hosting

Verio Inc. is the world's largest operator of Web sites for businesses with an emphasis on serving the small and mid-sized business market.[13] The company provides Web-hosting services to customers in more than 170 countries using brands such as Verio, 'Rapidsite' and 'Bestwwwd'. The company has more than 1 200 resellers, relations with Swisscom, the Italian telecommunications company Infostrada, a subsidiary of the Vodafone-Mannesmann Group, as well as equity investments in Web Hosting companies in the top four European markets. Verio has marketing relationships for Web Hosting services with AOL, CompuServe and Netscape Online in the United Kingdom. Verio fully owns its 'Rapidsite' subsidiary in the United Kingdom and 'WWWService' in Germany and has minority interests in Web Hosting companies in Spain and France.

One of the most interesting features of Verio's Web Hosting activities, under 'Rapidsite' and 'Bestwwwd', is that it is possible to count the number of sites associated with these brands under different domains. This is made possible by Netcraft's Web Server survey. Each month Netcraft probes networks to see what software is being run on all the Web Servers connected to the Internet. These results are reported by domain and by the type of software being used. The most popular software is 'Apache', but Microsoft and Netscape products are also run on many Web Servers. Some web-hosting firms, such as Verio also run software with their brand name. When this information is compared to the total number of Web Servers under a domain it is possible to see how many are being hosted by Verio's subsidiaries such as Rapidsite.

The best way to see the significance of such Web Hosting in terms of location is by way of example. In February 2000, 'Rapidsite' hosted 102 sites and 'Bestwwwd' a further 19 sites under Ireland's top-level domain. This means that under these two brands, Verio hosted around 2% of all sites under **.ie**. In other words the physical location of at least 2% of sites under **.ie** was in the United States.

There are obviously many caveats in using this indicator to explore the actual location of Internet infrastructure and content. Indeed, for each country it is necessary to know whether Rapidsite has local marketing and storage facilities and the extent to which these are used relative to those in the United States. That being said, random traceroutes run to a small number of these sites under different domains showed many to be physically located in the United States. Accordingly, the data in **Table 8**, albeit only a partial indicator and subject to many caveats, do show the challenges in trying to assign Web Servers by location. While the proportions are relatively small it is necessary to remember that this is an indication of the Web Hosting penetration of only one company and that ownership is subject to change.

In December 1999, France Telecom purchased a 75% share of Rapidsite, France.[14] The acquisition made France Telecom the leading Web site hosting provider in France, with over 22 000 sites. Rapidsite's share of **.fr** sites has exceeded 3% since at least June 1998 and much of this content is hosted in the United States. In March 2000, a series of traceroutes indicated a high proportion of the **.fr** sites hosted by Rapidsite are at locations in the United States. France Telecom's purchase of a majority share in Rapidsite France may, however, bear on future location decisions.

For the moment it can be noted that the Rapidsite market share is relatively small under each ccTLD. That being said the impact of shaving 1% or 2% from each country's total adds to the weight of Internet content and services in the United States. It may also indicate that a larger underlying share of the market is hosted in the United States in the hands of other Web Hosting companies. It is almost certainly the case that a larger proportion of gTLDs, than ccTLDs, are hosted for foreign users by companies such as Rapidsite.

Internet Multi-Media: Application and content divides

One indicator of comparative Internet development is the prevalence of 'webcasters' and the amount of multimedia content on the World Wide Web in different countries. The characteristics of multimedia suppliers and multimedia content, in the Internet context, can be far different from those of traditional broadcasting. This is because the entry barriers to supply are far lower than in traditional broadcasting mediums (*e.g.* no licence required, lower costs and so forth). By using 'streaming media', an increasing range of entities can distribute content over the Internet. One group of users is the traditional broadcasters using streaming media to simultaneously webcast over the Internet. Another group is business users utilising streaming media tools for electronic commerce.[15] A third group is individual users who post multimedia content on their 'home pages' or elsewhere on the Internet.

This is not, of course, to imply that all content is 'equal' in terms of the cost of production and supply. A traditional free-to-air broadcaster simultaneously Webcasting their service over the Internet will incur greater costs than an individual user posting a single audio file on their home page. Accordingly, for the purposes of comparing developments, across different countries, it is possible to separate Internet radio stations from general multimedia content (**Table 9**). This enables analysis of the amount of content supplied by entities likely to be traditional broadcasters, as well as from business and individuals.

Data on the number of radio stations Webcasting live over the Internet can be obtained from a number of online indexes. In February 2000, the largest of such indexes recorded more than 3 320 radio stations. Of these stations 2 774 were based in the OECD area. Most of these webcasters are traditional broadcasters simultaneously supplying their free-to-air service over the Internet.

An indication of the amount of multimedia content can be obtained by using search engines, such as AltaVista, and interrogating their databases for content under particular domains. This reveals the location audio and video files in different formats on the World Wide Web (*i.e.* excluding peer to peer content exchange using programmes such as Gnutella or Napster). These files typically include music, short films, multimedia advertisements, archived webcasts and so forth.

By placing these two indicators together it is possible to get an indication of which countries are the leading locations of multimedia content on the Internet (**Figure 2**). The countries that are performing best on both measures are Australia, Canada, New Zealand and the United States. These countries share a number of characteristics. One common characteristic is the use of the English language, and being able to aim at the largest 'language market' may be a factor in their performance. However, using language as a basis to explain the performance of this group of countries is not as persuasive as other factors (**Box 3**).

The most striking characteristic shared by Australia, Canada, New Zealand and the United States is that they have unmetered access to the Internet (clearly use of the Internet to listen to radio would be more costly with metered access). Differences in usage patterns are examined in the following sections. For the moment, it should be noted that those countries where users are not paying metered charges for listening, watching or downloading multimedia content are also the leading locations of content.

There are, of course, countries doing relatively well on one measure or the other. Ireland, Greece and Switzerland have a higher number of Internet radio stations per capita. On the other hand Finland, Norway and Sweden have a relatively high amount of audio and video content on the Internet. However these countries do not perform as well on both measures and all have metered access. The data indicate that the supply side of transferring multimedia content over the Internet, has been more inclined to locate content in countries with unmetered Internet charges. Consider the following:

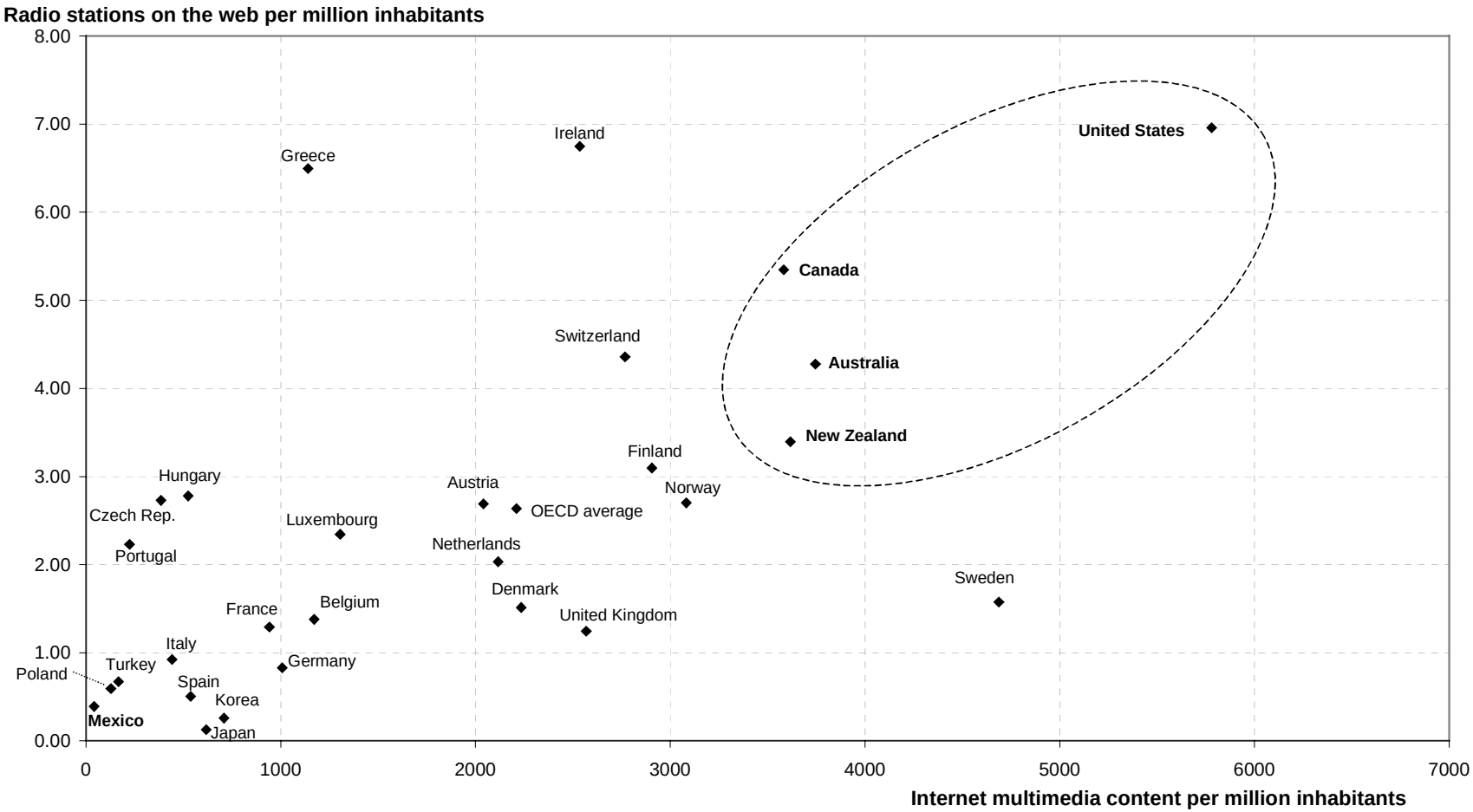
- Some 79% of the Internet radio stations were in OECD countries with unmetered Internet access and 21% in countries with metered access.

- On a per capita basis there are five times as many Internet radio stations in countries with unmetered Internet access charges as those with metered access charges.

- In February 2000, 73% of multimedia files were in countries with unmetered Internet access and 27% in countries with metered access.

- On a per capita basis there was four times as much audio and video content located in countries with unmetered Internet access than in countries with metered access:

Figure 2. Location of Multimedia content in the OECD area



Source: OECD, 2000.

Box 3. Language and Internet multimedia location

If the English language was a prerequisite for being an Internet multi-media hub it would be expected that the United Kingdom would be a leader. As is evident in **Figure 2** this is not the case.

Many analysts associate Internet penetration with the availability of content and services in local languages. It seems intuitive that more attractive content and services in local languages will attract more users online. That being said, the supply of these content and services in local languages also depends on the cost of the underlying infrastructure. In other work the OECD has examined the price of infrastructure for content suppliers (*i.e.* leased lines). However the cost of accessing content in certain languages can also influence its availability.

To the extent that the level of content in different languages has played a role in the international digital divide, its significance is not in the ready availability of English but the absence of other languages. There are far more radio and television stations broadcasting in English on the Internet than any other language. But this needs to be considered against the fact that more than 90% of current Internet users, with English as a first language, have access to unmetered access in OECD countries. Of the countries where English is the most spoken language only Ireland and the United Kingdom have traditionally had metered access. In other words, because of the structure of local access pricing, it is more expensive for some users to listen to their preferred language. In turn, without the development of this demand, supply of content will not be forthcoming.

Where users have a preferred language, apart from English, in a country with unmetered calls the number of radio and television stations on the Internet reflects that demand. For example, of those stations indexed by the "RealGuide", one in every four stations broadcasting in Spanish is in the United States. The same index records one in every three stations broadcasting in French is in Canada. The main message, in terms of infrastructure, is to focus on the barriers to business, community groups and individuals building and accessing content and services in their preferred language -- these are mainly pricing policies.

Online time: Usage divides

In the foregoing sections the emphasis has been on 'infrastructure connections and applications' and the emerging divide between countries. The three indicators chosen were for specific reasons. The penetration of Internet hosts provides the best available measure of infrastructure connectivity to the Internet. The penetration of Web sites provides an indication of the dispersal of content and the development of infrastructure supporting that content. At the same time, the penetration of secure servers provides the best available infrastructure-based indicator of the penetration of electronic commerce.

An alternative approach could be to compare the number of users accessing the Internet. The major challenge to this approach is the lack of comparable data, official or non-official, across the OECD area. Offsetting this lack of data, to some degree, is the correlation between the penetration of Internet hosts and of users where data are available. Users in countries with a high Internet host penetration also have relatively high access to the Internet. At the same time countries with low penetration rates for Internet hosts have relatively low numbers of users with Internet access. However there is another important dimension to Internet access, involving a digital divide, that is only partly reflected in penetration rates. The indicator showing the location of Internet multi-media content points in this direction.

Indications are that average patterns of Internet usage have greatly diverged across the OECD area in recent years. In some countries users are staying online significantly longer, on average, than users in other countries. One aspect of the different usage patterns is the speed or quality of the connection. "Nielson/Netratings" reported in January 2000 that the users they track with 'high speed' connections visit the Internet 83% more and view 130% more pages than those with mid-range modem speed.[16] This may simply reflect the fact that users with high-speed access are more enthusiastic users of the Internet. But it may also reflect a greater satisfaction in terms of the quality of service received. As these data are drawn from the United States, they probably do not reflect a difference in pricing, as unmetered rates generally typify all access speeds in that country. If the same analysis was made in countries with metered access, via the PSTN, the same phenomenon might be expected due to different pricing structures emerging for

high-speed access. Notwithstanding this, it is noteworthy that users in the United States increase their online time with higher speed access. The same phenomenon is also observed in Europe (**Box 4**).

If users feel constrained in the amount of time they spend online, this is clearly a potential barrier to electronic commerce. There are two potential 'digital divides' in this area. The first is in the development of models for electronic commerce (*i.e.* the supply side divide) and the ability of different economies to create new e-commerce firms and for existing firms to adapt to the demands of electronic commerce. The second is in access models for electronic commerce (*i.e.* the demand side divide). The rates of secure server penetration across the OECD area, taken to be a proxy for new and existing firms initiating electronic commerce on the Internet, appear to be increasingly correlated with users' ability to stay online for longer periods of time.

The United States has been clearly leading in producing innovative models for web-based electronic commerce. Some of the benefits of these services can only be realised if users can maintain their Internet connections for a significant duration. The average length of time spent by users, tracked by Nielson/Netratings, visiting 'eBay' is more than four hours per month. By way of contrast the same users only spend less than one hour per month at 'Amazon'.[17] Another comparison might be average usage time of two hours at the sites of 'Intuit' compared to less than 40 minutes at those of 'Time Warner'.

The reasons for these differences are that e-Bay (an auction site) and Intuit (suppliers of financial software and information) offer services that generate longer average amounts of online time. Whereas users may log onto Amazon (to purchase books, films and so forth) or Time Warner (to be entertained or informed) they need to spend longer amounts of time at sites where events require monitoring (*e.g.* auctions at e-Bay and stock markets at Intuit). This appears to indicate that firms producing content and services that require longer amounts of online time are more likely to emerge and thrive in the access framework typical to the United States and other countries with unmetered access to the Internet.

The pricing structures in countries with unmetered access are allowing users to experiment with electronic commerce, 'to-shop-around', to disregard the time of day, and to have certainty in their monthly communications cost (a particularly important factor for many parents). For something as nascent as electronic commerce these benefits are very important and an overlooked aspect of building consumer confidence. Moreover the pricing structure enables something approaching an 'always-on' mode of use. For the PSTN, connections may, of course, be terminated by a service provider after a certain period of inactivity. Notwithstanding this, unmetered PSTNs are the closest current approximation to 'always-on' capability that may only come with broadband networks. And they do enable users to maintain an active connection while at work or leisure for a range of applications. Obvious candidates are the ability to receive 'real-time' e-mails and messaging, monitoring information flows, or working or playing collaboratively with others. At the same time unmetered access appears to be extremely beneficial for utilising multi-media capabilities (*e.g.* listening to a radio station) over the Internet.

In July 1998, Arbitron and Edison Media Research determined that 6% of all users in the United States had tuned to Internet radio. In January 1999, they found that this Internet 'listening penetration' had more than doubled to 13%.[18] Not only are users in the United States increasingly using the Internet to listen to or view other traditional media, the amounts of time are significant. Arbitron measures average usage time, for users listening to Internet radio stations via equipment installed on their servers. In November 1999, the leading radio stations were recording average online times, by users, of over seven hours per month in the United States.[19]

One of the advantages of the Internet is that users can combine different services at the same time. For example users can listen to an Internet radio station that may not be available via traditional broadcasting means, while using any other functionality provided by the Internet. Noteworthy, in this context, is that Arbitron report that users of streaming media stay online for twice as long as average

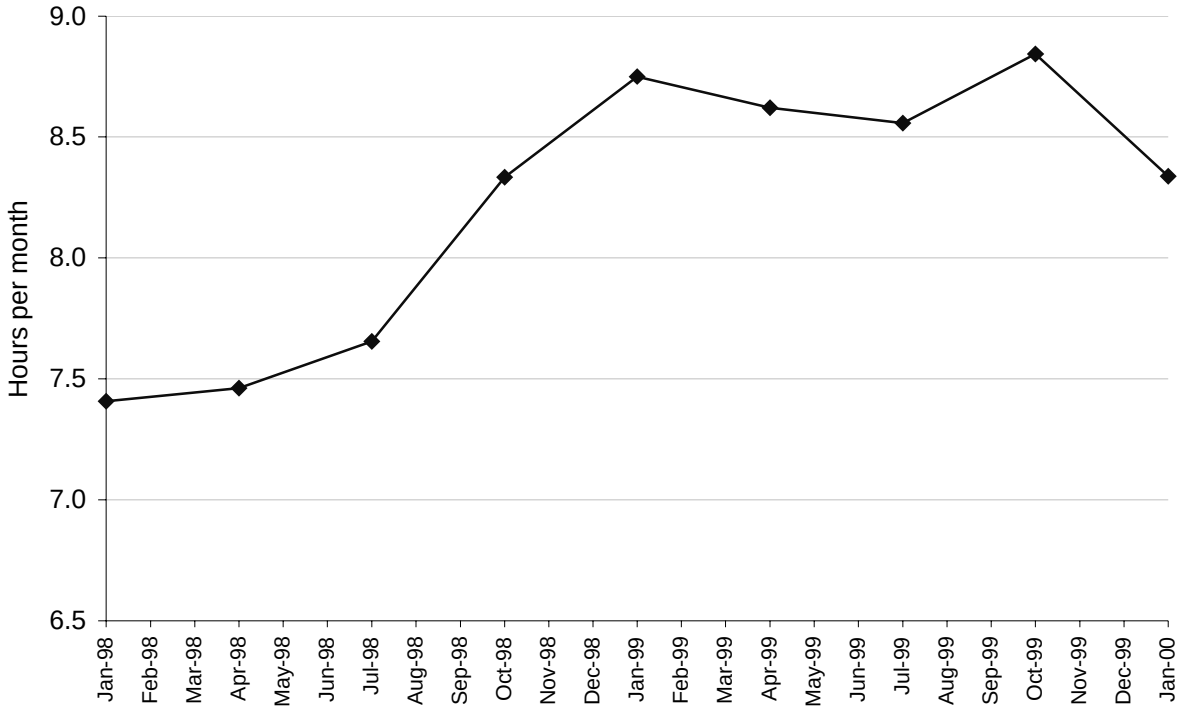
Internet users. They also contend that these users are more likely to engage in electronic commerce than other users.[20] If this is the case, then it is perhaps not surprising that longer amounts of online time in a country correlate with the growth of electronic commerce.

The issue of usage and its relationship to electronic commerce (both on the supply and demand side) generate the need to analyse pricing and pricing structures in relation to Internet access. There is certainly a divide between countries with low and high cost access to the Internet. However there is also a divide emerging between usage patterns. Some countries with very good infrastructure and low prices still appear to have slower rates in the take-up of electronic commerce than others with similar features. Consider, for example, that in Finland, one of the most advanced countries in terms of developing Internet infrastructure, most users spend much less time online than counterparts in the United States.

Microsoft puts average adult Internet usage time at 36 hours per month in the United States.[21] Usage can of course vary depending on the ISP or whether users are conscious of being tracked and so forth. Accordingly, using the largest Internet access provider in the United States would seem to be a reasonable benchmark. Users of AOL spent an average of 27 hours online per month in 1999. By way of contrast only 14% of users in Finland match or exceed the AOL average.[22] In Finland, 61% of users went online for less than 8 hours per month in 1999 (this includes 11% not logging on on a weekly basis). A further 25% of users stayed online between 12 and 20 hours per month. Internet access prices in Finland are amongst the lowest in the OECD area. Internet users in Finland are amongst the most sophisticated in the OECD. This raises the question of why there is an 'international digital divide', in terms of average online time, among even the leading countries.

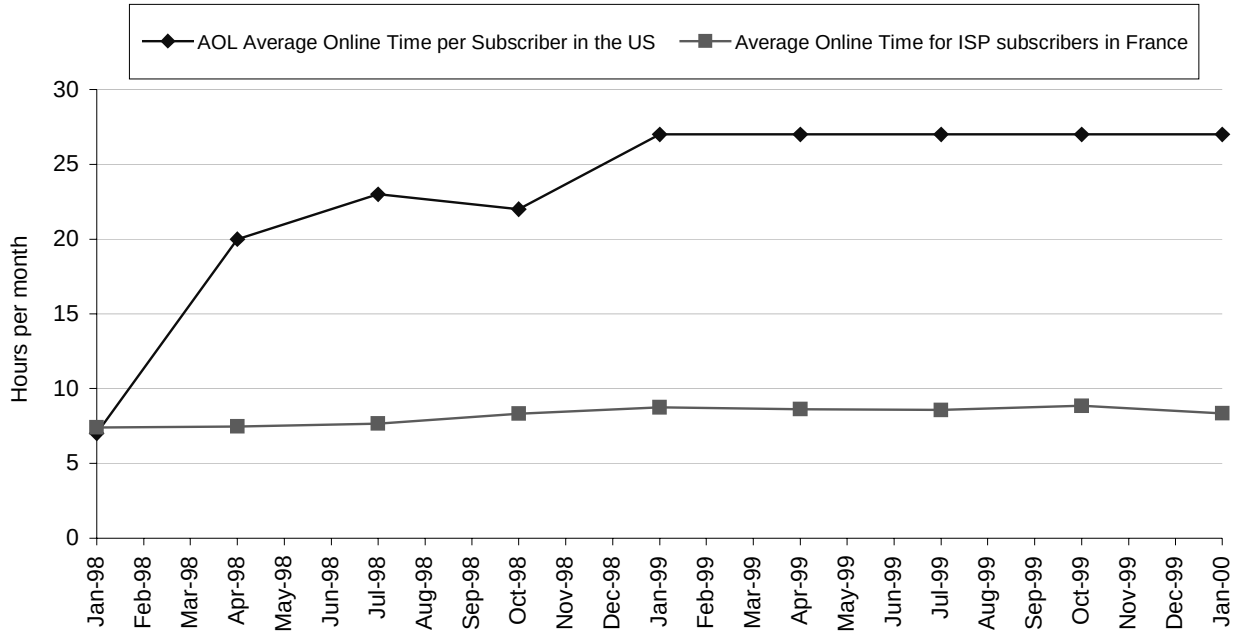
The differences in usage patterns between France and the United States are even more striking. It is little remembered that, prior to 1998, subscribers to ISPs in France stayed on-line longer than the users of AOL in the United States. At that time both sets of users paid metered rates. French users accessing their ISPs paid metered local call charges to France Telecom. Users of AOL, generally, had unmetered telecommunication charges but paid metered charges to AOL beyond an initial allowance. At the beginning of 1998, French users stayed online for an average of 7.4 hours per month (**Figure 3**).[23] In the United States, at the same time, AOL users stayed online for an average of 7 hours per month. In 1998, AOL introduced unmetered options for users. By 1999, the average online time had increased to 27 hours per month for AOL users. By way of contrast French users stayed online for an average of 8.7 hours per month in 1999 (**Figure 4**).

Figure 3. Average online time for users of ISPs in France



Source: AFA - Association des Fournisseurs d'Accès et de Services Internet, AOL.

Figure 4.Average online time for AOL users in the United States and users of ISPs in France



Source: AFA - Association des Fournisseurs d'Accès et de Services Internet, AOL.

The experience in France and the United States suggests that the digital divide in "online time" is due to the availability of unmetered charges. There has been significant change to the tariffs faced by French users since the beginning of 1998. For example, in 1998 France Telecom's only discount scheme specifically aimed at Internet users did not commence until 22:00 hours. For other times of the day the best options available to users were discount plans aimed at telephony -- a result of the liberalisation of the telecommunication market rather than the advent of the Internet. Notwithstanding this, these plans did assist to increase average online time during 1998 from 7.4 hours to 8.8 hours. Since that time average online time has not increased in France even though better pricing options have become available. In the first quarter of 1999, the trend toward 'free ISPs' spread from the United Kingdom to France. France Telecom also introduced a more extensive range of discounts aimed specifically at its Internet service and not tied to a certain time of day. By March 2000 there was little difference in the prices that would be paid for 30 hours of Internet access in France and the United States. However, the unavailability of unmetered options meant average online use in France was only one third of the average use of AOL in the United States at the beginning of 2000. This suggests the impact of the structure of pricing is just as important as the level of pricing in terms of developing electronic commerce and of better understanding the international digital divide.

The available evidence shows that usage patterns, in the same country, are greatly influenced by different pricing structures. The average Internet online time of subscribers to French ISPs, where metered charges only apply to calls, is much greater than that for Minitel sessions, where metered charges apply to calls and most information services **(Box 5)**. The average use of AOL is much higher, where users have access to unmetered local calls, than in some rural areas of the United States, where access to AOL may only be possible via metered '800 numbers'. At the same time both these examples show how average use can rapidly change in response to new pricing structures. Further evidence of this comes from New Zealand. Although residential users of Telecom New Zealand have always had unmetered local calls to access their ISP, most ISPs charged metered rates for Internet access. Following the introduction of unmetered pricing by Xtra, Telecom New Zealand's ISP, in May 1999, the average time spent online by users doubled, from nine hours to 18 hours per month by the end of the year.

Box 4. Chello 'Broadband' survey

Chello is a leading European high speed access ISP and is commercially active in six countries. In March 2000 the company released the results of an online survey of 1 500 high speed and 2 000 dial-up users.[24] The results indicated that Chello subscribers to high speed access networks spend twice as much time on line as dial-up users. Chello's 'high speed' users in Europe reported an average of 72 hours per month online. As the survey relied on an online questionnaire, instead of network based measurements, the reported online time may be higher than actually exists for both sets of users. That being said the differences are significant.

In addition, Chello reported that its 'high speed' users access the Internet, on average, four times per day, compared to two times per day for dial-up users. The company attributed the different usage to its high speed service pricing being unmetered and the faster connection speeds available from cable modem connections. The company noted that families were taking advantage of these capabilities and that the average number of users in households connected to Chello's high speed networks was 2.2 compared with 1.8 users in dial-up households. Significantly, from an electronic commerce perspective, the survey found that Chello 'high speed' Internet subscribers spend 67% more money online than their dial-up counterparts. Chello's 'high speed' users reported spending USD 457 in the previous six months compared to USD 275 for dial-up users over the same period. Chello attributed this difference to 'high speed' users being able to browse more and for longer, and when enhanced content – like expanded views or such as samples of video or audio are offered, they get a better feel for the product than they might even in a shop.

Box 5. France's Minitel Service

Beginning in the 1980s, France developed Teletel, a computerised videotext system. The service was essentially made available via a specialised and inexpensive terminal, the Minitel. In 2000, there are five million Minitels in use, to which should be added 3.5 million computers with access to Teletel; there are in all some 18 million users.

Electronic commerce is among the uses to which Teletel is put. The sale of information and of products on line amounts to USD 1.66 billion. Sales number 50 000 a day. Teletel uses a secure public network -- France Telecom's Transpac. Tariffs for information services (not including call charges) range from zero to USD 1.32 per minute, and the operator, France Telecom, returns part of the rate charged (from 30% to 70%) to the service provider. Minitel's limited technical capabilities are compensated for by the speed of certain operations (train reservations, purchases of securities, and so forth).

The pricing structure of Minitel access has meant that users' online sessions are of a similar length to telephony rather than Internet access. In 1997 the average online duration of a Minitel session was 4.3 minutes.[25]

Growth in the use of Teletel and Audiotel services began to level out in 1997. That year Audiotel traffic increased by 5.9% compared to 17.6% in 1996. Teletel traffic increased by 0.5% in 1997 compared to 1.3% in 1996. Since that time traffic and revenue from both services has decreased. In 1998 there was a 2% decrease in traffic and a 2.8% decrease in France Telecom's revenue from Teletel and Audiotel services. In 1999 France Telecom's revenues from Teletel and Audiotel decreased 5%.

By way of contrast France Telecom's revenue from Internet access increased by 143.9% in 1999 and Internet traffic increased by 153.9%. Revenues from France Telecom's Wanadoo Internet access service for consumers rose 96% in the first quarter of 2000 compared to the first quarter of 1999. In May 2000 there were 4.1 million subscribers to ISPs in France up from 1.2 million in January 1999.

PRICING AND THE INTERNATIONAL DIGITAL DIVIDE

The rate of development of Internet demand and infrastructure, supporting electronic commerce, in different countries is undoubtedly influenced by many factors. This document focuses on one of these factors -- local access pricing. This is, of course, only one aspect of telecommunication pricing structures influencing electronic commerce (other important pricing aspects include leased lines and traffic exchange and these subjects have been discussed in previous work). That being said there is a strong tendency for countries with lower prices to have more highly developed Internet access.

Comparisons of Internet prices and penetration are generally snapshots at a particular point in time. The main limitation of this approach is that it does not indicate the impact of pricing over time. To address this weakness it is possible to calculate the average cost of 20 hours of Internet access for each country from 1995 to 2000. This data can then be plotted against the penetration of Internet hosts (**Figure 5**). The data show a significant correlation between the cost of Internet access and the penetration of Internet hosts. In countries where the access costs have been the lowest over time, the penetration of Internet hosts is the highest.

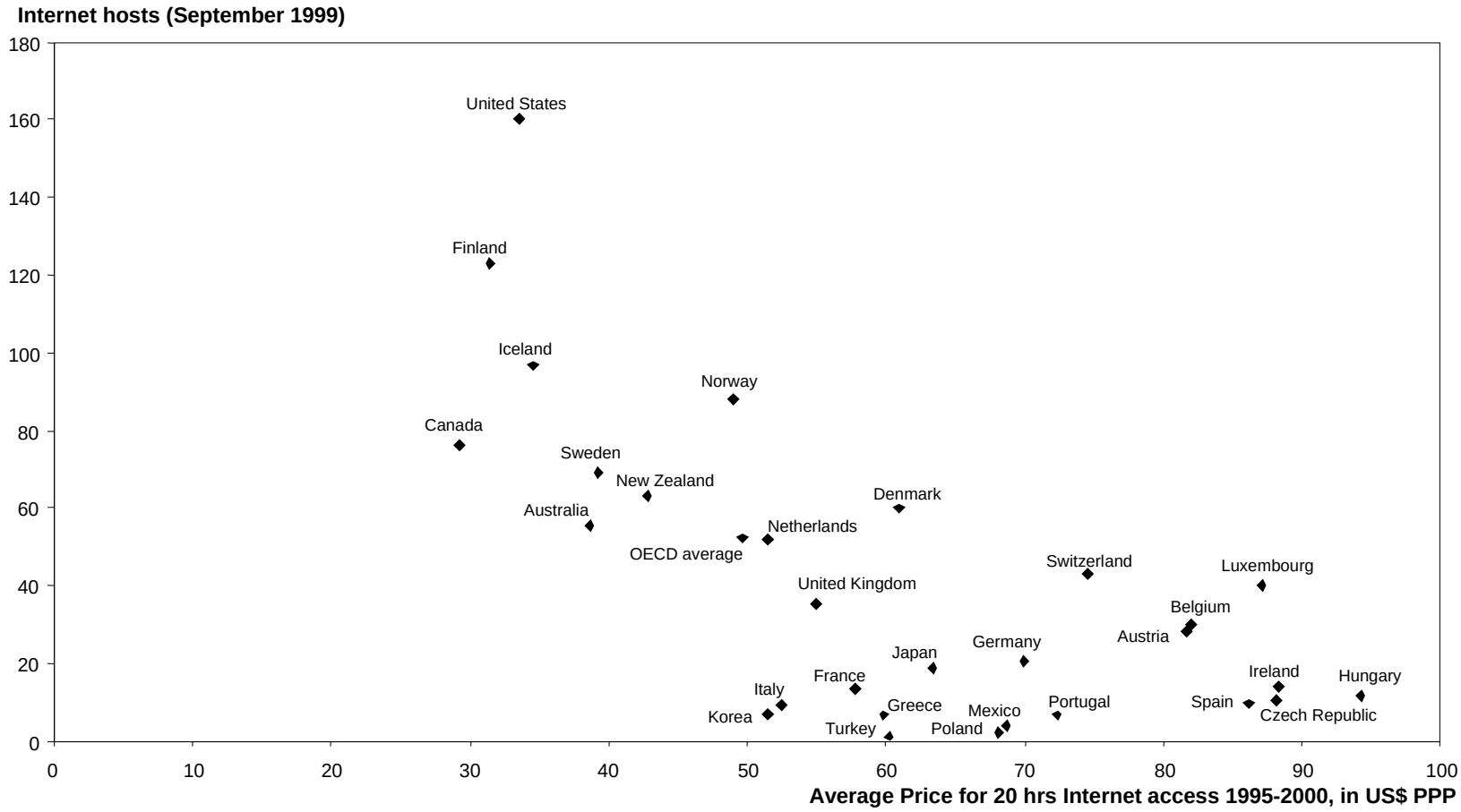
It is also becoming increasingly apparent that the structure of pricing, for consumers and small businesses, is at least as important as its absolute level. Previously, comparisons of telecommunication pricing have focused on the level of prices rather than their structure. If a user made a three minute local telephony call it generally did not matter how the price was structured (*e.g.* metered or unmetered) because the difference in structure did not appear to significantly influence the duration of the call.

In retrospect, perhaps, more attention should have been paid to this area. In countries with unmetered local calls such as Canada and the United States, users have always tended to make more calls even if their duration for telephony was not significantly higher than in countries with metered local calls. Arguably use of the telephone became more integrated in the social and commercial activities of these countries due to unmetered local call pricing. Even today, Vattenfall, a company currently conducting a trial with unmetered domestic telephony and Internet access in Sweden, reports that usage of their metered service is also affected. Vattenfall say that users in the trial make longer international telephone calls and longer calls to cellular telephone networks. Vattenfall meters both these types of calls.

In the transition to Internet use, the duration of calls has become substantially longer. For users with unmetered local telecommunication prices the adjustment has been made relatively smooth -- in others words users do not focus on telecommunication charges but rather the level of ISP charges. As the ISP market has shown steeply increasing competition, the affordability of Internet access has grown accordingly. The zenith of this movement has been the growth of 'free ISPs' in Canada and the United States. For a user with an existing telecommunication service, subscribing to a 'free ISP', such as "Altavista" or "Netzero", there is no additional communication carriage cost for Internet access.

In countries with metered local calls the transition has not been as easy as in those countries with unmetered access. As the inherited pricing structures in these countries was based on three-minute local calls, the structures have drawn increasing criticism from users wanting to stay online for longer periods. The focus on the cost of PSTN access has increased in these countries as a highly competitive ISP market has brought down ISP charges. In some countries, with metered access, ISPs have been able to gain additional revenues via interconnect payments made from the telecommunication access charge. This has further served to highlight the level and structure of the PSTN pricing component. This raises the question of how the Internet is developing in markets with metered and unmetered pricing structures.

Figure 5. Average price of 20 hours of Internet access (1995-2000) and Internet host penetration



Note: Data on hosts for Luxembourg is from mid-1999. Internet access costs include VAT.
Source: OECD (www.oecd.org/dsti/sti/it/cm) and Telcordia Technologies (www.netsizer.com)

Performance and pricing structures

To access the Internet a dial-up user needs a telecommunication connection to their Internet Service Provider (ISP). In countries with metered local charges, users pay according to the duration they stay online. In countries with unmetered charges, this rate is either included in the rental of a telecommunication line or paid per call (*i.e.* irrespective of the duration of that call). The growth of Internet in metered and unmetered markets shows marked differences. Consider that:

- The difference in the penetration of Internet hosts, between countries with metered and unmetered local telecommunication charges to access the Internet, is a multiple of 6.1.

- The difference in the penetration of secure servers, between countries with metered and unmetered local telecommunication charges to access the Internet, is a multiple of 5.8.

Putting these two indicators together it is possible to view the 'always-on' zone of unmetered telecommunication access to the Internet in the OECD area (**Figure 6**). The countries included are Australia, Canada, New Zealand and the United States. Mexico also has unmetered local telecommunication charges but that country's relatively low telephone penetration rate has curtailed a comparable benefit in terms of Internet access. That being said Mexico's development in Internet, relative to the size of its PSTN, is faster than many other OECD countries. The only other countries with above average performance on both axes are Iceland and Sweden **(Box 6)**.

In **Figure 6** the international digital divide is conceptualised along two axes. The countries in 'Group 1' are ahead of the OECD average in the penetration of both Internet hosts and secure servers. The countries in 'Group 2' and 'Group 3' are ahead of the OECD average in either Internet Hosts or Secure Servers. The countries in 'Group 4' are below the OECD average on both measures. This conceptualisation of the international digital divide is useful because it enables the performance of difference groups of countries with similar pricing structures to be compared against each other and against those with different pricing structures. The characteristics of the four groups can be summarised as follows:

- Group 1: The group includes the 'always-on group' of Australia, Canada, New Zealand and the United States. The group is typified by unmetered local telecommunication charges. Iceland and Sweden are the two exceptions, both having relatively inexpensive metered telecommunication access charges to their ISPs. In terms of electronic commerce, Iceland is the leading exception by having metered charges and being on the favourable side of the international digital divide. The only caveat here is that the size of the exception to the rule is relatively small. In March 2000, there were 54 secure servers in Iceland compared to more than 47 000 in the United States. Nevertheless the experience of Iceland is that if metered charges are low enough electronic commerce can still prosper. Having said that, the question remains of whether Iceland would be doing better with unmetered charges. It will be interesting to monitor the performance of those countries, such as the United Kingdom, where telecommunication carriers are introducing unmetered PSTN access to the Internet. In terms of Sweden's performance a significant factor, in very recent times, is that communications operators in Sweden are now offering very inexpensive high speed options with unmetered pricing. Prices for DSL service in Sweden are three times less than the OECD average for DSL services at comparable speeds. At a fixed price of USD 19.30 per month for an unmetered DSL service, a growing number of Swedish users can access the

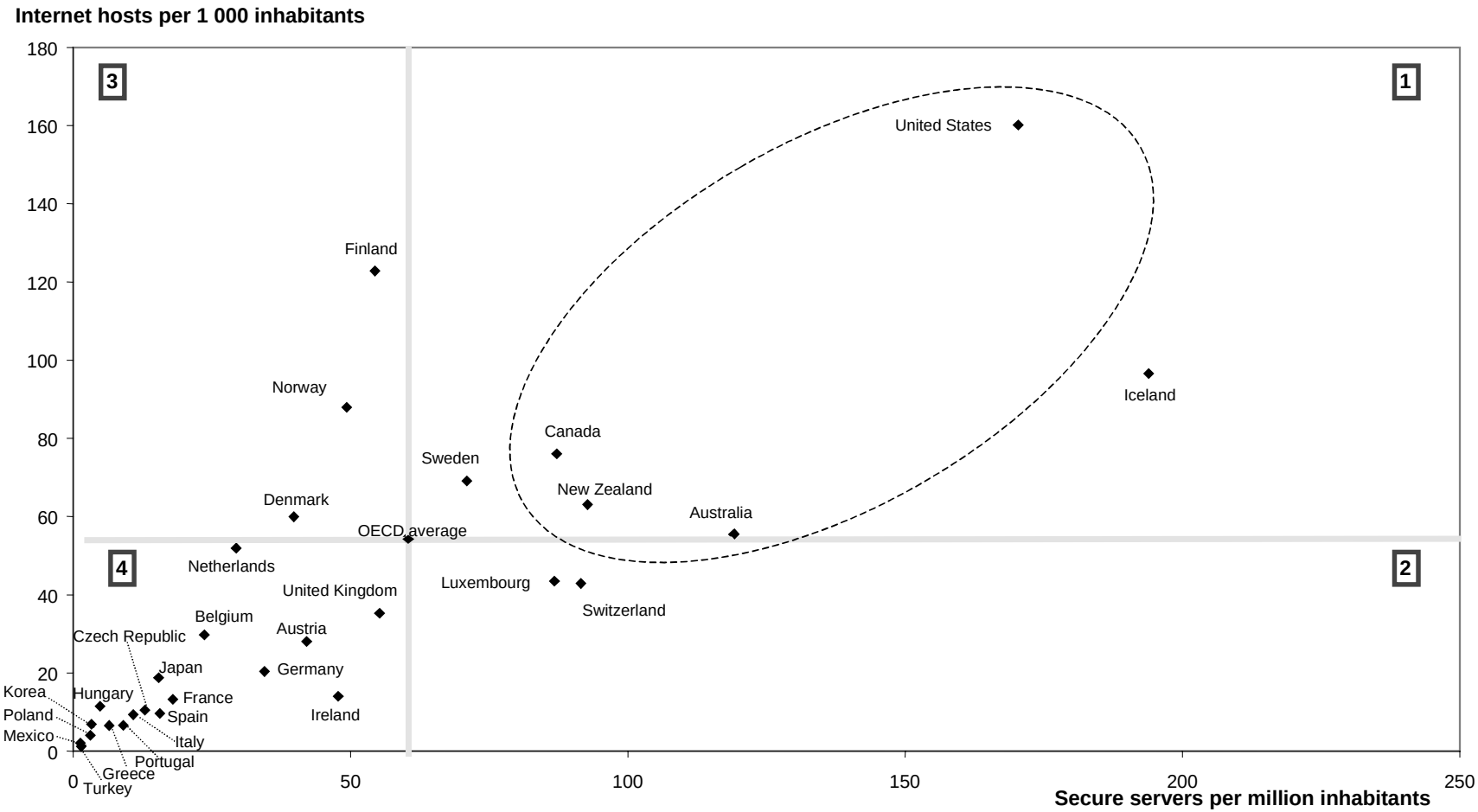
Internet at much higher speeds and at a lower cost, than Internet access via the PSTN in many OECD countries.

- Group 2: This group of countries includes Finland, Norway and Denmark. These countries have a relatively high penetration of Internet hosts but are below the OECD average for secure servers. Internet access prices are inexpensive but users have metered telecommunication access to their ISP. The position of Finland is one of the most interesting. Finland entered the mid-1990s with a widespread tradition of unmetered local telecommunication pricing. In Finland, when the Internet was first commercialised, many dial-up users had unmetered access (*e.g.* customers of Elisa -- formerly Helsinki Telecom --at off-peak times). Internet access pricing from some ISPs was also available at unmetered rates. Since that time ISP charges have been drastically reduced but Elisa has introduced metered charges for local calls. These charges are relatively low but may have cost Finland the number one position relative to the United States. More significant is whether they have slowed the development of electronic commerce as appears to be the case from Finland being below the OECD average for secure servers. Unlike Finland, Denmark and Norway have a tradition of metered local pricing. While the charges are relatively low the impact of rebalancing has increased the telecommunication component of Internet access charges. Historically, Denmark has had higher prices than the rest of the Nordic countries for Internet access and this appears to correlate with their position relative to the other countries. The main question facing these countries is whether their model of relatively low prices for metered charges will sustain growth at the same rate as the 'always-on group'.

- Group 3: This group of countries includes only Luxembourg and Switzerland. Both countries are quickly developing electronic commerce, as measured by secure servers (reflecting that their traditional strengths in banking, insurance and financial services are evolving), but are below the OECD average on Internet host penetration. ISP prices are inexpensive but users have metered telecommunication access to their ISP. It also suggests that the price of Internet access has been a barrier to increasing access to the Internet but has not been as much of a drag on electronic commerce. The main question posed here is whether the international nature of both economies is reflected in a higher proportion of the secure servers being aimed at international electronic commerce.

- Group 4: This group includes all other OECD countries. All these countries, except Mexico, have metered local telecommunication charges for users to access the Internet. These countries typically have had high average Internet access charges between 1995 and 2000. With some notable exceptions, such as Korea, Internet access continues to be expensive in these countries. The 'free ISP' model, based on interconnect charges from the local telecommunication access charge, commenced in many of these countries during 1999. While this has undoubtedly encouraged growth there is still discussion of what might be needed to bridge the international digital divide. Some telecommunication carriers in this group of countries have announced the introduction of unmetered telecommunication access in 2000 to accelerate the development of electronic commerce and Internet access. Countries involved include Germany, Hungary and the United Kingdom.

Figure 6. Always-on zones of communication (Internet host penetration and secure server penetration)



Note: Data on secure servers are from March 2000. Data on Internet hosts are from September 1999.

Source: OECD (www.oecd.org/dsti/sti/it/cm) based on Telcordia Technologies (www.netsizer.com) and Netcraft (www.netcraft.com).

Box 6. Comparing the 'Always-on' countries to the Nordic countries

The most noticeable characteristic of 'Group 1' is the predominance of unmetered local telecommunication charges in the 'always-on group'. Iceland and Sweden are also in Group 1 and have relatively inexpensive metered charges. As Finland, Norway and Denmark are also above the OECD average on one indicator, and have metered charging, it is worth comparing the Nordic performance against the 'always-on group'.

The Nordic countries have been traditional leaders in Internet infrastructure indicators and, by common agreement, have many of the factors considered to be critical to success in the development of information infrastructure. Some of these factors include:

Nordic countries were among the first to connect to NSFnet.

Nordic countries have some of the most competitive telecommunication markets and several countries liberalised markets ahead of most OECD countries.

Nordic countries have traditionally had among the highest penetration rates for PSTNs.

The prices of Internet access, and of the underlying telecommunication networks, are amongst the lowest in the OECD area.

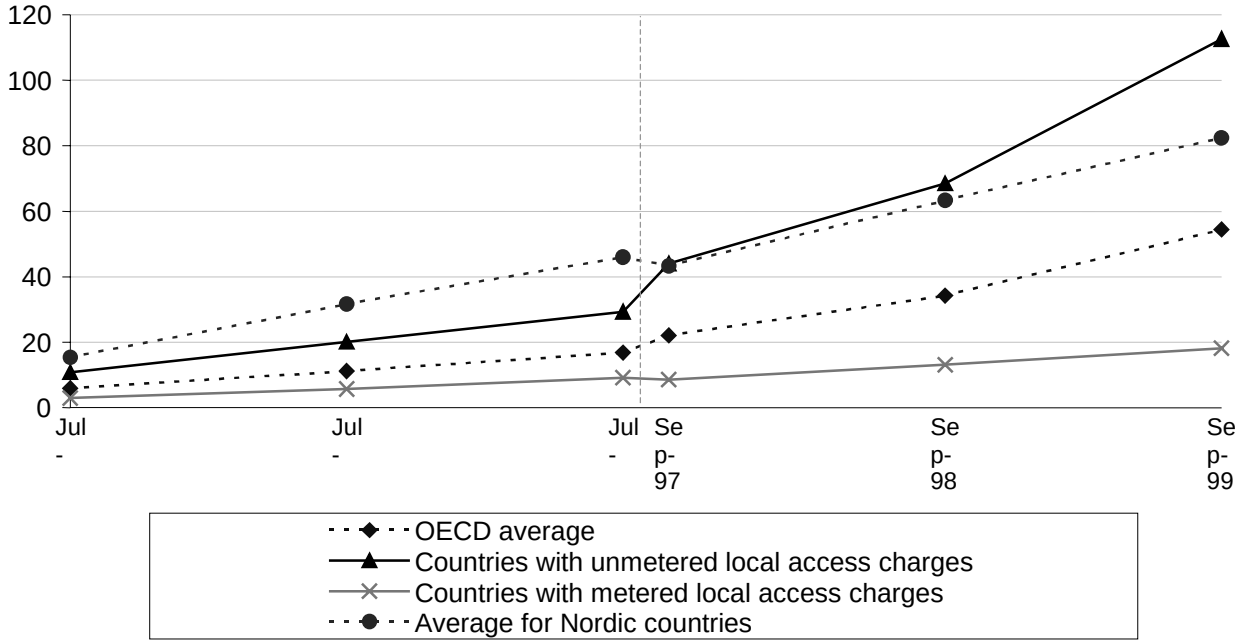
Nordic countries qualify among the leaders in most other attributes which have been forwarded to explain different rates of development such as levels of education, PC penetration, high GDP per capita, strong culture of technological innovation and adoption and so forth.

Most of these attributes can, of course, be said to characterise the 'always-on' group of countries. However the 'always-on group' has not only exceeded the performance of the Nordic countries but is also drawing away on some measures. The most obvious difference between the two groups of countries is that one has inexpensive metered access to the Internet and the other inexpensive unmetered access to the Internet.

It is possible to compare the growth of Internet hosts and secure servers between the Nordic countries and those countries with unmetered telecommunications rates. What this comparison reveals is that the average penetration rate of Internet hosts is growing faster in countries with unmetered rates than in the Nordic countries. In September 1997 very little separated the two groups but a considerable gap had opened by September 1999 (**Figure 7**). This suggests that the role of unmetered pricing structures is becoming more significant in terms of the growth of Internet connections.

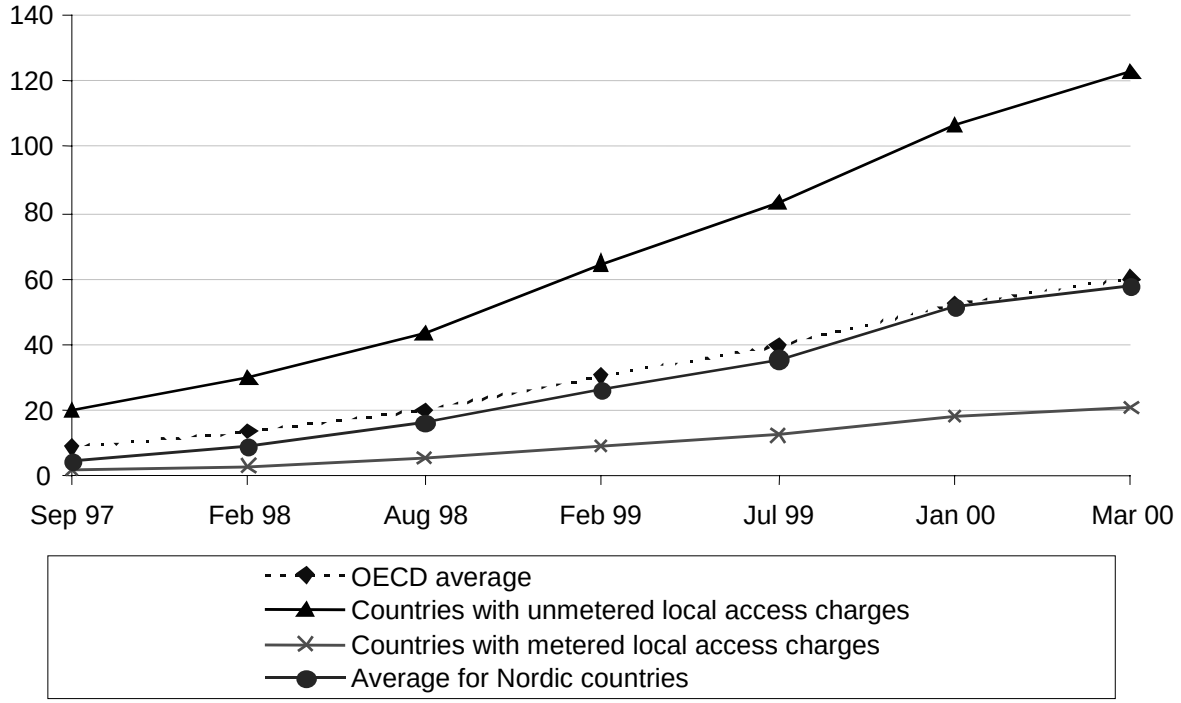
A similar comparison can be made for the growth of secure servers in the Nordic countries and in countries with unmetered telecommunication access to the Internet (**Figure 8**). In this case the differences are even more significant. Whereas the performance of the Nordic countries is close to the OECD average the countries with unmetered local telecommunication access have more than doubled the OECD average. This suggests that the role of unmetered pricing structures is becoming much more significant in terms of the growth of electronic commerce.

Figure 7.Growth of Internet hosts in countries with metered and unmetered Internet access



Source: July 1995 to July 1997 data are from Internet Software Consortium (www.isc.org). September 1997 September 1999 data are from Telcordia Technologies (www.netsizer.com).

Figure 8. Growth of secure servers in countries with metered and unmetered Internet access



Source: OECD (www.oecd.org/dsti/sti/it/cm) based on Netcraft (www.netcraft.com).

Trends in the 'always-on' group

The common factor found in Australia, Canada, Mexico, New Zealand and the United States is that they have unmetered local telecommunication charges. That being said there is actually a history of metered ISP charging in these countries. Outlining a brief history of the main pricing trends is useful in considering the performance of these countries compared to the rest of the OECD and relative to each other.

Prior to the commercialisation of the Internet the closest approximation to 'Internet like' services were those available from online service providers (*e.g.* AOL, CompuServe, Delphi, MSN, Prodigy, E-World). While users could access these services using unmetered telecommunication rates, the online services themselves were metered. In 1995, beyond small monthly allowances for online time for a fixed charge, the charges for these services ranged from USD 3.00 to USD 10.00 per hour. In addition access to premium content found on proprietary databases was sometimes metered at higher rates. These services were also metered in countries with metered local telecommunication charges. In such countries, this effectively meant that 'three clocks' were recording usage -- local telecommunication charges as well as basic and premium online access charges.

Following the commercialisation of the Internet, new entities called Internet Service Providers (ISPs) quickly developed a market for dial-up access and lowered prices. Many characteristics set the new ISPs apart from the Online Service Providers. At a technical level ISPs used the TCP/IP protocol and created open networks whereas the Online Service providers used proprietary protocols with content reserved for subscribers. In addition the ISPs were very small relative to the Online Service Providers. Due to a combination of factors such as the cost of introducing metered billing in a TCP/IP environment and demands on capital to expand networks and market services in the face of fierce competition, most ISPs opted for flat rate billing. When telecommunication carriers entered the market for Internet access some, such as AT&T, opted for metered charges. However by this time the market was already swinging toward unmetered access. Accordingly, today's market leaders, such as AT&T and AOL, switched to unmetered charges. By 1998 this meant that USD 19.95 had become a fairly standard rate for unmetered ISP service in the United States.

Similar forces were at work over the same period in Canada. As in the United States the major Online Service providers charge metered rates for access to their proprietary databases. At the same time, some of the initial ISPs also charge metered rates. For example, the ISP used in the OECD's first comparison of the cost of Internet access in 1995, charged USD 15.96 for 20 hours of service with additional time being charged at USD 0.02 per minute. However as competition increased, including the entry of Canada's telecommunication carriers into the Internet access market, unmetered options became the norm.

More recently in Canada and the United States the model of free ISP access has also begun to be offered. Unlike countries where a considerable amount of the 'free ISPs' revenue is gained from interconnection payments the North American model is based on revenues from electronic commerce and advertising. The long-term viability of this model is yet to be proven even though 'free ISPs', such as NetZero and Altavista, are rapidly gaining subscribers. That being said these services are adding to the downward pressure on ISP prices. During the March 2000 survey of prices AT&T was offering monthly access for USD 14.95 -- down from its standard rate of USD 19.95. By April 2000, Microsoft was offering the first six months free for new subscribers to its MSN service -- as opposed to its standard rate of USD 22 per month.[26]

In the other countries with unmetered PSTN access, the widespread availability of unmetered ISP charges is more recent. While the telecommunication charges have always been unmetered for residential

users, ISPs in New Zealand have generally charged metered rates. Moreover some ISPs in New Zealand were unique in that they charged users differently for downloading local and international content. However, in 1999, the market swung toward unmetered options being available (*e.g.* Telecom New Zealand's 'Xtra' Flat Rate offer became available in May 1999). Since that time, New Zealand has witnessed a significant boost in growth of the Internet. Another interesting development in New Zealand is the separation of Internet traffic from telephony. While users continue to have unmetered Internet access, via Telecom New Zealand's local network to their ISPs, they are required to use a special access number (*i.e.* 0867).[27] Customers are still able to dial their ISP using their existing local telephone number, however after the first 10 hours of usage per month, residential customers incur a USD 0.01 cents per minute calling charge (including tax). To avoid this charge, and retain their unmetered option, most users dial the 0867 number to access their ISPs. Telecom says this change has enabled the company to better manage Internet traffic, which by early 2000 accounted for half the number of local calls.[28]

The development of Internet pricing in Australia is more similar to New Zealand than to Canada and the United States. Like these other countries, users in Australia have unmetered telecommunication charges (users pay a flat rate per local call). However the largest telecommunication provider in Australia has been a strong advocate of metered pricing for Internet access (**Box 7**). In addition, while unmetered rates are ubiquitous not all local calling areas have an ISP point of presence. As a result, ISP charges for longer periods of online time have been relatively expensive in Australia. However, the benefits of ending the duopoly in Australia over PSTN infrastructure are increasingly evident. In 2000 competition is increasing in the provision of backbone infrastructure and ISP prices are falling.

While Mexico has been grouped with the 'always-on' countries it has among the lowest penetration rates for Internet hosts and secure servers. The reason for placing Mexico in this group is that residential PSTN subscribers receive 100 local calls included in their monthly line rental. They can use this allowance to place local unmetered calls to their ISP. When the low Internet penetration rate and unmetered pricing are placed together it might seem incongruous to say that unmetered pricing is proving to be increasingly important. The main factor mitigating this incongruity is that Mexico has the lowest penetration of telecommunication access lines in the OECD area. From this it can be concluded that the impact of unmetered pricing is lower because access to telecommunication lines is relatively low. Indeed, when the number of Internet hosts is measured relative to the number of access lines Mexico's performance actually exceeds that of many other OECD countries (**Table 10**). In 1999, the growth of Internet hosts per 1 000 access lines in Mexico exceeded 13 other OECD countries including four G7 countries with metered pricing. This has been accomplished in an environment where Mexico has the second lowest penetration of PCs in the OECD area. This suggests that, for those that have a telecommunication connection to the PSTN, unmetered pricing has been significant in the growth of Internet in Mexico. Notwithstanding this the development of the Internet has placed increasing demands on infrastructure and, as in other countries, networks need to be upgraded to manage new patterns of use. At the same time rapid expansion of basic service provision for households and businesses throughout Mexico is necessary. This can best come about through policies that promote competition through investment and efficiencies generated by a competitive market. Competition is a tool that can be applied to overcome the barrier which low network penetration rates currently pose to the development of Internet access and electronic commerce.

Box 7. ISP pricing in Australia

The development of the Internet in Australia, as measured by the penetration of Internet hosts is ahead of the OECD average. However it is below that for Canada and the United States. This raises the question of why the impact of unmetered PSTN charges appears to have been less forceful than in North America. One reason may be that while the PSTN is unmetered ISPs have generally capped the amount of time available to users for a fixed fee.

The predominant model for ISP pricing in Australia has been metered (*i.e.* users pay per hour or in advance for a block of hours after which metered charges apply). At the beginning of February 2000, Telstra's price for 150 hours, purchased in advance, was USD 31.65 per month. The second largest telecommunication carrier, Optus, charged a similar amount for 200 hours. Both these price structures were 58% higher than equivalent services in North America (*i.e.* USD 19.95 for unmetered ISP service or 150 hours). Even major international ISPs, such as AOL, entering the Australian market prefer metered rates. Whereas AOL charges USD 19.95 for unmetered access in the United States the company charged USD 35.94 for the same service in Australia. In February 2000, Ozemail the second largest ISP (then owned by MCI-Worldcom), charged USD 32.34 for 200 hours.

Telstra's Internet backbone pricing has also encouraged smaller ISPs to charge metered prices or to cap the amount data users can download per month for a flat rate. Telstra's metered Internet backbone charges are reportedly less expensive than the prices Telstra and foreign carriers charge Australian ISPs for international half circuits. As the incentive to construct international capacity was limited prior to end of the PSTN duopoly in Australia in mid-1997, competition is only starting to increase across the Pacific. Where ISPs have secured or invested directly in international capacity their pricing models have more flexibility. It has also been suggested that Telstra's backbone pricing has encouraged some content providers to have their sites hosted in the United States to keep their costs down.[29] In 1997 nearly one in 10 sites under **.com.au** were hosted in the United States and this has only begun to decline since the end of the fixed network duopoly in Australia.

In February 2000, Telstra failed in its bid to purchase Ozemail, its closest dial-up rival. While the Australian Competition and Consumer Commission was considering the impact of Telstra's bid on the level of competition, MCI-Worldcom accepted to sell Ozemail's dial-up business to another ISP. In the week following this, Telstra announced major price reductions in ISP charges. This reduced the price of 150 hours from USD 31.65 to USD 25.18. The price reductions appear to be in response to two factors. The increasing size of ISPs is providing them with the scale they need to bypass Telstra's backbone pricing. At the same time new undersea capacity is coming onto the market as a result of the end of the duopoly (*e.g.* Southern Cross).[30] The result is that ISPs in Australia have increasing flexibility to price Internet access in different ways for users in metropolitan areas. The same flexibility, in other areas of Australia, will depend on the roll out of competitive infrastructure and a greater number of points of presence from ISPs.

LOCAL INFRASTRUCTURE ACCESS PRICING

To access the Internet, a dial-up user needs access, via a public switched telecommunication network, to their Internet Service Provider (ISP). The price of this telecommunication access is comprised of different elements. First, is the cost of line connection and the rental of a line. These tariffs are known as fixed charges. The tariffs for making calls to the ISP's gateway to the Internet are known as usage charges. A further charge, which is rarely mentioned in terms of the cost of Internet access, is the tax rate applied to telecommunication and ISP fees (**Box 8**). This section examines trends in the pricing of these elements of telecommunication service as they relate to Internet access.

Fixed prices

The cost of connecting a telecommunication line for a residential user has probably not impacted greatly on Internet penetration. This is largely because basic telecommunication penetration rates were

high, in most OECD countries, prior to the Internet developing into a mass market. In addition, there is a general trend toward lower connection costs in liberal markets. This is because competitors need to attract users with an existing connection. In turn this competition has meant that incumbents have needed to drop their connection charges. At the same time connection costs when spread over a number of years make up a very small part of a users overall costs to access the Internet.

The cost of a line rental is a more significant part of the cost of accessing the Internet than the connection charge. That being said, by far the majority of users accessing the Internet via a dialup connection do so with a connection that they previously had for telephony. The main exceptions are in those countries where the advent of the Internet has generated significant sales of second residential lines. Yet even in these countries the majority of households accessing the Internet do so over a single line.

Over recent years the price of line rental has been increasing throughout the OECD area. This process has been known as 'rebalancing' (see discussion below). While rebalancing has meant, on average, higher line rentals throughout the OECD area, the pricing of this element of telecommunication service is not believed to have significantly impacted on Internet penetration rates.

Local call prices and rebalancing

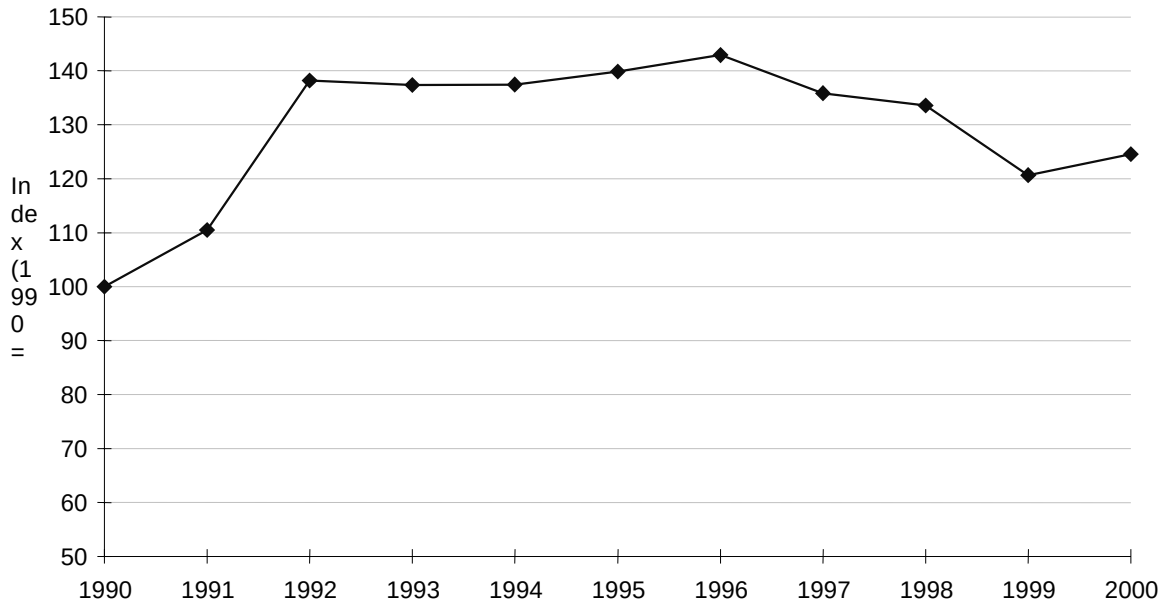
The rebalancing of telecommunication charges has involved lowering 'long distance' charges and raising the charges for fixed network elements and local calls. In an environment where telecommunication was primarily used for telephony the overall impact of this rebalancing was neutral for many users. For example, in 1994, France Telecom rebalanced local call charges. Prior to this change, users of France Telecom were charged in units of six minutes for calls within their local area. Following the change the length of a unit was cut to three minutes for the same price. At the same time the size of the local calling area was significantly increased. In other words subscribers could make calls at the local rate to a much larger area but if the calls lasted longer than three minutes the price increased. According to France Telecom, three quarters of local calls were unaffected by the change because they lasted less than three minutes. For users of a traditional basket of telecommunication services, France Telecom calculated that the overall impact of the change, when reductions in long distance rates were taken into account, was to reduce the average prices to customers by 2.4%. By way of contrast, the impact on the cost to users of accessing the Internet was to double the price.

The experience of France Telecom is not unique. When the rebalancing programmes of most telecommunication carriers were underway, in the early to mid 1990s, none of these carriers offered Internet access. The first dial-up offers, from incumbent telecommunication carriers, began to emerge in late 1995 and most from 1996. Accordingly, the impact of rebalancing on the emerging service received little attention from telecommunication carriers. In countries with metered local calls, the result of rebalancing was higher prices precisely at a time when usage patterns were significantly changing. The full impact of these rising PSTN prices, on the initial users, was to some extent offset by declining ISP prices. However, those telecommunication carriers that had delayed rebalancing began to do so in an environment that had significantly changed from the early 1990s. This resulted, by 1998, in a trend toward separating the pricing of local telephony and Internet access.

The first separation between Internet and PSTN pricing was, generally, to offer discount schemes specifically tailored for Internet users. That being said some telecommunication carriers lowered local call charges between 1996 and 1999 (**Figure 9**). As the pricing of Internet access has been separated from local telephony, some telecommunication carriers have raised local call prices. Between February 1999 and February 2000, telecommunication carriers in nine countries raised the price for local telephony calls (prices were decreased in a further nine countries). In all cases where the prices increased, the pricing of Internet access has been separated from telephony by specific discount schemes. By way of contrast, in

some of the countries where separation has not occurred between local call charges and Internet access, such as in Iceland and Australia, prices were reduced.

Figure 9. Trends in local call pricing in the OECD area



Notes: 1. The average of Index (1990= 100) of a basket of local calls in each country weighted by the number of
2. Calculation is based on PPP expressed in US$.
3. Luxembourg and New Zealand are not included.
Source: OECD.

In summary, the lowering of long distance charges has not had a significant impact on Internet access as the majority of telecommunication subscribers can access the Internet for the price of a local call. Raising local charges did significantly increase the cost of accessing the Internet in some countries particularly between 1995 and 1998. More recently discount schemes specifically aimed at Internet access have mitigated, if not eliminated, the negative impact of rebalancing. In those countries with unmetered access rebalancing has not significantly impacted on the price of Internet access. The possible exception is for users renting additional residential lines (*i.e.* facing price increases on both lines) but this is not a factor in creating digital divides. The more important factor here is the overall affordability of Internet access for a household's primary connection to an ISP.

Local call areas and off-peak times

Local access

The size of local calling areas has tended to rise over recent years. In part this is because a growing number of OECD countries have telecommunication carriers offering the same rate to call any domestic location. Those countries in which long distance pricing has been eliminated by the incumbent telecommunication carrier include Iceland, Norway and Sweden. In Denmark, Italy and the United Kingdom, national calls at local rates are available from some new entrants. At the same time most telecommunication carriers, such as France Telecom, with metered local call charges began to offer national access numbers reserved for Internet access from around 1996. This meant that access to the

Internet was available for the same price as a metered local call even if an ISP did not have a point of presence in a particular area.

This means that access to the Internet, for the price of a local call, is not available in some countries with unmetered telecommunication charges. In these countries users may pay a metered long distance rate to access the Internet. To date these charges, while sometimes making the cost of accessing the Internet prohibitive for users in these areas, have probably not significantly impacted on national Internet penetration rates -- simply because most potential users can access the Internet via a local call. They have, however, held back the development of the Internet in rural and remote areas and are a contributing factor in national digital divides.

In Australia, many users in rural areas can not access the Internet for the price of a local call. Prior to February 2000, Telstra charged USD 5.49 per hour for Internet access, under its rural connect plan.[31] In February 2000 the price for Internet access under the rural connect plan was lowered to USD 3.21 per hour. This meant that for 20 hours of service (*i.e.* 20 x 1 hour online sessions) a user of the rural connect plan would pay USD 66.41 compared to a user in a metropolitan area paying USD 19.00. The fact that some users pay more than three times more than other users for Internet access illustrates how digital divides can arise at the national level.

In the United States, users in rural areas are less likely to be connected to the Internet than urban users.[32] At a given income level, those in urban areas are 50% more likely to have Internet access than those earning the same income in rural areas. Low-income households in rural areas of the United States are the least connected, with connectivity rates in the singles digits for both computers and Internet access. The reasons for the digital divide in rural areas are no doubt multi-faceted. Accordingly, the United States Government has proposed a series of initiatives aimed at bridging the digital divide including programmes in rural areas.[33] However it is also important to recognise the role competition has played in addressing the problem of increasing local access to an ISP's point of presence.

In rural United States many of the areas that had no coverage in 1996 were covered by an ISP by 1998.[34] At the same time the number of ISPs competing in these markets increased. Research undertaken by Downes and Greenstein shows that more than 92% of the United States population had access via a short local phone call to seven or more ISPs by 1999. The same researchers found that no more than 5% did not have such access. They concluded that the true percentage of the population without access to a competitive dial-up market was much lower than 5%. For these users the best available option may be the use of "800" or freephone numbers but charges can be in the order of USD 0.10 per minute.

Peak and off-peak

Over the years telecommunication carriers with metered pricing have tried to match tariffs with periods of peak and off-peak usage. Higher rates were charged during times of peak usage and lower charges were in effect during times of off-peak usage. The main problem with these pricing structures is that they may not match patterns of Internet usage, which can be very different from patterns of usage for telephony. In some cases, as part of a wider restructuring of tariffs, the time at which off-peak rates commence has been made later (*e.g.* the Netherlands). The impact of such a change is to hold back demand for Internet access until the time at which off-peak rates commence. A similar phenomenon has been observable in Japan, which has not traditionally had peak and off-peak rates for local calls. This has meant that the introduction of discount schemes for Internet use, related to time of day, have influenced patterns of Internet access. For NTT's network a major increase in Internet traffic has occurred at 23:00 hours based on the commencement of a discount scheme.

In Southern European countries off-peak rates have traditionally begun much later than Northern European countries in line with different daily cycles of economic and cultural activity. Notwithstanding

this demand for Internet access can be radically different than for telephony in these countries. An example might be children wanting to access the Internet from home after school hours. Whereas the same children may also have made telephone calls after school the impact of peak rate pricing is greater on the cost of Internet access. The same might be said for a user working from home. Some telecommunication carriers have separated peak and off-peak pricing for Internet access by bringing forward the time when off-peak rates are available (*e.g.* Portugal Telecom). In Spain, Telefonica has also introduced earlier off-peak times. At the same time, France Telecom has eliminated the time-of-day as a consideration in the pricing of access to Wanadoo. However, the absence of off-peak pricing at certain times of day has probably been one factor in the creation of an international digital divide.

Box 8. Taxation

In 1990 over one third of OECD Member countries had no direct taxation on telecommunication services. By way of contrast, when Australia introduces a value-added tax in July 2000, every OECD country will have either State or Federal taxes on telecommunication services. The level of consumption taxes varies from 5% in Japan to 25% in Sweden (**Table 11**). The average tax rate on telecommunication services doubled during the 1990s from 8.6% to 16.9%.

One factor worth noting, in relation to the relative performance of access to the Internet, is that those countries with a metered charge have a 5% higher tax rate than those with unmetered prices. However a more significant impact of consumption taxes on Internet access are the differences generated by metered and unmetered pricing structures. Although they are commonly called consumption taxes, the taxes on telecommunication services are linked to the structure of prices charged by service providers. In countries with metered charges this means there is a direct link between the level of consumption and taxation. In countries with unmetered access there is no direct link between the two.

In countries with unmetered access to the Internet, taxes are only applicable on the fixed charges. In many cases users in unmetered countries have not changed their fixed access charges due to Internet access. In other words a user has always paid a tax on the monthly rental of a telecommunication line and does not pay any increase in tax on increased consumption of "online time". This does not mean that some users, in unmetered countries, are not paying more tax on some telecommunication charges associated with Internet access. Many such users subscribe to additional access lines or higher speed connections, which carry a tax. However, they are not paying tax on their increasing use of basic telecommunication access to the Internet.

By way of contrast those users in countries with metered access to the Internet are paying significantly more as their online time increases. Between 1990 and November 1999 the average rate of consumption tax on telecommunication services in the Europe Union area increased from 9% to 19.4%. When these increases are added to rebalancing local telecommunication charges (*i.e.* higher local call charges) then the cost of increasing consumption of online time rises considerably in countries with metered access.

The overall impact of the differences between countries is that not only do the users in countries with metered access pay a higher tax rate but also their charges increase in proportion with online time. On the contrary, many users in unmetered countries will have had no increase in the tax associated with basic telecommunication access to the Internet

INTERNET ACCESS PRICING

Internet access price comparison

Prices to access the Internet continue to fall across OECD countries and a trend has emerged toward 'unmetered' access, which will be important in facilitating electronic commerce. These are the conclusions from a survey of the cost of accessing the Internet across the OECD area. Comparisons of the price for a basket of Internet access services area are available in **Annex 1**. The methodology is described at the beginning of the Annex.

The average cost to users to access the Internet for 20 hours per month, fell by 15% between October 1999 and March 2000, and by 17% for 40 hours. For 40 hours of off-peak usage per month, including telecommunication charges, the average price of Internet access fell from USD 54.36 to USD 45.34. Based on announced plans for unmetered access options in several countries, there will be increased price reductions in 2000 and continued demand from the market for price innovation.

To take into account the shift toward unmetered pricing the OECD has also compared the price of 'always-on' Internet access. The benchmark used to compare these offers is the average price for 150 hours Internet access per month, for OECD countries with metered telecommunication charges for Internet access. The differences in pricing are very large. The average price for countries with unmetered Internet access, including all charges, is USD 35.68 at off-peak and USD 38.06 at peak rates. The average price for metered Internet access for 150 hours, in countries with this structure, is USD 131.23 at off-peak times and USD 235.67 at peak times. Few users in the latter countries would pay this amount because, if available, they would shift to other unmetered access options (*e.g.* cable modem, DSL or even leased lines). The comparison is made to highlight the benefit for Internet users in markets with unmetered options.

Local calls and Internet access

The major trend in the pricing of Internet access, in countries with metered local telecommunication charges, is towards separation of local call pricing from Internet access pricing. In 1995, when the OECD undertook its first comparisons of Internet access virtually all users paid standard local call prices to access their ISP. Some discount schemes were available, in countries with liberalised telecommunication markets, but these were aimed at telephony (*e.g.* some users included their ISP in options such as "Family and Friends"). At the same time local call pricing was undergoing major rebalancing in a number of OECD countries in advance of market liberalisation.

While much of this rebalancing was neutral in terms of the pricing of telephony (*e.g.* lower long distance prices offsetting high local charges) it severely impacted on Internet users. At this time, the large reductions in ISP prices were offsetting the impact of PSTN rebalancing. It was not until late in 1997 that the first discount plans aimed specifically at Internet use started to emerge. By mid 1998,

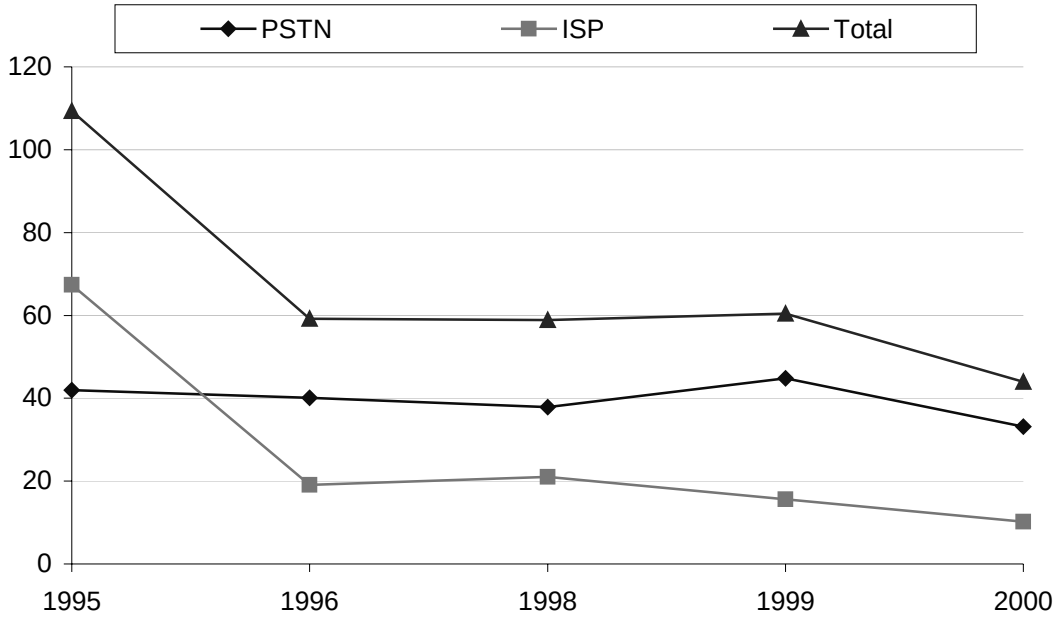
telecommunication carriers in 13 OECD countries with metered charges, had introduced a specific PSTN discount scheme aimed at Internet users. A further four countries had 'telephony discount schemes' that could be applied to Internet access. By March 2000, nearly all the leading telecommunication carriers in OECD countries had Internet specific discount schemes or separate PSTN pricing aimed at Internet users, including structural changes such as unmetered options. Only the users of the leading telecommunication carriers in Iceland and Poland paid standard local rates to access the Internet. Notwithstanding this, Iceland Telecom had reduced prices for all local calls, including those to the Internet, since the previous survey. At the same time, Polish users of TPSA were the first to receive a 'free ISP' service, meaning the cost of service is bundled in the price of a local call. The trend toward bundling telecommunication charges with ISP charges is increasing such that it is sometimes impossible to know the price being charged for each element.

ISP pricing trends

In August 1996 the average price charged by ISPs for 20 hours of service per month, across the OECD area, was USD 19.07. A year earlier the equivalent price was USD 67.35. During that time complicated schemes based on time or volume sensitive pricing gave way to unmetered ISP prices. Most ISPs also eliminated connection fees. The overall impact of these changes was that for the first time the main expense to access the Internet was no longer the ISP charges but PSTN charges. In 1995, the ISP fee, for 20 hours service at peak rates, represented 63% of the total cost to users. By 1996 the same measure had fallen to 39% and by 1998 it had further decreased to 35%. In March 2000, the average charge from ISPs stood at just 23% of the cost to users for 20 hours at peak times.

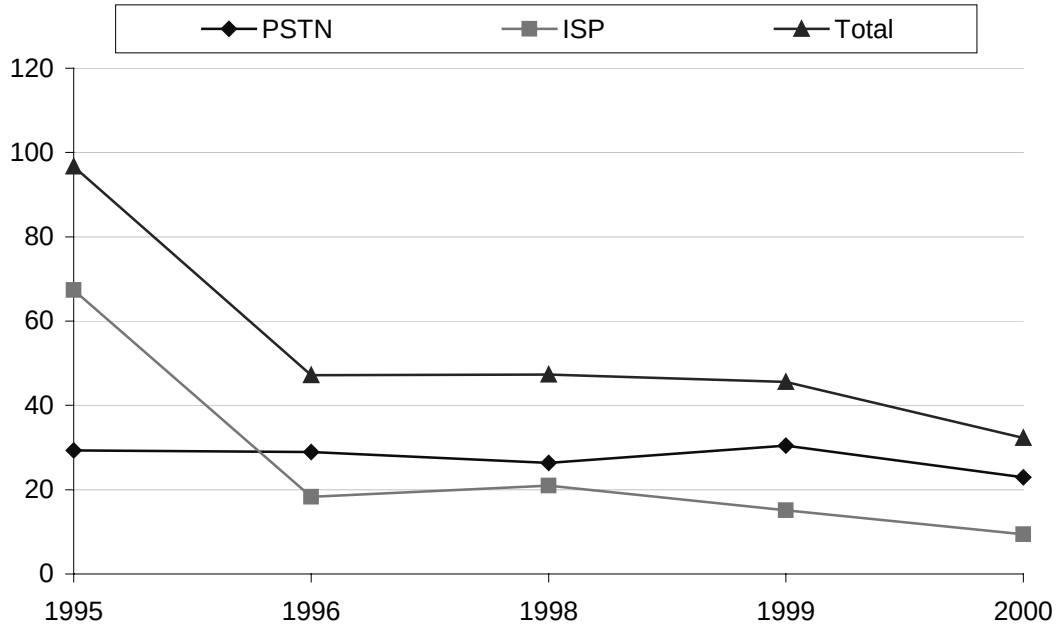
While the main price declines undoubtedly occurred between 1995 and 1996, significant changes in the structure of ISP charges occurred from 1998 onwards. Noteworthy, in this respect, was the advent of so called 'free ISPs'. The introduction of 'free ISP' services by an increasing number of telecommunication carriers has meant that the average price for the ISP component has fallen to USD 10.23 at peak times and USD 9.39 at off-peak times. However this indicator needs to be placed alongside trends in telecommunication charges. This is because users sometimes pay for ISP services via the telecommunication charges and vice versa. The trends in the average price of the ISP and telecommunication services necessary to access the Internet are shown at peak times (**Figure 10**) and off peak times (**Figure 11**).

Figure 10. Trends in Internet access pricing at peak rates for 20 hrs of access per month, in US$PPP



Source: OECD.

Figure 11. Trends in Internet access pricing at off-peak rates, (US$PPP) for 20 hrs of access per month, in US$PPP



Source: OECD.

It should be noted that the slight rise in ISP charges, between 1996 and 1998, in **Figures 9** and **10**, is due to two factors: one is that as telecommunication carriers began offering Internet access the OECD changed its methodology to use the ISP prices of the largest telecommunication carrier rather than the least expensive ISP; the other is that several countries joined the OECD during this time, which, together with rebalancing, had the impact of increasing both the average ISP and PSTN charges. Although the impact of separating PSTN access charges from local call charges and introducing discounts is evident from 1999 onwards the major cost reductions have been due to falling ISP prices. This is to be expected in that the ISP market is extremely competitive compared to the PSTN where incumbent operators still exercise significant market power.

"Free" ISPs

There are several different business models underpinning 'free ISPs'. These models tend to share certain characteristics in terms of the costs of doing business. One common element, typical to 'free ISPs', is a reduced expense for customer management and support. For example, because free ISPs do not charge customers there are none of the traditional costs associated with billing end users. At the same time customer support, such as that provided by 'help-desks' is generally charged for by 'free ISPs' (this is included in the charge of most fee based ISPs).

It is more on the income-side of a balance sheet that the business models of free ISPs diverge. In some countries, with metered local charges, 'free ISPs' rely on interconnection revenue from telecommunication carriers for terminating local calls, for a significant part of their income. While it was not the first of such services, Dixon's 'FreeServe' is generally credited with pioneering this model. Launched in September 1998, Freeserve soon spawned a host of 'free ISPs' in the United Kingdom. During 1999, ISPs adopted the model in a number of other European countries. Notwithstanding this, by the first quarter of 2000 the model was increasingly being called into question.

One reason for this was the announcement of unmetered PSTN Internet access offers from telecommunication carriers. Several of the unmetered offers, such as the one by NTL in the United Kingdom, meant that less expensive Internet access was available from the owners of the underlying telecommunication infrastructure than from the 'free ISPs'. In addition the unmetered offers from companies such as NTL and Telewest were tied to users accessing the ISPs of those companies. However the most significant aspect of the development of unmetered PSTN access was that the 'free ISPs' could no longer rely on the termination payments received via metered local calls. In the new environment 'free ISPs' need to either generate revenue from electronic commerce to replace metered termination charges (they may receive part of a fixed termination fee) or charge for their services. Accordingly, following BT's announcement of an unmetered PSTN offer, Freeserve announced a fee for users accessing the Internet via unmetered PSTN options. Experience in other countries indicates that the termination payments, including those for 'free ISPs' in unmetered environments, continue to be contentious (**Box 9**).

The second model of free ISPs is to rely on electronic commerce generating revenue streams necessary to cover the costs of access. In some cases this involves ISPs working with particular businesses so that the clients of that business receive a certain amount of Internet access. For example, the National Australia Bank works with an ISP called 'Freeonline' to offer Internet access to its customers. The business model of 'Freeonline' is to offer unmetered access to 4 000 prescribed Web sites, including the most popular Web sites in Australia. The service also offers a certain amount of time at Web sites not on the list.[35] Some web site owners, in the so called "FreeZone" pay FreeOnline when a user visits their web sites, generating revenue for FreeOnline. The advantages of this model for users are that it can provide inexpensive and unmetered access to electronic commerce (*e.g.* online banking or online trading from the National Australia Bank). At the same time all Web sites ending in '.gov.au' and '.org.au' are included

meaning that unmetered access is also available to online government services, community organisations, charities and so forth. The disadvantages are the limitations on time in visiting non-prescribed Web sites, that the service is only available in major cities and the limitations on the use of some applications available from fee based ISPs.[36] On the other hand, the service can be used concurrently with that of a fee based ISP.

Box 9. ISPs, 'FreeISPs' and termination charges in an unmetered environment

In Australia ISPs receive a capped termination charge. In the first quarter of 2000 this charge was in the order of USD 0.07 per call. The termination payment was 40% of the then flat rate per call charge of USD 0.18 (the local call charge was reduced in March 2000 to USD 0.11). Telstra, as permitted under its access regime, is working to lower the termination charge paid to ISPs as it believes the current charge is not cost oriented. In Australia, although calls are unmetered, the call charge can be divided between telecommunication carriers and ISPs. In countries with wholly unmetered local calls the issue has been more complex.

In the United States reciprocal compensation arrangements have been subject to contention between local exchange carriers and ISPs. The issue was whether traffic carried by connections to the Internet, via a local call, was local or interstate (*i.e.* long distance) in nature for the purposes of interconnection payments. If it was regarded as local then existing arrangements generally entailed local exchange carriers paying reciprocal compensation for terminating each other's traffic. If traffic was regarded as interstate in nature, the issue was raised as to whether Internet and other information service providers would continue to be exempt from paying interstate access charges.

In February 1999, the FCC concluded that carriers are bound by their existing interconnection agreements, as interpreted by state commissions, and thus are subject to reciprocal compensation obligations.[37] The Commission declared that Internet traffic is jurisdictionally mixed and appears to be largely interstate in nature. But the decision preserved the rule that exempts the Internet and other information services from interstate access charges. This means that those consumers who continue to access the Internet by dialling a seven-digit number will not incur long distance charges when they do so.

In New Zealand the question of termination payments has also arisen as a controversial question. Following the introduction of the 0867 access numbers, a number of ISPs have routed calls from Telecom New Zealand to Clear Communications. In return, Clear Communications pays these ISPs a portion of the interconnect fee it receives from Telecom New Zealand. This is accomplished via the ISP obtaining an 0867 number, from Telecom NZ, and then diverting it to Clear's network using the number portability agreement it has with Telecom NZ. As Clear Communications receives revenue from commercially negotiated interconnection agreements with Telecom NZ it has not joined the 0867 access scheme. Moreover Clear Communications offers Telecom NZ's retail users a USD 0.01 per minute rebate for calls to its ISP beyond 10 hours.[38] The only way to access Clear Communications 'Flat Rate' plan is via a standard local call for which the company receives an interconnect payment from Telecom NZ. Some media critics of Telecom New Zealand allege that the 0867 scheme was introduced to avoid the company paying termination charges to Clear Communications.[39]

The dispute reached a head when a number of ISPs launched 'free ISP' services in April 2000. This led to Telecom NZ blocking access to one of the start-up 'free ISPs'-- a company called 'I4free'.[40] Telecom NZ claimed that the call forwarding aspect of the service was defeating the benefits gained from separating Internet traffic from telephony. I4free claimed that Telecom NZ was acting in an anti-competitive manner by blocking access to a service which would have otherwise undercut Telecom NZ's ISP pricing. In addition one leading fee-based ISP began blocking their customers from accessing the Web sites of the 'free ISPs' in New Zealand.[41] At the time of writing the dispute between Telecom NZ and I4free is before the New Zealand courts. New Zealand does not have an industry specific regulator to rule on this dispute.

A third model of 'free' Internet access is provided by ISPs such as Netzero in the United States. Well known search engines such as Altavista, Yahoo, Lycos and Excite also offer variations of this model.[42] In these cases the ISP's major revenue stream is based on advertising. When users of the Netzero's free ISP service log on they see a small window displayed on their computer screens. While the user is online that screen is always visible regardless of where they navigate (*i.e.* it can not be closed or reduced in size). The window displays advertisements and advertiser-sponsored buttons and icons, all of which can link directly to sites and services such as news, financial information, sports and shopping. Advertisers pay Netzero for the number of advertisements displayed, the number of times users click on advertisements, or based on other defined criteria. Netzero also sells targeted advertising based upon

Web-sites visited, key word searches, and users' demographic and geographic information. Launched in October 1998, Netzero claimed more than three million registered users, in more than 2 300 cities across the United States, by the beginning of 2000.

Changing pricing structures

Demand for increased pricing options

All indications are that if users do not feel constrained in the amount of time they spend online or, perhaps just as important, that their ability to maintain connections is not constrained, then the take up of electronic commerce will increase. There is also a clear demand from users for pricing that is more responsive to their needs. The evidence for this is fourfold:

- First, in countries where there are no unmetered options grass roots movements have been created to lobby for the option of unmetered Internet access.[43] These groups have organised a series of 'Internet strikes' across Europe over recent years. During these 'strikes' supporters do not log onto the Internet for a day in protest over the structure of access charges.

- Second, companies whose businesses are closely intertwined with growth of Internet use, from AOL to Microsoft, are increasingly supportive of a greater range of tariff options including unmetered access. Moreover those telecommunication carriers who have introduced unmetered access say it is in response to an 'urgent demand by the public' or a 'longstanding wish of Internet users'.[44]

- Third, in countries where unmetered end-to-end access becomes available users rush to register with the service provider and online time substantially increases. Consider the experience of AOL as the company shifted to unmetered pricing:

  "Average monthly subscriber usage in the first quarter of fiscal 1997, the last quarter before the introduction of flat-rate pricing, was approximately seven hours. In fiscal 1998, average monthly subscriber usage ranged between 20 and 23 hours, and was approximately 22 hours in the fourth quarter of fiscal 1998. In fiscal 1999, average monthly subscriber usage ranged between 24 and 27 hours and was approximately 27 hours in the fourth quarter of fiscal 1999."[45]

- Fourth, market research indicates a significant number of users would like to make greater use of the Internet. In February 2000, the results of a Durlacher survey were reported involving interviews with users in 4 000 residential homes in the United Kingdom.[46] Evidence from the survey suggested that residential Internet users would increase the frequency of their Internet access by 46% and the duration of their Internet sessions by over 100% if they had the option of unmetered access. According to Durlacher this would lift the average Internet use in the United Kingdom from 11 hours per month to 32 hours per month.

The Durlacher study led the company to conclude that the United Kingdom Internet economy was being 'dramatically' held back by the absence of unmetered Internet access. Durlacher surmised that the widespread adoption of unmetered Internet access would have a substantially beneficial effect on consumer-focused Internet companies in the United Kingdom. The need for a greater range of tariff options to support the development of electronic commerce had also been recognised in a report prepared for the United Kingdom. In the report "E-commerce@its.best.uk" the Performance and Innovation Unit of the UK Cabinet Office recommended that a wider range of tariff options needed to be available to drive the

take up of electronic commerce.[47] The report also stated that tariff structures in the United Kingdom "…should not create inappropriate disincentives for spending online time relative to international rivals."[48]

In meeting these objectives the United Kingdom has a major advantage over other countries with metered telecommunication charges for Internet access. The reason is that local infrastructure competition is more advanced in the United Kingdom than in any other OECD country. This is why in the following section there are more references to activity occurring in the United Kingdom than other OECD countries which have traditionally had metered Internet access.

Innovation in response to the market in countries with metered Internet access

There is growing evidence from the growth in Internet hosts and secure servers that electronic commerce is growing faster in countries with unmetered Internet access pricing. In most OECD countries ISP pricing has been driven toward monthly flat rates or even 'free' access (the latter being associated either with particular business models of electronic commerce or interconnect rates paid via the local call charge). These developments have focused greater attention on the range of local loop pricing options available to users to access the Internet. The most innovative options being announced are in the area of unmetered options for consumers and small business. The following section highlights developments in countries which have traditionally had metered rates.

France

WorldOnline is a relatively large ISP operating in a number of different European countries. On 1 March 2000, WorldOnline launched an offer for French users to access the Internet at unmetered rates during off-peak times for USD 27.35 per month. However, demand to register for the service exceeded the ISP's capacity to deal with taking on new subscribers and the offer was suspended for users who were not among the first to subscribe. WorldOnline received 300 000 calls per day to the dedicated toll free number with 65% of subscribers seeking to connect within a few minutes after 19:00 hours. This experience demonstrates a pent up demand for unmetered access in France. It also demonstrates the challenges for being the first to offer a service, demanded by the market, without being able to structure the underlying charges. The problem faced by ISPs offering unmetered access, against peak and off-peak pricing structures designed for telecommunications (*i.e.* interconnection or retail PSTN charges), is that usage patterns are also determined by the access pricing of the incumbent telecommunication carriers. WorldOnline offers an unmetered service in the United Kingdom, 24 hours per day/seven days per week, for USD 20.37 and users need to subscribe to the company's telephone company WorldOnline Telecom.

In April-May 2000 several ISPs in France launched unmetered Internet access offers. Freesurf commenced an unmetered access offer for week day nights and weekends for USD 14.40 per month. This was followed by an offer for 'round the clock' access from OneTel, a telecommunication carrier and ISP. In May 2000, OneTel began offering unmetered Internet access to their telephony customers for USD 21.95 per month.

Hungary

In April 2000 Matav introduced an unmetered Internet access option called "Matav Mindenkinek" for residential customers. The offer enables users to make unlimited calls to the Internet at off-peak times for a monthly fee of HUF 4 000 (USD 15.00 or USD 35.00 when expressed in purchasing power parities). Users of this option are free to select to which ISP they subscribe. The off-peak periods include 18:00 - 7:00 hours on weekdays and 15:00 - 7:00 on weekends.

Germany

In February 2000, Deutsche Telekom announced it would introduce an unmetered option for accessing its ISP (T-Online) during the first half of the year. In making the announcement, the company said unmetered access, including telecommunication and ISP fees, would be available for less than USD 47.84. Another offer targets users of T-Online with an unmetered rate for Sundays for a monthly charge of USD 2.49 on top of the basic ISDN price.[49] A further offer for frequent users of the Internet is to be implemented in the course of 2000 -- "ISDN@ctive". For under USD 5 per month, users are connected via a control line (D channel) to ISDN and, via a narrowband channel, constantly connected to the Internet. This gives users permanent access to small volumes of data in order, for example, to be informed immediately of new e-mails or to follow the latest share prices. If the volume of data to be transmitted requires a greater bandwidth, both main lines (B channels) of the T-ISDN access are activated as and when needed. However the usage of these channels is billed by time, as is the case presently.

Deutsche Telekom's unmetered offer for Internet access was launched on 1 June 2000. For the payment of USD 37.39 per month users with a Deutsche Telekom line can opt for unmetered access to the Internet at all times of the day and week. On 1 June 2000 Versatel Telecom, a facilities-based provider in Germany, and several other European countries, also began offering unmetered Internet access for USD 37.39.

Ireland

Esat Clear, a telecommunication carrier and ISP, began offering unmetered Internet during weeknights and weekends on 1 September 1999. In 2000, Esat Clear's ISP, Ireland Online, was offering unmetered Internet during weekday nights and weekends for USD 26.67.

Italy

In Italy, driven by competition for telephony, the initial movement toward unmetered service options has been oriented toward voice services. However Internet access offers are also becoming increasingly competitive and include some unmetered offers. In March 2000 Infostrada, the Italian telecommunication carrier and ISP owned by the Vodafone-Mannesmann group, announced it planned to launch unmetered telecommunication services. From 1 May 2000, for USD 53.72 per month, Infostrada's offer enables users to make unmetered local, regional and national calls. The offer also included 10 hours of Internet access. At the same time a number of ISPs began to offer unmetered Internet Access. In March 2000 Galactica, an Italian ISP, launched an unmetered Internet offer for USD 39.58 per month. The offer is available throughout Italy. In April 2000, Tiscali, a telecommunication carrier and an ISP, commenced offering to pay for a user's local calls to the Internet, in return for that user accepting an advertising banner on their screen. In June 2000, Telecom Italia responding to the increasingly competitive market by launching a new tariff package for telephony and Internet. For a monthly payment of USD 50.32 users receive unmetered local and long distance calls (in addition to discounts on international calls and calls to mobile networks). The offer also included unmetered Internet access for the first three months. Following the first three months Telecom Italia proposed to include 20 hours of Internet access per month in the package.

Japan

NTT was one of the first telecommunication carriers to launch an option for unmetered access to the Internet. NTT offers a flat rate for late evening for certain specified numbers for which subscribers pay

a higher rental. However the unmetered rate was only available between 23:00 hours and 8:00 hours (for the payment of USD 10.56 per month). The time of day restrictions on the availability of the service have limited its usefulness to most users. In November 1999, NTT launched a trial with an unmetered ISDN service. The price for unmetered access at that stage was USD 44.33. In February 2000, NTT announced it would launch a wider service, in Tokyo and Osaka, with price cuts to the initial charges. Beginning in May 2000, for users accessing an ISP which has co-located equipment with NTT, the price for unmetered access is expected to be between USD 15.51 and USD 16.62 per month. For users accessing an ISP whose point of presence is within the same *prefecture*, the price is expected to be USD 22.16 to USD 27.70 per month. ISP charges would be in addition to the above (the prices were not established at the time of writing but ISPs generally charge a higher rate for ISDN access).

Korea

Korea Telecom introduced an unmetered offer, using the PSTN, for Internet access in major cities in May 2000.

Netherlands

'Superweb' was the first ISP in the Netherlands to introduce an unmetered rate for Internet access. For a monthly charge of USD 15.87 users can access the Internet without paying metered telecommunication charges.[50] However media reports indicate there have been problems for users logging onto the service because of its popularity.

'Wish', another Dutch ISP, has announced that it will offer an unmetered service for voice and data, by the end of 2000, for USD 43.08 per month.[51]

Spain

In June 2000, ONO, a communications service provider in Spain, launched an unmetered Internet access option.[52] The service, named "Barra Libre" ("free bar") provides the user with unlimited, unmetered dial-up Internet access for a flat monthly fee of USD 14.21.

Sweden

'Vattenfall', one of the largest energy companies in the Nordic region, is a new entrant in the Swedish communications market. In early 2000 Vattenfall was testing unmetered Internet access with 2 500 users.[53] Commercial service is expected to begin in mid-2000. The prices in the company's trial are USD 7.72 for line rental and USD 9.55 for unmetered Internet access. As in North America local voice calls are included in the line rental. Significantly, this includes all domestic calls as long distance pricing has been eliminated in Sweden (the entire country is a local call zone for customers of Telia and Vattenfall).

Switzerland

In February 2000, GTN launched an offer for Swiss users to make unmetered national calls weekdays from 17:00 to 8:00, and all weekend, for USD 22.63 per month.[54] However calls to the Internet were excluded from this offer. In March 2000, the company launched a service called 'RealFreeNet' for

Internet users. For the payment of USD 24.98 GTN's RealFreeNet service offers unmetered Internet access.[55] This service is also supported by advertising revenue. Users of the service see a banner on their screen and need to fill out a questionnaire when they join the service. Depending on the success of the scheme in Switzerland, the company says it plans to extend service to France, Germany and Italy.

United Kingdom

During the first quarter of 2000 a growing number of telecommunication carriers and ISPs announced or launched unmetered access options. The offers from the selected companies set out in the following paragraphs show the variety of the unmetered options available in the United Kingdom.

Kingston Communications serves a 120 square mile area around the city of Kingston-upon-Hull. In 1999 Kingston introduced unmetered access to the Internet. Kingston charges users USD 0.07 per call regardless of duration. The company's monthly ISP charge is USD 7.37. The monthly line rental for unmetered calls is USD 24.21 compared to USD 8.89 for metered local calls. Kingston Communications also has unmetered options for ISDN.

Telewest provides cable television, telephony and Internet access services to 1.5 million homes, and delivers business communications solutions to around 40 000 public and private sector organisations. Telewest's network currently passes more than four million homes across the United Kingdom. In February 2000, Telewest launched an unmetered Internet access service. The company charges USD 12.16 for line rental and its ISP charge is USD 13.51 (including unmetered Internet access calls). The only condition, relevant to pricing, is that users must make USD 13.51 of telephony calls per month using their Telewest line. If a user does not make this amount of non-Internet calls the difference is added to their fixed charge.

British Telecom (BT) is the largest telecommunication carrier in the United Kingdom. In December 1999, BT announced a range of new tariff options entitled "Surftime", and said they would change radically the way Internet access is charged, encouraging more people to get on-line. At that stage BT's proposed tariffs included an unmetered option for weekends (USD 9.45) and evenings/night during weekdays (USD 9.45). Options also included a daytime rate (USD 36.47) and an all-inclusive rate (USD 47.28). Outside these times metered charges would apply. BT's standard line rental is USD 12.50 per month. In March 2000, BT's projected prices were significantly cut, and BT announced it planned to introduce "Surftime" from 1 June 2000, and substantial reductions to the original prices. In the interim, BT's ISP offered an option of unmetered access at all off-peak times for USD 13.58. For the launch of the service, on 1 June 2000, BT's 'Surftime' rates were USD 13.58 (including call changes and BT Internet access charges) for evenings/nights and weekends. For completely unmetered call charges to an ISP, at all times of the day, BT's rate was USD 27.17. In addition, companies in which BT has stakes are offering unmetered Internet access (**Box 10**).

NTL provides cable television, telephony and Internet services in the United Kingdom and the largest cable communications provider in the United Kingdom. In July 1999, the Company announced an agreement to acquire the consumer cable telephone, Internet and television operations of Cable & Wireless Communications (CWC) plc. The combination of NTL and CWC consumer operations will make NTL the largest cable telephone and television company in the United Kingdom and Ireland by a factor of two with more than 3.4 million customers. In March 2000, NTL announced unmetered Internet access would be available at no additional charge to the company's standard line rental (USD 13.52). In other words users of NTL's telecommunication service could access the Internet without local call charges or ISP charges. The only condition, relevant to pricing, is that users must make USD 13.59 of telephony calls per month using their NTL line. If a user does not make this amount of non-Internet calls the difference is added to

their fixed charge. Significantly, NTL said the service would be made available across the whole of the United Kingdom. NTL proposed that users with BT line rentals would pay a one-off charge of USD 13.59 for a line adapter and would be required to spend at least USD 13.59 a month on voice calls via NTL.

AltaVista, best known as a search engine, provides free Internet access in a growing number of countries. By March 2000, AltaVista had more than two million registered users for its 'free' ISP service, which is available throughout the United States and most of Canada. Launched seven months previously, AltaVista Free Access was signing up about 10 000 users per day in March 2000. At this time, AltaVista's operation in the United Kingdom announced it would go a step further by providing unmetered access to its free ISP service via an 800 number (the actual number is 0800 in the United Kingdom). In other words AltaVista said it was willing to pay the local access charges for users of its ISP service to access the Internet. The company said the number of users would be limited to several hundred thousand users for the first six months of service and then be reviewed. In March 2000, the company announced that users will be required to pay a one-time fee about four times less expensive than the average cost users currently pay annually in local call charges for so-called 'free' services in the United Kingdom. In June 2000 Altavista announced the annual fee would be USD 69.31 (excluding tax) for a service to be launched on 30 June 2000. Worthy of note is that between the initial announcement and the launch of service, Oftel had ruled on FRIACO (Flat Rate Internet Access Call Origination) on 26 May 2000.[56] This decision mandated that BT make available unmetered local loops for other telecom providers and ISPs, which meant that the Altavista service no longer required the use of an 800 number.

Freeserve, the company that pioneered the 'free ISP' model announced an unmetered Internet access offer in March 2000. From May 2000, Freeserve subscribers using BT's 'Surftime' option will be able to pay an additional USD 9.50 per month for unmetered Internet access.[57] As a separate offer, Freeserve, in partnership with the telecommunication carrier Energis, will offer its customers an extension of its existing 'Freeserve Time' offer, for unmetered access at all times provided a minimum of USD 13.59 per month is spent on voice calls. Users of this option need to purchase a 'router' box, or dial the Energis access code, when making national and international calls.

Box 10. Internet access pricing and discount telecommunication pricing in the United Kingdom

In March 2000, two companies in which British Telecom has stakes, 'Quip!' and 'LineOne', launched a 'free ISP' with unmetered Internet access in the United Kingdom. Quip! is 49% owned by BT, with Unisys, the software company, and the Bank of Scotland, each holding 22.5%.[58] Quip! is a discount telephony provider and advertises "massive savings over the BT rates".[59] For example Quip! offers calls to Australia for USD 0.09 per minute compared to BT's standard rates (*i.e.* excluding discounts schemes) of USD 0.63 (BT Day), USD 0.57 (BT Evening) and USD 0.53 (BT Weekend).

LineOne is an ISP, in the United Kingdom, owned by United News & Media and BT.[60] In March 2000 LineOne had 850 000 users, and was reported to be growing at the rate of 20 000 new members per week. At the end of March 2000, LineOne launched a 'free ISP' offer for Internet access using unmetered access from Quip. To access this service users need to spend a minimum of USD 6.80 per month on national and international phone calls via the Quip! telephone network. User's credit cards are debited for this amount each month and they continue to be billed for the line rental from their telephone company. Quip says the rates are up to 60% less expensive than BT's standard rates. Users also need to purchase a telephone adapter for USD 27.18 to route their calls via the Quip! Network.[61] This offer is not available to business users. The offer is available to consumers 24 hours a day, seven days a week. Calls are limited to sessions of two hours but there is no limit on the number of times a user can re-connect.

High speed Internet access

At the beginning of 2000 the deployment of high speed Internet access across the OECD area is still at a very early stage. This section examines the initial pricing of DSL (Digital Subscriber Line) and cable modem services. Although other technologies are available, such as ISDN, its capabilities and

pricing are well known. In addition, as the performance and capabilities of DSL and Cable Modems far surpass that of ISDN, infrastructure providers are in a number of cases bypassing ISDN to market other technologies to users. This does not, of course, mean that the use of ISDN is not expanding in those countries where telecommunication carriers have not yet chosen to deploy, or actively market, DSL services (or cable modems in some cases). In fact, an emphasis on ISDN rather than DSL might be taken as an indicator of a lack of competition in high-speed local access networks.

Digital Subscriber Line (DSL)

DSL refers to a digital coding technology that utilises an existing copper telephone line for high-speed data communications. Among various DSL technologies, Asymmetric Digital Subscriber Line (ADSL) has been commercialised the most extensively in OECD countries -- hence the focus on ADSL in this report.[62] The word 'asymmetric' indicates that the downstream flow of data (downloading) is faster than the upstream flow of data (uploading). The asymmetry corresponds to the fact that the users usually download data (*e.g.* surfing the Web or listening to an online radio station) far more than they upload (*e.g.* sending e-mails).

ADSL is significant in several aspects, both technologically and commercially. As this technology utilises an existing telephone line, a consumer need not install a new connection but need only connect a modem to an existing line. The technology utilises frequency on a copper line that is not used for regular voice calls.[63] Accordingly, a user can make and receive telephone calls at the same time as maintaining an 'always-on' Internet connection.

The 'always-on' capability of DSL is a major advantage of this technology over ISDN. An ISDN service also utilises the existing telephone line with digital technology, but it can not offer an always-on capability, at its maximum speed, with simultaneous use of the line for ordinary telephony. The feature that the most significantly differentiates ADSL from ISDN, is that the former offers a much faster data connection speed. Theoretically, DSL has up to 8 Mbit/s downstream and up to 1 Mbit/s upstream, while ISDN offers a fixed rate of 64 kbit/s for both streams.[64] The speed of ISDN can doubled (*i.e.* 128 kbit/s). But in this case, the capacity for the regular telephone is used, which means that a user cannot make or receive a phone call while logged on to the Internet. In some cases it may also mean that users pay more for the connection than for access at 64 kbit/s.

In practice, the initial speeds being offered by telecommunication carriers for DSL service are typically between 512 - 1000 kbit/s for downstream and 128 - 256 kbit/s upstream (**Tables 12** and **13**). It appears that the speeds lower than theoretically possible, result from the consideration of the stability of the speed, accommodation of as many customers as possible using the existing exchanges, as well as financial and other business factors in the introductory phase of the service.[65] The physical limitations in connection speed come from such factors as the distance between the home and the telephone exchange, the quality of the line, and the capacity of ADSL modems.[66]

Development of DSL in OECD countries

By March 2000, incumbent operators had introduced ADSL services in just over half of the OECD Member countries. However some of these services have their availability limited to certain cities or regions. In addition some services, such as in Australia, Japan, and Sweden, were still listed as trials. A number of telecommunication carriers, *i.a.* Telecom Italia, have announced plans to launch services in 2000.[67] In the United States the FCC has mandated line sharing (*i.e.* mandated unbundling of the high frequency portion of the loop to allow competitive DSL providers to offer services over the same loop on

which incumbents provide a customer's voice service). In the United States incumbents must begin to provide such access in June 2000. This is expected to rapidly increase the availability of DSL services.

In terms of the connection speeds, Telenor's trial offers the fastest downstream rates of up to 2 Mbit/s. However these speeds are not yet available to the mass market in Norway (similarly the prices are for the trial). Bell Atlantic has an option offering speeds of up to 1.6 Mbit/s for downstream access. Belgacom and France Telecom offer downstream access rates of 1 Mbit/s. In some cases the differences are related to offers aimed at business or residential users and this is reflected in the pricing of some of the options with higher speed. The majority of options aimed at residential users range between downstream access rates of 500 to 800 Kbit/s.

For upstream rates, Telenor offers a choice ranging from 256 Kbit/s to 448 Kbit/s with the higher speeds, once again, aimed at business users. France Telecom and NTT's offers of 256 Kbit/s and 224 Kbit/s are the next highest rates. The majority of the offers for upstream rates are at speeds 128 Kbit/s. The various combinations show very different approaches. For example, Bell Atlantic offers one of the lowest upstream rates, at 90 Kbit/s, but has one of the fastest downstream rates. Another interesting combination is that of Korea Telecom, where ADSL is offered at symmetric speeds in both directions, (128 Kbit/s albeit, from 512Kbit/s to 2Mbps for communications within the same PBX).

It needs to be noted that the prices shown are at the retail level. At the time of writing information on offers for ADSL from British Telecom, Telecom Italia, KPN, and Telefonica were only available at the wholesale level. This is also an important area of pricing as many ISPs without access networks are planning to use ADSL products.

DSL pricing

Several aspects of ADSL pricing follow traditional models of telecommunication pricing. Most telecommunication carriers charge a connection fee. That being said, in March 2000 some companies were waiving connection charges in Belgium and the United States or charging low rates in other countries such as Austria and Canada. In many of these instances cable modem services are competing with ADSL. Another element of traditional telecommunication charging, repeated with ADSL, is the monthly line rental inclusive or exclusive of usage charges. At the same time some carriers bundle the ISP charge with the basic monthly price while for others it represents a separate charge.

The majority of carriers charge an unmetered rate for the monthly line rental. In some cases this mirrors PSTN pricing, as in Canada and the United States, but in a number of other instances it represents a new direction for pricing of Internet access in the countries concerned. For example Telecom New Zealand's prices are metered compared with unmetered residential PSTN services. In such cases, services are not metered by time but by the amount of Mbytes which are downloaded or uploaded beyond a monthly allowance. Other telecommunication carriers with this model include Belgacom, TeleDanmark, and Iceland Telecom. An exception within the latter model is a pricing structure of EPT of Luxembourg. EPT charges, a fixed amount and a metered charge if a user exceeds their monthly allowance.

All the ADSL pricing models enable an 'always-on capability', with the exception of Luxembourg, because users can maintain their connection. This includes those services with a restriction on the amount of bytes that can be downloaded or uploaded. Whether metering pricing by bytes will prove successful in the market is yet to be determined. From the perspective of the telecommunication carrier this form of pricing provides an incentive to be economical with usage while still enabling an always-on capability. The mechanism may also discourage "unnecessary" data flows, although most network operators monitor usage for abuses, such as spam, without recourse to metered pricing.

Such a price mechanism might be effective for discouraging unnecessary data flow over the Internet and maintaining a certain level of speed in practice. But, on the other hand, the necessity for an "always-on" environment, to develop electronic commerce and other Internet applications, seems to override such costs, and in this sense, complete flat rates might be preferable. There is a possibility that one company offers an option in between the two price structures so that a consumer could choose the better system according to his needs, but no incumbent operators have introduced it at the moment. The disadvantage of metering may be that it discourages certain forms of electronic commerce or multimedia applications if the rates included are relatively low. At the same time some users may find pricing metered by bytes complicated to understand or may resent paying for downstream data they did not request. As competition evolves between ADSL and cable modems it might be expected that a range of options will be available from the same operators.

Undertaking pricing comparisons with ADSL is more complicated than with PSTN because some operators are bundling the cost of equipment with the line rental. In addition the speeds on offer vary, unlike the PSTN where the telecommunication prices are uniform whether a user has a 14.4 kbit/s, 28.8 kbit/s or a 56 kbit/s modem. A further factor is that although higher access speeds are on offer from some telecommunication carriers, the limitations resulting from metered pricing may curtail users extracting the full benefits of these speeds relative to users with lower speed but unmetered options.

Over time it might be expected that similar options will develop and more information will be available on usage patterns to enable comparisons. For the moment it can be observed that prices in Canada and the United States have amongst the simplest structures, and, depending on usage, probably have the most attractive charges. There are even offers of 'free' DSL services beginning to emerge in the United States (**Box 11**). It is also interesting to note that the initial prices in Europe are split between those operators using metered and unmetered pricing approaches. In Europe the least expensive prices for DSL service are in Sweden, for those users covered by agreements between Telia and various household associations. This is the result of a highly competitive market for high speed Internet access in Sweden (Box 12).

Box 11. Free DSL

In April 2000 a 'free' DSL service commenced in selected cities in the United States. Broadband Digital Group (BDG) is the first provider of 'free' high speed Internet access for the consumer market.[68] The company's FreeDSL service offers speeds of up to 144 kbit/s. In return for the FreeDSL service, users agree to accept advertising and provide the company with demographic information. This involves usage patterns being tracked. The company then targets advertising to these users based on profiles contracted from their usage. Users purchase their own modems.

Users can pay about USD 10 per month to have the 'FreeDSL' service without advertising or about USD 20 a month to upgrade to a connection to higher speeds.[69] The company plans to roll out services in most major metropolitan areas in the United States by the end of 2000. For USD 35 per month users can have a 1.5 Mbit/s connection rate. At the commencement of service the company reported 740 000 potential users had registered for the service.

Cable modem Internet access

Cable modems enable high-speed access to the Internet utilising the local access infrastructure of cable television networks. Cable modems mirror the 'always-on' functionality of ADSL. In addition, as the service uses the cable television network it does not preclude the use of telephone and may obviate the need for an additional line for some users. The downstream rates for cable modem service can be up to 27 Mbit/s, and up to 10 Mbit/s for the upstream rates. However both downstream and upstream access speeds are determined by the amount of bandwidth available to be shared by users.[70] In practice, the speeds seem to typically be 512 kbit/s for downstream and 128 kbit/s for upstream (**Tables 14** and **15**).

The major factor in the capabilities of ADSL depends on the length of the subscriber line between the home and the telephone exchange.[71] By way of contrast the speeds of the cable modem services are greatly affected by the number of subscribers who share Internet access over the same cable TV network in the area. The actual speed obtained by the subscribers could vary depending on the usage of the network by their neighbours. This may mean that ADSL will have an advantage in areas where there is a high density of users close to existing telecommunication exchanges (*e.g.* central business districts) whereas cable modems will have an advantage for the opposite reasons in suburban areas.

There is also a further limitation on cable modem services. In most instances users cannot currently choose their ISP as they can with ADSL. In most cases the ISP of the cable company bundles their access price with their ISP price, but some users can access the content and services of other ISPs by paying a separate charge.

Development and cable modems in OECD countries

By March 2000, cable modem services were available in at least 12 OECD countries, with some limitations on the areas covered. As noted in the previous section, the nominal speeds of connection offered by cable operators – typically 512Kbit/s for downstream and around 128Kbit/s for upstream – will in practice depend on the actual conditions when accessed by users. Norway has three operators providing Internet access by cable (Telenor Avidi, UPC and AlphaNett) but pricing information was not available at the time of writing.

Pricing of cable modem access

For cable modem service, users typically pay for an initial connection and monthly line rental. The connection charge sometimes includes the purchase of a cable modem, which is usually proprietary to a particular cable network. In some instances, if this is not included in the connection price, the monthly fee includes the rental of the cable modem. In other cases a subscriber could opt for a separate rental charge or a direct purchase. In all cases shown the cable modem service prices include the ISP component.

The price for connection to a cable Internet service, when purchase of a cable modem is included, is generally between USD 200 and USD 260. Where the modem is not included in the connection, prices range from USD 50 to USD 100. When users purchase the cable modem 'up front' the monthly price of service is generally in the range of USD 30 to USD 40. When a rental of a modem is included in the monthly rate, the cost is USD 35 to USD 55. The cable modem offer in Denmark is less expensive than other countries because it involves use of the PSTN. In this case users download data over their cable modems from a cable television network but use their regular telephone connection to request the data. The prices shown in **Tables 14** and **15** do not include the PSTN charges.

As in the case of ADSL services, the prices at the lower end of the scale are becoming increasingly attractive for users compared to the PSTN. Here users will generally take into account that the prices include ISP charges, may negate the need for an additional telephone line and promise much better performance levels.

The differences in pricing approaches in different countries are also evident. As might be expected unmetered offers are available in countries such as Canada and the United States. In Australia, Telstra -- traditionally a strong advocate of metered pricing for Internet access -- has also introduced unmetered pricing prompted by competition and demand from the market. On the other hand, France Telecom, who offers unmetered ADSL services, has a metered cable modem service. This raises the question of whether the unmetered service is not available for cable because it does not face competition from ADSL in those regions where France Telecom is the cable provider. Although not indicated in

Table 14 and **Table 15** some cable companies offer unmetered downstream service but cap upstream services.

In some countries, a correlation between ADSL and cable modem pricing is also worth noting. For example, Saturn Communications meters cable service in New Zealand, mirroring the metered ADSL pricing. In addition it is noteworthy that Saturn charges different prices for domestic and international traffic. This raises the question of how such a metered service is accomplished in respect to different networks caching data, foreign hosting of New Zealand content, domestic hosting of foreign content and the possibility that some domestic traffic may be routed internationally. It is also raises the question of how the users know which content is domestic and which content is international.

Box 12. High speed access in Sweden

The company offering the fastest broadband Internet access to residential users is undoubtedly the Swedish company Bredbandsbolaget (more commonly known as B2). Among B2's owners are NTL and Intel, with technical partners including Cisco Systems.[72] For USD 19.30 per month users of B2's system can access the Internet at speeds of up to 10 Mbit/s. This speed is much faster than the offerings of telecommunication carriers via DSL or cable networks using cable modems, and this speed is available in both directions. In other words users of B2's system can receive and send data at up to 10 Mbit/s with an 'always-on' unmetered connection. With such high speeds, B2 is encouraging users to set up their own multimedia centres -- including applications such as Webcasting films to other B2 users.

The major limitation of B2's offer is that it is only available to users in apartment buildings (the offer is not available to detached or terrace houses). Nor is the offer available, in the first instance, to individual occupants. Rather the owner, or owners, of an apartment building must first agree to an installation and then the service becomes available to individual occupants. For apartment buildings B2 builds a LAN (Local Area Network) into the property. All apartments are equipped with an Ethernet socket. An Ethernet switch is located on the premises from which connections are subsequently made to the public Internet via the optical fibre networks that are available in most Swedish towns. Users of B2's service do not need a modem but do require a network card in their PC. The initial connection fee is USD 192.96 and after installation the LAN becomes the property of the owners of the apartment building. The individual occupants taking the service pay the monthly fee of USD 19.30. In August 1999, B2 signed a contract with HSB, the largest Swedish organisation of tenant-owned housing. HSB provides services to tenant-owned housing, including construction work and administration and serves some 350 000 Swedish households. In Sweden, every tenth residential apartment was built by HSB.

Telia, the incumbent telecommunication carrier in Sweden, has responded to the increasingly competitive market for high speed Internet access by also signing agreements with the Swedish Association of Private House Owners (Villaägarnas Riksförbund) and Sweden's largest real estate management company, Svenska Bostäder in Stockholm. The first agreement covers private households in 24 areas that Telia have targeted as a priority, including major cities in Sweden. The second agreement covers 50 000 residential units and around 100 000 tenants. For the users covered by these agreements Telia's prices for DSL service are the least expensive on offer from an incumbent telecommunication carrier in the OECD area -- a monthly price of USD 19.30 (there is a one-off connection charge of USD 94.07). The downstream speed of Telia's DSL service is 0.5 Mbit/s. Telia says these connections can potentially be upgraded to 8 Mbit/s (downstream to subscribers) and 1 Mbit/s (upstream from subscribers).

CONCLUSION

The level, and structure, of pricing for Internet access is one of the major constraints facing users and potential users. This report has reviewed new pricing structures that are emerging to facilitate increasing access and use of the Internet, and concludes that the key to greater tariff innovation to support electronic commerce is increased competition, including appropriate regulation of incumbent carriers. In those countries where competition is most advanced, at the local level, the benefits of pricing innovation are increasingly evident. By way of contrast, the growing international digital divide, across the OECD, will further widen in the absence of competition in local markets in other countries.

For policy makers or regulators the preferable response to the challenges of the international digital divide, is not to mandate particular tariff structures (*e.g.* unmetered access), even if the evidence is mounting that they are more appropriate for electronic commerce. This would be a retrograde step in that it would return policy makers to setting telecommunication tariffs. Rather the report highlights other policy options which are available, including:

- High level policy support for a greater range of tariff options, in particular pricing favourable to 'always-on' capabilities necessary to support electronic commerce.
- Policy support for infrastructure competition.
- Policy support for unbundling local loops.
- Policy support for the competitive development of high-speed access options.

Table 1. Charging practices for rsidential uers in the OECD area, 2000

	PSTN charging structure					
	Local telephony	Internet access	Local telephony	Internet Access	ISP fee includes unmetered local calls(2)	Unmetered PSTN for Internet access by 1 July 2000
Australia	Unmetered (flat rate)		Per call	Per call		Yes
Austria	Metered	Metered	Seconds	Seconds		
Belgium	Metered	Metered	Seconds	Seconds		
Canada	Unmetered	Unmetered	None	None		Yes
Czech Republic	Metered	Metered	Units	Seconds		
Denmark	Metered	Metered	Seconds	Seconds		
Finland	Metered	Metered	Seconds	Seconds		
France	Metered	Metered	Seconds	Seconds	Yes	
Germany	Metered	Metered	Units	Seconds		Yes
Greece	Metered	Metered	Units	Seconds		
Hungary	Metered	Unmetered/ Metered (3)	Seconds	None/Seconds		Yes
Iceland	Metered	Metered	Seconds	Seconds		
Ireland	Metered	Metered	Seconds	Seconds	Yes (off-peak)	
Italy	Metered	Metered	Seconds	Seconds		
Japan[1]	Metered	Metered	Units	Units		Yes
Korea	Metered	Metered(3)	Units	Units		Yes
Luxembourg	Metered	Metered	Units	Seconds		
Mexico	Unmetered (First 100 calls free, then flat rate)		Per call	Per call		Yes
Netherlands	Metered	Metered	Seconds	Seconds	Yes	
New Zealand	Unmetered	Unmetered	None	None		Yes
Norway	Metered	Metered	Seconds	Seconds		
Poland	Metered	Metered	Units	Units		
Portugal	Metered	Metered	Seconds	Units		
Spain	Metered	Metered	Seconds	Seconds	Yes	
Sweden	Metered	Metered	Seconds	Seconds		Yes
Switzerland	Metered	Metered	Units	Seconds	Yes	
Turkey	Metered	Metered	Units	Units		
United Kingdom	Metered	Unmetered/ Metered (3)	Seconds	None/Seconds	Yes	Yes
United States	Metered/Flat rate/Unmetered		Seconds/per call/none			Yes

1. NTT offers a flat rate for late evening for certain specified numbers for which subscribers pay a higher rental. The company is also expanding an unmetered option using ISDN.
2. In France for WorldOnline users at off-peak times, Sauperweb in the Netherlands, GTN in Switzerland and various ISPs in the United Kingdom. In Ireland an unmetered offer is available at off-peak times from IOL.
3. Users in Hungary and the United Kingdom have the option of metered or unmetered Internet access under the new tariff plans on offer. Korea Telecom's offer operates in major cities.

Source: OECD.

Table 2. Internet hosts per 1 000 inhabitants

	Jul-95	Jul-96	Jul-97	Jul-98	Jul-99	Jan-00	Change (Jul 1999-Jan 2000)
Finland	22.5	55.3	67.1	104.0	122.7	148.1	25.4
United States	14.0	26.2	37.2	78.1	118.0	141.5	23.5
Iceland	25.6	40.5	52.6	77.1	108.2	137.0	28.8
Norway	16.1	29.4	50.1	77.0	92.8	120.3	27.6
Sweden	14.6	26.3	39.7	62.1	96.0	114.8	18.9
Canada	14.0	25.2	38.7	73.4	93.6	111.1	17.5
Denmark	9.0	18.8	32.0	51.1	73.4	92.7	19.3
New Zealand	12.3	21.7	42.5	49.6	59.2	88.1	28.9
Netherlands	9.9	16.3	25.5	42.0	56.9	84.8	27.8
Australia	12.2	23.3	40.6	45.5	60.2	77.3	17.1
Switzerland	10.6	17.9	25.6	41.3	59.6	76.1	16.5
United Kingdom	6.0	12.1	18.1	28.2	43.7	60.3	16.6
Austria	5.6	9.9	12.4	20.2	35.5	50.0	14.5
Belgium	2.8	5.3	10.0	19.1	36.8	49.2	12.4
Luxembourg	4.9	9.5	12.8	23.6	38.1	43.5	5.4
Ireland	3.3	7.1	10.8	16.6	28.8	36.4	7.7
Germany	4.8	7.9	12.4	18.4	25.6	34.0	8.4
France	2.5	4.4	6.6	11.4	22.7	29.8	7.2
Japan	1.4	4.2	8.0	11.8	18.1	25.8	7.6
Spain	1.5	2.6	4.6	9.9	16.2	22.8	6.5
Italy	1.1	2.6	4.6	8.0	12.6	18.9	6.3
Korea	0.7	1.5	3.5	5.4	8.5	18.8	10.3
Hungary	1.2	2.6	3.5	7.7	10.3	14.2	3.9
Portugal	1.0	2.0	2.2	5.4	8.1	12.8	4.7
Czech Republic	1.5	3.2	4.9	6.7	9.4	12.8	3.4
Greece	0.6	1.4	2.1	4.4	8.1	9.6	1.5
Poland	0.4	1.0	1.2	2.6	4.4	6.0	1.6
Turkey	0.1	0.3	0.6	1.0	2.6	5.4	2.8
Mexico	0.1	0.3	0.4	1.1	2.7	5.0	2.2
OECD Average	5.9	11.2	16.8	31.4	47.1	59.3	12.2
Countries with unmetered local access charges	10.8	20.1	29.2	58.6	86.9	104.9	18.0
Countries with metered local access charges	2.9	5.8	9.2	14.6	22.2	30.8	8.6

1. These data are based on a survey undertaken by Network Wizards for the Internet Software Consortium (ISC). Internet hosts under generic top level domains (.com, .org and .net) have been reallocated according to the proportion of gTLDs registered by users in each country. The registration data for January 2000 was contributed by Matthew Zook.

Source : ISC, OECD.

Table 3. Netsizer (Telcordia) host data

	Internet hosts per 1 000 inhabitants				Reallocated gTLDs as a proportion of country total		
	Sept 1997	Sept 1998	Sept 1999	Mar 2000	Sept 1997	Sept 1998	Sept 1999
United States	61.3	95.5	160.1	185.2	66.1	68.7	76.9
Finland	70.4	102.4	122.8	138.5	9.3	7.6	9.8
Iceland	n.a	76.1	96.6	n.a	n.a	-1.0	0.7
Norway	43.1	74.2	88.0	97.8	4.4	1.1	3.1
Canada	31.9	54.5	76.0	83.4	33.6	34.9	35.6
Sweden	36.6	47.8	69.1	79.7	8.0	8.1	14.2
New Zealand	35.7	51.8	63.1	78.6	2.8	0.5	4.4
Denmark	27.7	41.3	59.9	n.a	6.5	2.9	1.6
Australia	33.6	44.5	55.4	60.8	12.4	5.5	6.8
Netherlands	23.2	37.8	51.9	n.a	8.4	8.3	12.6
Switzerland	21.7	34.6	42.9	n.a	8.7	11.9	14.2
United Kingdom	16.7	25.4	35.3	40.8	12.0	11.5	14.7
Belgium	8.6	17.7	29.8	n.a	3.9	1.9	1.3
Austria	8.9	17.9	28.0	n.a	4.3	9.6	16.6
Germany	11.0	15.6	20.4	23.4	7.3	8.2	14.1
Japan	9.2	13.5	18.8	22.9	3.3	1.5	2.2
Ireland	0.0	11.8	14.1	21.4	n.a	8.1	6.9
France	5.7	8.4	13.2	15.9	6.6	7.5	9.7
Hungary	3.9	8.1	11.5	n.a	10.6	13.8	11.7
Czech Republic	4.7	7.3	10.6	n.a	6.0	5.3	2.9
Spain	4.3	6.5	9.6	12.8	4.5	6.5	8.9
Italy	3.8	6.3	9.3	n.a	5.1	2.7	5.4
Korea	2.4	4.2	6.9	9.1	7.8	9.2	11.2
Greece	2.9	4.2	6.6	n.a	5.5	2.0	0.4
Portugal	3.2	5.4	6.6	8.1	6.0	3.8	0.8
Poland	2.0	2.9	4.0	n.a	2.2	-0.1	0.8
Mexico	0.2	0.9	2.1	3.2	4.3	3.1	4.7
Turkey	0.3	0.7	1.2	1.5	5.6	14.5	14.7
Luxembourg	n.a	n.a	n.a	n.a	n.a	n.a	n.a
OECD average	22.0	34.3	54.4				
Countries with unmetered local access charges	44.0	68.5	112.5				
Countries with metered local access charges	8.5	13.1	18.2				
Average for the EU	10.7	16.3	22.8				
Average for the Nordic countries	42.7	63.3	82.4				

1. Telcordia data for 31 March 2000.

Source: Netsizer (Telcordia as reported in *Telegeography 2000*), OECD.

Table 4. Secure servers per 1 million inhabitants

	Sep 97	Feb 98	Aug 98	Feb 99	Jul 99	Jan 00	Mar 00
Iceland	36.6	36.2	47.1	100.5	104.1	161.6	193.9
United States	27.6	40.9	60.8	89.9	116.0	147.7	170.4
Australia	13.6	24.1	36.6	53.9	69.8	105.7	119.1
New Zealand	15.4	22.7	26.6	46.8	59.3	83.3	92.7
Switzerland	8.0	13.8	24.1	41.3	54.6	81.8	91.5
Canada	18.1	30.6	33.5	49.5	58.0	74.6	87.1
Luxembourg	7.2	9.5	28.4	42.2	61.0	75.1	86.8
Sweden	6.0	10.5	20.7	33.6	45.7	63.5	71.0
United Kingdom	6.0	9.2	14.0	21.3	29.5	47.4	55.2
Finland	3.9	7.4	15.7	24.8	34.8	47.8	54.4
Norway	5.2	9.5	14.5	22.7	29.3	44.6	49.3
Ireland	4.6	9.2	16.6	17.5	26.2	42.1	47.8
Austria	3.2	7.5	13.0	23.1	29.5	40.5	42.1
Denmark	2.1	5.5	10.1	13.8	21.2	33.7	39.8
Germany	1.8	4.0	6.8	13.2	19.8	29.5	34.5
Netherlands	4.8	6.8	9.4	15.5	19.4	25.8	29.4
Belgium	2.1	3.5	5.1	11.4	15.7	21.2	23.6
France	1.1	2.4	4.3	7.6	10.7	15.9	18.0
Spain	3.0	4.6	6.7	9.3	10.9	14.3	15.6
Japan	1.6	2.5	4.2	7.6	9.2	12.9	15.4
Czech Republic	0.6	1.3	2.5	4.5	8.6	10.6	13.0
Italy	1.5	2.7	3.4	5.3	7.5	9.6	10.8
Portugal	1.6	1.9	3.1	5.1	6.0	8.8	9.0
Greece	0.5	0.8	1.4	2.8	4.5	5.6	6.5
Hungary	0.7	1.1	1.9	2.4	2.6	4.3	4.9
Korea	0.4	0.7	0.9	1.9	2.3	3.4	3.3
Poland	0.2	0.2	0.7	1.2	1.6	2.5	3.1
Turkey	0.1	0.1	0.2	0.6	0.8	1.2	1.5
Mexico	0.2	0.3	0.3	0.5	0.6	1.0	1.3
OECD average	8.9	13.6	20.1	30.5	39.6	52.2	60.1
Countries with unmetered local access charges	20.0	30.1	43.8	64.6	83.0	106.6	122.9
Countries with metered local access charges	2.0	3.4	5.5	9.2	12.5	18.3	21.0
EU average	2.7	4.7	7.6	12.5	17.3	25.4	29.1
Average for the Nordic countries	5.0	8.9	16.6	26.4	35.8	51.4	58.0

Source: Netcraft, OECD.

Table 5. Web sites in the OECD area

	Sites by country				Sites by country		
	By ccTLD domain	weighted by gTLDs probable physical location or network	weighted by gTLDs probable economy	By cc TLD per 1000 inhabitants	Including gTLDs per 1000 inhabitants probable physical location or network	Including gTLDs per 1000 inhabitants probable economy	Increase by ccTLD domain per 1000 inhabitants between January 1998 - February 2000
United States(1)	489 688	7 465 358	5 602 437	1.8	27.0	20.3	*1.6*
United Kingdom	832 878	895 369	1 125 788	14.2	15.2	19.2	12.50
Switzerland	87 035	96 206	132 259	11.9	13.1	18.0	9.10
Denmark	62 844	63 870	90 139	11.9	12.1	17.1	8.76
Luxembourg(2)	3 137	4 727	4 727	7.4	11.1	11.1	5.80
Iceland	2 746	2 787	4 278	9.9	10.0	15.4	7.50
Germany	745 130	793 547	940 218	9.1	9.7	11.4	8.08
Netherlands	121 249	142 442	213 018	7.7	9.1	13.5	6.52
Sweden	57 376	75 266	133 649	6.5	8.5	15.0	3.89
New Zealand	29 008	31 183	40 884	7.6	8.1	10.7	5.84
Austria	56 899	64 695	80 957	7.0	7.9	9.9	5.67
Canada	59 937	231 428	374 338	1.9	7.5	12.1	1.33
Australia	106 145	120 650	169 814	5.7	6.5	9.1	4.20
Norway	25 802	28 284	49 534	5.8	6.4	11.2	4.35
Finland	17 062	29 802	40 948	3.3	5.8	7.9	2.08
Belgium	41 200	42 000	73 092	4.1	4.1	7.2	3.53
Czech Republic	32 058	32 694	35 429	3.1	3.2	3.5	2.66
Ireland	6 334	7 073	19 800	1.7	1.9	5.3	1.26
Korea	75 949	83 273	181 490	1.6	1.8	3.9	1.55
Italy	74 219	80 148	150 607	1.3	1.4	2.6	0.96
Hungary	9 929	12 719	15 177	1.0	1.3	1.5	0.75
Poland	44 939	45 206	53 750	1.2	1.2	1.4	1.01
France	51 669	67 158	226 147	0.9	1.1	3.8	0.69
Greece	11 399	11 461	15 613	1.1	1.1	1.5	0.93
Portugal	10 239	10 342	16 541	1.0	1.0	1.7	0.60
Spain	20 125	27 121	107 316	0.5	0.7	2.7	0.34
Japan	65 829	76 436	176 925	0.5	0.6	1.4	0.32
Mexico	13 001	14 929	27 137	0.1	0.2	0.3	0.09
Turkey	11 710	14 110	58 945	0.2	0.2	0.9	0.13
.com	6 280 702						
.net(3)	*800 381*						
.org	552 241						
OECD	10 798 860	10 570 283	10 160 959	9.7	9.5	9.1	

1. The US includes .edu, .mil, .gov and .us but most activity occurs under gTLDs.
2. A netsizer weighting was not available for Luxembourg.
3. The data for .net is an estimate based on the December 1999 data.

Source: Netcraft (www.netcraft.com).

Table 6. International Internet bandwidth by country

	International bandwidth (Mbps)
United States	28 308
United Kingdom	18 338
Germany	11 612
Netherlands	10 874
France	9 687
Canada	8 134
Switzerland	6 816
Belgium	6 213
Sweden	4 388
Japan	2 643
Italy	2 200
Denmark	1 274
Korea	1 106
Austria	979
Australia	729
Finland	670
Spain	618
Norway	490
Turkey	300
Ireland	239
Czech Republic	177
New Zealand	155

1. These data are drawn from the Top 50 Internet hub cities 1999. Some OECD countries did not have an international route large enough to make *Telegeography*'s cut-off point.

Source: *Telegeography 2000.*

Table 7. Web Hosting prices

	20 Mb.	40 Mb	50 Mb	60 Mb	100 Mb	Cost of additional storage	Cost per 1 Mb @ 50 Mb	Cost per 1 Mb @ 100 Mb
AT&T		25.00		50.00	125.00	25.00 per 25 Mb	0.83	1.25
BT	33.77				270.27	8.45 per 5 Mb or 67.57 per 50 Mb	1.69	2.70
France Telecom ('Professional' plan)			143.88			35.97 per 10 Mb	2.88	3.24
France Telecom ('Enterprise' plan)			359.71			35.97 per 50 Mb	7.19	3.96
	Data transfer included per month (Mb)					Cost of additional data transfer		
AT&T		2 000		4 000	6 000	50.00 per 500 Mb		
BT	1 000				5 000	3.38 per 100 Mb		
France Telecom ('Professional' plan)			50			14.39 per 10 Mb		
France Telecom ('Enterprise' plan)			500			179.86 per 500 Mb		

1. Data exclude set up charges and cost of domain name. Data for BT are from the "Publisher Gold" plan and the "Premium Publisher" plan. Prices are monthly as at 23 March 2000.

Source: OECD.

Table 8. Rapidsites by top level domains, February 2000

	Number of sites under domain using Rapidsite	Proportion of total ccTLD sites using Rapidsite under domain (%)
France	1710	3.31
Mexico	350	2.69
United States	181 339	2.23
Spain	408	2.03
Greece	201	1.76
Germany	12 182	1.63
Ireland	102	1.61
Japan	1 017	1.54
Italy	990	1.33
Austria	521	0.92
Switzerland	775	0.89
Denmark	526	0.84
Portugal	68	0.66
United Kingdom	4 892	0.59
Netherlands	608	0.50
Turkey	42	0.36
Luxembourg	7	0.22
Iceland	5	0.18
Canada	100	0.17
Hungary	17	0.17
Belgium	52	0.13
New Zealand	39	0.13
Norway	27	0.10
Australia	99	0.09
Korea	67	0.09
Sweden	44	0.08
Finland	6	0.04
Czech Republic	6	0.02
Poland	10	0.02
OECD	206 210	1.91

Source: Netcraft (www.netcraft.com).

Table 9. Internet multimedia content

	Radio stations on the Web	Radio stations on the Web per million inhabitants	Internet multimedia content incl gTLDs (excl MP3)	Internet multimedia content per million inhabitants
United States	1 922	7.0	159 653.0	578.0
Sweden	14	1.6	4 168.0	468.7
Australia	80	4.3	7 007.2	374.6
New Zealand	13	3.4	1 384.9	361.7
Canada	165	5.3	11 055.0	358.3
Norway	12	2.7	1 369.4	308.3
Finland	16	3.1	1 500.8	290.6
Switzerland	32	4.4	2 033.0	276.8
United Kingdom	73	1.2	15 087.4	256.8
Ireland	25	6.7	939.6	253.6
Denmark	8	1.5	1 180.1	223.4
Netherlands	32	2.0	3 329.9	211.6
Austria	22	2.7	1 669.5	204.2
Luxembourg	1	2.3	55.7	130.6
Belgium	14	1.4	1 190.4	117.3
Greece	69	6.5	1 210.9	114.0
Germany	68	0.8	8 280.6	100.8
France	76	1.3	5 544.2	94.2
Korea	12	0.3	3 294.1	70.9
Japan	16	0.1	7 820.3	61.8
Spain	20	0.5	2 132.1	53.8
Hungary	28	2.8	528.4	52.4
Iceland	6	21.5	137.4	49.3
Italy	53	0.9	2 533.5	44.2
Czech Republic	28	2.7	395.5	38.5
Portugal	22	2.2	220.4	22.3
Turkey	44	0.7	1 095.9	16.7
Poland	23	0.6	495.1	12.8
Mexico	38	0.4	407.2	4.2
OECD	2 932	2.6	245 719.6	221.1
Unmetered	2 218	5.2	179 507.4	420.4
Metered	714	1.0	66 212.2	96.7
EU	513	1.4	49 043.0	130.8

1. Includes audio (WAV, Streaming, and Other but excludes MP3) and video files (Streaming, MPEG, AVI, MOV and other). Files found under gTLDs were allocated proportional to domain name registration data. MP3 files were excluded because the majority are ftp files.

Source: OECD.

Table 10. Internet hosts per 1 000 access lines

	September 1997	September 1998	September 1999	Change Sept-98 to Sept-99
United States	93.0	146.3	247.4	101.0
Finland	126.5	184.9	222.2	37.2
Canada	52.2	86.7	122.1	35.4
Iceland	0.0	117.7	150.8	33.1
Sweden	53.9	71.2	103.1	31.9
Denmark	43.5	62.3	90.6	28.3
Belgium	17.7	35.4	59.6	24.2
Netherlands	41.0	63.5	87.5	24.1
New Zealand	73.0	105.2	129.2	24.0
Australia	65.9	86.1	108.2	22.1
Norway	69.3	111.7	133.2	21.4
Austria	19.3	36.4	57.4	21.0
United Kingdom	31.1	45.3	63.1	17.8
Switzerland	33.5	52.7	65.6	12.9
Mexico	2.5	8.5	20.2	11.7
Japan	19.2	26.8	37.3	10.5
Hungary	12.4	24.1	33.8	9.8
Czech Republic	14.6	20.1	28.9	8.9
Germany	19.9	27.5	36.0	8.5
France	9.8	14.5	22.9	8.4
Spain	10.6	15.7	23.4	7.7
Italy	8.5	13.9	20.5	6.6
Korea	4.6	9.7	15.8	6.1
Ireland	0.0	27.1	32.6	5.6
Poland	10.1	12.8	17.6	4.9
Greece	5.7	8.1	12.6	4.5
Portugal	7.9	12.9	15.8	3.0
Turkey	1.1	2.5	4.7	2.2
OECD average	45.3	69.9	111.6	41.8
Countries with unmetered local access charges	84.4	131.9	219.0	87.1
Countries with metered local access charges	18.4	27.7	38.5	10.9

1. Data for Luxembourg was unavailable.
Source: Netsizer, OECD.

Table 11. Consumption taxes on telecommunications services

	Tax rate applicable to consumption of local telecommunication services (1990)	Tax rate applicable to consumption of local telecommunication services (November 1999)
Australia (1)	0	10 (July 2000)
Austria	0	20
Belgium	19	21
Canada	0	15
Czech Republic	n.a	5
Denmark	22	25
Finland	16	22
France (2)	18.6	20.6
Germany	0	16
Greece	16	18
Hungary	n.a	25
Iceland	25	24.5
Ireland	0	21
Italy	9	20
Japan	3	5
Korea	n.a	10
Luxembourg	0	15
Mexico	n.a	15
Netherlands	0	17.5
New Zealand	0	12.5
Norway	0	23
Poland	8	22
Portugal	0	17
Spain	12	16
Sweden	0	25
Switzerland	0	7.5
Turkey	10	15
United Kingdom	15	17.5
United States	0	10
OECD(1)	8.6	16.9
Unmetered	n.a	12.5
Metered	n.a	17.8
EU Area	9.0	19.4

1. Average of available countries. November 1999 includes July 2000 data for Australia.
2. France reduced VAT by 1% on 1 April 2000. The rate would now be 19.6%. The average excludes this change.

Source: OECD.

Table 12. Internet access by DSL in OECD Member countries, March 2000 (USD PPP)

Country	Company	Connection charge (USD PPP)	Monthly rental (USD PPP)	Mbytes included	Additional cost per mbyte (USD PPP)	Monthly ISP access cost if additional	Additional ISP set up fee	Equipment included in connection / rental?	Additional cost for equipment (US$ PPP)	Speed of connection downstream (kbit/s)	Speed of connection upstream (kbit/s)
Austria	Telekom Austria (A-Online Speed alpha)	6.77	54.65	1000	0.07	Included				512	64
Belgium	Belgacom – Turbo Line (Go)	0.00	37.15	3000	0.12	29.93	29.93	No	247.56	300	64
Belgium	Belgacom – Turbo Line (Plus)	220.33	47.00	3000	0.12	53.89	29.93	Yes		1000	128
Canada	Bell Canada Sympatico (Bell Sympatico High Speed Edition)	47.66	38.12	Unlimited		Included		Yes			
Denmark	TeleDanmark (NetExpress)	169.40	40.55	100	0.03			No	199.69	512	128
France	France Telecom (Netissimo1)	111.19	38.02	Unlimited		23.67		No		500	128
France	France Telecom (Netissimo2)	142.04	100.43	Unlimited		23.67		Yes		1000	256
Germany	Deutsche Telecom (T-Online Speed 50)	143.87	47.64							768	128
Germany	Deutsche Telecom (T-Online Speed 100)	143.87	71.70							768	128
Iceland	Iceland Telecom (ADSL 256)	62.72	31.36	1000	0.05	47.04		No	250.86	256	128
Iceland	Iceland Telecom (ADSL 512)	62.72	73.17	Unlimited	0.00	47.04		No	250.86	512	256
Japan	NTT (Trial)	109.32	23.39			10.88	53.30	No	4.35 per month	512	224
Korea	Korea Telecom	46.83	62.44					No		128	128
New Zealand	Telecom NZ (Xtra Velocity 600)	212.60	43.15	600	0.22	12.51		No	281.43		
New Zealand	Telecom NZ (Xtra Velocity 1500)	212.60	124.45	1500	0.22	12.51		No	281.43		
Norway	Telenor	561.78	140.44					Yes		640	256
Norway	Telenor	561.78	185.39					Yes		1000	384
Norway	Telenor	561.78	219.09					Yes		2000	448
Spain	Telefonica (Terra Familiar)	220.52	54.09					No	191.39	256	128
Spain	Telefonica (Terra Profesional)	303.73	116.22					No	191.39	512	128
United States	Bell Atlantic (Personal Infospeed)	99.00	49.95			Included		No	350.00	640	90
United States	Bell Atlantic (Professional Infospeed)	99.00	99.95			Included		No	350.00	1600	90

Source: OECD.

Table 13. Internet access by DSL in OECD Member countries, March 2000 (USD)

Country	Company	Connection charge (USD)	Monthly rental (USD)	Mbytes included	Additional cost per mbyte (USD)	Monthly ISP access cost if additional	Additional ISP set up fee	Equipment included in connection / rental?	Additional cost for equipment (USD)	Speed of connection downstream (kbit/s)	Speed of connection upstream (kbit/s)
Austria	Telekom Austria (A-Online Speed alpha)	7.04	56.83	1000	0.07	Included				512	64
Belgium	Belgacom - Turbo Line (Go)	0.00	30.09	3000	0.10	24.24	24.24	No	200.51	300	64
Belgium	Belgacom - Turbo Line (Plus)	215.93	38.07	3000	0.10	43.65	24.24	Yes		1000	128
Canada	Bell Canada Sympatico (Bell Sympatico High Speed Edition)	39.56	27.51	Unlimited		Included		Yes			
Denmark	TeleDanmark (NetExpress)	216.84	51.91	100	0.03			No	255.60	512	128
France	France Telecom (Netissimo1)	115.64	39.54	Unlimited		24.62		No		500	128
France	France Telecom (Netissimo2)	147.72	104.45	Unlimited		24.62		Yes		1000	256
Germany	Deutsche Telecom (T-Online Speed 50)	149.63	49.54							768	128
Germany	Deutsche Telecom (T-Online Speed 100)	149.63	74.56							768	128
Iceland	Iceland Telecom (ADSL 256)	82.16	41.08	1000	0.07	61.62		No	328.63	256	128
Iceland	Iceland Telecom (ADSL 512)	82.16	95.85	Unlimited	0.00	61.62		No	328.63	512	256
Japan	NTT (Trial)	190.22	40.69			18.93	92.74	No	7.57 per month	512	224
Korea	Korea Telecom	29.04	38.72					No		128	128
New Zealand	Telecom NZ (Xtra Velocity 600)	165.83	33.66	600	0.17	9.76		No	219.51		
New Zealand	Telecom NZ (Xtra Velocity 1500)	165.83	97.07	1500	0.17	9.76		No	219.51		
Norway	Telenor	741.54	185.39					Yes		640	256
Norway	Telenor	741.54	244.71					Yes		1000	384
Norway	Telenor	741.54	289.20					Yes		2000	448
Spain	Telefonica (Terra Familiar)	180.82	44.35					No	156.94	256	128
Spain	Telefonica (Terra Profesional)	249.06	95.30					No	156.94	512	128
United States	Bell Atlantic (Personal Infospeed)	99.00	49.95			Included		No	350.00	640	90
United States	Bell Atlantic (Professional Infospeed)	99.00	99.95			Included		No	350.00	1600	90

Source: OECD.

Table 14. Internet access by cable in OECD Member countries, March 2000 (USD PPP)

Country	Company	Plan	Connection charge (USD PPP)	Monthly rental (USD PPP)	Mbytes included	Additional cost per mbyte (USD PPP)	Additional monthly cost for cable modem (USD PPP)	Speed of connection downstream (kbit/s)	Speed of connection upstream (kbit/s)
Australia	Telstra Big Pond	Freedom	69.43	46.25	Unlimited	0.00	0.00	400	128
Australia	Telstra Big Pond	Blast Off	69.43	35.03	250	0.17	0.00	400	128
Belgium	Telenet	Pandora Formula 1	247.55	37.11	300		0.00		128
Belgium	Brutele	Brutelecom@home	59.90	35.95			13.32	256	64
Belgium	ALE	Economy Pack	71.70	24.63	250	0.12	9.88		
Belgium	ALE	Family Pack	71.70	39.49	1024	0.12	9.88		
Belgium	ALE	Power Pack	71.70	113.76	Unlimited		9.88		
Canada	Shaw Communications	Shaw @ Home	143.13	47.66	Unlimited	0.00	0.00		
Denmark	TeleDanmark		204.82	10.06			0.00	512	
France	France Telecom Cable (Wanadoo)	Prime@accès	77.47	45.91	500	0.36	0.00	512	128
Ireland	Cablenet	Cable Net Home	200.44	40.09			0.00	128	
Ireland	Cablenet	Cable Net Plus	200.44	60.13				256	128
Japan	Titus Communications	ALLNET	119.66	32.63	Unlimited	0.00	0.00	512	100
Mexico	InterCable	CableLink 300	88.93	44.32	300	0.21	14.82		
Mexico	InterCable	CableLink 600	88.93	73.96	600	0.12	14.82		
New Zealand	Saturn Communications		187.62	71.89	US$ 109.44 PPP worth of traffic	0.22/Mbyte international traffic, 0.022/ Mbyte for national traffic	0.00	512	128
Sweden	Tele2		48.31	29.95			8.21	512	
Switzerland	Cablecom	Hispeed: COMFORT	90.53	30.18	500	0.12	6.96		
Switzerland	Cablecom	Hispeed: BUSINESS	90.53	88.21	2000	0.09	6.96		
United Kingdom	NTL	Hispeed	34.36	67.69					
United States	Cablevision Systems Corp.	Optimum online	0.00	43.95	Unlimited	0.00			

Source: OECD.

Table 15. Internet access by cable in OECD Member countries, March 2000 (USD)

Country	Company	Plan	Connection charge (USD)	Monthly rental (USD)	Mbytes included	Additional cost per mbyte (USD)	Additional monthly cost for cable modem (USD)	Speed of connection downstream (kbit/s)	Speed of connection upstream (kbit/s)
Australia	Telstra Big Pond	Freedom	61.10	40.70	Unlimited	0.00	0.00	400	128
Australia	Telstra Big Pond	Blast Off	61.10	30.83	250	0.15	0.00	400	128
Belgium	Telenet	Pandora Formula 1	242.60	36.37	300		0.00		128
Belgium	Brutele	Brutelecom@home	58.72	35.23				256	64
Belgium	ALE	Economy Pack	70.24	24.14	250	0.14	10.84		
Belgium	ALE	Family Pack	70.24	38.70	1024	0.14	10.84		
Belgium	ALE	Power Pack	70.24	111.49	Unlimited		10.84		
Canada	Shaw Communications	Shaw @ Home	118.80	34.40	Unlimited	0.00	0.00		
Denmark	TeleDanmark		262.18	12.88			0.00	512	
France	France Telecom Cable (Wanadoo)	Prime@accès	80.57	47.75	500	0.37	0.00	512	128
Ireland	Cablenet	Cable Net Home	186.40	37.28			0.00	128	
Ireland	Cablenet	Cable Net Plus	186.40	55.92				256	128
Japan	Titus Communications	ALLNET	208.20	56.78	Unlimited	0.00	0.00	512	100
Mexico	InterCable	CableLink 300	64.03	31.91	300	0.15	10.67		
Mexico	InterCable	CableLink 600	64.03	53.25	600	0.09	10.67		
New Zealand	Saturn Communications		146.34	56.07	US$ 85.37 worth of traffic	0.17/Mbyte international traffic, 0.017/Mbyte for national traffic	0.00	512	128
Sweden	Tele2		57.49	35.64			9.77	512	
Switzerland	Cablecom	Hispeed: COMFORT	118.60	39.53	500	0.15	9.12		
Switzerland	Cablecom	Hispeed: BUSINESS	118.60	115.56	2000	0.12	9.12		
United Kingdom	NTL	Hispeed	39.86	78.52					
United States	Cablevision Systems Corp.	Optimum online	0.00	43.95	Unlimited	0.00			

Source: OECD.

ANNEX 1: INTERNET PRICING COMPARISONS, MARCH 2000

Methodology

The Internet basket includes one monthly line rental for a residential user. Usage charges are defined in blocks of one hour for the 20, 30 and 40 hour baskets. For 20 hours of usage, the price is the equivalent of 20 calls of one-hour duration at peak or off-peak rates. For the 'always-on' basket, usage is defined in 30 calls of five-hour duration.

Discount schemes (or special access number pricing) and tax rates are applied to these charges. The access pricing selected represents the best available offer for the applicable online time (this can be a different discount scheme for peak or off-peak service). The ISP charge is the best available rate, from the largest telecommunication operator, for that amount of service. The services of the largest communications operators are used to ensure comparability across countries and because they offer the widest national coverage. Countries may have other telecommunication operators and independent ISPs that together may offer a less expensive package.

Basket elements

- Fixed charge: the fixed charge comprises the monthly line rental for a residential user.
- Usage charge: the price of local telephone calls to an ISP for residential users.
- ISP charge: the price of Internet access from the largest telecommunication operator.
- Discount schemes: the best available scheme for each basket is selected.
- Tax: the value added tax rate.
- Peak: the price of local calls at 11:00 hours during weekdays.
- Off-peak: the price of local calls at 20:00 hours during weekdays.

Local call pricing structure

The predominant model for pricing local calls in the OECD area is measured service. In other words, the cost increases in proportion to the duration of the calls. The main exceptions are Australia, Canada, Mexico, New Zealand and the United States. In Australia, users pay a flat rate per local call irrespective of the duration. In the United States, residential users in large part have unmeasured local rates. The OECD basket uses a price option available in New York where calls are unmeasured but incur a set-up charge (*i.e.* similar to Australia). Residential users in Canada and New Zealand have unmeasured local calls and in Mexico they receive 100 local calls as part of the standard subscription. In Finland, the pricing structure varies between different providers of local telecommunication access services. For subscribers to Elisa, in Helsinki, there is also a specific rate available for ISPs (so-called Internet local call), that are using specific numbers. The price of the first 10 minutes is made at a flat rate at off-peak times followed by measured pricing. In some countries the telecommunication carriers bundle the metered local call prices with the ISP charge for a certain amount of online time. This online time is purchased in

advance and users pay additional charges if they exceed this amount. This occurs in France and Luxembourg, as well as the United Kingdom for off-peak options.

Table A1. OECD Internet access basket for 20 hours at peak times using discounted PSTN rates, including VAT, 2000

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
Korea	2.42	3.90	10.47	16.88	3.77	6.09	16.66	26.87
Italy	12.43	13.97	12.35	13.88	0.00	0.00	24.78	27.85
Finland	13.22	11.40	11.98	10.33	8.07	6.95	33.27	28.68
Australia	8.55	9.71	1.85	2.10	17.25	19.60	27.65	31.42
United States	14.29	14.29	2.33	2.33	16.45	16.45	33.07	33.07
France	11.64	11.19	0.00	0.00	23.72	22.81	35.36	34.00
Turkey	2.11	3.83	4.39	7.97	12.28	22.33	18.77	34.13
Japan	18.45	10.61	22.71	13.05	19.87	11.42	61.04	35.08
Iceland	7.30	5.57	26.48	20.22	12.32	9.41	46.11	35.20
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Sweden	12.07	10.14	27.89	23.44	2.76	2.32	42.72	35.90
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
New Zealand	17.73	22.73	0.00	0.00	12.20	15.63	29.92	38.36
Germany	12.42	11.94	18.02	17.32	9.96	9.58	40.39	38.84
Greece	7.95	9.82	8.30	10.24	17.28	21.34	33.53	41.39
Norway	19.17	14.52	25.50	19.32	11.82	8.95	56.49	42.79
Spain	11.55	14.08	26.00	31.71	0.00	0.00	37.55	45.79
Netherlands	15.37	15.84	30.73	31.68	0.00	0.00	46.10	47.53
Denmark	15.81	12.35	46.06	35.99	0.00	0.00	61.88	48.34
Switzerland	15.36	11.72	48.66	37.14	0.00	0.00	64.01	48.86
OECD average	12.62	13.54	21.08	24.04	10.23	12.01	43.93	49.59
United Kingdom	19.12	16.48	43.00	37.07	0.00	0.00	62.12	53.55
Ireland	15.40	16.56	20.62	22.18	15.04	16.17	51.06	54.90
Austria	17.07	16.41	45.24	43.50	0.00	0.00	62.31	59.91
Luxembourg	13.39	13.39	0.00	0.00	48.41	48.41	61.80	61.80
Poland	5.88	10.89	31.77	58.83	0.00	0.00	37.65	69.73
Portugal	12.79	17.53	23.30	31.92	18.93	25.94	55.03	75.39
Belgium	15.85	16.18	58.13	59.31	0.00	0.00	73.98	75.49
Czech Republic	4.82	11.22	30.10	69.99	12.35	28.73	47.27	109.93
Hungary	9.78	22.23	35.55	80.79	12.57	28.58	57.91	131.60

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable. Includes 20 one-hour calls. In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A2. **OECD Internet access basket for 20 hours at off-peak times using discounted PSTN rates, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
Italy	12.43	13.97	7.55	8.48	0.00	0.00	19.98	22.45
Finland	13.22	11.40	6.42	5.53	8.07	6.95	27.70	23.88
Sweden	12.07	10.14	14.41	12.11	2.76	2.32	29.24	24.57
United Kingdom	14.76	12.72	0.00	0.00	14.60	12.59	29.36	25.31
Iceland	7.30	5.57	13.80	10.53	12.32	9.41	33.42	25.51
Spain	11.55	14.08	9.43	11.50	0.00	0.00	20.98	25.58
Korea	2.42	3.90	10.47	16.88	3.77	6.09	16.66	26.87
Ireland	15.40	16.56	10.23	11.00	0.00	0.00	25.63	27.56
Switzerland	15.36	11.72	21.90	16.71	0.00	0.00	37.25	28.44
Denmark	15.81	12.35	16.10	12.58	5.46	4.27	37.38	29.20
Austria	17.07	16.41	15.36	14.77	0.00	0.00	32.43	31.19
Australia	8.55	9.71	1.85	2.10	17.25	19.60	27.65	31.42
Turkey	2.11	3.83	3.07	5.58	12.28	22.33	17.46	31.74
Netherlands	17.59	18.13	14.21	14.65	0.00	0.00	31.80	32.78
United States	14.29	14.29	2.33	2.33	16.45	16.45	33.07	33.07
France	11.64	11.19	0.00	0.00	23.72	22.81	35.36	34.00
Japan	18.45	10.61	22.71	13.05	19.87	11.42	61.04	35.08
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
Norway	19.17	14.52	16.65	12.61	11.82	8.95	47.63	36.09
OECD average	12.55	13.49	10.35	11.97	9.39	10.67	32.29	36.14
New Zealand	17.73	22.73	0.00	0.00	12.20	15.63	29.92	38.36
Belgium	15.85	16.18	21.84	22.28	0.00	0.00	37.69	38.46
Germany	12.42	11.94	18.02	17.32	9.96	9.58	40.39	38.84
Luxembourg	13.39	13.39	0.00	0.00	26.57	26.57	39.96	39.96
Greece	7.95	9.82	8.30	10.24	17.28	21.34	33.53	41.39
Czech Republic	4.82	11.22	13.60	31.62	4.77	11.10	23.19	53.94
Portugal	12.79	17.53	10.49	14.37	18.93	25.94	42.22	57.83
Poland	5.88	10.89	31.77	58.83	0.00	0.00	37.65	69.73
Hungary	9.78	22.23	9.72	22.08	12.57	28.58	32.07	72.89

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.
The basket includes 20 one-hour calls. Off peak is taken at 20:00.
In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP charge.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A3. **OECD Internet access basket for 30 hours at peak times using discounted PSTN rates, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
Finland	13.22	11.40	17.98	15.50	8.07	6.95	39.26	33.84
France	11.64	11.19	0.00	0.00	23.72	22.81	35.36	34.00
United States	14.29	14.29	3.50	3.50	16.45	16.45	34.23	34.23
Italy	12.43	13.97	18.52	20.81	0.00	0.00	30.96	34.79
Korea	2.42	3.90	15.70	25.32	3.77	6.09	21.89	35.31
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
Australia	8.55	9.71	2.78	3.16	21.60	24.55	32.92	37.41
Turkey	2.11	3.83	6.58	11.96	12.28	22.33	20.96	38.12
Japan	18.45	10.61	34.07	19.58	21.77	12.51	74.29	42.70
New Zealand	17.73	22.73	0.00	0.00	17.07	21.89	34.80	44.61
Iceland	7.30	5.57	39.72	30.32	12.32	9.41	59.35	45.30
Greece	7.95	9.82	12.44	15.36	17.28	21.34	37.68	46.52
Germany	12.42	11.94	27.02	25.98	9.96	9.58	49.40	47.50
Sweden	12.07	10.14	41.84	35.16	2.76	2.32	56.67	47.62
Norway	19.17	14.52	37.71	28.57	11.82	8.95	68.70	52.05
Spain	11.55	14.08	38.95	47.51	0.00	0.00	50.50	61.58
OECD average	13.63	15.84	30.27	32.94	11.63	13.78	55.53	62.57
Netherlands	15.37	15.84	46.10	47.53	0.00	0.00	61.47	63.37
Ireland	15.40	16.56	30.94	33.26	15.04	16.17	61.37	65.99
Denmark	15.81	12.35	69.09	53.98	0.00	0.00	84.91	66.33
Switzerland	15.36	11.72	72.98	55.71	0.00	0.00	88.34	67.44
United Kingdom	19.12	16.48	65.94	56.84	0.00	0.00	85.06	73.32
Austria	17.07	16.41	67.86	65.25	0.00	0.00	84.93	81.66
Luxembourg	13.39	13.39	0.00	0.00	70.24	70.24	83.64	83.64
Portugal	12.79	17.53	34.96	47.89	18.93	25.94	66.69	91.35
Poland	5.88	10.89	47.65	88.25	0.00	0.00	53.54	99.14
Belgium	15.85	16.18	87.19	88.97	0.00	0.00	103.05	105.15
Czech Republic	4.82	11.22	45.14	104.98	12.35	28.73	62.32	144.93
Hungary	39.12	88.91	13.20	30.01	20.19	45.90	72.52	164.81

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable. Includes 30 one-hour calls. In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A4. **OECD Internet access basket for 30 hours at off-peak times using discounted PSTN rates, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
United Kingdom	14.76	12.72	0.00	0.00	14.60	12.59	29.36	25.31
Finland	13.22	11.40	9.63	8.30	8.07	6.95	30.91	26.65
Italy	12.43	13.97	11.32	12.72	0.00	0.00	23.75	26.69
Sweden	12.07	10.14	21.61	18.16	2.76	2.32	36.44	30.62
Iceland	7.30	5.57	20.70	15.80	12.32	9.41	40.32	30.78
Spain	11.55	14.08	14.13	17.24	0.00	0.00	25.68	31.32
Ireland	15.40	16.56	15.35	16.50	0.00	0.00	30.74	33.06
France	11.64	11.19	0.00	0.00	23.72	22.81	35.36	34.00
United States	14.29	14.29	3.50	3.50	16.45	16.45	34.23	34.23
Turkey	2.11	3.83	4.61	8.37	12.28	22.33	18.99	34.53
Korea	2.42	3.90	15.70	25.32	3.77	6.09	21.89	35.31
Denmark	15.81	12.35	24.15	18.87	5.46	4.27	45.43	35.49
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
Switzerland	15.36	11.72	32.84	25.07	0.00	0.00	48.20	36.79
Australia	8.55	9.71	2.78	3.16	21.60	24.55	32.92	37.41
Austria	17.07	16.41	23.05	22.16	0.00	0.00	40.12	38.57
Netherlands	17.59	18.13	21.32	21.98	0.00	0.00	38.91	40.11
Norway	19.17	14.52	24.81	18.80	11.82	8.95	55.80	42.27
Japan	18.45	10.61	34.07	19.58	21.77	12.51	74.29	42.70
OECD average	12.55	13.49	15.47	17.88	10.41	12.07	38.42	43.44
New Zealand	17.73	22.73	0.00	0.00	17.07	21.89	34.80	44.61
Greece	7.95	9.82	12.44	15.36	17.28	21.34	37.68	46.52
Germany	12.42	11.94	27.02	25.98	9.96	9.58	49.40	47.50
Belgium	15.85	16.18	32.75	33.42	0.00	0.00	48.61	49.60
Luxembourg	13.39	13.39	0.00	0.00	37.49	37.49	50.88	50.88
Portugal	12.79	17.53	14.16	19.39	18.93	25.94	45.89	62.86
Czech Republic	4.82	11.22	20.39	47.43	4.77	11.10	29.99	69.75
Poland	5.88	10.89	47.65	88.25	0.00	0.00	53.54	99.14
Hungary	9.78	22.23	14.57	33.12	20.19	45.90	44.55	101.25

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.
The basket includes 30 one-hour calls. Off peak is taken at 20:00.
In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP charge.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A5. **OECD Internet access basket for 40 hours at peak times using discounted PSTN rates, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
United States	14.29	14.29	4.66	4.66	16.45	16.45	35.40	35.40
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
Australia	8.55	9.71	3.70	4.21	21.60	24.55	33.85	38.47
Finland	13.22	11.40	23.97	20.66	8.07	6.95	45.25	39.01
Italy	12.43	13.97	24.70	27.75	0.00	0.00	37.13	41.72
Turkey	2.11	3.83	8.77	15.95	12.28	22.33	23.16	42.10
Korea	2.42	3.90	20.93	33.76	3.77	6.09	27.13	43.75
New Zealand	17.73	22.73	0.00	0.00	17.07	21.89	34.80	44.61
Japan	18.45	10.61	45.43	26.11	21.77	12.51	85.65	49.22
Greece	7.95	9.82	16.59	20.48	17.28	21.34	41.83	51.64
Iceland	7.30	5.57	52.96	40.43	12.32	9.41	72.59	55.41
Germany	12.42	11.94	36.03	34.64	9.96	9.58	58.41	56.16
Sweden	12.07	10.14	55.79	46.88	2.76	2.32	70.62	59.34
France	11.64	11.19	0.00	0.00	50.58	48.64	62.22	59.83
Norway	19.17	14.52	49.56	37.55	11.82	8.95	80.55	61.02
OECD average	13.63	15.84	40.37	43.93	14.00	16.63	68.00	76.41
Ireland	15.40	16.56	41.25	44.35	15.04	16.17	71.68	77.08
Spain	11.55	14.08	51.91	63.30	0.00	0.00	63.45	77.38
Netherlands	15.37	15.84	61.47	63.37	0.00	0.00	76.83	79.21
Denmark	15.81	12.35	92.12	71.97	0.00	0.00	107.94	84.33
Switzerland	15.36	11.72	97.31	74.28	0.00	0.00	112.67	86.01
United Kingdom	19.12	16.48	88.88	76.62	0.00	0.00	107.99	93.10
Austria	17.07	16.41	90.48	87.00	0.00	0.00	107.55	103.41
Luxembourg	13.39	13.39	0.00	0.00	92.08	92.08	105.47	105.47
Portugal	12.79	17.53	46.61	63.85	30.59	41.90	89.99	123.28
Poland	5.88	10.89	63.54	117.66	0.00	0.00	69.42	128.56
Belgium	15.85	16.18	116.26	118.63	0.00	0.00	132.11	134.81
Czech Republic	4.82	11.22	60.19	139.98	12.35	28.73	77.37	179.92
Hungary	39.12	88.91	17.60	40.01	28.58	64.95	85.30	193.86

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable. Includes 40 one-hour calls. In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A6. **OECD Internet access basket for 40 hours at off-peak times using discounted PSTN rates, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP
United Kingdom	14.76	12.72	0.00	0.00	14.60	12.59	29.36	25.31
Finland	13.22	11.40	12.84	11.07	8.07	6.95	34.12	29.42
Italy	12.43	13.97	15.09	16.96	0.00	0.00	27.53	30.93
United States	14.29	14.29	4.66	4.66	16.45	16.45	35.40	35.40
Canada	17.11	20.61	0.00	0.00	12.63	15.22	29.74	35.83
Mexico	17.01	23.62	0.00	0.00	8.88	12.34	25.89	35.96
Iceland	7.30	5.57	27.60	21.07	12.32	9.41	47.22	36.05
Sweden	12.07	10.14	28.81	24.21	2.76	2.32	43.64	36.68
Spain	11.55	14.08	18.83	22.97	0.00	0.00	30.38	37.05
Turkey	2.11	3.83	6.14	11.16	12.28	22.33	20.53	37.32
Australia	8.55	9.71	3.70	4.21	21.60	24.55	33.85	38.47
Ireland	15.40	16.56	20.46	22.00	0.00	0.00	35.86	38.56
Denmark	15.81	12.35	32.20	25.15	5.46	4.27	53.48	41.78
Korea	2.42	3.90	20.93	33.76	3.77	6.09	27.13	43.75
New Zealand	17.73	22.73	0.00	0.00	17.07	21.89	34.80	44.61
Switzerland	15.36	11.72	43.79	33.43	0.00	0.00	59.15	45.15
Austria	17.07	16.41	30.73	29.55	0.00	0.00	47.80	45.96
Netherlands	17.59	18.13	28.42	29.30	0.00	0.00	46.01	47.43
Norway	19.17	14.52	32.79	24.84	11.82	8.95	63.78	48.31
Japan	18.45	10.61	45.43	26.11	21.77	12.51	85.65	49.22
OECD average	12.55	13.49	20.61	23.83	12.18	14.24	45.34	51.56
Greece	7.95	9.82	16.59	20.48	17.28	21.34	41.83	51.64
Germany	12.42	11.94	36.03	34.64	9.96	9.58	58.41	56.16
France	11.64	11.19	0.00	0.00	50.58	48.64	62.22	59.83
Belgium	15.85	16.18	43.67	44.56	0.00	0.00	59.53	60.74
Luxembourg	13.39	13.39	0.00	0.00	48.41	48.41	61.80	61.80
Portugal	12.79	17.53	18.88	25.86	24.18	33.12	55.85	76.51
Czech Republic	4.82	11.22	27.19	63.24	4.77	11.10	36.79	85.56
Poland	5.88	10.89	63.54	117.66	0.00	0.00	69.42	128.56
Hungary	9.78	22.23	19.43	44.16	28.58	64.95	57.79	131.34

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.
The basket includes 40 one-hour calls. Off peak is taken at 20:00.
In France and Luxembourg, ISP and PSTN usage charges are bundled and included under the ISP charge.
Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A7. **OECD "Always On" Internet access basket at peak times, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		Charge for unmetered access		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP	US$	PPP
Average, metered countries	13.43	15.41	191.08	206.26			31.17	34.23	235.67	255.90
BT (Surftime 24/7)	14.76	12.73			31.87	27.48	15.94	13.74	62.58	53.95
TCNZ	17.73	22.73	0.00	0.00			21.92	28.11	39.65	50.83
Bell Canada	17.11	20.61	0.00	0.00			19.76	23.81	36.87	44.42
Telstra	8.55	9.71	2.78	3.16			21.60	24.55	32.92	37.41
Bell Atlantic/AT&T	14.29	14.29	3.50	3.50			16.45	16.45	34.23	34.23

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.

The basket includes 30 five-hour calls, for a total of 150 hours of Internet access per month. "Average, metered countries" includes all OECD countries with metered telecommunication charges for Internet access.

Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

Table A8. **OECD "Always On" Internet access basket at off-peak times, including VAT, 2000**

	PSTN fixed charge		PSTN usage charge		Charge for unmetered access		ISP charge		Total	
	US$	PPP	US$	PPP	US$	PPP	US$	PPP	US$	PPP
Average, metered countries	12.00	12.57	97.91	109.76			21.32	22.73	131.23	145.06
Matáv	8.64	19.64			15.24	34.64	17.15	38.97	41.03	93.24
TCNZ	17.73	22.73	0.00	0.00			21.92	28.11	39.65	50.83
Bell Canada	17.11	20.61	0.00	0.00			19.76	23.81	36.87	44.42
Telstra	8.55	9.71	2.78	3.16			21.60	24.55	32.92	37.41
Bell Atlantic/AT&T	14.29	14.29	3.50	3.50			16.45	16.45	34.23	34.23
BT (BT-Internet)	14.76	12.73	0.00	0.00			14.60	12.59	29.37	25.32

Note: PSTN fixed charges include monthly rental fee and additional monthly charges related to discount plans, if applicable.

The basket includes 30 five-hour calls, for a total of 150 hours of Internet access per month. "Average, metered countries" includes all OECD countries with metered telecommunication charges for Internet access.

Source: OECD, http://www.oecd.org/dsti/sti/it/cm/

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