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WORLD TELECOMMUNICATION DEVELOPMENT REPORT

Access Indicators for the Information Society

world summit on the information society
Geneva 2003 - Tunis 2005

International Telecommunication Union

2003

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WORLD TELECOMMUNICATION DEVELOPMENT REPORT 2003

Access Indicators for the Information Society

2003

INTERNATIONAL TELECOMMUNICATION UNION

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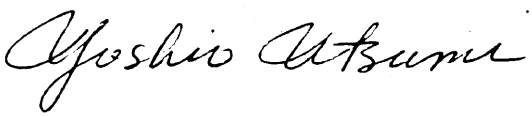
FOREWORD

The 2003 ITU *World Telecommunication Development Report: Access Indicators for the Information Society* has been specially prepared for the first phase of the World Summit on the Information Society (WSIS) (Geneva, 10-12 December 2003). This year's report examines the specific issue of measuring access to information and communication technologies (ICTs). ITU has long been involved in analysing access to ICTs. As early as 1984, the Maitland Commission Report, known as *"The Missing Link"*, first drew international attention to the large inequities in telephone access across the world. ITU's 1998 *World Telecommunication Development Report*—on "universal access"—updated the *Missing Link* findings in light of technological and regulatory changes affecting the telecommunication industry.

Until recently, infrastructure had been considered as the main obstacle to improving access to ICTs. Existing indicators are therefore often infrastructure-based, measuring such variables as the number of main telephone lines, and typically use telecommunication operators' data. But there is growing evidence that other factors, such as affordability and knowledge, are an important part of the access picture. It is widely recognized that new indicators are needed. The new environment, with a growing emphasis on reducing the digital divide, requires access and usage indicators disaggregated by socio-economic categories such as age, gender, income and location. To measure the ICT picture in full, new multi-stakeholder partnerships will be required involving not only the statistical agencies that are traditionally responsible for conducting surveys, but also policy-makers, the private sector, civil society, multilateral organisations and others involved the ICT arena.

In 2003, nearly two decades after the Missing Link findings, this new edition of the *World Telecommunication Development Report* seeks to help meet this need by identifying relevant indicators for measuring access of the world's populations to ICTs—helping to measure the extent to which countries and communities worldwide have genuine access to the information society. The report has six chapters. The *first* puts the information society in context, describing why new indicators are needed to follow trends and make comparisons. The *second* chapter discusses indicators for measuring individual, household and community access to ICTs showing their relevance for different policy objectives such as universal service or access. Chapter *three* looks at measuring ICT access in the key sectors of businesses, government and schools, where ICT use is crucial for electronic commerce, efficient public administration, and to encourage youth to participate in the information society. Chapter *four* examines the interrelationship between ICT indicators and the Millennium Development Goals, which have attracted considerable attention as a standard for identifying and measuring global development objectives. Chapter *five* examines the need for a relevant and inclusive ICT index to measure country progress. In conclusion, chapter *six* offers recommendations for improving the availability of information society access indicators.

The views expressed are those of the authors and may not necessarily reflect the opinions of ITU or its Members.



Yoshio UTSUMI
Secretary-General
International Telecommunication Union

PREFACE

It is a pleasure to present this seventh edition of the *World Telecommunication Development Report*. The report reflects the importance that the ITU's Development Sector (ITU-D) attaches to the collection, dissemination and exchange of information on telecommunications and ICT. These activities arise out of the ITU's role to collect statistics covering its sector as the United Nation's specialized agency for telecommunications and Resolution 8: *Collection and dissemination of information* of the last World Telecommunication Development Conference (Istanbul, 2002).

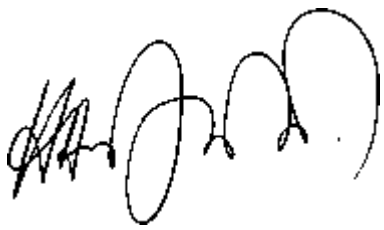
The compilation of statistics and analysis of trends have accelerated recently with increased focus around the world on ICTs. Identifying and understanding the challenges and the emergence of the global information society is particularly important for the World Summit on the Information Society (WSIS) for which this report was specially prepared. Should—as expected—one of the outcomes of the Summit be a deepened focus on indicators for monitoring the information society, ITU stands ready to collaborate with other partners to reinforce efforts in this direction.

There is also growing focus on indicators coming from the adoption of Millennium Development Goals (MDGs). These goals and targets were adopted by the international community and are global standards by which many facets of human development will be measured over the years to come. ICTs have been identified as both an MDG target as well an indispensable tool for achieving the other MDG targets. In that respect ITU has been closely involved with the MDG Expert Group on indicators for monitoring the implementation of the Millennium Declaration. Related to that is the need for harmonized indicators to measure the impact of ICTs on the MDGs. I am pleased to note that this report uncovers new ground in that area by providing examples of possible indicators.

The Report also features the Digital Access Index (DAI), the first truly global ICT ranking. While many of our Members were excluded from previous ICT rankings, one of the benefits of the DAI is its inclusiveness. By covering a total of 178 economies, it provides a valuable contribution to international benchmarking and will be a vital reference to assess national conditions in information and communications technology.

The report wraps up a busy year for ITU-D statistical activities. In January it organized the World Telecommunication Indicators/ICT meeting. This brought together telecommunication regulators and national statistical agencies to identify and define key indicators for tracking telecommunication/ICT markets. In October, the ITU-D and the Mexican Undersecretary of Communications jointly organized a workshop on measuring community access to ICTs. In December, the WSIS statistical side event on monitoring the information society was organized by ITU along with five other international agencies. Our staff also participated in statistical events throughout the year to share on-going research on defining indicators in various areas, including mobile Internet, ICT knowledge, public access and broadband.

I am convinced that ICT policy-makers, operators, investors, researchers, statisticians, and international, regional and non-governmental organizations will find this report a vital toolkit for their work and activities. If governments adopt the guidelines identified in the report, it would aid immensely towards understanding the development of the information society around the world, particularly in developing countries.



Hamadoun I. TOURÉ
Director, Telecommunication Development Bureau
International Telecommunication Union

A team led by Michael Minges and comprising Vanessa Gray and Esperanza Magpantay prepared the report. Tim Kelly, Taylor Reynolds, Megha Mukim, Susan Schorr and Sushant Suri also contributed. Joanna Goodrick was the principal editor.

Nathalie Delmas-Rollet coordinated the layout and production of the report. Patricia Sofia Sousa Pinto, age ten, of Portugal made the drawing on the cover. Stéphane Rollet did the cover design.

The authors would like to thank ITU Member States and Sector Members, public telecommunication operators, regulators and others that have provided data and other inputs to the report. Special thanks to Martin Hilbert of the UN Economic Commission for Latin America and the Caribbean and Rahul Tongia of Carnegie Mellon University for their comments on the Digital Access Index and the Statistical Office of the European Communities (EUROSTAT) for granting permission to reproduce their surveys.

Several meetings provided valuable input to the report. These included the World Telecommunication / ICT Indicators Meeting, Indicators Workshop on Community Access to ICTs, Expert Meeting on Measuring Electronic Commerce as an Instrument for the Development of the Digital Economy, Inter-agency and Expert Group on Millennium Development Goals Indicators, the Eurostat Working Group Meeting on Communication Statistics and the New Initiatives workshops.

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Country groupings

A number of economic and regional groupings are used in the report. Economic groupings are based on gross national income (GNI) per capita classifications used by The World Bank. Economies are classified according to their 2002 GNI per capita in the following groups:

- *Low income* — Economies with a GNI per capita of US$ 735 or less;
- *Lower-middle income* — Economies with a GNI per capita of between US$ 736 and US$ 2'935;
- *Upper-middle income* — Economies with a GNI per capita of between US$ 2'936 and US$ 9'075;
- *High income* — Economies with a GNI per capita of US$ 9'076 or more.

See the *World Telecommunication Indicators* section for the income classification of specific economies.

The classification *developed* and *developing* is also used in the report. *Developed* economies are classified as: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom and the United States. *Advanced* economies include *Developed* plus Hong Kong, China; Republic of Korea; Singapore and Taiwan; China as well as Cyprus and Israel. All other economies are considered *developing* for the purposes of this report. The classification *least developed countries* (LDCs) is also employed. The LDCs are Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea Bissau, Haiti, Kiribati, Lao People's Democratic Republic, Lesotho, Liberia, Madagascar, Malawi, Maldives, Mali, Mauritania, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Togo, Tuvalu, Uganda, United Republic of Tanzania, Vanuatu, Yemen, and Zambia. *Emerging* is also sometimes used in the report. These are countries that are neither developed nor LDCs. The grouping *Organization for Economic Cooperation and Development* (OECD) is also used. Members include all the developed countries plus Czech Republic, Hungary, Republic of Korea, Mexico, Poland, Slovak Republic and Turkey.

A number of regional groupings are used in the report. The main regional groupings are *Africa, Asia, Americas, Europe* and *Oceania.* Note that *Pacific* is also used in the report to refer to the Oceania region. See *List of economies* in the *World Telecommunication Indicators* section for the primary regional classification of specific economies. The following subregional groupings are also used in the report:

- *Arab region*— Arabic-speaking economies;
- *Asia-Pacific* — refers to all economies in Asia east of, and including Iran, as well as Pacific Ocean economies;
- *Central and Eastern Europe* — Albania, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania, Serbia and Montenegro, Slovak Republic, Slovenia and The Former Yugoslav Republic of Macedonia;
- *Commonwealth of Independent States* — 12 republics emerging from the former Soviet Union excluding the Baltic nations;
- *Latin America and the Caribbean* — Central (including Mexico) and South America and the Caribbean;
- *North America* — Generally, Canada and the United States although in some charts, Mexico is also included (if so, this is noted);
- *Southern Europe* – Cyprus, Malta and Turkey;
- *Western Europe* — refers to the member states of the European Union, Iceland, Norway and Switzerland.

Data notes

- Billion is one thousand million.
- Dollars are current United States dollars (US$) unless otherwise noted. National currency values have been converted using average annual exchange rates.
- Growth rates are based on current prices unless otherwise noted.

- Thousands are separated by an apostrophe (1'000).
- Totals may not always add up due to rounding.

Additional definitions are provided in the technical notes of the *World Telecommunication Indicators*.

Note that data in some charts and tables referring to the same item may not be consistent and may also differ from the tables shown in the *World Telecommunication Indicators* section. This can happen because of revisions to data that occurred after sections of the report were written as well as different estimation techniques and/or exchange rates. These variations tend to be insignificant in their impact on the analysis and conclusions drawn in the report. Finally it should be noted that the data generally refer to fiscal years as reported by countries.

1. ACCESSING THE INFORMATION SOCIETY

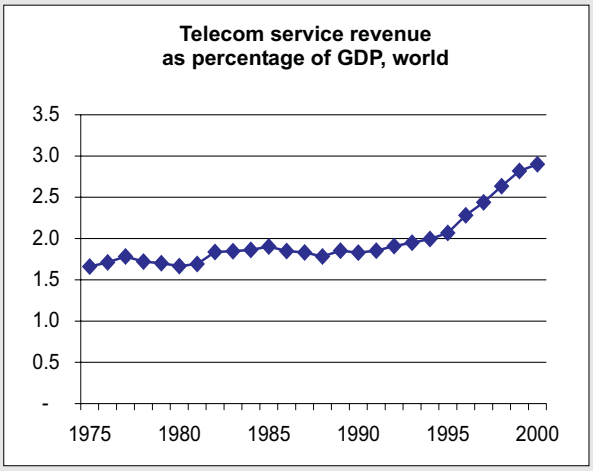
1.1 ICTs and the information society

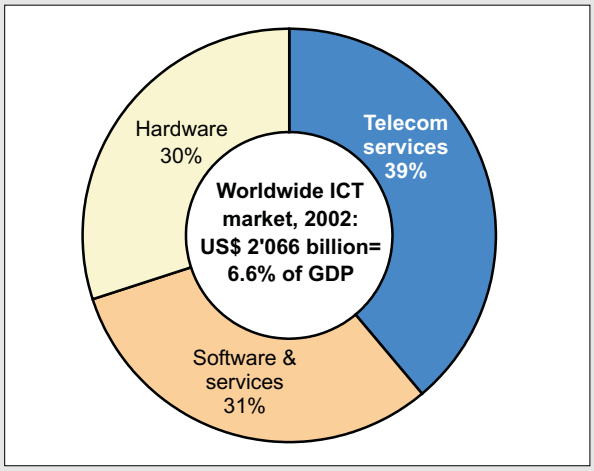
In December 2003, the United Nations held the first high-level meeting focused on the information society.[1] The UN's decision to organize a World Summit on the Information Society (WSIS) after holding major conferences on the environment, human rights and women illustrates the importance the topic has taken on in the world.[2]

The draft WSIS Declaration states that the information society is where "…everyone can create, access, utilize and share information and knowledge, enabling individuals, communities and people[s] to achieve their full potential and improve their quality of life in a sustainable manner."[3] The concept of using and processing information is central to this vision, emphasizing its importance for transforming lives. New information and communication technologies (ICTs) enable instantaneous exchange of information and hold promise for delivering innovative applications in government, commerce, education and health.

Figure 1.1: The ICT sector in the world economy

Telecom service revenues as a percentage of Gross Domestic Product (GDP), world, 1975-2000 (left) and Information and Communication Technology sector (ICT) revenue, by market segment, world, 2002 (right)





Source: ITU World Telecommunication Indicators database and ITU estimates derived from European Information Technology Observatory.

The industries that support the transmission and processing of electronic information are transforming the global economy. The impact of communication technologies is reflected in their growing share of world output. In the quarter century between 1975 and 2000, telecommunication service revenues as a percentage of gross domestic product (GDP) practically doubled from 1.6 to 2.9, with most of the growth coming in the last decade (Figure 1.1, left). The wider information and communication technology sector accounted for 6.6 per cent of global GDP in 2002 (Figure 1.1, right).[4] Although the ICT sector is important in its own right, its greatest impact is through the use of ICT services and products by other sectors to enhance productivity and generate new revenue streams.

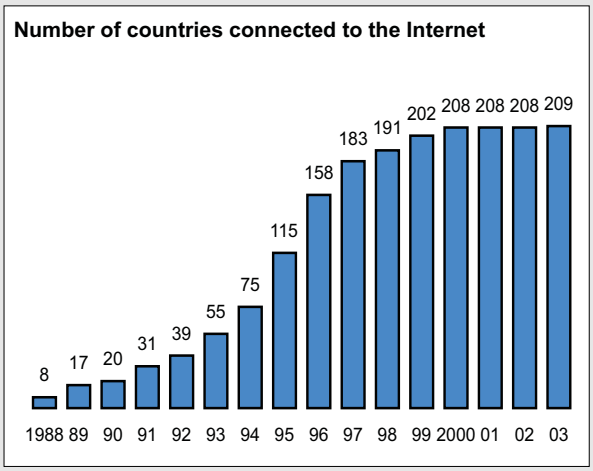
The speed with which ICTs have permeated every country in the world has been astounding (Box 1.1). Take the Internet, a network that began accepting global connections only some 15 years ago. It has spread like wildfire, from eight countries online in 1988 to virtually all today (Figure 1.2, left). The Internet allows instant access to information from anywhere, anytime and it is this possibility more than anything, which has excited many about the information society. Another success story has been mobile communications. While it took over a century for the world to reach a figure of one billion fixed telephone lines, for mobile communications this was accomplished in under two decades (Figure 1.2, right).

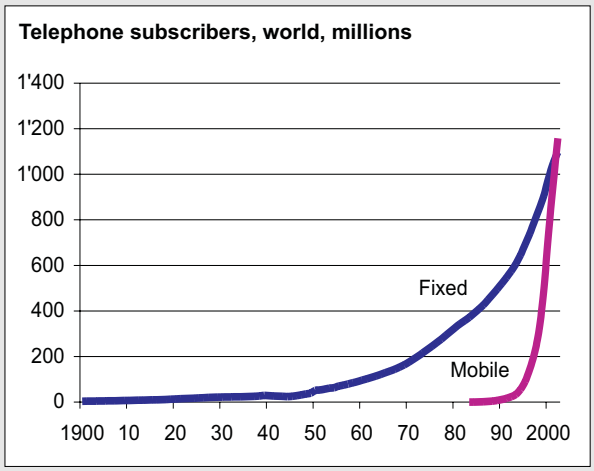
Although ICTs have spread rapidly over the last decade, penetration levels vary among and within countries, creating a digital divide between those with high and low access (Figure 1.3). A little over a decade ago, the major factor underlying the digital divide would have been a shortage of infrastructure. One popular cliché of the 1980s was that the city of Tokyo alone had more telephones than the whole of Africa (Box 1.2). The tremendous growth in communication network construction during the 1990s has since erased this gap. Today's breaches are more complex and can no longer be simply attributed to a lack of infrastructure. Uncovering the factors that underlie today's access gap is therefore one of the biggest hurdles facing us. Why, for example, do only one third of South Africans have a mobile phone when almost 100 per cent of the population is within coverage of cellular service? Why are only three per cent of Egyptians online when the country has the second lowest Internet prices in the world?

Answering these questions requires detailed analysis, and analysis requires statistics. In order to move towards an inclusive information society, countries

Figure 1.2: Spreading like wildfire

Number of countries with a direct connection to the Internet 1988-2003 (left) and number of fixed and mobile telephone subscribers, world, 1900-2002, millions (right)



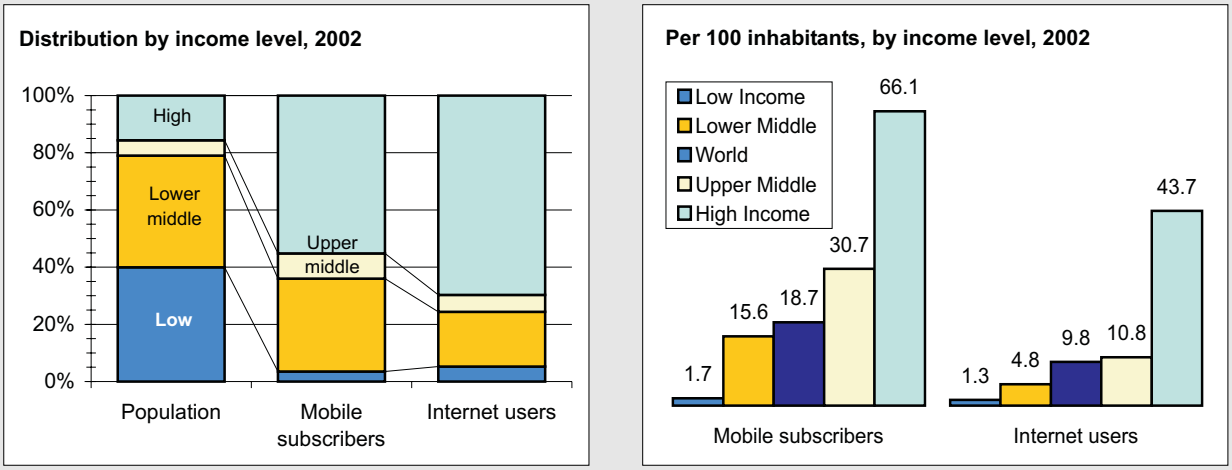


Note: The US National Science Foundation Network (NSFNet), the Internet's first backbone, began accepting connections from overseas in 1998. Between 2000 and 2002, no new economies connected to the Internet. In September 2003, the Pacific island of Tokelau became the latest to connect to the global Internet.

Source: ITU World Telecommunication Indicators database.

Figure 1.3: Digital divides

Distribution of population, mobile telephone subscribers and Internet users by income level, world, 2002 (left) and mobile telephone subscribers and Internet users per 100 inhabitants, by income level, world, 2002 (right)



Source: ITU World Telecommunication Indicators database.

need meaningful data to identify disparities in access, track progress and make international comparisons. It is crucial to understand who has access, and where and how people use or do not use ICTs. Only then can policy-makers uncover reasons for lack of access and most effectively target underserved segments of society.

If it is time to measure the information society, it is also time to re-think traditional indicators. The convergence of ICT industries, and the new emphasis on addressing the digital divide, has led to the need for a set of policy-oriented information society statistics. Although a number of ICT indicators already exist, they are not always appropriate for policy analysis. Few countries collect pragmatic indicators for measuring access, and even where they exist, international comparisons are often hampered by differences in definition and methodologies. Existing data are also typically derived from administrative records rather than from purpose-built surveys.

1.2 Measuring access to ICTs — a first step towards the information society

This report is about measuring information societies. More specifically it is about measuring access to information and communication technologies, crucial for participating in the information society and reaping its benefits. Widespread ICT access can boost economic development and improve citizens' lives. Ensuring access is therefore the basis for aspiration towards an information society. The first step is to take an inventory of who has access and who does not in order to target policies to where they will have the most effect. Determining the level of access is a prerequisite for measuring use and more sophisticated applications of ICTs.

While there is a growing body of data about the economic impact of ICTs, little is known about people's access to and use of ICTs, particularly in developing nations. Even less is known about the social impact of ICTs. In particular, there is a dearth of information for the world's poorest economies, which in some ways stand to benefit the most from the information society. This statistical divide is as great as—or even greater than—the digital divide (Figure 1.4).

While some developed nations are racing ahead in measurement, tracking a multitude of factors such as ICT infrastructure, access, usage, volume and value, many developing nations are struggling to produce even basic ICT indicators. A globally relevant approach needs to concentrate on trends that can be measured to a comparable extent in all countries, not just those already collecting data. This report argues

Box 1.1: Tales of the information society in two countries

The information society is affecting lives everywhere around the world, from developing to developed, from Africa to Asia. Its manifestation ranges from brightly coloured billboards advertising mobile cellular services in Uganda to multi-player, broadband Internet cafés in the Republic of Korea.

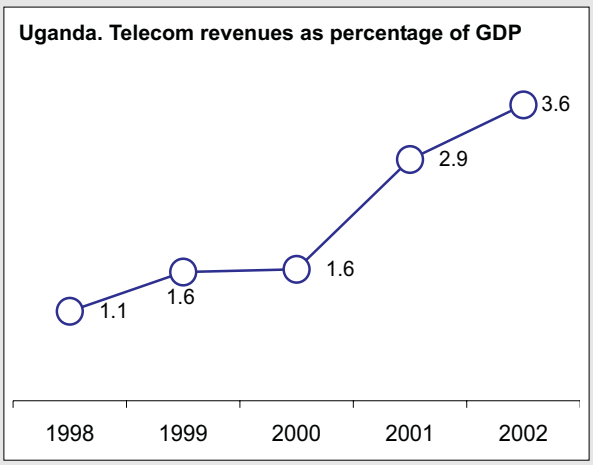
Five years ago, there was only one telephone subscriber for every 314 Ugandans; today there is one for every 44 inhabitants. Uganda was one of the first nations in Africa to liberalize its telecommunication market and the results are showing. Much of the gain has come in the area of mobile communications where there are three operators. The growth of mobile in Uganda goes beyond just simple access. It has revolutionized the way people perceive, value and use communications. The orange logo of MTN—a new market entrant—is omnipresent, brightening billboards and kiosks. The Ugandan mobile scene has even invented its own vocabulary. A prepaid mobile card is the "seed" while adding value to it is "juicing." These fruit terms are carried through to the incumbent's mobile service dubbed "Mango." Hundreds of jobs have been created at mobile kiosks that offer public payphone services, sell prepaid cards and recharge mobile handsets. Operators have been active in the community sponsoring sports teams and building houses and schools.

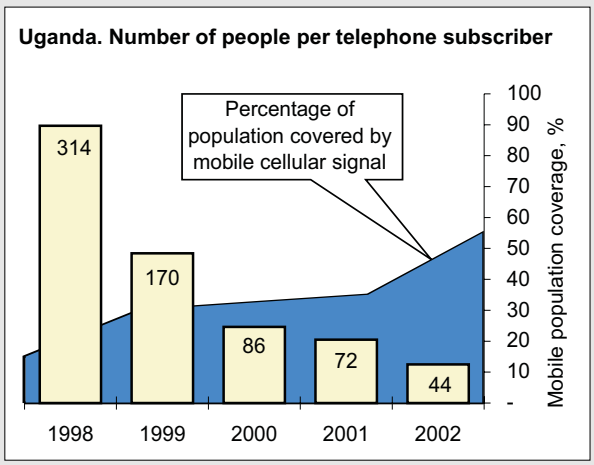
Internet cafés have spread throughout the capital Kampala and other towns, creating a cyber culture of their own. Rural areas—which comprise 88 per cent of Uganda's population—are not being left behind. Multipurpose Community Telecentres (MCTs) exist in several villages. Though the MCTs have been subject to criticism, they have offered a provocative training ground for testing assumptions about the sustainability of ICT access in rural zones. A number of programmes incorporating ICTs have been developed. One exploits the growing number of mobile phones by using Short Message Service (SMS) to relay information about prices in markets. This saves farmers time and money for unnecessary transport and reduces the leverage of middlemen. The fishing industry is also benefiting from a project using SMS to provide pricing information about Lake Victoria perch. Doctors are using Personal Digital Assistants (PDAs) to conduct surveys on malaria.

The amazing thing is that all this has only happened in the last five years. Bits and pieces of the information society—mobile phones, Internet cafés— have taken root in the country. Although it has been predominantly in cities and towns, it slowly but surely is spreading "up-country", the term Ugandans employ for the rural areas. Over forty per cent of the rural population is currently covered by mobile telephone service compared to practically zero just five years ago. Perhaps the surest sign that the information society has arrived is talk of a new Ugandan "Cyber Elite", showing that just as the digital divide is wide across countries it is also wide within countries.[5]

Box Figure 1.1a: The information society takes root in Uganda

Telecom revenue as percentage of gross domestic product (GDP) (left) and number of people per telephone subscriber (right), Uganda





Source: ITU World Telecommunication Indicators database.

Box 1.1: Tales of the information society in two countries (cont'd)

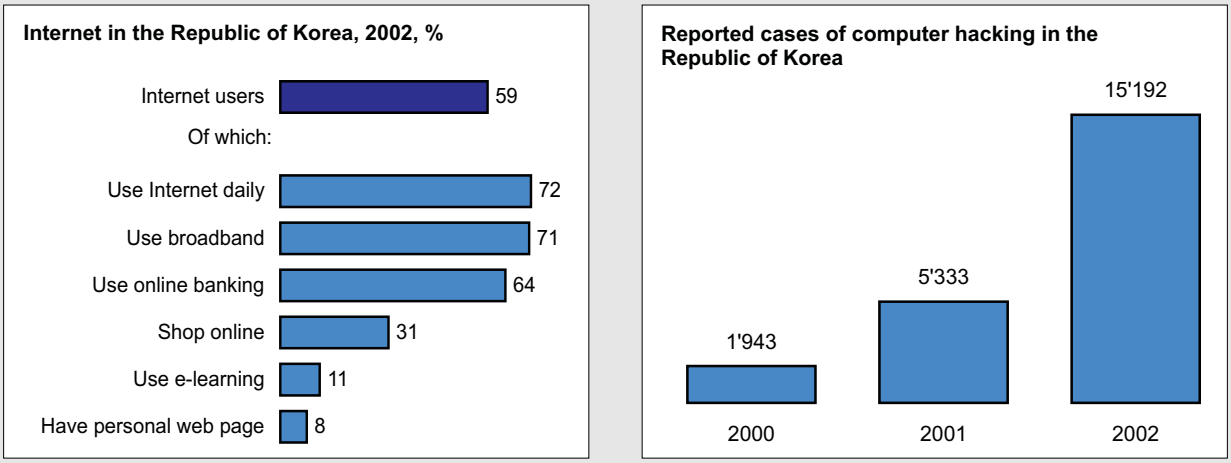
Few countries have gone through the transformation from an agrarian to an industrial to an information society as quickly as the Republic of Korea. As Korea's economy has matured, its manufacturing base has shifted from textiles, to chemicals,

then machinery and later electronics. Today knowledge and information products and services play an important and increasing role in the Korean economy. The share of the ICT industry was 13 per cent in 2000, up from 8.6 per cent in 1997 and the highest among the Organisation for Economic Co-operation and Development (OECD) countries. Furthermore, ICT products account for a third of Korea's total exports. The ICT sector in Korea employed 1.3 million people at the end of 2000 and is forecast to grow around five per cent through 2005, compared to only two per cent for overall employment.[6]

To fully appreciate the impact of ICTs, it is interesting to look at the way Koreans live the information society. The average Internet user spends more than 50 hours a month online and more and more Koreans shop, learn, and play on the Internet. Around a third of users shop online, almost 70 per cent of stock market trading is done over the Web and there are 17 million Internet banking users. All schools are connected to the Internet with five million students, teachers and parents accessing information over the government-funded education portal. The Internet has also modified social interaction in Korea, famous for its *PC bangs*, or online game rooms, where teenagers spend hours absorbed in cyber life, and meeting other *Internauts*. ICT penetration is real and everyone is adapting, including fast food chains, where hamburgers now come with Internet access. All this cyber euphoria comes at a price. Unsolicited electronic mail (i.e. "spam") and viruses are a problem and hacking incidents were up 185 per cent in 2002. This has led to a number of measures to protect the information society including computer emergency response teams, stiff laws against spam and free counselling for those experiencing sexual harassment in cyberspace.

Box Figure 1.1b: The good and the bad of the information society

Internet users, per cent, 2002 (left) and reported cases of computer hacking, 2000-02 (right), Republic of Korea



Note: In the left chart, Internet users are defined as those aged six and over who use the Internet at least once a month.
Source: ITU adapted from Korea Network Information Center and Ministry of Information and Communication (Republic of Korea).

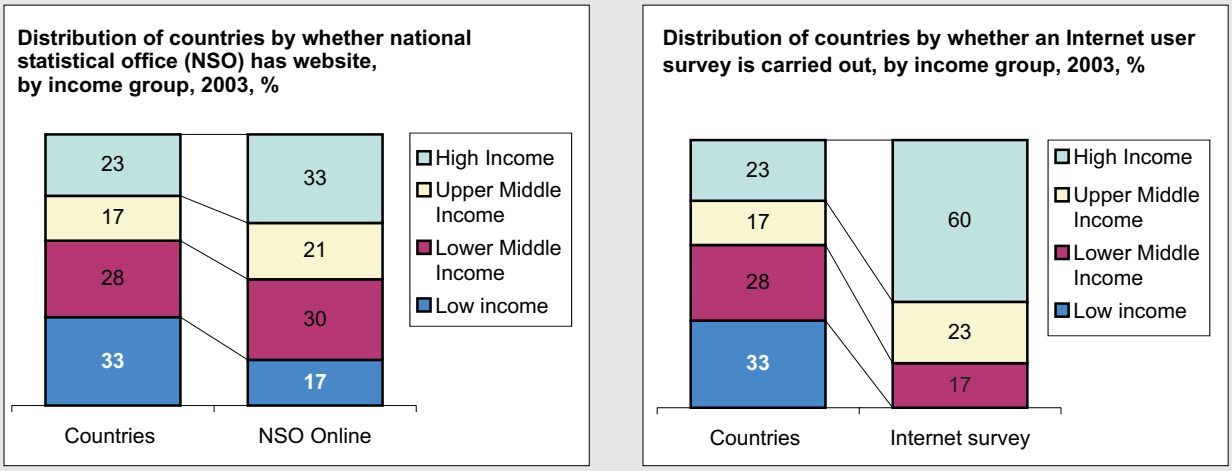
that access to ICTs is doubtless the most fundamental prerequisite for an inclusive information society. Measuring access is therefore a key priority and a set of indicators is needed that is relevant to all countries of the world. This report explains the different ways of measuring access to ICTs and offers a middle way between too much and too little, between relevance for the majority of countries or only for a minority, between what is achievable within existing constraints and what would require significantly increased resources.

The focus on indicators reflects a growing trend by the international community towards the use of transparent and concrete measurements for monitoring countries' performance. The International Monetary Fund (IMF) was one of the first international agencies to design a framework for the presentation of standardized financial and economic statistics with the General Data Dissemination System (GDDS).[7] The GDDS provides guidelines for countries on which indicators they should collect and disseminate in order to enhance transparency. The United Nations has adopted a set of development targets, the Millennium Development Goals (MDGs) and associated indicators to monitor progress towards the reduction of poverty, hunger and other areas (see Chapter 4). In the ICT field, the European Union's eEurope indicators measure progress towards the information society among its members and candidate countries.[8]

In that spirit, this report proposes a basic list of indicators—the *e-ITU indicators*— which, ideally, every country should strive to collect to measure progress towards the information society. Existing indicators used to measure access to ICTs are identified. From those, the most relevant are selected, bearing in mind the trade-off in importance between developed and developing nations and the capacity of the latter to collect the proposed indicators. The second chapter of the report discusses indicators for measuring individual, household and community access to ICTs showing their relevance for different policy objectives such as universal service or access. Chapter three looks at measuring ICT access in the key sectors of business, government and education, where ICT use is crucial for electronic commerce; transparent and efficient public administration, and to encourage youth to participate in the information society. Chapter four examines the interrelationship

Figure 1.4: The Statistical Divide

Distribution of countries by income group by whether national statistical office has website (left) and whether and Internet user survey is carried out, 2003 (right)



Note: Note: In both charts, "Countries" refers to the percentage of countries in each income group. For example, 23 per cent of all countries are in the high income group. In the left chart, "NSO Online" refers to the percentage of countries in each income group whose national statistical office has a website. For example, 33 per cent of all national statistical offices with a website are in high income nations. In the right chart, "Internet survey" refers to the percentage of countries in each income group that have conducted an Internet user survey. For example, 60 per cent of all Internet user surveys have been carried out in high income nations.

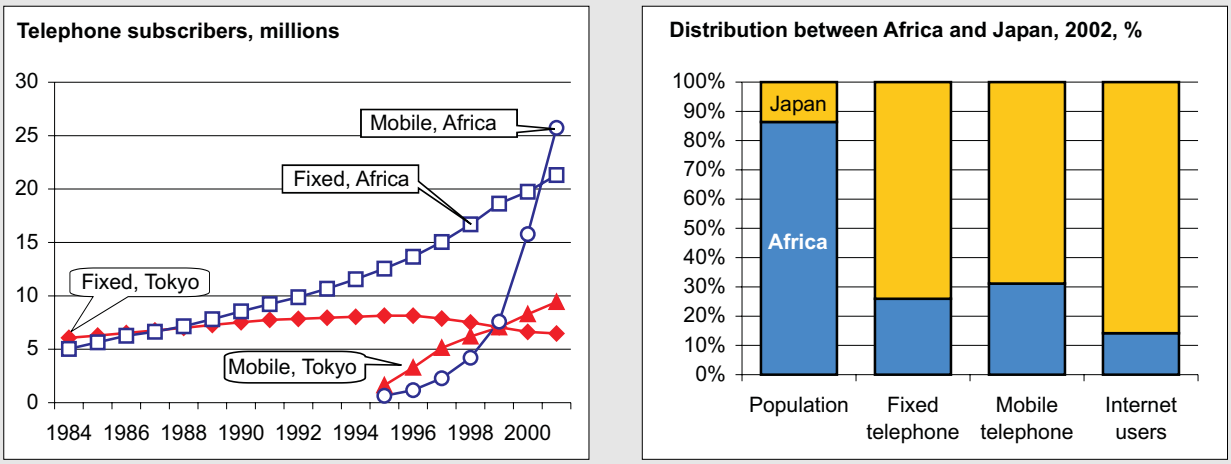
Source: ITU.

Box 1.2: Dispelling the myths

One cliché emerging from the seminal "Missing Link" report issued almost two decades ago was that "Tokyo has more telephones than the whole of the African continent".[9] Variations on this phrase have been repeated numerous times since then, often to illustrate the large gap in access to telephone services. Ironically however, the gap in fixed telephone service between Tokyo and Africa was erased just after the publication of the Missing Link report (Box Figure 1.2, left). There are also now more mobile phone subscribers and Internet users in Africa than there are in Tokyo. In one respect therefore, the situation has improved. However, comparison of Africa to Japan, for example, reveals that there is still a huge gap between a developing region and a single developed nation (Box Figure 1.2, right). Although Africa has more than six times the population of Japan, there are more than twice as many telephone subscribers in Japan than in Africa. The situation is worse with respect to newer ICTs; Japan has six times more Internet users than Africa and there are more broadband Internet users alone in Japan than all Internet users in Africa.

Box Figure 1.2: Africa, Tokyo and Japan

Fixed and mobile telephone subscribers in Tokyo, Japan and Africa, 1984-2001 (left) and distribution of population, fixed telephone subscribers, mobile telephone subscribers and Internet users, Africa and Japan, 2002 (right)



Source: ITU World Telecommunication Indicators database.

between ICT indicators and the Millennium Development Goals, which have attracted considerable attention as a standard for identifying and measuring global development objectives. Chapter five examines the need for a relevant and inclusive ICT index to measure countries' progress. In conclusion, chapter six offers recommendations for improving the availability of information society access indicators and summarizes the e-ITU indicators.

[1] World Summit on the Information Society website: http://www.itu.int/wsis; accessed November 11, 2003.

[2] "United Nations Conferences: What have they accomplished?" Available from: http://www.un.org/News/facts/confercs.htm; accessed November 5, 2003.

[3] See the draft Declaration of Principles (WSIS/PC-3/DT/6) of November 14, 2003 available from: http://www.itu.int/wsis/documents/doc_multi.asp?lang=en&id=1104|1106; accessed November 30, 2003.

[4] The Organisation for Economic Co-operation and Development (OECD) has defined the ICT sector as "…manufacturing and services industries that capture, transmit and display data and information electronically." In terms of use of ICT products, this implies access to broadcasting, computer and telecommunication networks, all of which capture and display information electronically. See: OECD. (2003). *Measuring the Information Economy 2002*. Annex available from: http://www.oecd.org/dataoecd/34/37/2771153.pdf; accessed November 5, 2003. The UN System of National Accounts has identified the components that make up the ICT sector in an economy. These components can then be assembled to measure the overall ICT sector. However few developing countries capture the level of detail required of these components to produce data on the ICT sector. See: "Information and Communication Technology" available from: http://unstats.un.org/unsd/cr/registry/docs/i31_ict.pdf; accessed November 5, 2003.

[5] Mwesige, P. (2003, February). "Cyber elites: a survey of Internet Café users in Uganda." *Telematics and Informatics.* For more on Uganda, see ITU. (2001). *The Internet in an African LDC: Uganda Case Study*. Available from: http://www.itu.int/ITU-D/ict/cs/uganda/uganda.html; accessed November 30, 2003.

[6] ITU. (2003). Broadband Korea: Internet Case Study. Available from: http://www.itu.int/ITU-D/ict/cs/korea/index.html; accessed November 30. 2003.

[7] "GDDS" available from: http://dsbb.imf.org/Applications/web/gdds/gddshome; accessed December 1, 2003.

[8] "Information Society Benchmarking" available from: http://europa.eu.int/information_society/eeurope/2002/benchmarking/list/2002/index_en.htm; accessed December 1, 2003.

[9] ITU. (1984, December). *The Missing Link*. Independent Commission for World-Wide Telecommunication Development.

2. MEASURING ACCESS TO ICTS

2.1 Introduction

Ensuring universal service and access to information and communication technologies (ICTs) is in many countries a top national objective, often enshrined in laws that govern the sector.[1] Despite this, few governments presently track accessibility on a regular basis. Those governments that do measure and monitor access, do not always use the most appropriate indicators. Furthermore, given the different approaches taken by different countries, the different indicators used worldwide are not always compatible. These factors have made it difficult to measure ICT development accurately and to elaborate targeted plans for enhancing access. With these obstacles in mind, this chapter examines ways of measuring access to ICTs in three major areas: individual, household and community access.

2.2 Measurement in practice

Access to ICTs can be quantified in various ways, with indicators based on different categories:

- *Individual*. Indicators that measure accessibility in terms of *people*. This includes indicators such as main telephone lines per 100 inhabitants or the percentage of the population that uses the Internet. This also includes spatial indicators that measure accessibility in terms of coverage or distance from ICT facilities. Some indicators in this category are useful for tracking *universal access*, or the percentage of the population that could theoretically use an ICT device or service.

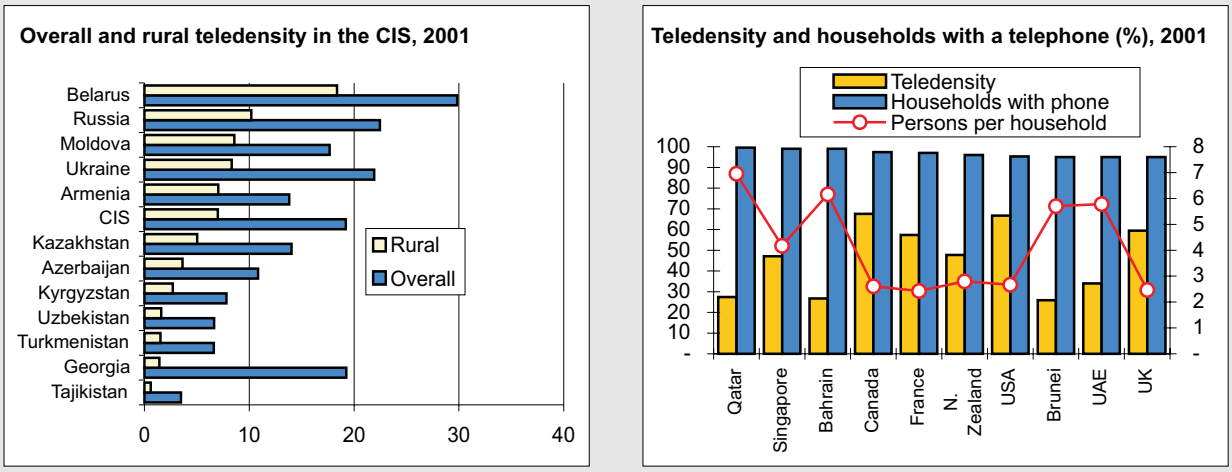
- *Household*. Indicators that measure the availability of ICTs in the *home* such as the percentage of households with a telephone. Household measurements determine the level of *universal service*.

- *Community*. Indicators that revolve around the availability of services in *population centres* such as the number of villages with telephone service. This can also include access to shared facilities such as Internet cafés.

Per capita measurement is the traditional method of illustrating individual access to ICTs. One reason for this is that virtually all ICT service providers compile administrative records for operational and billing purposes. It then is a simple mathematical exercise to divide an ICT device or service by the population to derive a per capita indicator. While such per capita measures are convenient and useful for comparing general statistics across countries, they can be misleading. This is because a *per capita* indicator does not reflect the differing socio-demographic composition of nations. If there are 100 telephone lines in a country all owned by the same person, for example, then is that country better off than a country with 50 telephone lines owned by 50 different people? In a similar vein, a concern in many countries is equitable distribution of ICT services between urban and rural areas. For example, data from the Commonwealth of Independent States on main telephone lines per 100 inhabitants would place Moldova sixth. However in terms of main telephone lines per 100 inhabitants in rural areas, Moldova ranks third, suggesting it has a more equitable distribution of telephone lines than countries that have a higher

Figure 2.1: Per capita distortions

Main telephone lines per 100 inhabitants, overall and rural, Commonwealth of Independent States (CIS), 2001 (left) and main telephone lines per 100 inhabitants and percentage of households with a telephone, selected high income economies, 2001 (right)



Source: ITU World Telecommunication Indicators database and RCC.

overall penetration (Figure 2.1, left). Per capita measures can also be distorted because of demographic differences. For example, some countries with large family sizes may be as well off in terms of household telephone penetration as countries that, on a per capita basis, have more telephone lines (Figure 2.1, right).

The penetration rate of ICTs per 100 households is thus a more precise measurement of access than per capita indicators. While the number of telephone lines per 100 subscribers gives only a general idea of access, the number of homes with a telephone is quite specific. With a per capita measure, it is difficult to determine what kind of targets should be set whereas for households, the ideal is that 100 per cent should have ICTs. The level of ICTs in households is also the way *universal service*—a fundamental policy objective of many nations— is measured.

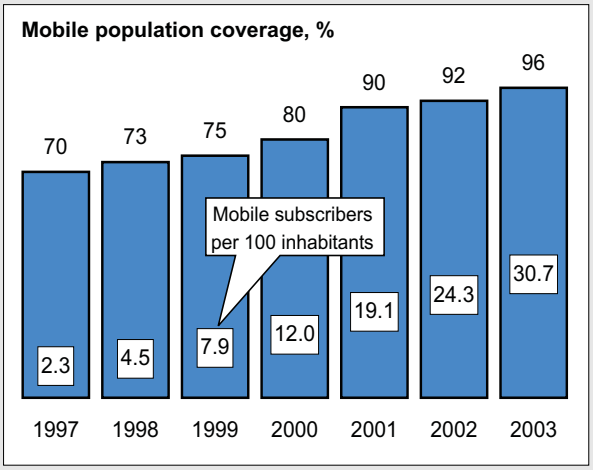
Universal service in telephones and newer ICTs such as personal computers or Internet access will not be achievable for many developing nations in the short-run. Their concern should be to promote widespread accessibility of facilities outside the home, such as public payphones and Internet cafés. This is known as *universal access* — that is, the prevalent availability of services. How can this be measured? Per capita measurements, such as public payphones per 100 inhabitants, are not so useful because they do not give a clear indication of how many people have access. One possibility is to ask heads of households, through a survey, what options they have for using ICTs. In the 2001 South African census for example, householders were asked whether they had access to a telephone at their neighbours' home or other locations outside their home. The census found that six per cent of households did not have convenient access to a telephone of any type. This result indicates that South Africa's rate of universal access is 94 per cent (Figure 2.2, left).

Another useful way of measuring universal access is mobile cellular coverage. Practically every country in the world now has at least one mobile cellular operator.[2] There is an ideal indicator for measuring universal access based on mobile technologies: the *percentage of the population that is covered by a mobile cellular signal*, regardless of whether they currently subscribe to the service. A number of mobile operators compile this statistic, though they do not always report it on a systematic basis. In addition, coverage rollout can be a licence obligation in some countries and is therefore a measurable indicator.[3] Furthermore, it is not a difficult statistic to compile, so it is surprising that more countries do not provide it, particularly in view of its usefulness in measuring universal access. In the case of South Africa, only four per cent of the population is not covered by a mobile cellular signal so the level of universal access

Figure 2.2: Two ways of measuring universal access

Household telephone access, per cent, 2001(left) and mobile population coverage, per cent 1997-2003 (right), South Africa

Telephone facilities available to households, per cent			
Telephone in dwelling and cell-phone	14.2	Universal Service = 42.4	Universal Access = 94.0
Telephone in dwelling only	10.2		
Cell-phone only	18.0		
At a neighbour nearby	6.6		
At a public telephone nearby	38.5		
At another location nearby	3.2		
At another location, not nearby	3.4		
No access to a telephone	**6.0**		
Total	**100.0**		



Note: Mobile population coverage refers to the percentage of population that are within range of a cellular signal regardless of whether they are subscribers or not.

Source: ITU adapted from Statistics South Africa and MTN.

is 96 per cent (Figure 2.2, right). The two figures reached, 94 and 96 per cent respectively, are remarkably close. The former figure is a more precise indicator of universal access since it is based on results that ask about the availability of telephone service. The latter figure is theoretical, based on the assumption that if a person had a mobile phone, they could use it to make a call. Nonetheless, they are both useful figures and the latter is particularly important in the absence of surveys.

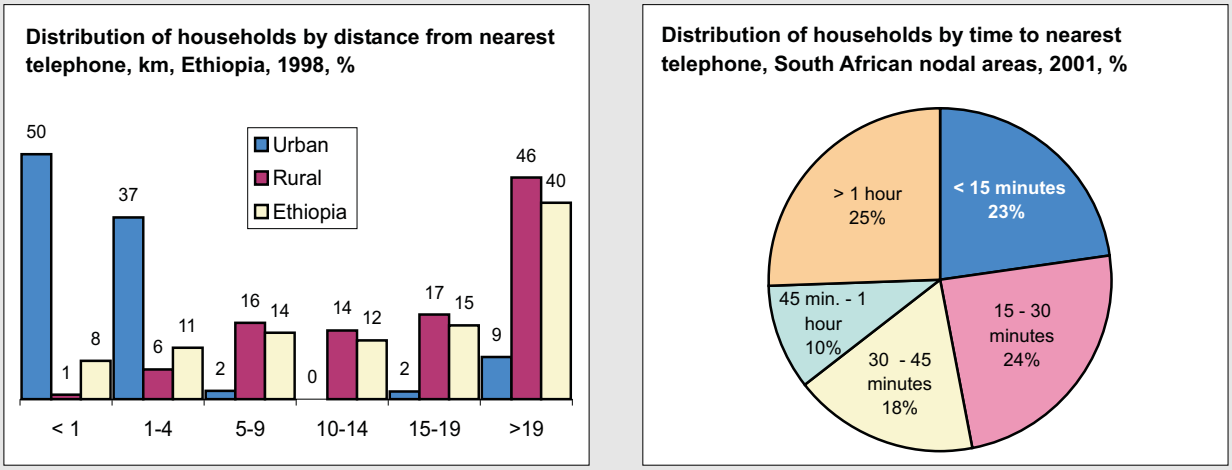
Some countries have used other ways of measuring universal access. Spatial indicators measure distance or time from ICT facilities. In 1998, Ethiopia collected data about distances between households and the nearest telephone broken down by rural and urban locations (Figure 2.3, left).[4] Respondents were asked whether they *used* a telephone and if not why. Surprisingly, even though 40 per cent of households are more than 19 kilometres from a phone, only half cited distance as being a barrier and only one per cent mentioned price. Over three-quarters mentioned there were other reasons for not using a telephone but did not specifically state them. And even though there were only 0.3 main lines per 100 inhabitants in Ethiopia, almost twenty per cent of households reported that they used telephones. South Africa has compiled data on the time to the nearest telephone for selected rural households.[5] The data show that one quarter of poor rural households are more than one hour away from a telephone (Figure 2.3, right).

While spatial indicators can be useful, they suffer from the relativity of the measurement. For example, ten kilometres may not seem like a great distance on a motorcycle, while two kilometres could be far to walk for an elderly person. The time taken to reach a telephone also depends on what transport is available. To avoid ambiguity, it would be preferable to use the *availability of a telephone service outside the home* and *percentage of population covered by mobile* as the preferred indicators for measuring universal access to telephones. While these measures are typically used in relation to telephone service, they could equally be applied to other ICTs.

Another concept of accessibility revolves around community measurements. In this case, indicators such as the number of localities with a certain ICT could be measured. This can be a valuable indicator, since one desirable goal in expanding ICT access would be to provide all localities with ICTs. Most countries have statistics about the number of localities (e.g. cities, towns and villages) within their territory. It would be logical to measure the availability of services in these administrative units. However, it has to be noted that population dispersion is not the same across localities. An indicator such as the *percentage*

Figure 2.3: Spatial dimensions of ICT access

Percentage distribution of households by distance from telephone service, kilometres, 1998, Ethiopia (left) and percentage distribution of nodal households by time to nearest telephone, South Africa, 2001(right)



Note: Right chart: Nodal areas are 13 specific areas for accelerated rural development. These are rural areas in South Africa of extreme poverty, with a serious lack of facilities and services.

Source: ITU adapted from Central Statistical Authority (Ethiopia), Ethiopian Telecommunication Corporation and Statistics South Africa.

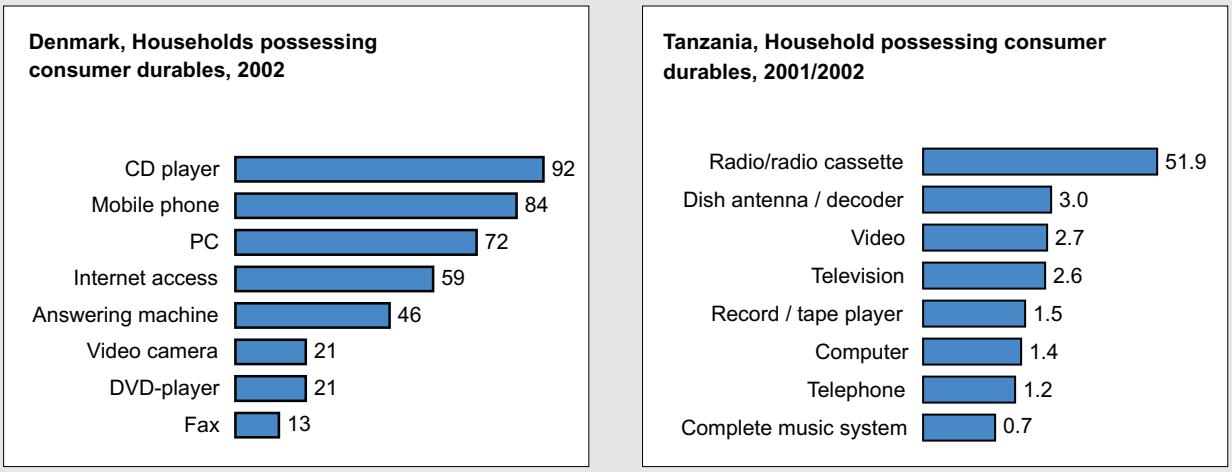
of villages with a telephone is not the same as the *village population with access to a telephone*. It would be logical to assume that more populated villages would be covered first.

2.2.1 The problems of comparability

One difficulty often confronted when comparing ICT statistics is that different terms are used for measuring access. This makes country comparisons imperfect. For example, a clear distinction exists between use, access and ownership/subscription, but the terms are sometimes used interchangeably. *Access* means that an individual could *utilize* an ICT because it is available but may not necessarily be doing so. *Use* means that a person is actually utilizing an ICT. *Ownership/subscription* means that the individual possesses an ICT device or subscribes to an ICT service. Another point of confusion is that some surveys ask households whether they have access to an ICT service, rather than asking whether the service is available from the home. For example, a household would be counted as having Internet access even if access was not available from the home, but the head of household had access from work. Countries should therefore try to be specific about what they mean or use the most appropriate term. Ideally, they should compile statistics on all three: access, use and possession/subscription. Comparing access, use and ownership helps identify barriers and has important policy implications. For example, if the level of usage does not match the level of accessibility, this suggests that there are other barriers besides infrastructure that are affecting the take-up of ICTs. The level of ownership, measured through purchase or subscription to an ICT good or service, can reflect how convenient it is to use ICTs.

Another important consideration is that the relevance of specific ICTs differs between developed and developing countries. Developed countries may be interested in newer ICTs and may no longer collect data for older ones (e.g. radio, television and fixed telephones) on the assumption that almost all households already possess them. Conversely, developing nations may assume that so few households have new technologies such as Internet access that they are not worth tracking. Denmark, for instance, does not track statistics on how many households have radios, televisions or fixed telephone lines and has chosen to focus on consumer electronics (e.g. DVD players, etc.), computers and the Internet (Figure 2.4, left). Tanzania on the other hand, tracks radios, television and fixed telephones but not access to the Internet (Figure 2.4, right). The drawback with these different focuses is that they result in a "statistical divide", where comparable data are not

Figure 2.4: Gaps in possession collecting and in possessions collected
Percentage of households with various ICTs, 2002, Denmark (left) and Tanzania (right)



Source: ITU adapted from Statistics Denmark and National Bureau of Statistics (Tanzania).

available for all countries. Another disadvantage relates to the fact that some ICTs, considered to be "old", are not tracked, whereas the decline of certain technologies can be an extremely useful factor to measure for analytical purposes. In the case of Denmark, the lack of data about household possession of fixed telephones means that this cannot be tracked in relation to mobile. This is important because a fixed telephone typically offers more and cheaper solutions for Internet access than a mobile.

2.3 Indicators

There are numerous ICTs from the mundane (radio) to the futuristic (global positioning systems) as well as many sub classifications (e.g. desktop computer, laptop computer, personal digital assistant). Collecting official data for all of them is beyond the capacity of most nations. This section highlights the most relevant ICTs for measuring household and individual access to the information society.

2.3.1 Broadcasting

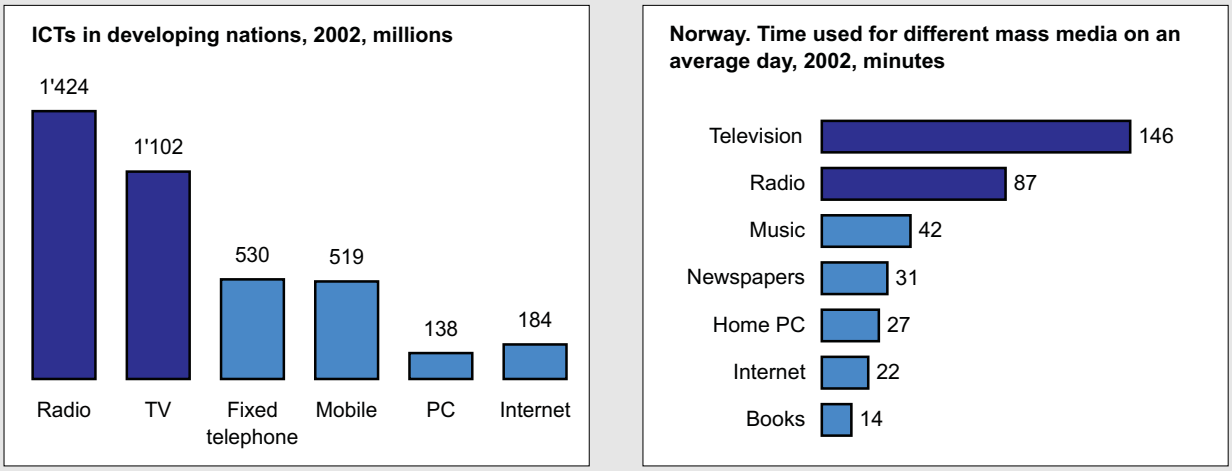
Radio and television broadcasting is the predominant means of electronic information and entertainment in all countries. Time use surveys for most developed nations show that watching television is the activity people devote the most time to after work and sleep. The average Norwegian spends over two hours a day watching television and over one hour listening to the radio (Figure 2.5, right). In developing nations, access to broadcasting is far higher than access to other ICTs such as telephones or personal computers (Figure 2.5, left). This makes compiling indicators on access to information delivered over broadcast networks very relevant.

Broadcasting is also important to monitor because of its fusion with other ICTs.[6] For example, it is possible to make telephone calls and access the Internet over cable television networks. Broadcast technologies also have a role to play as a development tool particularly in developing countries. Radio is being combined with Internet technologies to overcome literacy and language barriers. In this situation, radio stations download information from the Internet and re-disseminate it orally to the surrounding community, in local languages.[7]

Most countries in the world have radio and television stations. One common indicator, c*overage*, varies with limitations due to difficult terrain and a lack of electricity.[8] The latter appears to be a significant barrier, perhaps even more than affordability. Data from Africa show a strong relationship between the availability of electricity and home television set ownership (Figure 2.6, left). Anecdotal evidence suggests that one of the main reasons consumers opt for electricity in developing nations is to power television sets. Unlike radios, batteries cannot easily power a television set.[9] Data from developing countries suggest that while radio ownership is

Figure 2.5: The most popular ICTs

ICTs in developing nations, millions, 2002 (left) and time used for different mass media, per day in minutes, 2002, Norway (right)



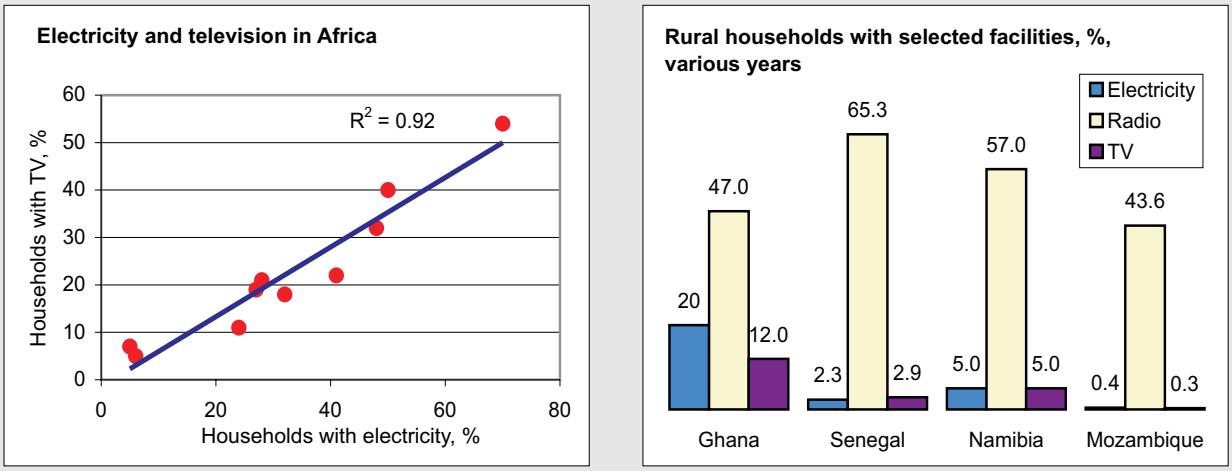
Note: Left chart: Radio and TV refers to sets, mobile refers to mobile cellular subscribers, Fixed telephone refers to main telephone lines, PC refers to personal computers and Internet refers to users. Right chart: Music refers to listening to DVDs, cassettes or records and not over radio.
Source: ITU World Telecommunication Indicators database and Statistics Norway.

roughly equally distributed between rural and urban areas, there is a significant gap for television, mainly attributable to the more limited availability of electricity in rural areas (Figure 2.6, right).[10] One implication is that statistics on the *number of homes with electricity* should be collected since the lack of a suitable energy source impacts the ability to use other ICTs.

The conventional indicators for measuring broadcast penetration are the *number of radio and television sets* and the *percentage of households with a radio or*

Figure 2.6: Electricity and ICTs

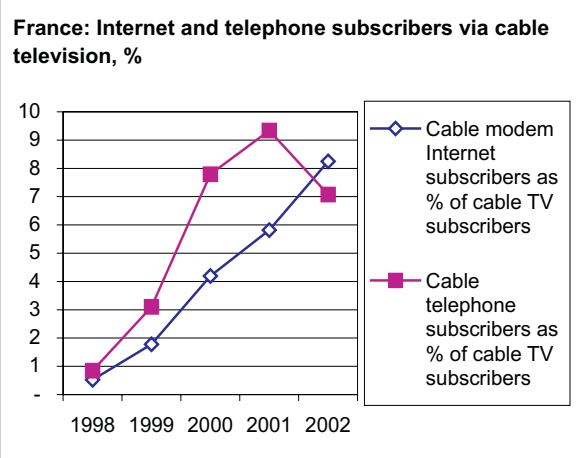
Relation between households with electricity and television (left) and rural households with selected facilities (right), selected African countries, various years



Source: ITU adapted from national statistical offices.

Figure 2.7: Cable television indicators
France, 2002

	31 Dec. 2002	Per cent of households
Households	24'651'000	100.0
Households passed by cable TV	8'810'270	35.7
Households passed by cable Internet	6'122'067	24.8
Cable TV subscribers	3'430'194	13.9
Cable modem Internet subscribers	282'992	1.1
Cable telephone subscribers	56'185	0.2



Source: ITU adapted from *Association française des opérateurs de réseaux multiservices* (AFORM, France).

television.[11] Few countries collect the number of broadcast sets and thus most data are estimates.[12] These are derived from sales of sets or surveys asking households whether they have a television. Some countries with licensing regimes collect data on the number of licences. This statistic is often used as a proxy for household availability. However not all people pay the licence fee so the true figure is underrepresented. This is apparent when licence data is contrasted with census or household surveys on the number of homes with a broadcast reception set. Few developed countries compile data on households with a radio and some do not ask about the availability of a television set.[13] This makes broadcast data another source of the statistical divide with radio ownership often of more relevance to the least developed nations.

Cable television networks can be built to provide telephone service and Internet access. Therefore the availability of cable television statistics is important for understanding a country's ICT potential. In this regard a number of useful indicators exist (Figure 2.7).

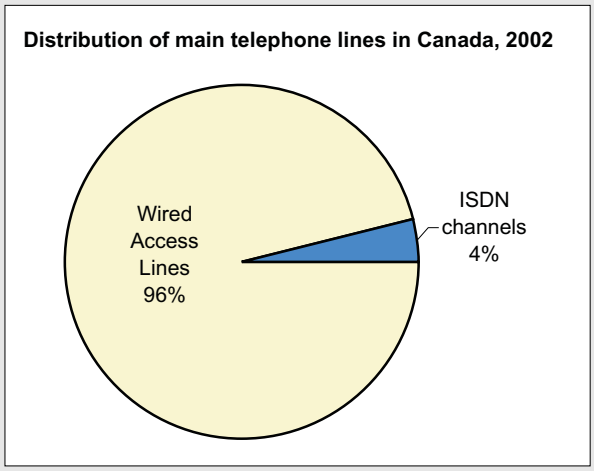
2.3.2 Fixed telephones

ITU has been publishing data on telephones since 1972 in its annual *Yearbook of Statistics*. The indicator has evolved with market trends and technological development. Initially, the number of telephone sets was compiled. This proved less useful as an indicator over time given the increasing number of telephone sets in the home, or attached to private branch exchanges (PBXs) in companies. Also, liberalization of equipment markets in many countries allowed consumers to choose their own sets, which meant that incumbent operators no longer knew how many there were. This led to a preference for *lines in operation*—also referred to as *main* or *direct exchange lines* (DELs) —as the primary indicator for measuring telephone access.

A main line has traditionally referred to the connection—typically a copper wire—from a subscriber to the telephone company's switching exchange. Technological changes have since blurred this definition. For example, in some countries, telephone service is provided via coaxial cable over pay television networks. In others, wireless local loop (WLL) technology severs the traditional concept of the main line represented by a copper line. The emergence of integrated services digital networks (ISDN) has also dramatically impacted the concept of the main line. ISDN converts a single physical line into virtual channels. Basic rate ISDN provides two channels while primary rate provides many more (e.g. 30 in Europe and 23 in North America and Japan).[14] This led to the practice, particularly in Europe and Japan of including ISDN channels in main line statistics. In order to enhance comparability, all countries should provide a breakdown of how their main telephone line figure is computed (Figure 2.8).

Figure 2.8: Breaking down main lines
Main telephone lines in Canada, 2002

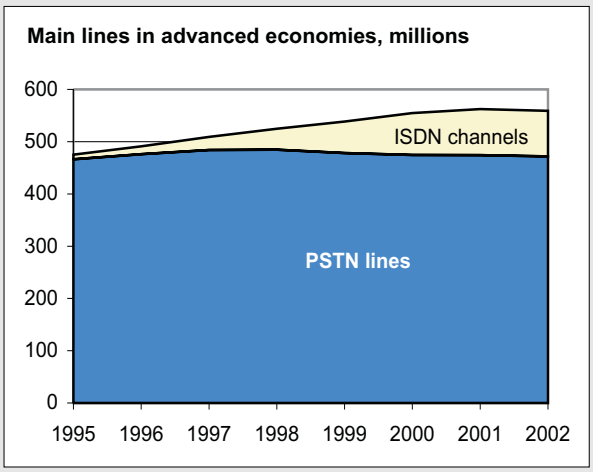
A. PSTN access lines	19'160'211	A. PSTN access lines	19'160'211
B. ISDN subscribers	95'853	C. ISDN channels	801'861
-Basic Rate	66'798	-Basic Rate a)	133'596
-Primary Rate	29'055	-Primary Rate b)	668'265
Total wired access lines (A+B) (telephone subscribers)	19'256'064	Total voice grade equivalents (A+C) (main lines)	19'962'072

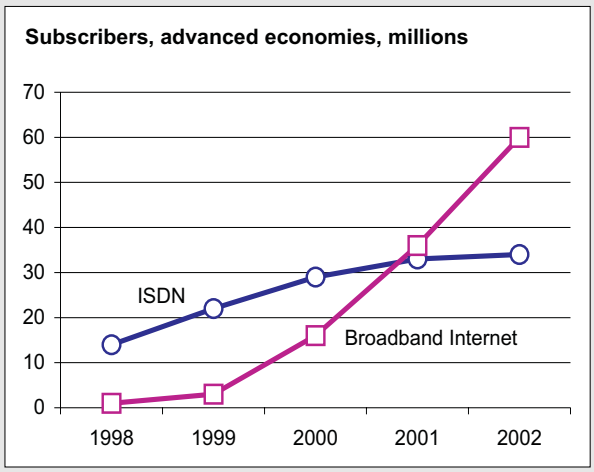


Note: a) Each basic rate ISDN subscriber is equivalent to two channels. b) Each primary rate ISDN subscriber is equivalent to 23 channels.
Source: ITU World Telecommunication Indicators database.

ISDN channels have provided an artificial boost to main line statistics. While main lines — including ISDN channels — have grown, fixed telephone lines in service peaked at 502 million in advanced economies in 1998 and have been declining since then (Figure 2.9, left). One reason for this is ISDN itself, which negates the need for a second physical line for a facsimile machine or dial-up Internet access. Another reason is the growing substitution of mobile phones for fixed ones. Furthermore, asynchronous digital subscriber line (ADSL), like ISDN, allows users to access the

Figure 2.9: The death of ISDN?
Main telephone line in advanced economies, millions (left) and ISDN and Broadband Internet subscribers (right), advanced economies, millions





Source: ITU World Telecommunication Indicators database.

Internet while keeping their telephone line free for voice communications. Broadband consumer technologies such as ADSL and cable modem access have now eclipsed ISDN as the main method for consumers moving beyond dial-up access. There were 60 million broadband subscribers in advanced economies compared to 34 million ISDN subscribers in 2002 (Figure 2.9, right). The few nations where ISDN continues to grow are those where there are bottlenecks to broadband access and ISDN is the only option for faster than dial-up access. It may only be a matter of time before ISDN disappears altogether, a victim of cheaper and faster broadband alternatives.

Another predicament with the traditional *teledensity* indicator (*main telephone lines per 100 inhabitants*) is that it is no longer the sole gauge of telephone access. Mobile telephone subscriptions have surpassed fixed lines in many countries.[15] This makes it difficult to find an ideal solution for measuring telephone density. One alternative is to combine all telephone subscribers, both fixed and mobile, to compute a *total telephone density* indicator. This results in double counting since the indicator includes subscribers that have both fixed and mobile phones, limiting its analytical usefulness. A way around double counting is to use *effective telephone density* whereby either fixed or mobile teledensity, whichever is higher, is used.

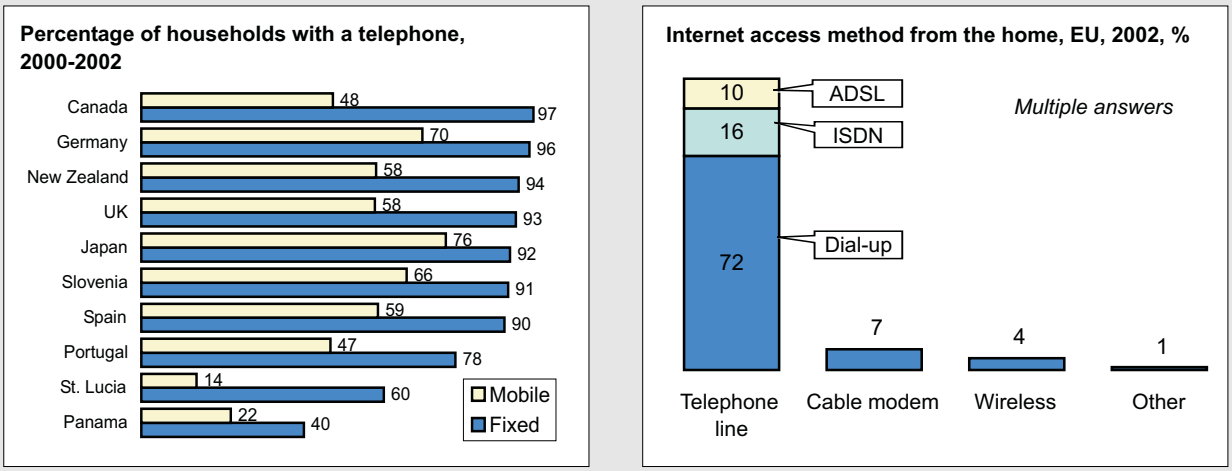
Despite the definitional issues and challenge posed by the rise of mobile phones, the number of main telephone lines and the associated penetration figure remains an important indicator. In most developed nations and many developing ones, the fixed line is still the predominant household telephone service (Figure 2.10, left). Main telephone lines are also the predominant method for Internet access since they provide the physical connection for dial-up, ISDN or ADSL (Figure 2.10, right).

A key statistic is the *number of homes with a fixed telephone*, the traditional indicator for measuring universal telephone service. The United States has been at the forefront of tracking home phone ownership, producing bi-annual reports with details by state, income and other socio-economic variables (Figure 2.11).[16] A number of developed nations do not compile this statistic on the questionable assumption that they believe all households already have a fixed telephone. . The highest rates of fixed telephones in households are to be found in Taiwan, China (97.8) and Canada (97.4). Furthermore, the rise of mobile shows that fixed telephones in homes are declining in developed economies that compile the two statistics (Figure 2.13, left).

One problem with national surveys is that it is often unclear whether a home telephone refers to only fixed

Figure 2.10: Still the most popular for homes and Internet

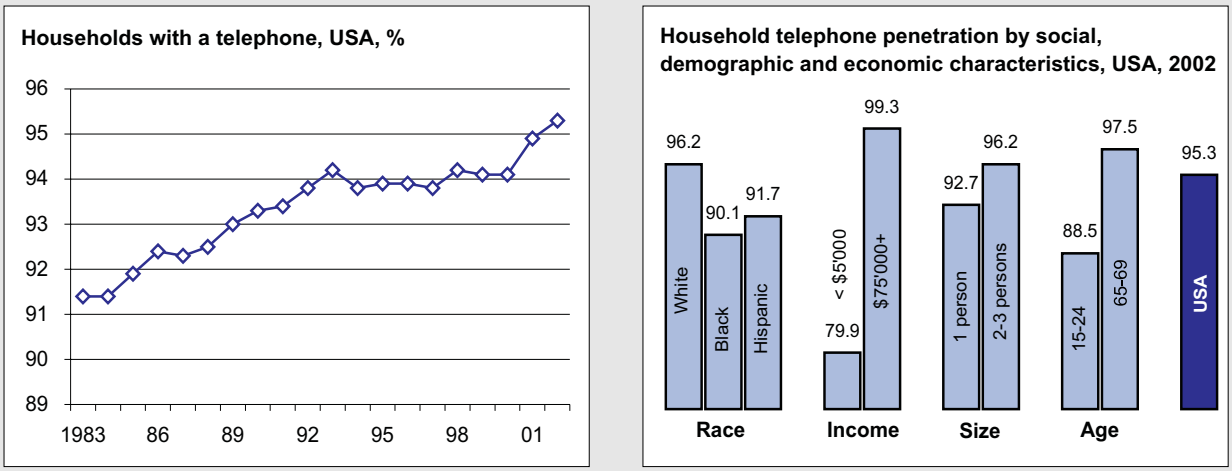
Percentage of households with fixed and mobile telephones, 2000-2002, selected countries (left) and Internet access from the home, distribution by method, 2002, European Union (right)



Source: ITU World Telecommunication Indicators database and ITU adapted from Gallup Europe.

Figure 2.11: Telephones in homes

In the United States, 1983-2002 (left) and breakdown by socio-economic characteristics, 2002 (right)

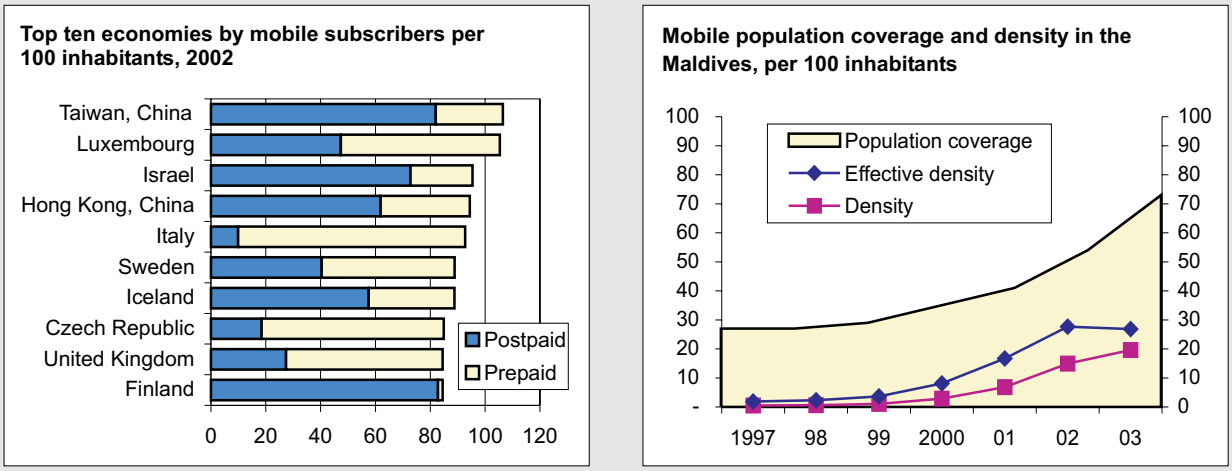


Source: ITU adapted from Federal Communications Commission (USA).

lines or also includes mobile. Ideally the following three questions should be asked in household surveys: whether the household has a fixed line only, both a fixed and mobile phone or only a mobile phone (Figure 2.13,right). For countries in which surveys on home telephone penetration is not available, a proxy can sometimes be used. The percentage of homes with a fixed telephone can be derived from administrative records if the share of residential lines is available. The *number of residential telephone lines per 100 households* is calculated by dividing the number of residential telephone lines by the number of

Figure 2.12: Mobile indicators

Top ten economies by mobile subscribers per 100 inhabitants, 2002 (left) and mobile population coverage, actual and effective mobile subscribers per 100 inhabitants, Maldives (right)



Note: Right chart: Effective density refers to mobile subscribers divided by the population with mobile coverage multiplied by 100.
Source: ITU World Telecommunication Indicators database.

households and multiplying by 100. This derivation has limitations since business lines can be reported as residential particularly where residential subscription is cheaper. Other distortions in the results of this derivation are caused by the inclusion of second lines and ISDN channels.

2.3.3 Mobile telephones

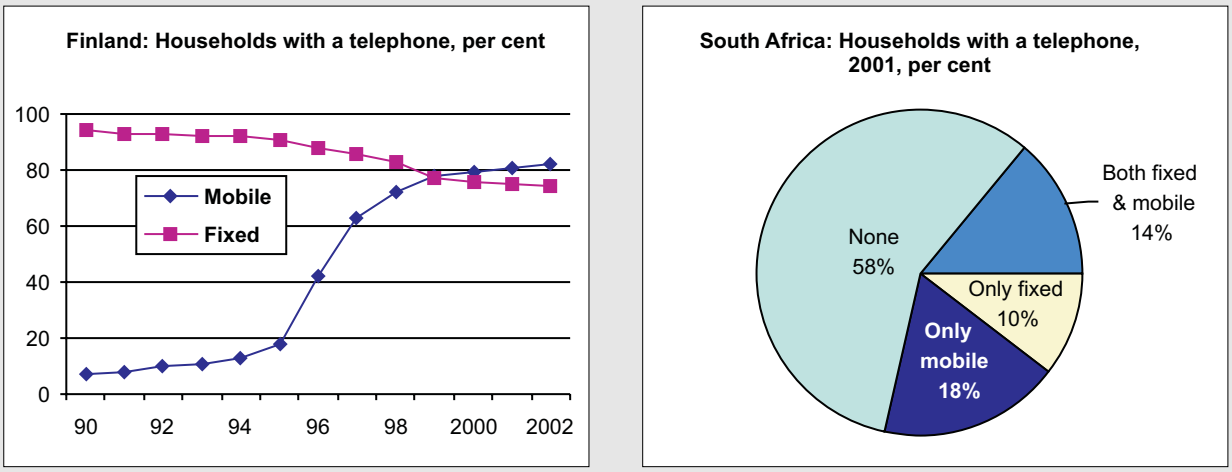
Mobile indicators are critical for analysing access to telephone service given that in most countries there are now more mobile than fixed telephone subscribers. *Mobile density*, or the *number of mobile subscribers per 100 inhabitants*, has surpassed 100 in some nations. It is difficult to determine whether this is caused by inactive prepaid accounts or growing ownership of more than one mobile telephone. Statistics regarding mobile subscriptions should include the split between subscription-based and prepaid accounts (Figure 2.12, left).

One of the most useful indicators of universal access is the *percentage of the population covered by a mobile cellular network* (see discussion in section 2.2). Inhabitants who are covered by a mobile cellular signal have the potential to subscribe to the network whether or not they actually do so. Where there is a large gap between population coverage and penetration, it suggests that bottlenecks in access are more due to affordability than to infrastructure shortcomings. One indicator that can be derived from the level of coverage is the *effective mobile subscribers per 100 inhabitants*, sometimes expressed as the level of take-up of a particular service. This indicator is calculated by adjusting the population to those with coverage (Figure 2.12, right).

The *percentage of homes with a mobile telephone* is another useful indicator for tracking universal service. Many developed nations now survey the percentage of households with a mobile telephone even when they do not ask for the number of fixed lines. This is unfortunate, as it is particularly useful to track these two indicators together. In Finland, one country where both are tracked, home ownership of fixed telephones has been declining since 1990 as a result of mobile phones (Figure 2.13, left). By 1998 the number of homes with mobile phones had exceeded those with a fixed one. By 2003, the percentage of Finnish homes with a mobile phone stood at 92 compared to just 64 for a fixed line. Data from developing nations also confirm that trend. According to the 2001 South African census, 18 per cent of homes have only a mobile phone compared to ten per cent that have only a fixed (Figure 2.13, right).

The growing use of mobile phones for data and text applications makes tracking that area important.[17] Although the *number of short message services* (SMS)—a precursor to more intensive mobile data use—is a popular indicator (Figure 2.14, left), a more

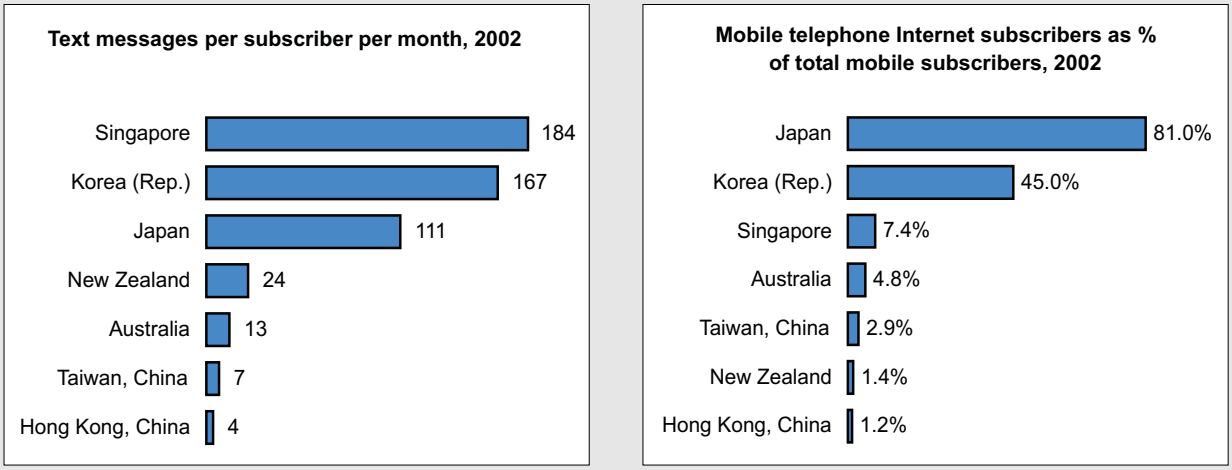
Figure 2.13: Households with more mobile phones than fixed
In Finland, 1990-2002 (left) and South Africa, 2001(right)



Source: ITU adapted from national sources.

Figure 2.14: Mobile Internet

Number of text messages per mobile subscriber per month (left) and mobile phone Internet subscribers as percentage of total mobile subscribers, 2002, advanced Asia-Pacific economies (right)



Source: ITU World Telecommunication Indicators database.

relevant one may be the *percentage of mobile subscribers that use SMS*. Mobile indicators that measure Internet access and high-speed data availability are also useful. This would include the *number of mobile customers that subscribe to a mobile Internet service* (Figure 2.14, right). In some countries, Internet access is occasionally bundled into the price of mobile subscription, so a better indicator might be the *number of mobile customers that use a mobile Internet service*. The availability of high-speed Internet access should be a policy indicator in countries that have licensed third generation networks. The licence conditions often compel operators to achieve a specific level of population coverage by certain dates. This would be captured by the *percentage of the population covered by high-speed mobile Internet access*. Related to this indicator, is the *number of mobile customers that use high-speed Internet services*.

2.3.4 Personal computers

Access to a personal computer (PC) is important not only because is it an information device in own right, but also because it is the leading gateway to Internet access. Plus, PCs are useful for developing basic computer skills prior to navigating the Internet.

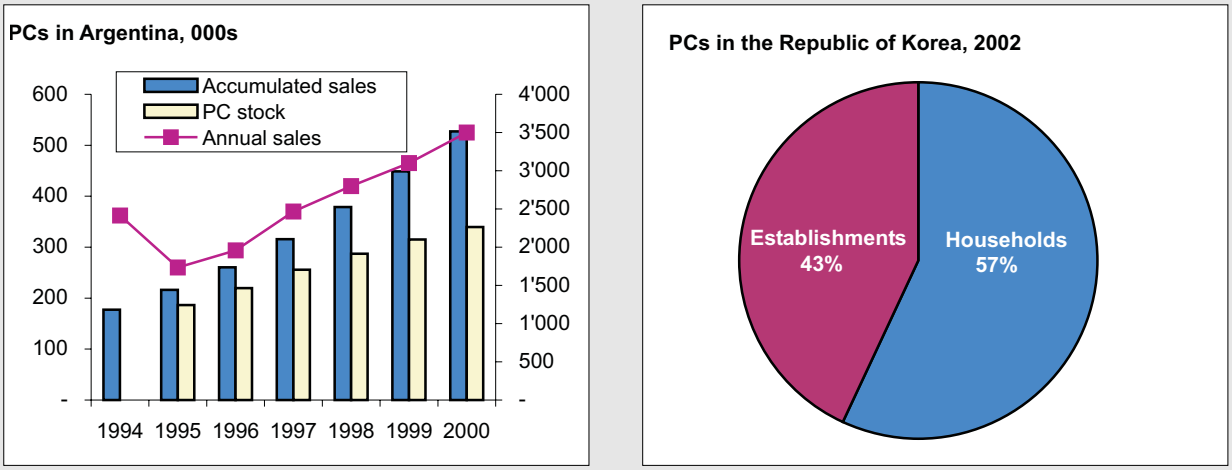
Despite their importance, only a few countries publish data on the number of PCs. Unlike television sets, that are basically found in homes or hotel rooms, collecting data would involve surveying all the places where there might be a PC: schools, homes, offices, libraries, Internet cafés, etc. Therefore most estimates regarding the stock of PCs are based on shipments (e.g. the number of PCs sold) in a given country and year. Annual shipment data can be multiplied by an estimated replacement rate to obtain an approximation of PCs for the country. The life of a PC will vary depending on various factors such as wear and tear and obsolescence, and replacement rates differ between developing and developed nations with the former hanging on to PCs for longer.[18] Though there is no precise methodology for determining PC replacement rates, a general rule of thumb is that they are changed every three to five years.

Apart from wear and tear, computers also become obsolete, as software updates require faster machines. In light of all these factors, an overall country figure for the number of PCs could be estimated by adding up the last five years sales (Figure 2.15, left).[19] It is a major drawback that, as with so many other statistics, reliable data on the number of PCs sold is not available for many developing nations.

A surrogate for sales is PC import figures, data that is sometimes available from customs departments of national governments. However, use of import data

Figure 2.15: PCs

Estimated number of PCs in Argentina (left) and the Republic of Korea, 2002 (right)



Note: Left chart: PC stock is derived from adding up sales for the last five years.
Source: ITU adapted from Prince and Cooke (Argentina) and National Statistical Office (Korea (Rep.)).

has limitations. Often only value rather than volume data is available. Also, if PCs were assembled in the country from imported parts, they would not be counted. Customs data would also not include undeclared imports. Additionally, some of the imported PCs may be later exported.

Despite the data difficulties, some national statistical offices as well as industry associations and consulting companies publish data on the number of PCs. ITU compiles statistics for countries in which shipment or import data is available based on the methodology described above. Data could also be aggregated from surveys of ICT usage in business, education, government and households (Figure 2.15, right).

Given the limitations with determining the number of PCs in a country, alternative measures should be considered. PC-related statistics collected by some statistical agencies and industry associations include the *number of people that use a computer*. For example, the Association of Spanish Internet Users has been collecting data since 1996 on the number of adults in Spain that use a computer (Figure 2.16, left).[20] In Malta, the National Statistics Office carried out a 2002 survey that not only determines the number of people using computers, but also provides information about their socio-economic characteristics (Figure 2.16, right).[21]

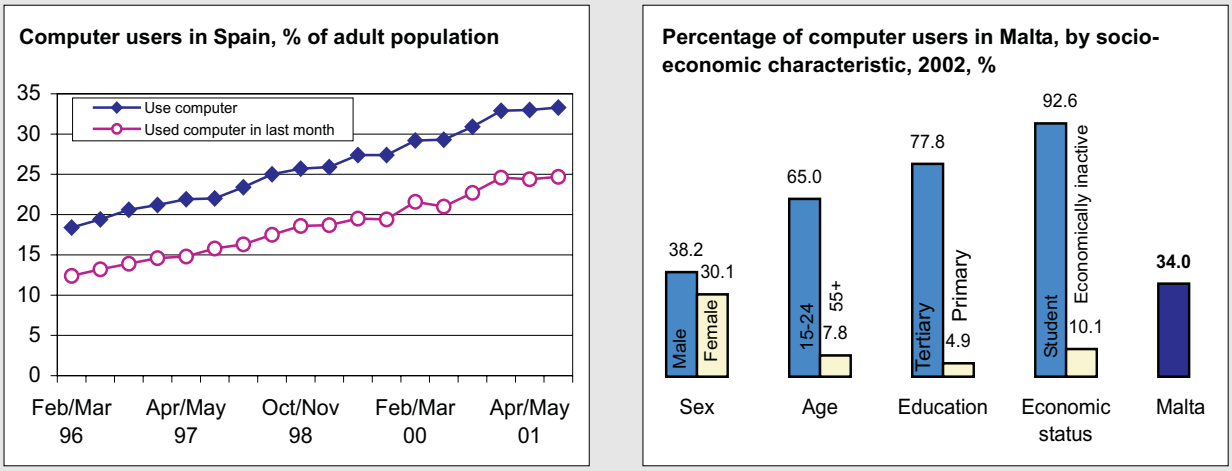
A growing number of national statistical agencies compile data on the *percentage of households with a computer* through censuses or on a more regular basis through household surveys. The advantage of official household statistics is that the methodology is usually sound and the data on ICT use are normally publicly available. Additionally, this data can be cross-correlated with other data, for instance on income, gender, location, education and other characteristics of the head of household. This can enhance the analysis of national digital divides. Sufficient data is now available for many developed economies to analyze developments over time.[22] Virtually all developed countries report this statistic allowing rankings of the top countries by PC household penetration (Figure 2.17, left). More developing nations have begun asking households about the availability of PCs particularly as a result of the 2000/01 round of censuses (Figure 2.17, right).

2.3.5 Internet

Most references to the digital divide and information society revolve around access to the Internet. Yet it is remarkable how little we know about the Internet's true extent—particularly in developing nations. While most developed nations now have regular Internet user surveys—either conducted by the National Statistical Office (NSO)

Figure 2.16: Computer use

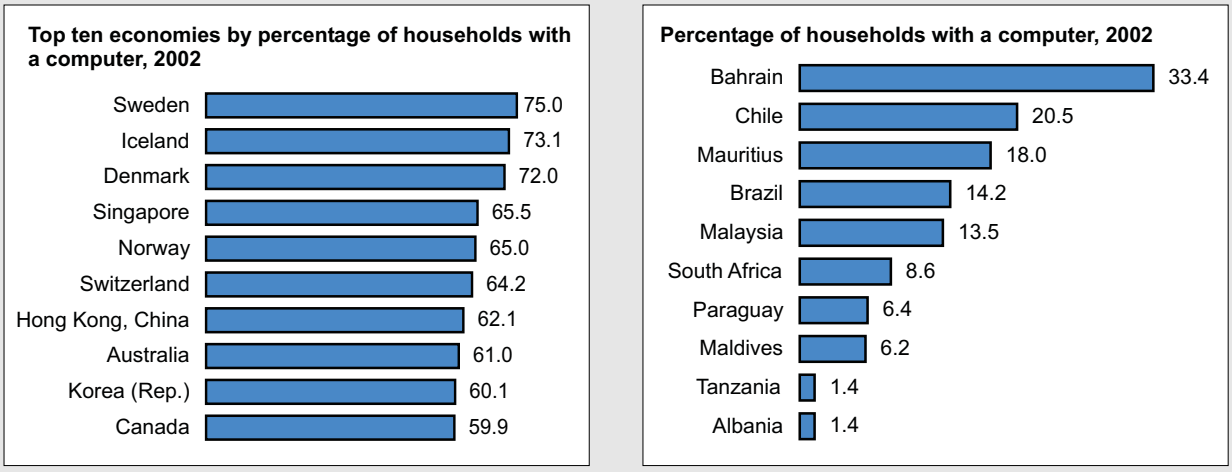
Computer users in Spain as percentage of adult population (left) and socio-economic characteristics of computer users in Malta, 2002 (right)



Note: The right chart shows the percentage of computer users within each category. For age, 65 per cent of all 15-24 year olds in Malta use a computer.
Source: ITU adapted from AUI (Spain) and National Statistics Office, Malta.

Figure 2.17: PC homes

Top ten economies by percentage of households with a computer (left) and percentage of households with a computer, selected developing economies (right), 2002



Note: Data for Norway and Sweden refer to household members with access to computer in the home. Data for Albania, Bahrain, Canada, Iceland, South Africa, Switzerland and Tanzania refer to 2001. Data for Malaysia and Maldives refer to 2000.
Source: ITU World Telecommunication Indicators database.

or private polling organizations—there have been few such surveys in developing nations and none in the lowest income countries (Table 2.1, Box 2.1).

Although Internet user surveys are available for developed regions, comparability is still a problem. This is because the surveys do not follow a standard methodology. Comparability revolves around three areas: age, frequency of use and access device.[23]

- The *age* from which Internet use is measured varies. For example, in the United States, government

surveys measure access from the age of three; in the Republic of Korea, surveys measure access from the age of six, while in Europe many national surveys start from the age of 16 (Figure 2.18, left). These differences could be reconciled by showing Internet use from a common starting age, and with uniform age cohorts.[24] The problem with just using adult penetration is that a large segment of the Internet market, youth, is being excluded. This also has relevance in benchmarking to determine why some countries have a higher rate of youth access than others. By the same token, Internet surveys often have an upper boundary for age that affects comparability. ITU data on Internet users reflects the number reported in a survey and divides that by the entire population to obtain a penetration figure (Figure 2.18, right).

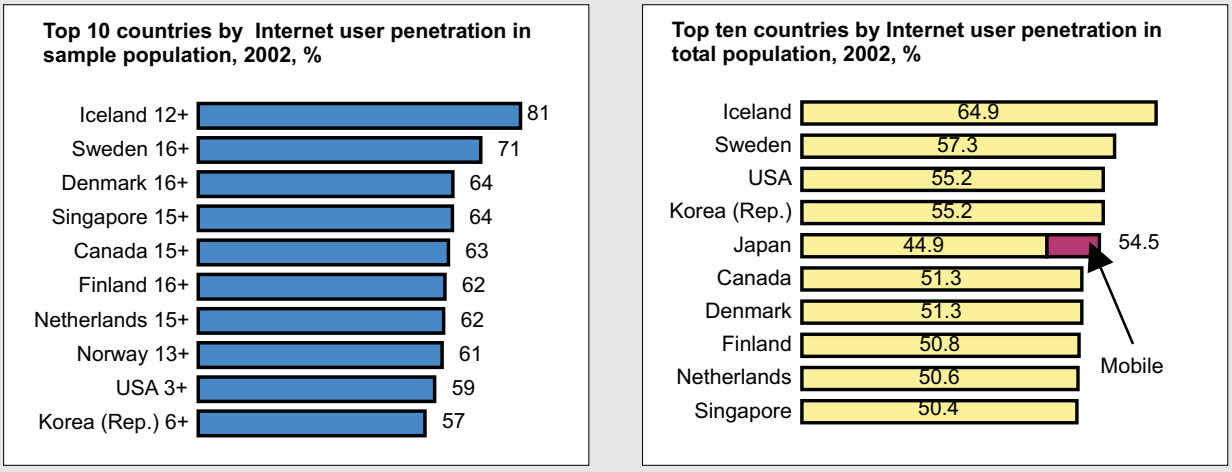
- *Frequency of use*. Another area where surveys are inconsistent is the definition of how often a person should use the Internet before being considered a user. The frequency of use in surveys ranges from within the last year, within the last three months, monthly, weekly and daily. It would be preferable for surveys to ask for a range of periods rather than just one in the hope of making the data more internationally comparable. A minimum commitment to the Internet would be using it at least once a month; this figure should be proposed as a common limit.

- *Access device*. Until recently, virtually all users utilized the Internet through a personal computer. However with the development of Internet access through mobile phones, this is starting to change. In the case of Japan, Internet access through mobile phones has become popular. According to administrative records, 81 per cent of all Japanese mobile customers also subscribe to a mobile Internet provider. Some 10 per cent of Japanese Internet users only access the Internet from their mobile phones.

In most developing nations however, estimating the number of Internet users is guesswork. In the early years of the Internet, before commercial services became available, Internet users were estimated by applying a multiplier to the number of Internet host computers.[25] One problem with this technique was that the multiplier was not very scientific. Another was that countries could have a low number of hosts—either because they were not picked up when the host

Figure 2.18: Who is number one?

Top ten countries ranked by Internet users per 100 inhabitants in the survey age population (left) and in the total population (right), 2002



Note: The left chart shows the number of Internet users divided by the surveyed population (shown to the right of the country name). For example, data for Singapore refer to those aged 15 and over using the Internet divided by the total 15 and over population. The right chart shows the reported number of Internet users divided by the total population for country. For example, data for the Republic of Korea refer to those six years old and over using the Internet divided by the total population of the country. Data for Japan also includes users only accessing the Internet from mobile phones. Data for Canada, Netherlands and the United States are estimated.

Source: ITU adapted from national Internet user surveys and ITU estimates.

Table 2.1: Internet user surveys around the world

Economy	Year	Population using Internet: Per cent	Population using Internet: Age	Source	Note
Argentina	2002	15.0	18+	TNS	Usage in last month.
Australia	2002	58.0	18+	AusStats	Usage in last year.
Austria	2002	36.6	16+	Eurostat	Usage in last 3 months.
Belgium	2002	44.0	15+	TNS	Usage in last month.
Brazil	2002	4.3	2+	Nielsen//NetRatings	Home users only.
Bulgaria	2002	9.6	18+	Vitosha	Ever used Internet.
Canada	2000	52.8	15+	Statistics Canada	Usage in last year.
Chile	2001	17.7	6+	SUBTEL	
China	2002	4.6	6+	CNNIC	% calculated on entire population.
Cyprus	2002	23.9	15+	CYSTAT	
Czech Republic	2002	21.7	16+	Eurostat	Usage in last 3 months.
Denmark	2002	64.3	16+	Eurostat	Usage in last 3 months.
Estonia	2002	43.0	15+	Emor	Usage in last 6 months.
Finland	2002	62.4	16+	Eurostat	Usage in last 3 months.
France	2002	36.8	11+	Mediametrie	Usage in last month.
Germany	2002	46.0	10+	Federal Statistical Office	Usage in last 3 months.
Greece	2002	14.7	16+	Eurostat	Usage in last 3 months.
Hong Kong, China	2002	48.2	10+	C&SD	Usage in last year.
Hungary	2002	18.0	15+	SIBIS	Usage in last month.
Iceland	2002	81.1	12+	Statistics Iceland	
India	2002	16.0	18+	TNS	Delhi, Mumbai, Calcutta and Chennai only.
Indonesia	2002	6.0	15+	TNS	2 largest cities only.
Ireland	2002	38.0	15+	Amárach	
Israel	2002	42.0	18+	TNS	Usage in last month. Jewish population.
Italy	2002	28.0	16+	Eurostat	Usage in last three months.
Jamaica	2003	36.0	15+	JAMPRO	
Japan	2002	57.1	6+	MPHPT	Including access from mobile phones.
Korea (Rep.)	2002	59.4	6+	KRNIC	Usage in last month.
Latvia	2002	28.0	15+	SIBIS	Last month.
Lithuania	2002	18.0	16+	Baltic	Usage in last 3 months.
Luxembourg	2002	39.8	16+	Eurostat	Usage in last 3 months.
Malaysia	2002	21.0	18+	TNS	Urban Peninsular only. Usage in last month.
Malta	2002	26.8	15+	National Statistics Office	
Mauritius	2002	12.8	12+	Central Statistics Office	
Mexico	2002	10.0	All	COFETEL	
Netherlands	2001	57.0	12+	Statistics Netherlands	Usage in last month.
New Zealand	2002	57.0	10+	ACNielsen	Usage in last month.
Norway	2002	52.0	13+	Gallup	Usage in last month.
Peru	2002	23.0	12+	Apoyo	“Habitual users.” Only metropolitan Lima.
Poland	2002	20.0	15+	SIBIS	Last month.
Portugal	2002	17.4	16+	Eurostat	Usage in last 3 months.
Romania	2002	13.0	15+	SIBIS	Last month.
Serbia	2002	16.0	18+	TNS	Past month.
Singapore	2002	63.9	15+	IDA	Last year.
Slovak Republic	2002	24.0	15+	SIBIS	Last month.
Slovenia	2002	37.0	15+	SIBIS	Last month.
Spain	2002	18.7	16+	INE	Last 3 months.
Sweden	2002	71.0	16+	Statistics Sweden	Last 3 months.
Switzerland	2002	45.1	14+	WEMF	Once a week.
Taiwan, China	2002	38.0	All	FIND	
Thailand	2001	5.6	All	National Statistical Office	
Turkey	2000	9.1	18+	OECD	Urban areas.
Ukraine	2002	4.0	18+	TNS	Past month.
United Kingdom	2002	55.0	16+	National Statistics	Last 3 months.
United States	2001	53.9	3+	NTIA	
Venezuela	2002	10.0	18+	CAVECOM	Regular.

Source: ITU adapted from sources shown in table.

Box 2.1: Over surveyed

While many developing nations have yet to carry out Internet user surveys, some developed nations already have a number of surveys. Take Spain for example where at least six Internet user surveys have been conducted. In theory, assuming the surveys follow appropriate methodological practice, they should all produce similar results. In reality, they do not, with estimates of the percentage of persons using the Internet ranging from over half to less than a fifth of the population (Box Figure 2.1, left). What can explain such large variations?

- *Age*. The surveys do not all use the same age. Sample ages range from those older than 14 to those older than 16. However at those ages, each year only accounts for around one per cent of the population. Therefore, age is not a significant factor in explaining the large differences in the survey results.

- *Sample size*. The population questioned for the surveys ranged from around one thousand to over 50'000. In general, the larger the population sample, the smaller the estimate of the number of people online. Therefore, the size of the sample seems to have a bearing on the results.

- *Method*. The smaller samples used only telephone interviewing techniques whereas the larger ones used personal interviews or a combination of the two. The use of interviews only by telephone would have an impact since ten per cent of Spanish households do not have fixed telephones. It is far more likely for family members to be using the Internet if they have a fixed telephone line. Therefore, surveys that only carry out telephone interviews would tend to overestimate the number of Internet users.

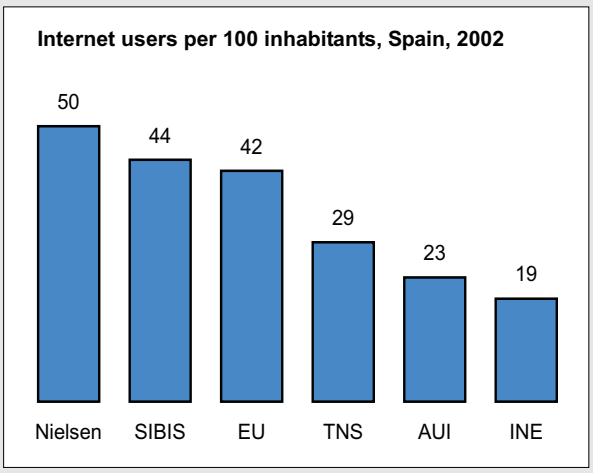
- *Frequency of use*. The period over which a person is considered an Internet user was not always specified. One would assume that the more lenient the definition, the higher the percentage of Internet users. Yet the survey that had the most generous definition, usage in the last three months, showed the smallest number of users online. Therefore, it is not clear that the frequency of use had much bearing in the different results.

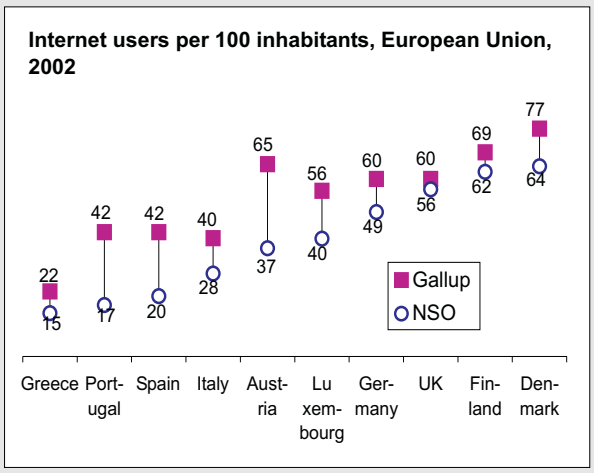
- *Date*. The surveys were all conducted throughout 2002. The first was in March and the last in the fourth quarter. According to one of the surveys, the percentage of Internet users increased between one to two per cent in 2002. Therefore, it does not seem that the nine-month range in survey dates could have had a significant impact.

The two surveys that used the largest samples sizes and personal interviews were conducted by national organizations. One has carried out Internet user surveys in Spain since 1996 whereas the other is the national statistical agency which carried out its first Internet user survey . The other surveys were conducted by organizations where Spain was just one of several countries surveyed. It is interesting to contrast the results of surveys carried out by Gallup for European Union nations with those conducted by national statistical agencies. In almost every country, Gallup reports a higher Internet penetration than the national statistical agencies (Box Figure 2.1, right). This is significant because the European Union has been using the Gallup data to analyze Internet diffusion in the region.

Box Figure 2.1: So how many are online?

Internet users per 100 inhabitants, selected European Union members, 2002





Source: ITU adapted from Gallup-Europe and Eurostat.

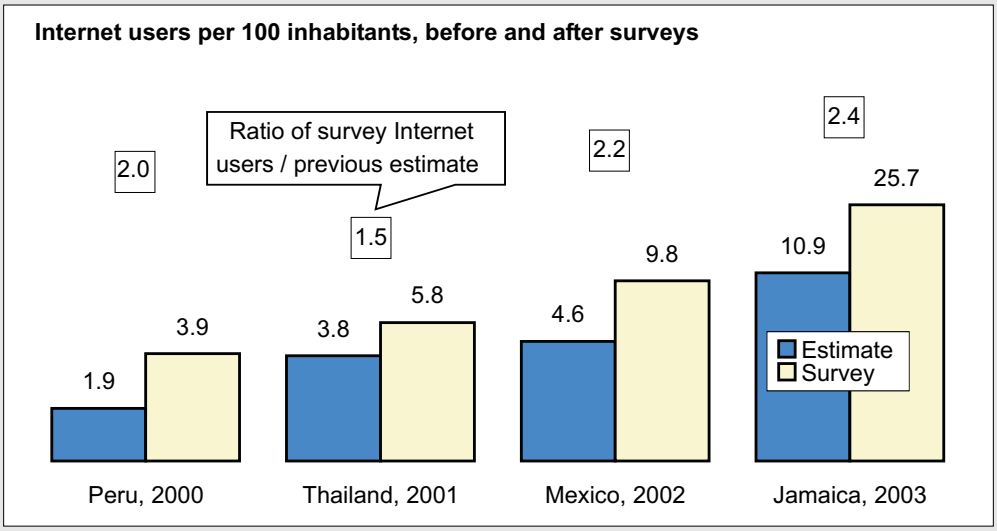
count was done or national organizations used generic top-level domain names (e.g. .com, .edu).[26] As time went on and Internet subscriber data became available, a multiplier of subscribers was used to estimate the number of users.[27] While the number of subscribers *may* set a minimum threshold, again the question of what multiplier to use is problematic. A widely used assumption is that most dial-up subscriptions are in households with an average of three users (e.g. husband, wife and child).

This method has become less reliable due to "free subscriptions" and prepaid cards.[28] There is also growing evidence that the use of Internet cafés in developing nations is increasing rapidly, seriously challenging the notion that the number of users can be estimated based on a multiple of the number of subscribers. In Togo, the incumbent telecommunication operator has estimated the number of Internet users by interviewing Internet cafés about the number of clients they receive. The Internet user to subscriber ratio in Togo works out to 17, or more than five times the multiplier commonly used. The resulting figure gives Togo the highest penetration rate among West African nations even though its per capita income is among the lowest. Either Togo is overestimating the number of users or its neighbours are underestimating.

Thailand used an interesting model for estimating the number of Internet users in the absence of formal surveys.[29] It was based on the assumption that each kbps of domestic and international bandwidth served 4 and 11 Internet users respectively. Beginning in January 2000, the formula was changed to account for the growing volume of excess bandwidth. Under the revised formula, the estimated number of users was 2.3 million in October 2000 compared to 3.9 million with the old methodology. In January 2001, the Thai National Statistical Office launched a survey with the results showing there were some 3.5 million Internet users in Thailand (Figure 2.19).

The results of recent surveys suggest the number of users in other developing nations may be underestimated to an even greater extent than in Thailand. This has profound implications on assumptions about the global digital divide. An Internet survey carried out in Jamaica in January 2003 found that there were almost 675'000 users in the country, five times more than what had been previously estimated (Figure 2.19).[30] Instead of previous estimates of five per cent, the Internet penetration rate in Jamaica was found to be closer to 26 per cent. Another case comes from Peru where a survey was conducted in the metropolitan area of the capital Lima in November 2000.[31] The survey found that 20 per cent of Lima's inhabitants had used the Internet at least once. It is not known how many users there are across the country, but just using the figure for Lima meant that there were at least twice as many Internet users as had been estimated in the past. One

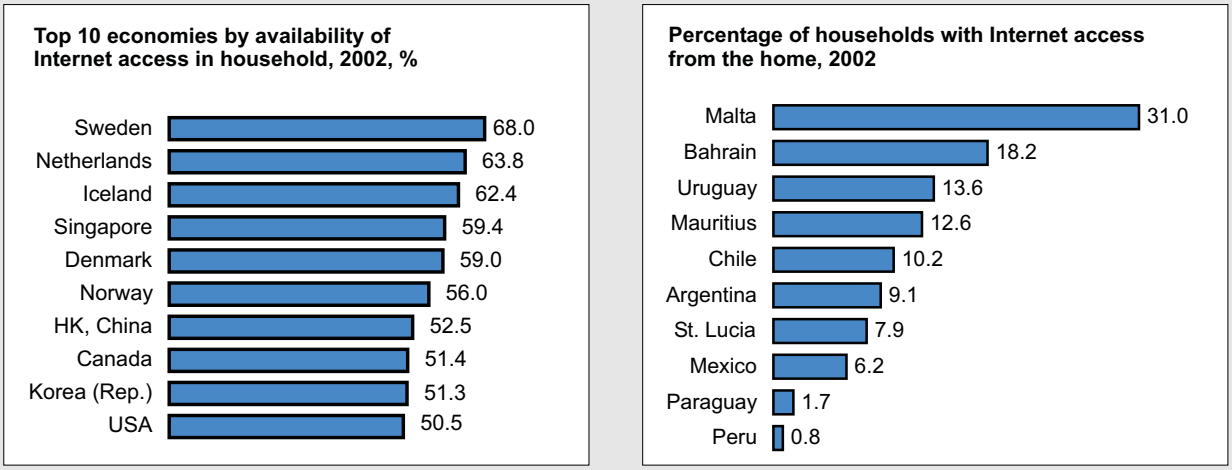
Figure 2.19: The shrinking the digital divide?
Internet users per 100 inhabitants in Peru, Thailand, Mexico and Jamaica



Source: ITU adapted from OSIPTEL, INEI, NECTEC, COFETEL and JAMPRO.

Figure 2.20: Internet in the home

Top ten economies by availability of Internet access in the home (left) and percentage of households with Internet access from the home, selected developing nations (right) 2002



Note: Data for Mexico, St. Lucia, Argentina and Bahrain refer to 2001.
Source: ITU World Telecommunication Indicators database.

of the reasons for the underestimation was widespread use of Internet cafés. In the most recent survey carried out in June 2002, 71 per cent of Lima's Internet users utilized Internet cafés as their main location. This raises the question of how many other countries there may be where the penetration of the Internet is being underestimated.

The evidence suggests that anything short of a proper survey to estimate the number of Internet users is essentially guesswork. The challenge is to increase the number of developing countries that carry out Internet user surveys.

In addition to individual Internet use, another indicator is the *percentage of households with Internet access from home*. Care must be taken in interpreting this statistic. Some countries report the number of households with Internet access, regardless of location. In other words, they would count a household as having Internet access if the home did not have its own access but members of the household used the Internet from work or school. Most developed nations consider this a key indicator of the information society and almost all now compile the percentage of households with Internet access in the home from annual household surveys (Figure 2.20, left). A number of developing countries are also beginning to compile this indicator (Figure 2.20 right).

The growing importance of broadband Internet access means that related indicators should be collected. Broadband may be defined as technologies that provide speeds greater than 128 kbps in at least one direction.[32] This would include ADSL, cable modem and subscribers to other technologies such as fibre Ethernet or wireless. The number of broadband subscribers is divided by the population to obtain the *number of broadband subscribers per 100 inhabitants* (Figure 2.21). It is also useful to know how many homes have broadband Internet access.

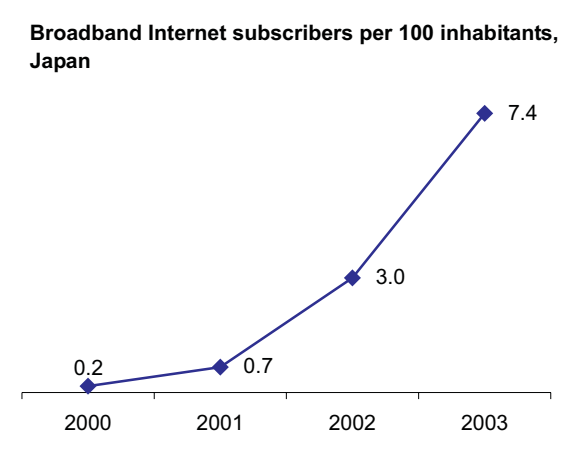
2.4 Community access indicators

The vast majority of households in developing nations do not have modern ICTs such as computers and Internet access. For example, even the most advanced economies in the Latin America region are still far behind their North American neighbours in terms of household ICT availability (Figure 2.22 left). The situation is even worse for other developing countries in the region and around the world. For the immediate future, if citizens in most developing nations are to have access to ICTs, it will have to come from elsewhere such as at the homes of relatives or friends, at work, school or public places such as Internet cafés. This assumption is borne out by surveys in developing countries that show that in many, a primary location of Internet access is an Internet café. In Peru, four out of five Internet users can be found in Internet cafés. In other Latin American countries for which

Figure 2.21: Broadband indicators

Broadband subscribers by technology, March 2003 (left) and per 100 inhabitants, March 2000- March 2003, Japan (right)

Broadband subscribers in Japan	March 2003
DSL Service	7'023'039
Number of Subscribers Using Internet Connection Services that Utilize the CATV Network	2'069'000
FTTH Service	305,387
Total Broadband subscribers	9'397'426
Population (000s)	127'320
Broadband subscribers per 100 inhabitants	7.4



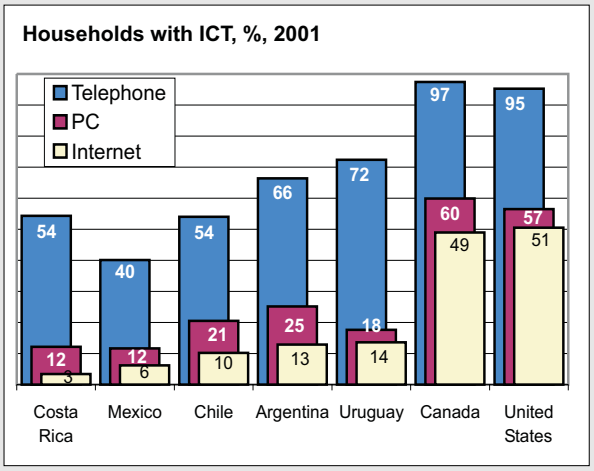
Note: FTTH = Fibre to the home.
Source: ITU adapted from MPHPT (Japan).

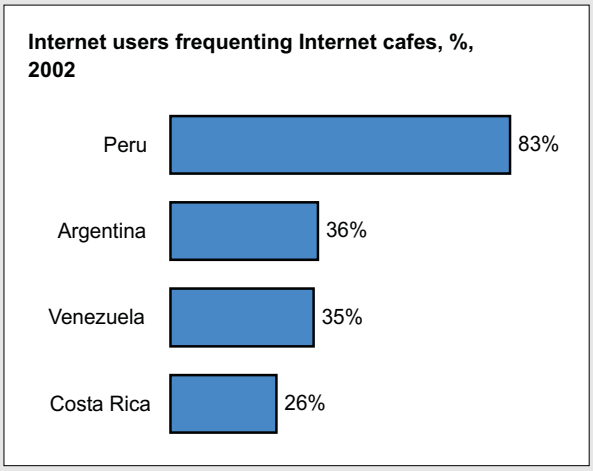
data is available, the corresponding figure is one in three (Figure 2.22 right).

This highlights the importance of measuring access to community ICT facilities. In January 2003, the ITU World Telecommunication/ICT Indicator meeting recommended that statistics on *public Internet access facilities* be collected.[33] This was defined as "*the number of facilities providing Internet access to the public. These can be Internet cafés and public*

Figure 2.22: Not enough ICTs at home

Percentage of households with different ICTs, 2001, selected America region countries (left) and percentage of Internet users that use Internet cafés, selected Latin American countries, 2002(right)





Source: ITU adapted from national surveys.

facilities such as telecentres or libraries. Schools should not be included unless the general public can also use the facilities."[34] The key word is *public,* meaning that the facility is available to all during the hours of operation, whether privately-owned or government-run.

The European Union (EU) included a public access indicator as part of its eEurope benchmarks, the number of *Public Internet Access Points* (PIAPs). This is defined as "*publicly provided centres providing access to the Internet regardless of their public and/or private provider and whether access is free or not though excluding fully private Internet cafés.*"[35] The EU also listed three supplementary indicators that members may want to collect: *number of public access points (excluding private initiatives) per 1'000 inhabitants*; *number of free public access points per 1'000 inhabitants* and *percentage of libraries offering Internet access to the public*. Member States are supposed to collect this data on an annual basis (Figure 2.23).

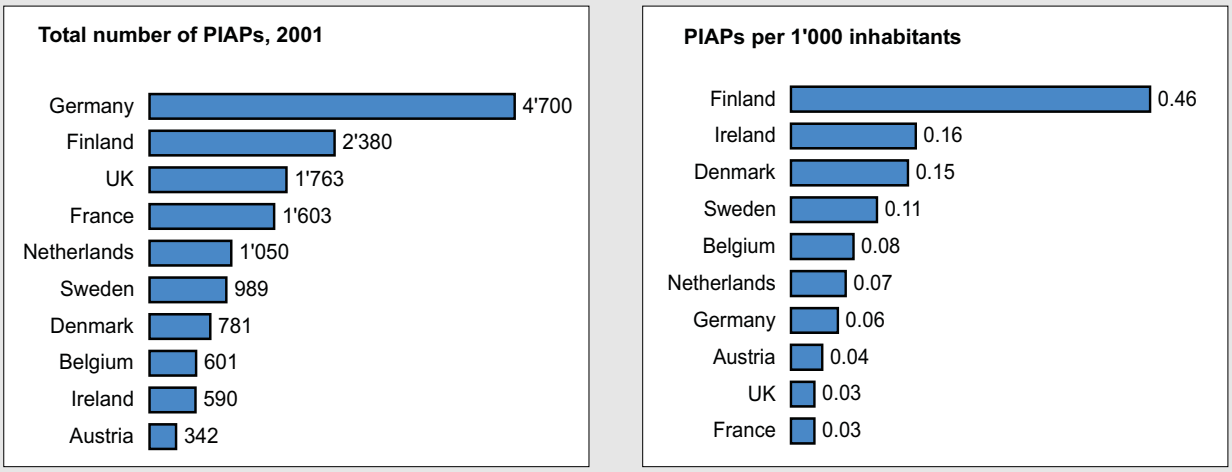
Some developing nations publish similar statistics. The telecommunication regulator in Venezuela has provided data since 2000 on the number of public Internet centres broken down by the type of facility (Figure 2.24, right).[36] In Tunisia, the government Internet agency has statistics on the number of *Publinets* or government sponsored Internet centres (Figure 2.24, left).[37] In July 2003, around ten per cent of all Tunisian users were accessing the Internet from Publinets.

One limitation with using the *number of public Internet facilities per 1'000 inhabitants* is that it does not give an indication of how the facilities are distributed (e.g. urban versus rural). Nor is there a basis for a recommended value since this would be a function of how necessary they are (which in turn depends on the underlying level of ICT ownership). Thus the *number of public Internet facilities* indicator should be analyzed in connection with household Internet availability. Another supplementary indicator would be *how many people frequent Internet cafés and other public Internet access facilities*. The common way of capturing this information is as a specific question in an Internet user survey (Figure 2.25). The typical way this indicator is expressed is the *percentage of users that access the Internet from Internet cafés*. It may be useful to disaggregate the indicator by the percentage that only uses Internet cafés or alternatively, where the Internet café is their main location of access. It may also be useful to distinguish between privately operated and government run facilities, insofar as the level of pricing is different.

Another way of looking at community access is to measure the *number of localities* with public ICT

Figure 2.23: Public Internet Access Points in the EU

Public Internet Access Points (PIAP), total (left) and per 1'000 inhabitants (right), 2001

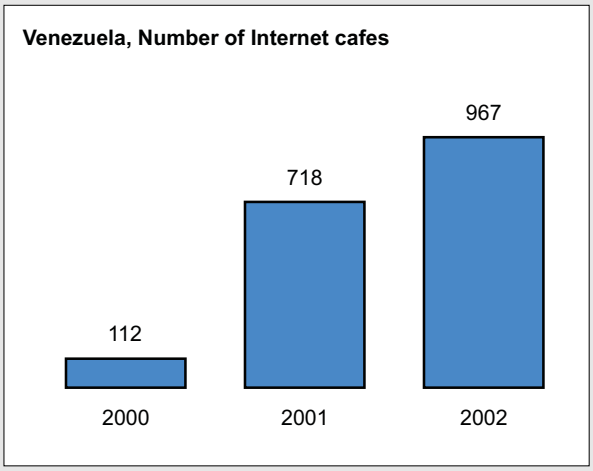


Source: ITU adapted from EU.

Figure 2.24: Public Internet facilities in Tunisia and Venezuela

Publinet statistics, Tunisia, July 2003 (left) and number of Internet cafés, Venezuela, 2000-2002 (right)

Tunisia Publinet (Public Internet access centres) Status at July 2003	
Number	281 (0.029 per 1'000 inhabitants)
Publinet Users	30'000 (10% of Internet users, 0.3% of population)
Price	DT 2 (US$ 1.41) / hour (Max.) Reduction of 25 per cent for students, journalists and handicapped.
Hours	Free to set own hours of service but generally 8h00 – 20h00 every day.
Services	Surfing, e-mail, assistance, training, etc.



Source: ITU adapted from ATI and CONATEL.

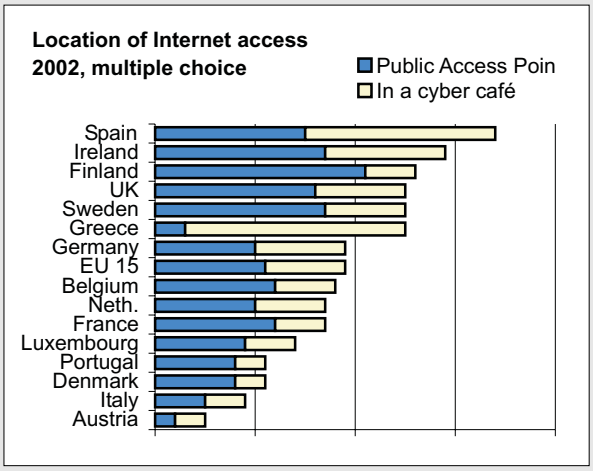
service. Here the availability of at least one facility in a locality is what is important rather than the total number of facilities. This could be broken down by telecentre (providing primarily telephone service) or Internet café (providing primarily Internet access). ITU carried out research for the South Asia region to try to determine how many localities had a telephone.[38] The localities were then mapped back to population to make an estimate of the per cent of the population covered by telephone service. India has regularly tracked the number of villages with a telephone and publishes ongoing statistics on the status

Figure 2.25: Location of access

Excerpt from Eurostat household survey on ICT usage (left) and percentages of Internet users utilizing public access points and Internet cafés, European Union, 2002 (right)

Where have you accessed the Internet in the last 3 months (using a computer or any other means)? (Multiple choice)

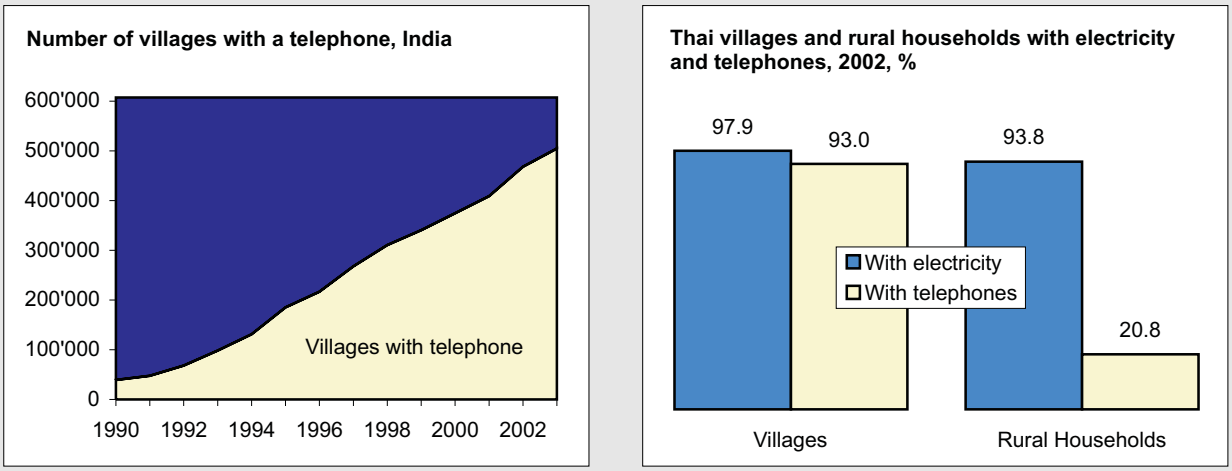
a) At home
b) At place of work (other than home)
c) At place of education
d) At other places
  Of which (optional)
    d1) Public Library
    d2) Postal Office
    d3) Public Office, town hall, government agency
    d4) Community or voluntary organizations
    d5) Internet Café
    d6) Neighbour, friend or relative's house



Source: ITU adapted from "General outline for Eurostat's 2003 household surveys on ICT usage" and Gallup Europe

Figure 2.26: Localities with access

Number of villages with a telephone, India, 1990-2003 (left) and Percentage of villages and rural households with electricity and a telephone, Thailand, 2002 (right)



Note: The number of "revenue" villages in India is 607'491.
Source: ITU adapted from BSNL (India) and National Statistics Office of Thailand.

(Figure 2.26, left).[39] The national statistical office in Thailand also publishes data on the number of villages and rural households with telephone service (Figure 2.26, right).[40]

National authorities may desire to go further in compiling a more detailed set of community access indicators. For example, Mexico has proposed indicators such as the total number of terminals available, minutes of use and population covered by community access centres (Box 2.2).[41] However at least the minimum indicators described above should be maintained for purposes of international comparability.

2.5 Conclusions

- While administrative records are available for some ICTs (e.g. telephone, Internet and cable television subscribers), they are not sufficient for understanding true access and usage of ICTs. *Surveys are therefore imperative*. Few developing countries collect a complete set of ICT data in surveys on a regular basis.

- Electricity is a major barrier to ICT infrastructure development in a number of developing nations. It would be useful to compile the indicator *percentage of homes with electricity* when reporting data on ICTs.

- Countries should strive to collect both universal service and access indicators for policy monitoring. It is important to choose the most appropriate indicators. For universal service, *ICTs in the home* would be the best option. For universal access, the indicators should cover: access options for households, mobile population coverage, community access indicators and other indicators discussed above.

- Good statistical practice is essential for proper analysis and to enhance international comparison. Transparency, clarity, timeliness and relevance are critical. There are many problems with the data available that hinder analysis. Some countries provide regional breakdowns but do not provide an overall country total. Some surveys refer to households having at least "one basic good" without referring to exactly what those goods are. Sometimes dates to which the data pertain are not clear. Another problem is the loose employment of terms: users, subscribers, ownership and access are quite different concepts.

- Surveys should be disaggregated by socio-economic characteristics such as location, gender, income, education and age in order to understand in detail the exact nature of national digital divides.

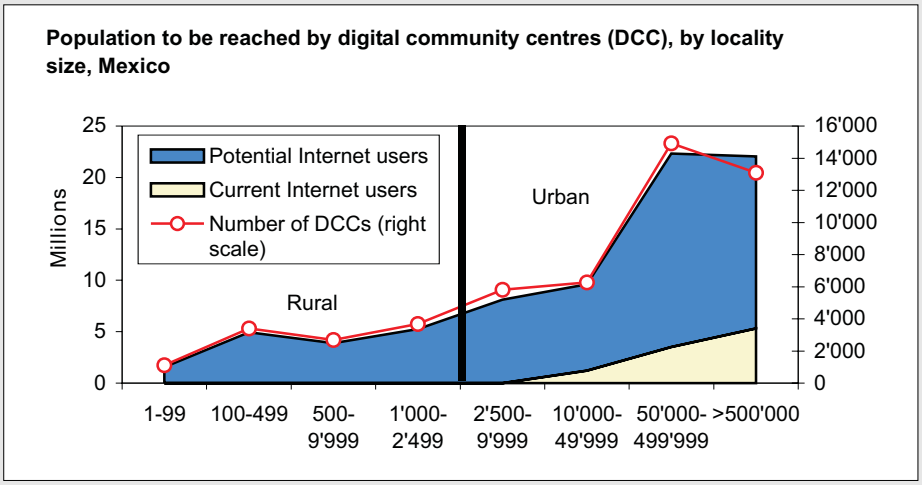
Box 2.2: Community access indicators

The majority of households in developing nations do not have newer information and communication technologies (ICTs) such as computers and the Internet. For the immediate future, the citizens of most developing nations will most likely gain access to ICTs through relatives or friends, work, school or in public places such as Internet cafés. This observation is borne out by surveys in developing countries, which show that, for many of their populations, Internet cafés are a primary location of Internet access.

This makes measuring access to community ICT facilities particularly important. In 2002, the ITU membership passed a Resolution calling on ITU to develop community access indicators. In October 2003, the ITU Workshop on Indicators for Community Access to ICTs proposed several indicators for measuring community access including: *the number of localities with public Internet access centres*, and the *number of users that use public Internet access centres*.

Mexico is keen to enhance nationwide access to ICTs. As a key element of its e-Mexico initiative, the nation plans to install some 50'000 digital community centres to enhance ICT access in underserved areas. It has carried out an analysis of the potential population that will have access; the methodology can serve as a reference for other nations (Box Figure 2.1).

Box Figure 2.2: DCCs in Mexico



Note: The number of DCCs required is calculated by assumptions about the average number of users served based on hours of operation and frequency of use. Potential Internet users are all those aged six and over who can read and write.
Source: ITU adapted from COFETEL (Mexico).

- Government ICT agencies (e.g. telecom regulators, ministries) need to forge links with the national statistical office. In many developing nations, relations between the two are often non-existent. This is unfortunate since the national statistical agency could have data useful for policy analysis and monitoring. Government agencies responsible for ICT should ensure that the necessary data for monitoring universal ICT service and access is being collected by the national statistical agency. As has been shown, administrative records typically collected by government ICT offices are generally insufficient for accurately gauging levels of access.

- Government ICT agencies (e.g. telecom regulators, ministries) need to forge links with the national statistical office. In many developing nations, relations between the two are often non-existent. This is unfortunate since the national statistical agency could have data useful for policy analysis and monitoring. Government agencies responsible for ICTs should ensure that the necessary data for monitoring universal service and access is being collected by the national statistical agency.

- Government agencies should also use the data to produce reports highlighting the level of

universal access and service, measuring progress and identifying digital divides. Very few developing nations do this. One exception is Chile, where the Undersecretary of Communications has produced detailed reports based on data collected by the national statistical agency. The latter should also publish the detailed data and make it available. For example national statistical agencies in Hong Kong, China and the Republic of Korea produce detailed publications on computer and Internet use in their economies.

- There is a continuing requirement for technical assistance in establishing systems for collecting, reporting and analysing ICT indicators.

Annex Table 2.1: The most important indicators for measuring access to ICT

Indicator	*Policy implication*	*Definition*	*Resp.**	*High value Developed***	*High value Developing***
Households with electricity	Universal service	The percentage of households with electricity.	NSO	Most 100	99 Mauritius
Households with a radio	Universal service	The percentage of households with a radio receiver. This should include radios built-in to other devices such as stereo systems or alarm clocks as well as mobile phones and automobiles.	NSO	99 USA	87.9 Brazil
Households with a television	Universal service	The percentage of households with a television receiver. This should include both colour and black and white.	NSO	99.6 Taiwan, China	96.8 Bahrain
Households with a telephone	Universal service	The percentage of households that have a telephone. This should be broken down by households with both a fixed and mobile subscription, only a fixed subscription and only a mobile subscription. For the percentage of households with a mobile phone, it would be useful to know if it is Internet-enabled.	NSO	98.5 (Any, Germany) 97.9 (Fixed, Taiwan- China) 92.0 (Mobile, Finland)	76.3 (Any and fixed, Mauritius) 51.0 (Mobile, Chile)
Households with a personal computer	Universal service	The percentage of households that have a personal computer used in the home.	NSO	73.1 Iceland	33.4 Bahrain
Households with Internet access	Universal service	The percentage of households that Internet access available in the home. A breakdown by the type of access (e.g. dial-up, broadband) would be useful.	NSO	62.4 Iceland	18.2 Bahrain
Percentage of population covered by mobile cellular	Universal access	The percentage of the population that is covered by a mobile cellular signal. This should not be confused with the percentage of the land area covered by a mobile cellular signal or the percentage of the population that subscribers to mobile cellular service. Note that this measures the theoretically ability to use mobile cellular service if one has a handset and subscription.	Regulator	100 many	100 several
Percentage of population with access to a telephone	Universal access	There are various ways of measuring this. One would be to use the percentage of the population covered by a mobile cellular signal. A second would be through a survey that asks people if the have access to a telephone. A third would be by determining the number of localities with telephone service and corresponding populations.	Regulator / NSO	100 many	100 several
Percentage of population that use a personal computer	Universal access	The percentage of population that use a personal computer at any location (e.g. home, school, work).	NSO	Not available	Not available
Percentage of population that use the Internet	Universal access	The percentage of population that use the Internet. The age, frequency of use, gender and access device should be specified.	NSO	81.1 (Age 12+, Iceland)	37.0 (Age 15+, Slovenia)

Annex Table 2.1: The most important indicators for measuring access to ICT (cont'd)

Indicator	*Policy implication*	*Definition*	*Resp.**	*High value Developed***	*High value Developing***
Number of localities with public telephone service	Universal access	The number of localities (e.g. towns, villages) that have telephone service.	Regulator	Not available	100 Maldives
Number of localities with public Internet service	Universal access	The number of localities (e.g. towns, villages) that have public Internet service.	Regulator	Not available	Not available
Percentage of population with access to the Internet	Universal access	The percentage of the population that have theoretical access to the Internet whether they use it or not. Theoretical access would imply that they either have access in the home or at work, school or a public facility. This could either be derived from surveys or through administrative records (i.e. number of localities with Internet service).	NSO / Regulator	Not available	Not available

Note: * Shows who should be responsible for compiling the data. In the case of surveys, it should be the National Statistical Office (NSO). In the case of administrative records, it should be the regulator.
** Among economies that publish this data.
Source: ITU.

Annex Table 2.2: ICTs in households

Percentage of households with different ICTs

Country	*Year*	*Electricity*	*Radio*	*TV*	*Telephone*	*Fixed line*	*Mobile*	*PC*	*Internet*	*Source*	*Note*
Albania	2001			90.0				1.4		INSTAT	
Argentina	2001				66.5	57.1	27.1	20.5	9.1	INDEC	
Australia	2002							61.0	46.0	AusStats	
Austria	2002						69.4	45.4	30.9	Statistics Austria	
Bahrain	2001			96.8				33.4	18.2	CSO	
Belgium	2001						69.4	44.6	28.0	INS	
Brazil	2002	96.7	87.9	89.9	61.6			14.2		IBGE	
Canada	2001			99.2		97.4	47.6	59.9	49.9	Statistics Canada	
Chile	2002			87.0		51.5	51.0	20.5	10.2	SUBTEL	Colour TV
Costa Rica	2000			84.9	54.3			14.1		INEC	Colour TV
Cyprus	2002							36.0	24.0	Statistical Service	
Denmark	2002						84.0	72.0	59.0	Statistics Denmark	
Estonia	2002		89.3	93.9	85.0	65.1	58.4	21.8	13.9	Statistical Office of Estonia	Colour TV
Finland	2003			96.0		64.0	92.0	58.0	43.0	Statistics Finland	Colour TV (2001/02)
Germany	2001				98.5	96.4	69.8	57.2	36.0	Federal Statistical Office	Total and fixed telephone refers to 2000.
Honduras	2001		74.2	48.0	16.0			3.7		INE	
Hong Kong, China	2002							62.1	52.5	C&SD	
Iceland	2001			96.8				73.1	62.4	Statistics Iceland	
India	2001	55.8	35.1	31.6	9.1					Census of India	
Ireland	2003							42.3	33.6	Central Statistics Office	
Israel	2001			92.6		91.7	73.8	49.8	22.5	Central Bureau of Statistics	Colour TV
Italy	2000						59.6	27.2	15.4	ISTAT	
Japan	2002			99.3			86.1	71.7	48.8	MPHPT	Colour TV (1999)
Korea (Rep.)	2002							60.1	51.3	KNSO	
Luxembourg	2001			93.1	91.0					STATEC	
Malaysia	2000		78.8	84.3		56.7	26.9	13.5	6.9	Department of Statistics	
Maldives	2000			56.7		22.9		6.2		Ministry of Planning and Development	
Malta	2002						74.5	38.0	31.0	National Statistics Office	
Mauritius	2002	99.0		92.8		76.3	28.1	18.0	12.6	Central Statistics Office	TV, radio & telephones from 2001. Electricity from 2000.
Mexico	2002			93.6	45.3			15.2	6.2	INEGI	Internet is from 2001
Morocco	2000	65.9		71.9		24.9				Direction de la Statistique	
Mozambique	2001	5.7	49.5	5.1						INE	
New Zealand	2001			98.1	96.3	93.7	58.3	46.6	37.4	Statistics New Zealand	
Paraguay	2002	89.2		72.3		16.8	32.4	6.4	1.7	DGEEC	
Peru	2002	69.9	80.1	68.7	24.4	21.0	8.3	6.0	0.8	INEI	Data for electricity and radio from 2001

Annex Table 2.2: ICTs in households (cont'd)

Percentage of households with different ICTs

Country	*Year*	*Electricity*	*Radio*	*TV*	*Telephone*	*Fixed line*	*Mobile*	*PC*	*Internet*	*Source*	*Note*
Philippines	2000	68.2	75.2	52.7	14.2					NSO	
Portugal	2001							24.0	13.0	INE	
Serbia and Montenegro	2002			91.8						Statistical Office	Color TV
Singapore	2002			98.6			85.4	65.5	52.0	Statistics Singapore	TV is from 1998
South Africa	2001	69.7	73.0	53.8	42.4	24.4	32.3	8.6		StatSA	
Spain	2002		77.1	99.5		90.2	58.8	36.1	17.4	INE	
St. Lucia	2001	86.6		79.0		60.2	13.7	13.1	7.9	Statistics Department	
Switzerland	2001			93.6			68.6	64.2	36.5	OFS	Internet access for 2000; source: OECD.
Taiwan, China	2002			99.6	97.9	97.9	83.6	56.8	45.9	DGBAS	
Tanzania	2001	9.2	51.9	2.6	1.2			1.4		NBS	Mainland Tanzania
Thailand	2000		77.2	91.5	27.7					NSO	
Tunisia	2001			88.6	31.9					INS	
United Kingdom	2000			99.0	98.0	93.0	58.0	45.0	45.0	National Statistics	Internet for 2002, all others for 2000
United States	2001		99.0	98.2	94.4			56.5	50.5	Census Bureau	Radio, TV and Telephone from 2000
Uruguay	2002			92.9	72.4			17.6	13.6	INE	Localities with > 5'000 inhabitants

Source: ITU adapted from sources shown in table.

[1] There is no shortage of references to universal service/ access being the main goal of telecommunication policy. For further information see ITU. (1998). *World Telecommunication Development Report: Universal Access.* Available from: http://www.itu.int/ITU-D/ict/publications/wtdr_98/index.html; accessed December 1, 2003 and ITU. (2003). *Trends in Telecommunication Reform: Promoting Universal Access to ICTs — Practical Tools for Regulators*. Available from: http://www.itu.int/publications/docs/trends2003.html; accessed December 1, 2003.

[2] Out of 206 countries analyzed, only 12 were found to not have a cellular network at the end of 2002. Thus 97 per cent of all countries had a mobile cellular network.

[3] A related statistic, *percentage of the territory of a country covered by a mobile cellular signal*, can be useful, especially for emergency services within a country. However, it is important that it not be confused with the *percentage of the population covered by a mobile cellular signal* when comparing between countries.

[4] Central Statistical Authority (Ethiopia). (1999, November). *Report on the 1998 Welfare Monitoring Survey*.

[5] Statistics South Africa. (2002). *Measuring rural development: Baseline statistics for the integrated sustainable rural development strategy*. Available from the Statistics South Africa website at: http://www.statssa.gov.za; accessed December 1, 2003.

[6] By the same token, new technologies can substitute for older ones. Radio and television stations provide audio and video streaming over the Internet while some mobile phone models have built-in radios.

[7] Minges, M. (2002, April). *Mixed Media in the LDCs*. Available from: http://www.itu.int/osg/spu/ni/ipdc/index.html; accessed December 1, 2003.

[8] This refers to terrestrial broadcasting since "direct-to-home" satellite broadcast signals are widely available, albeit expensive and some countries have restrictions on use. It is also worth noting the existence of television sets in many countries prior to the introduction of national service. This is due to the reception of signals from neighbouring countries and the use of satellite antennas or Video Cassette Recorders / Digital Video Disks.

[9] Wind-up and solar powered radios also exist, such as those produced by Freeplay (www.freeplay.net). The company also produces a wind-up mobile phone charger.

[10] "Lack of access to electrical energy in rural areas deprives communities ... of … television, which are essential ways of disseminating information on general development concerns." United Nations Development Programme. "Recharging batteries — Zimbabwe". *Sharing Innovative Experiences*, Vol. 8. Available from: http://tcdc.undp.org/experiences/vol8/Zimbabwe.pdf; accessed November 5, 2003.

[11] The broadcast industry uses other metrics such as "universe estimates" (e.g., potential television audience). See "FAQ — About Ratings" at the Nielsen Media Research website: http://www.nielsenmedia.com; accessed December 1, 2003.

[12] The United Nations Educational, Scientific and Cultural Organization (UNESCO) had published the number of radio and television sets in different countries but stopped with its *1999 Statistical Yearbook*.

[13] This lack of data may be a problem in the future, as countries shift towards digital radio and television broadcasting. Important policy-decisions on when to turn-off analogue broadcast channels may be delayed due to lack of reliable data on homes with radios and televisions.

[14] Variations on basic and primary ISDN exist in some countries, sometimes referred to as fractional ISDN. For example in Denmark a variant known as Flex-ISDN provides 12 channels per line.

[15] For more on the statistical implications of mobile telephones surpassing fixed refer to Kelly, T. (2003, January). *Mobile overtakes Fixed*. Available from: http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/doc44_E.pdf; accessed November 5, 2003.

[16] The Federal Communication Commission (FCC), the US industry regulator, requests the national statistical agency, the Bureau of Census, to include questions about telephone availability in its thrice-yearly *Current Population Survey*. Data is available for the last two decades. Considering the variety of information available in the reports, it is surprising that a breakdown by type of home telephone is not shown (e.g. fixed or mobile). This would indicate whether the relatively large increase in US home telephone ownership since 2000 is due to the popularity of mobile phones or specific universal policies. FCC (USA). (2003, April). *Telephone Subscribership in the United States*. Available from: http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/subs1102.pdf; accessed December 1, 2003.

[17] Minges, M. (2003, June). *Is the Internet mobile? Measurements from Asia-Pacific*. Available from: http://www.itu.int/ITU-D/ict/papers/2003/Measuring%20mobile%20Internet.pdf; accessed November 5, 2003.

18 According to some researchers, the PC replacement rate in the US is as high as 70 per cent. On the other hand "In more developing regions, PC replacement rates are much lower". CyberAtlas. (2003). "PC Market headed for geographic shift". Available from: http://cyberatlas.internet.com/big_picture/hardware/article/0,,5921_988841,00.html; accessed November 5, 2003.

[19] Prince and Cooke. (1998, December). *Mercado Informático*. Available from: http://www.spkrsbr.com/biblioteca/htm/resultados.htm; accessed November 5, 2003.

[20] See: http://www.aui.es; accessed December 1, 2003.

[21] National Statistical Office (Malta). (2003). *Survey on ICT Usage in Households*. Available from: http://www.nso.gov.mt; accessed December 1, 2003.

[22] See, for instance, the data for Hong Kong, China, available on the website of the Census and Statistics Department, at http://www.info.gov.hk/censtatd/eng/press/ops/1202/itsurveysummary2002.pdf; accessed December 1, 2003.

23 Another comparability issue for some surveys is the location of use. Surveys conducted by some private organizations only measure Internet access from the home. This would under-report the number of users where access from other locations is widespread.

[24] For example the United States shows data in five age groups (3-8, 9-17, 18-24, 25-49 and 50+); the Republic of Korea shows data broken down by 6-19, 20s, 30s, 40s and 50 and over; European data is broken down into four groupings: 15-24, 25-39, 40-54 and 55+.

[25] Host computers have an Internet Protocol (IP) network address that can be captured by online surveys. Host count surveys are conducted by the Internet Software Consortium (http://www.isc.org/ds; accessed December 1, 2003) and Réseaux IP Européens (RIPE, http://www.ripe.net; accessed December 1, 2003). Multipliers usually range between 3 – 10. See: Hoffman, D. and Novak, T. (1994 , November). "Wanted: Net.Census." *Wired*. Available from: http://www.wired.com/wired/archive/2.11/hoffman.if.html; accessed December 1, 2003.

[26] Through the late 1990s it was not unusual to see statistical tables showing there were no Internet users in Bangladesh despite the fact that the nation connected to the Internet in October 1996. See "First Ping BD — Bangladesh on line (1996.10.11)". Available from: www.nsrc.org/db/lookup/operation=lookup-report/ID=890202369299:497431318/fromPage=BD; accessed November 5, 2003. The Bangladesh country domain name (BD) only started appearing in host counts as from July 1999. See "Distribution by top level domain name". Available from: http://www.isc.org/ds/WWW-9907/dist-byname.html; accessed November 5, 2003.

[27] Another issue is that the term *subscriber* is often used interchangeably with *user,* causing confusion. A subscriber is someone who has registered for Internet service with a provider. A user is someone who uses the Internet regardless of whether they have paid or not.

[28] *Free subscriptions* are where there is no charge levied directly on customers by the Internet access provider for using the Internet. However, there are normally telephone usage charges that the operator shares with the ISP. Some countries therefore report all telephone subscribers who have pre-registered for the service as being Internet subscribers whether they use it or not. Prepaid Internet cards come in various denominations allowing access via telephone numbers indicated on the card until the amount is used up. In some cases, prepaid cards are also sold by Internet cafés. Widespread use of prepaid cards in some countries understates the number of subscribers since there is no conventional contract. One way of dealing with this situation is for telecommunication operators to count the number of telephone numbers accessing prepaid Internet services. Only a few operators currently do this.

[29] National Electronics and Computer Technology Center (Thailand). (2002). *The ASEAN Workshop on the Measurement of Digital Economy*. Available from: http://www.ecommerce.or.th/project/asean-measurement/measurement_report.pdf; accessed November 5, 2003.

[30] Paulwell, P. (2003). "Launch of Jamaica Internet Market Study". Available from: http://www.mct.gov.jm/Minister%20launches%20intnet%20study.pdf; accessed November 5, 2003.

[31] OSIPTEL. (2002, May). *Diagnostico de la Situación de Internet en el Peru*. Available from: http://www.osiptel.gob.pe/OsiptelDocs/GPR/EL_SECTOR/INTERNET/dt_internet.pdf; accessed November 5, 2003.

[32] For more on broadband developments, see ITU. (2003). *Birth of Broadband*. Available from: www.itu.int/birthofbroadband; accessed November 30, 2003.

[33] The meeting noted: "Special emphasis was placed on the development of community access indicators…". World Telecommunication/ICT Indicators Meeting. (2003, January). *Final Report*. Available from: http://www.itu.int/ITU-D/ict/WICT02/conclusions/index.html; accessed November 30, 2003.

[34] ITU. (2003). *Key indicators of the telecommunication/ICT sector*. Draft. Available from: http://www.itu.int/ITU-D/ict/material/Top50_e.doc; accessed November 30, 2003.

[35] EU. (2000, November 20). *List of eEurope Benchmarking indicators*. http://europa.eu.int/information_society/eeurope/benchmarking/indicator_list.pdf; accessed October 1, 2003.

[36] "Centros de acceso de telecomunicaciones, centros de navegación y cibercafé" on the CONATEL website at: http://www.conatel.gov.ve/ns/indicadores/Indicadoresnuevos/CENTROS%20DE%20ACCESO%20DE%20TELECOMUNICACIONES.htm; accessed October 3, 2003.

[37] "Les centres d'accès publics (Publinets)" on the Agence Tunisienne d'Internet (ATI) website at: http://www.ati.nat.tn/publinets/index.htm; accessed October 3, 2003.

[38] Minges, M. and Simkhada, P. (2002, December). "A closer look at South Asia." *ITU News Magazine*. http://www.itu.int/itunews/issue/2002/10/southasia.html; accessed October 3, 2003.

[39] See the "Village Panchayat Telephones(VPT) Monthly Progress Report" on the BSNL website at: http://www.bsnl.co.in/vptstatus(monthly).htm; accessed November 30, 2003.

[40] Available from the National Statistics Office of Thailand website at: http://www.nso.go.th; accessed November 30, 2003.

[41] Undersecretary of Communications (Mexico). (2003, September). *Propuestas sobre indicadores para medir y cuantificar el acceso comunitario a las TIC*. Available from: http://www.itu.int/ITU-D/ict/mexico03/doc/pdf/Doc07_S.pdf; accessed November 30, 2003.

3. ICTs IN BUSINESS, EDUCATION AND GOVERNMENT

Although household penetration of information and communication technologies (ICT) is a fundamental measure, home use is not the only means of access. Use outside the home—at work or school for example—can be a springboard by which people first gain ICT skills and experience. In developing countries in particular, shared ICT use through Internet cafés or schools may be the only affordable form of access available. This chapter looks at how ICT availability in different sectors can be measured, with particular focus on business, education and government.

3.1 Measuring business access to ICTs

3.1.1 What to measure?

It is becoming increasingly apparent that the availability of ICTs in the business sector has several important economic and social implications. It has been shown, for instance, that investment in ICTs by business contributes to economic growth by making companies more productive (Figure 3.1, left).[1] ICTs also make companies more competitive, network-ready and able to exploit new trading opportunities such as electronic commerce. A further impact of ICTs in enterprises is that they help extend Internet access to those who have nowhere else to log on from (Figure 3.1, right).

In view of the central importance of ICTs for business, and the associated potential for economic growth, there is a clear need to measure computer and Internet penetration. Carrying out business surveys is far from straightforward, however. The large number of companies existing in most countries means that an exhaustive census of them is usually impractical. The standard approach is therefore to survey a representative sample of companies. Indeed, this kind of business survey is already common in many countries, and is typically carried out by national statistical offices on the basis of company registers. To date, however, these surveys have rarely included questions on ICTs. As with household access measurements, in order to develop meaningful indicators of ICTs in business, it is important that harmonized and specially targeted survey techniques be used. For many developing nations in particular, guidance is needed on developing such techniques. One fundamental question facing countries is whether to cover ICT usage in existing business surveys or to create separate ones.

Unsurprisingly, work covering ICTs in the business sector has to date been carried out predominantly by developed nations and certain inter-governmental organizations whose members represent advanced economies. Model questionnaires have been designed by these organizations in order to enhance international comparability.[2] The type of information collected can be classified into four areas:

1. Access—such as whether companies use computers or the Internet;

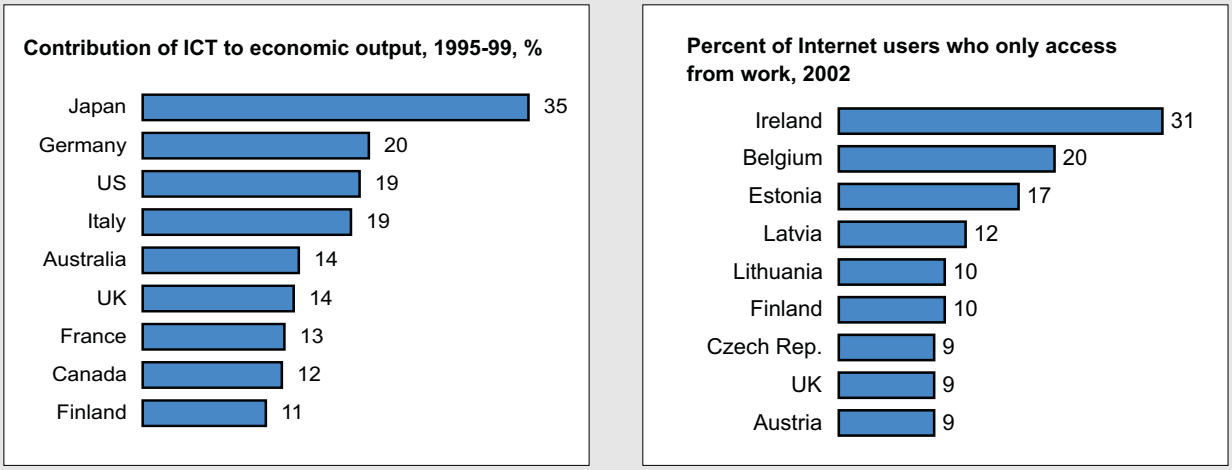
2. Usage—such as what type of connection is used to access the Internet and whether a company has a web page;

3. Electronic commerce—such as use of Internet for sales and purchases;

4. Perceived benefits and barriers related to ICT usage.

Figure 3.1: Importance of ICTs in business

Contribution of ICT investment to economic growth, 1995-1999, percentage, selected economies (left) and percentage of Internet users who only access Internet from work, 2002, selected economies (right)



Source: ITU adapted from OECD, SIBIS.

Under the methodology usually used, raw data from surveys are compiled into indicators—such as the *percentage of companies with a computer or Internet access*—in order to facilitate analysis and comparability. Just as Internet user surveys are broken down into variables such as age, gender and educational attainment, statistics on the use of ICTs in business are typically broken down by company size (e.g. number of employees) and classification (e.g. primary, manufacturing, services, etc.). However, even where statistics are collected, few countries provide a complete picture of business ICT usage.

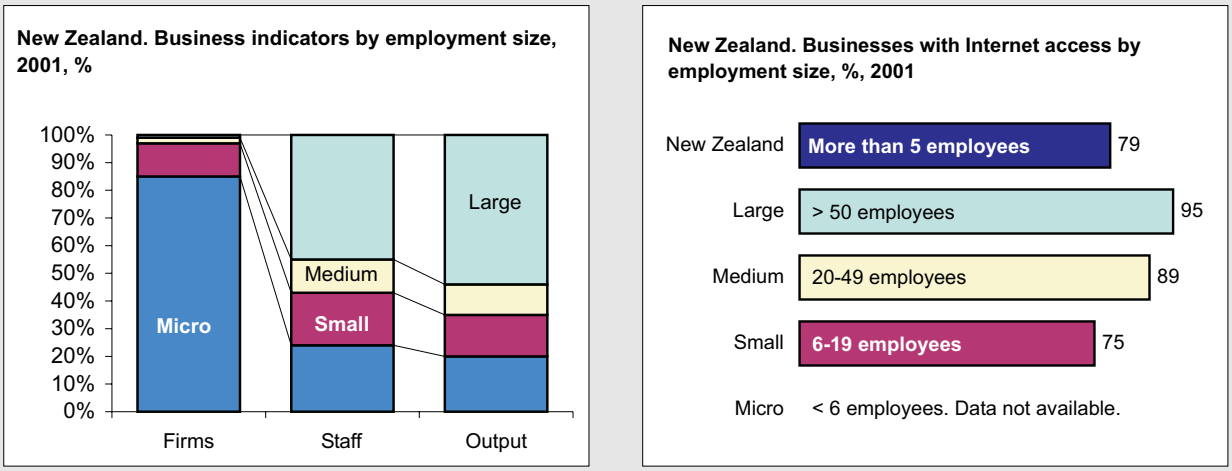
In many surveys, primary-producing industries such as agriculture are omitted. Furthermore, micro or small business enterprises are often also missing from country surveys, and international comparisons typically only show usage for companies with 10 or more employees. This can give a misleading impression of the extent of business ICT penetration and highlights the danger of blindly comparing data between countries without carefully reading definitions first. In every country, the number of small, medium sized and micro enterprises (SMMEs) far exceeds the number of larger establishments, and in many countries, employment in SMMEs is greater than in larger enterprises. Even though ICT usage in SMMEs is generally much lower omitting them from surveys can tend to distort the overall picture. Take New Zealand for example, where micro enterprises (less than 5 employees) comprise 85 per cent of all companies. These companies are not included in surveys on business use of ICTs (Figure 3.2). This situation raises a considerable challenge for future analyses of ICT access in the business sector.

Given the fundamental importance of business in raising economic levels and providing ICT access to citizens, meaningful indicators are all the more important in this sector. Measuring the level of business access to ICTs is a precursor to analysing the use to which ICTs are put, the adoption of electronic commerce, and the barriers and benefits they bring.

3.1.2 Indicators in action

Questionnaires and indicators have been designed by a number of organizations, and some countries have also developed similar survey tools. The Organisation for Economic Co-operation and Development (OECD) has disseminated results based on its model questionnaire (Figure 3.3, left).[3] The European Union (EU) has also published indicators on business use of ICTs in its member countries (Figure 3.3, right).[4] The EU has identified business indicators as part of its eEurope benchmarking exercise and proposes an e-business index based on a composite of various indicators (see Table 3.1). Surveys will be carried out in 2003 (and thereafter on an annual basis) by national

Figure 3.2: ICTs and company size
In New Zealand, 2001



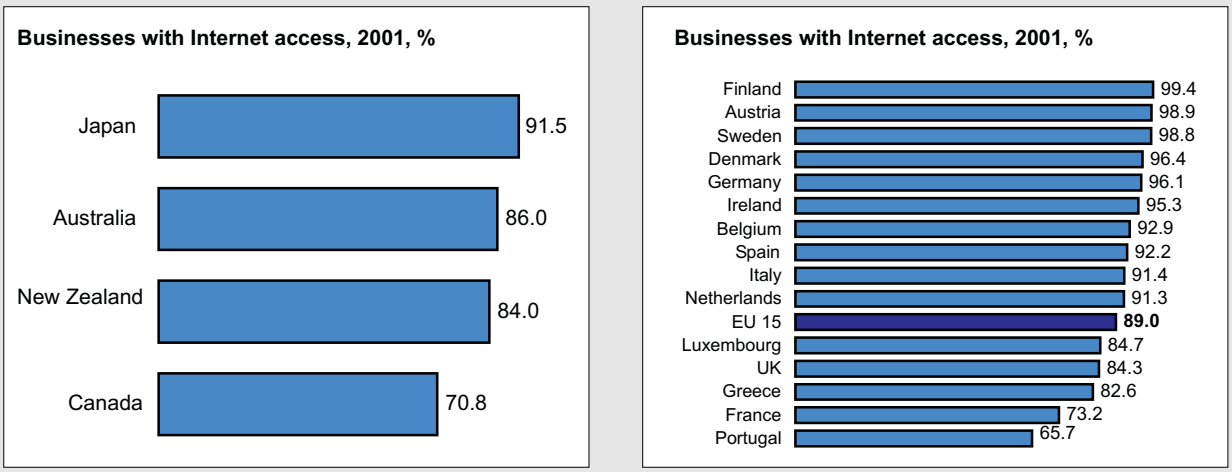
Source: ITU adapted from Ministry of Economic Development (New Zealand), Statistics New Zealand.

statistical institutes based on a questionnaire developed by Eurostat.[5]

Among countries carrying out ICT research, the Nordic countries have been publishing data on business adoption of ICTs since 1999, enhancing the level of analysis over time (Figure 3.4, left).[6] The region has a high level of technological know-how, with almost all companies possessing a computer and close to 90 per cent having Internet access. As penetration approaches the limit for traditional ICTs such as computers, more sophisticated services are being measured, such as high-speed Internet access and intranets (Figure 3.4, right).

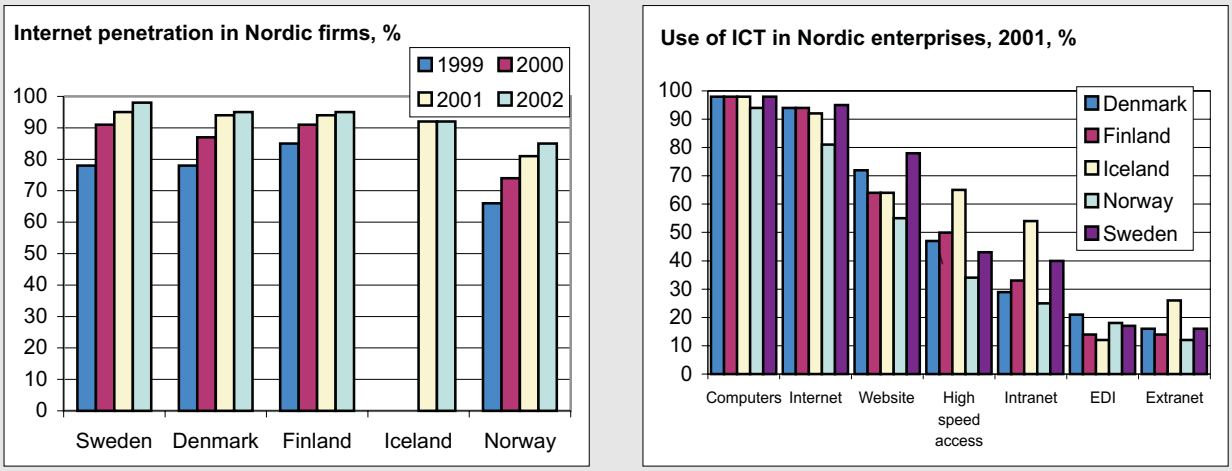
As a result of these efforts, a core set of reasonably comparable indicators on basic ICT penetration in

Figure 3.3: Businesses with Internet access
In selected OECD member countries (left) and in the EU (right), 2001



Source: ITU adapted from OECD, Gallup Europe.

Figure 3.4: ICT penetration in Nordic companies
Proportion of enterprises with at least more than 10 employees

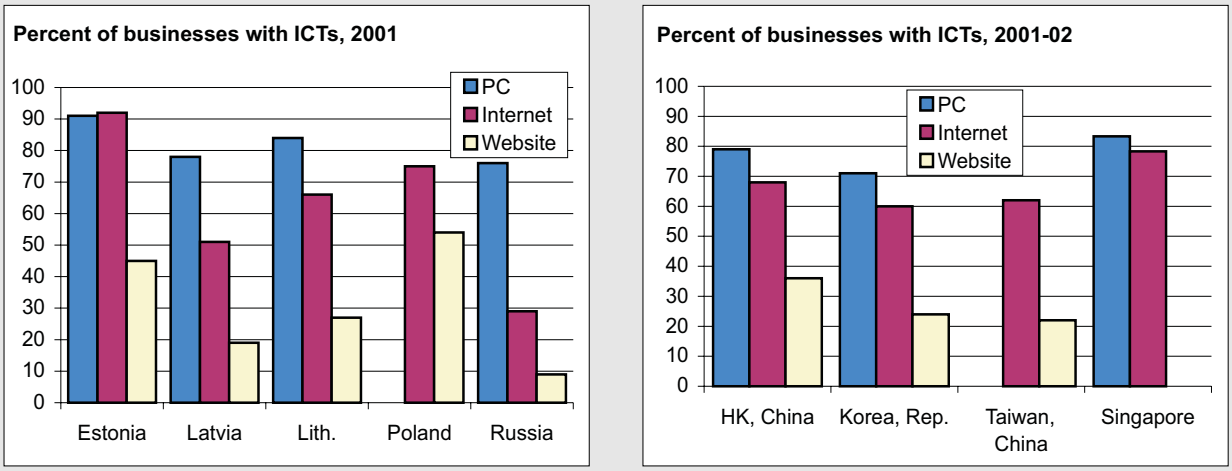


Source: ITU adapted from Nordic Information Society Statistics 2002.

companies is available for most developed nations.[7] Data for some countries in Central and Eastern Europe is also available, owing to links with Western European statistical agencies. For example, Nordic statistical agencies have extended their expertise to cooperate with the Baltic region, where data on ICT penetration in companies has been made available for Estonia, Latvia, Lithuania, Poland and Russia (Figure 3.5, left).[8] In the Asia region, the "Tigers" also regularly compile data on use of ICTs in companies (Figure 3.5, right).

This is not the situation in most developing nations, where the availability of statistics is generally poor. One result is that the few developing nations that have the data cannot compare themselves with their peers

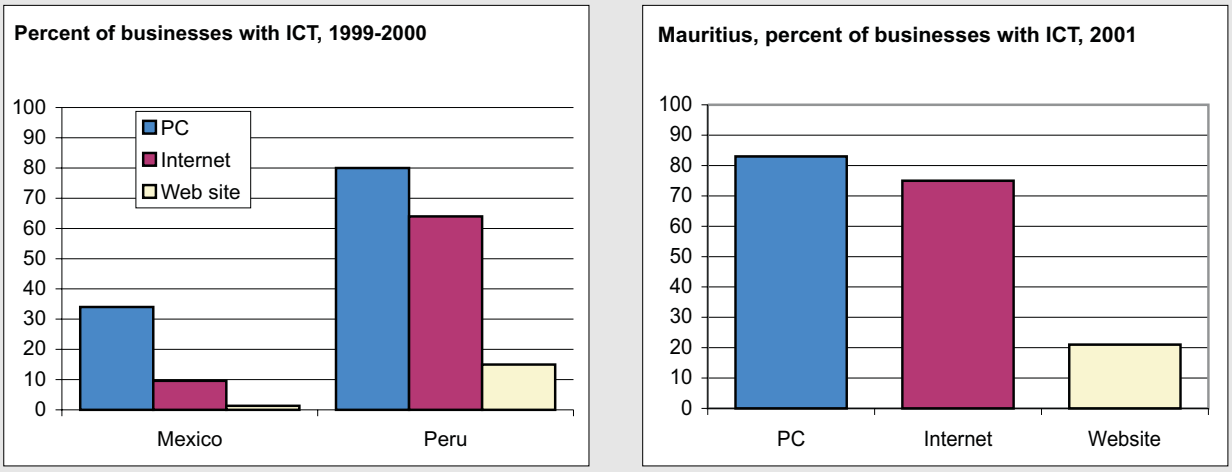
Figure 3.5: Business ICTs in emerging economies
In selected economies from Central and Eastern Europe , 2001 (left) and East Asia, 2001-02 (right)



Source: ITU adapted from FIND 2002 (Taiwan, China), IDA 2002 (Singapore), C&SD 2002 (Hong Kong China), NCA 2001 (Korea, Rep.) and Baltic Information Society Statistics (right chart).

Figure 3.6: Business ICTs in developing nations

Percentage of businesses with ICTs, selected Latin American economies, 1999-2002 (left) and Mauritius, 2001 (right)



Source: ITU adapted from Subsecretaría de Economía (Chile, 2002, companies with annual revenue > US$ 55'000, INEGI (Mexico, 1999, all company sizes), INEI (Peru, 2000, 5+ employees) and NCB (Mauritius, 2001, 10+ employees).

and are left with the frustration of measuring themselves against the high levels already achieved by developed nations. Another consequence is that though developing nations are targeted as potentially major beneficiaries of new possibilities offered by electronic trade, almost nothing is known about the potential of their businesses to exploit such opportunities.

Peru is one of the few developing nations where the national statistical office has compiled enterprise-level ICT statistics in an analytical report.[9] Chile and Mexico have also carried out enterprise-level ICT surveys (Figure 3.6, left). There are, however, limitations with the Latin American data in terms of comparability, completeness and timeliness. The only other developing nation known to have carried out an official survey specifically on business ICT use is Mauritius (Figure 3.6, right).[10]

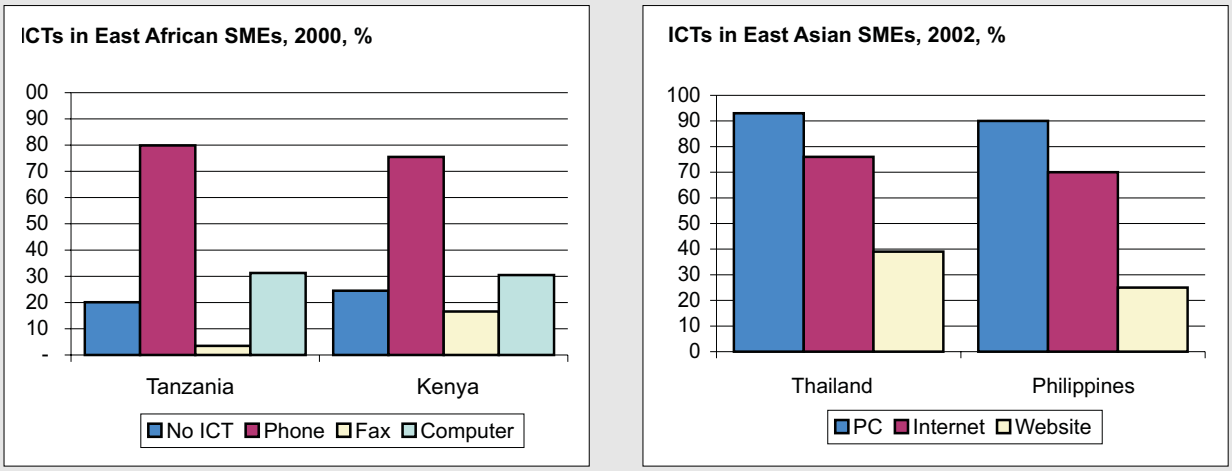
There is also some unofficial data available for other developing countries, particularly with respect to small- and medium-sized enterprises (SME), which seem to be a special focus of attention. Although the data do not allow for international comparability, they do give some indication of possible trends in developing nations. In East Africa for example, a survey was carried out among 300 SMEs in Kenya and Tanzania in early 2000 (Figure 3.7, left).[11] It is interesting to note that measurement priorities in developing nations typically differ from those in developed countries in that the data cover basic ICTs such as telephones and fax machines. SME surveys have also been carried out in Costa Rica and in a number of developing Asian nations including Indonesia, the Philippines, Sri Lanka and Thailand (Figure 3.7, right).[12]

ITU's experience illustrates the difficulty of obtaining enterprise statistics from developing nations. In country case studies carried out under ITU's Internet Case Study project, ICT markets in 20 emerging economies have been studied since 2000. In support of this project, ITU developed a simple questionnaire to obtain data about the use of ICTs in different sectors of the economy and followed this up with field visits. The results were not encouraging. Only five economies—all higher income—were able to provide data on ICT use by enterprises. This suggests that the statistical divide is strongly economic in its roots.

Attempts were made to fall back on surrogate measures. These included a proxy indicator for the number of companies with a website, based on the number of domain names registered as commercial (i.e. ".com") in the country. However, this indicator proved to be an unsatisfactory since not all registered domain names are associated with active websites, and enterprises may be using domain names outside the country. Attempting to measure companies with

Figure 3.7: ICTs in SMEs

Penetration of ICTs in selected East African (left) and East Asian (right) small and medium sized enterprises



Source: ITU adapted from ZEF and The Asia Foundation.

a website before knowing how many have computer and Internet access also jumps ahead of the necessary basic indicators. Another possible proxy indicator for enterprises with Internet access is the number of business Internet subscriptions. However too few telecommunication regulators collect data to be useful for purposes of international comparison.

3.1.3 Conclusions

It is becoming widely recognized that business adoption of ICTs is crucial for the evolution towards an inclusive information society. Use of ICTs raises productivity, helping to boost economic development. With increasingly widespread electronic processing in commerce and business, ICT infrastructure levels are a fundamental prerequisite for enterprises to carry out electronic transactions. The availability of ICTs in business also has a social dimension, with many workers developing ICT skills and obtaining access to the Internet through their workplace, which they can then use in other areas.

These factors make the compilation of business ICT indicators crucial. While most developed nations now compile internationally comparable indicators on the extent of ICT availability in the business sector, few developing nations regularly compile or readily disseminate such statistics. Though a wide variety of indicators can be applied to measure business ICT penetration, a minimum set of indicators should ideally include:

- Percentage of businesses with personal computers;
- Percentage of businesses with Internet access;
- Percentage of business with a website.

These indicators should also be available broken down by company size and industry classification. They are a precursor to developing a more comprehensive statistical system for measuring electronic transactions that should be the next stage of development. Ideally, surveys should be conducted on a regular basis and at least annually. There are standard modules, developed by the OECD and Eurostat that could be adopted by developing nations and incorporated in ongoing business surveys. As an optimum target, countries might endeavour to provide at least the three indicators listed above by the next World Summit on the Information Society, due to be held in Tunis, Tunisia, in 2005. In that respect, developed nations might consider assisting developing nations by providing technical assistance and resources for statistical research, so that a comprehensive survey of the level of business ICT adoption can be measured on a global level.

There is also a need to make existing surveys more visible. There are a number of statistical publications

Box 3.1: A digital divide in enterprises?

If the digital divide in enterprises is understood simply as differences in the prevalence of various ICTs used in separate groups of enterprises, the picture given is one of large discrepancies. It must be noted, however, that in many enterprises some forms of ICTs are considered unnecessary and are therefore not in use. This does not mean that these enterprises are behind the times or marginalized, but reflects the fact that enterprises in different industries and of different sizes need different ICT solutions. With these reservations, the clearest differences between the enterprises inside all Nordic Countries are that smaller enterprises are less likely to use ICTs than larger ones. For instance, in Sweden 69 per cent of the enterprises with 10 to 19 employees have web homepages while 94 per cent of those enterprises with at least 100 employees have them. A similar pattern can also be seen regarding Internet access. There are also differences between industry sectors, but the general pattern is not as clear as there is variation between the countries. Generally it can be said, however, that enterprises in the construction sector often seem to be using ICTs less and that business services enterprises often appear to use ICTs more than other industries.

Source: Nordic Information Society Statistics 2002.

on ICT use in enterprises, as well as official national surveys and special studies, but in the absence of a single repository, these can be difficult to locate. One solution would be to create an "Internet library" where all of this information is stored, including links to model questionnaires and other methodological information. An example is provided as Annex Table 3.2 to this report.

3.2 Measuring ICT access in the educational sector

3.2.1 Schools as ideal access points

The significance of educational institutions for accessing the Internet is underscored by surveys from countries with a high level of academic connectivity. In the European Union for example, 19 per cent of Internet users connect at their place of study (Figure 3.8, left). The potential impact of ICT access in schools in developing countries is certain to be even greater. Home Internet access in developing nations is limited and the average age of populations in developing countries is comparatively young. For instance, one third of the population is under the age of 15 in developing nations compared to less than a fifth in high-income economies. The ratio rises even higher in the least developed countries (LDC) where 43 per cent of the population is less than 15 years old (Figure 3.8, right).

Another reason to target educational institutions is that students are the easiest population group to get online. Not surprisingly, the young already make up a disproportionately high share of Internet users in the world. This applies to all countries, irrespective of their development status (Figure 3.9, left). ICT use also increases with educational attainment (Figure 3.9, right). Another benefit of connecting educational institutions is that ICT access can be extended to the wider community outside of school hours. This service is already offered in some countries, such as Nepal, where free ICT access is provided to rural communities using school facilities.[13]

3.2.2 The data dilemma: disparity and deficit

The use of ICTs in educational institutions—including computer courses, multimedia applications and e-learning—has received a great amount of attention. A number of success stories have been highlighted to illustrate the potential of ICTs for improving educational systems.[14] Despite the large body of research and positive conclusions, international assessments of ICTs in education are not possible because comparable data exist for only a limited number of countries. One problem is that while certain educational statistics, such as school enrolment figures, have been harmonized and are collected by many countries, there are no such global standards for ICTs in the educational sector. A recognized set of indicators is needed to effectively evaluate and compare the situation worldwide.

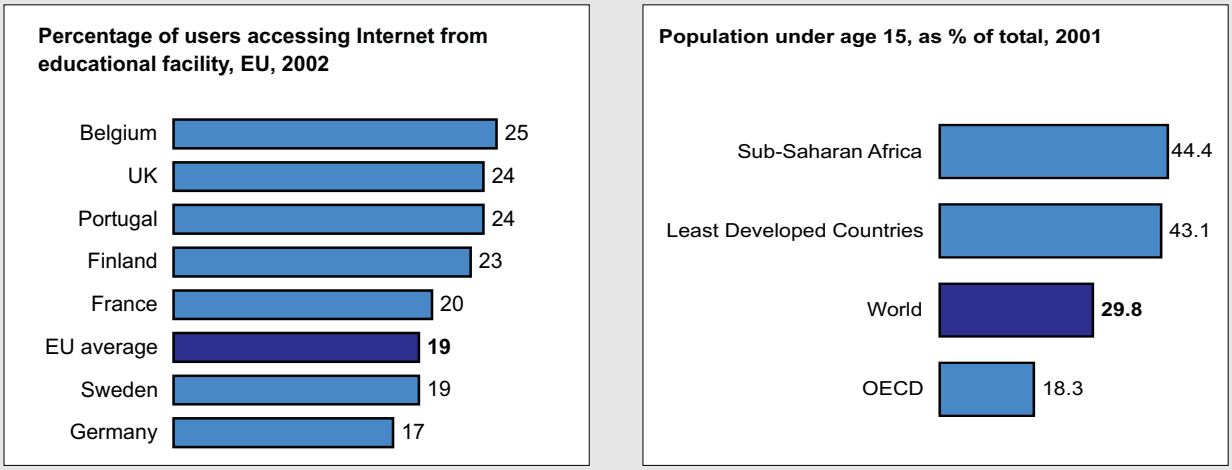
Another problem is simply the absence of data on ICTs in education. Some countries do not collect relevant data. In a number of cases, these data are available but can be difficult to obtain.

3.2.3 Examples from the developed world

The lack of comparable data goes hand in hand with the fact that there are few accepted guidelines on how to measure ICTs in the educational sector. Since access to computers and the Internet are the basic building block for any e-education application—sophisticated ones such as ICT-based distance education as well as

Figure 3.8: Youth and ICTs

Percentage of Internet users accessing the Internet from an educational facility, in the European Union, 2002 (left) and population under age 15 as a percentage of total population, selected regions, 2001 (right)



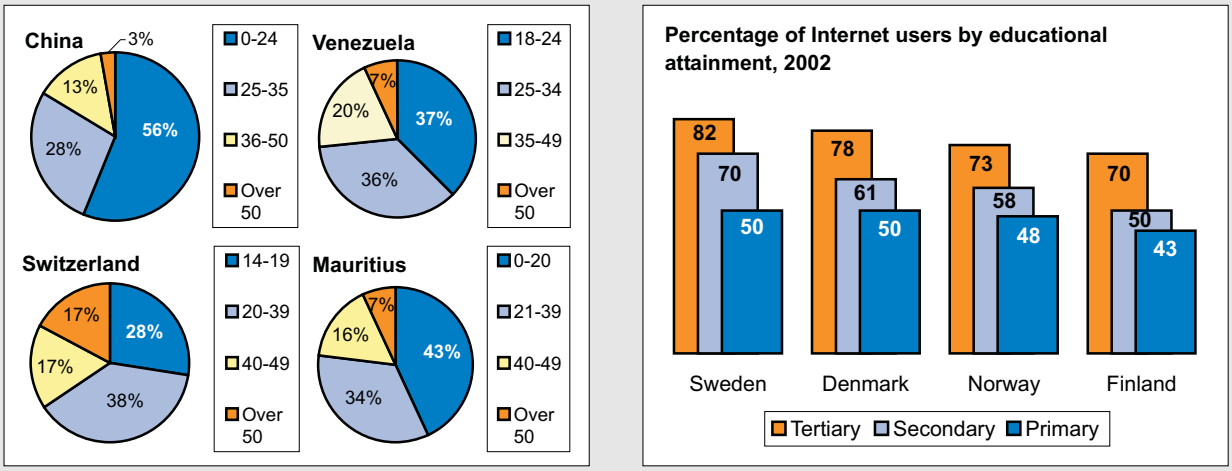
Source: ITU adopted from Gallup Europe and UNDP.

simple e-mail—they are key indicators to gauge a country's e-education readiness. Not surprisingly, the most popular indicators encountered in surveys and reports are the *student to computer ratio* and the *number of schools connected to the Internet*.

As would be expected, developed countries have been at the forefront of collecting ICT statistics in the educational domain. The data collected often reflect qualitative as well as quantitative differences in infrastructure and use. The United States, for example,

Figure 3.9: Internet user profiles

Internet users by age group, per cent, various countries,2002 (left) and percentage of Internet users by educational attainment groups, Nordic countries, 2002 (right)



Note: Left chart: The pie charts show the percentage of Internet users in each country by age. For China, 56 per cent of Internet users are age 24 or less. Right chart: The columns show the percentage of Internet users based on educational attainment. For Sweden, 50 per cent of those with only a primary education use the Internet compared to 82 per cent of those with a tertiary education. Data for Norway refers to 2001.

Source: ITU adapted from NCB (Mauritius), WEMF (Switzerland), Cavecom (Venezuela), CNNIC (China) (left) and Nordic Information Society Statistics 2002 (right).

started collecting data on the number of schools with Internet access in 1994, when an estimated 35 per cent of public (i.e. State-run) schools were already connected to the Internet.[15] The Nordic countries have been publishing data on ICT in education since the mid-1990s. Sweden first collected data on *pupils per computer* and *proportion of schools with Internet access* in 1995.[16] Finland started collecting data on the *percentage of pupils who had used a computer at school* in 1996. At that time, 72 per cent of all students had used a PC at school.[17] In 1999, 90 per cent of all primary and lower secondary schools, 95 per cent of upper secondary schools and all vocational schools in Finland had Internet access.

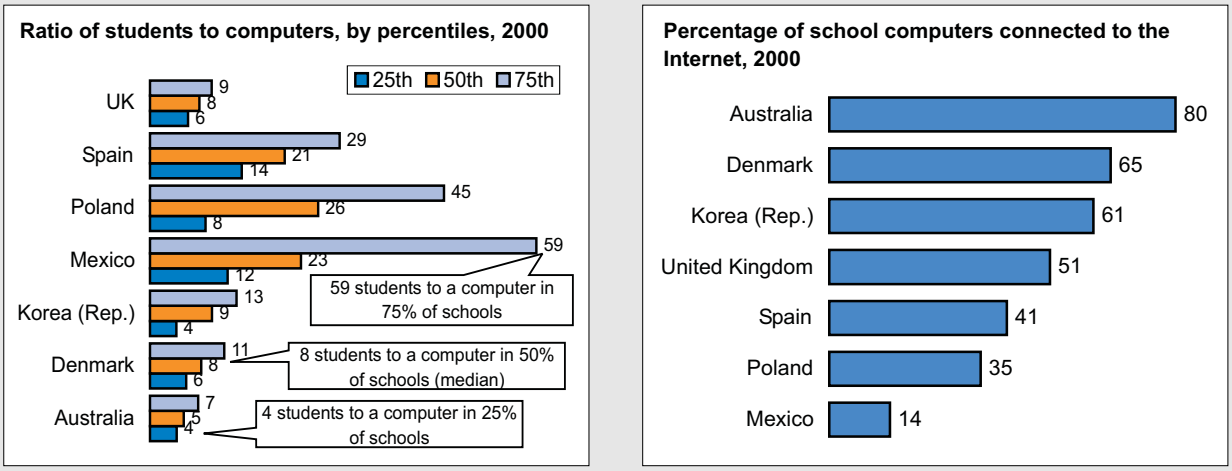
The OECD disseminates a number of ICT statistics for the educational sector for its members.[18] The data are collected through surveys, developed and carried out in cooperation with member countries. With regard to connectivity, the OECD has published data on the *percentage of computers connected to the Internet* (Figure 3.10, right). It does not, however, collect data on the percentage of schools connected to the Internet, as many non-member countries do. This indicator, however, is usually available individually for most OECD members from the national statistical agency or ministry of education.

Another fundamental indicator to measure access to ICTs in education is the *ratio of students to computers* (Figure 3.10, left).[19] The OECD data is not collected annually, though, and the definition of the indicators to measure ICTs in education has varied. The OECD's latest data does not include the student to computer ratio. Instead of access-oriented indicators, it focuses on usage-oriented indicators, such as the introduction of computer applications in schools. Also, the two OECD data sets are not directly comparable because they did not survey the same schools and the definitions changed. In brief, the compatibility of the OECD with available data from other countries or regions is limited. The results allow a comparison between the OECD countries, but not a comparison over time, nor a comparison with other countries that do not use exactly the same definition.

As part of its eEurope benchmarking exercise the European Union (EU) has disseminated several indicators for its members.[20] The two indicators for the 2002 benchmarking were *number of Internet computers per 100 pupils* and the *percentage of schools connected to the Internet* (Figure 3.11). This data was collected through surveys covering a total of over 7'000 schools.[21] The data are disaggregated by primary and secondary schools and also distinguish

Figure 3.10: Students, computers and Internet access in the OECD

Student to computer ratio, 2000 (left) and percentage of computers connected to the Internet (right) 2000, selected OECD countries



Note: Left chart: The ratio of students to computers refers only to schools where 15 year-olds are educated. Data is divided into three percentiles: the 25 per cent of schools with the lowest ratio of students to computers, 50 per cent with an average ratio of students to computers, and 25 per cent of schools with the highest student-to-computer ratio. This distinction provides an overview of levels of equality in the distribution of computers in schools across countries.

Source: ITU adapted from OECD.

between urban and rural and schools of different sizes. The EU's eEurope 2005 Action Plan identified the *number of pupils per computer with Internet connection (*broken down by *broadband/ non-broadband)* as the official indicator to measure e-learning. The target set by the EU is *15 pupils per online PC* by the end of 2003 and by the end of 2005 all schools should have a broadband connection.

3.2.4 Examples from the developing world

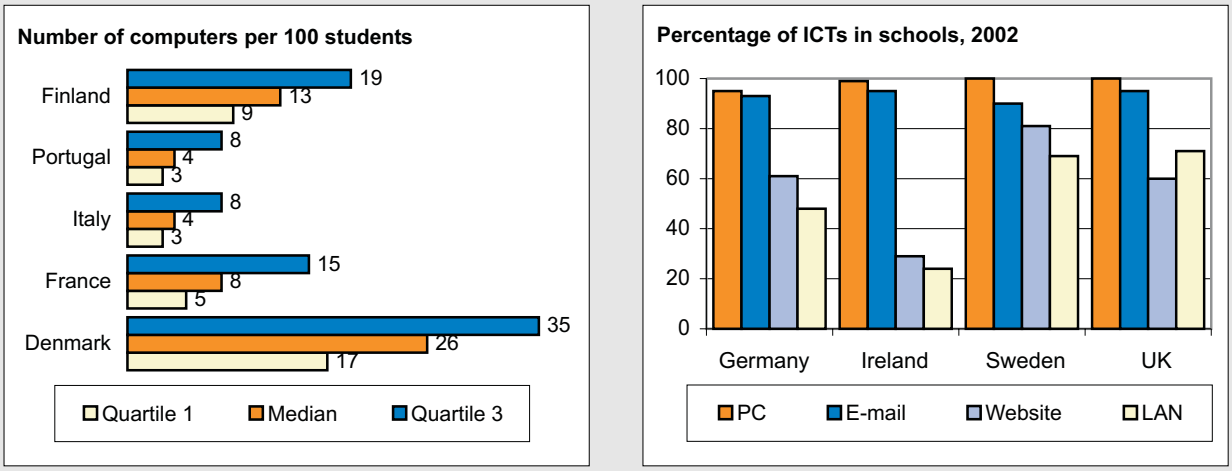
Despite the overall lack of comparable statistics, inter-country comparisons for developing countries are possible where national surveys have been carried out. The available data give some idea of the situation regarding ICTs in the educational sector in the developing world. A number of developing countries have made great efforts to use ICTs in schools and to track their progress. In Chile for example, the *Enlaces* project has used ICTs to implement major reforms in the educational system since the early 1990s.[22] The project, which is overseen by the Ministry of Education, collected data on ICTs in education, including the number of schools connected to the Internet from 1995 on (Figure 3.12, left). In Estonia, the Tiger Leap National Programme connected all schools to the Internet by 2002 (Box 3.2).

ITU's Internet Case Study project, under which e-readiness analyses were carried out for almost 20 emerging economies, found major differences in school connectivity, as well as in data availability.[23] While some countries were found to have low Internet access in schools, others had implemented projects with considerable impacts on Internet access in the educational sector. In Lao PDR, for example, no primary or secondary schools had access to the Internet in 2001, and while there were plans to provide a computer and Internet access in some secondary schools, the government had no overall strategy for ICTs in education.[24] Singapore, on the other hand, began connecting schools as early as 1997. By the end of 2002 it had provided all of its schools with broadband Internet access and achieved a two-to-one student-computer ratio.[25]

The ITU case studies also illustrate some of the problems related to the collection and dissemination of statistics. One such problem faced by a number of countries is the lack of coordination among different government agencies. This is particularly the case in countries where the ministry of education is not the driving force of ICTs in education. Where other organizations (such as other government institutions, non-governmental organizations (NGO), or development agencies) have projects to connect schools and provide computers, it can be difficult to track progress.[26] For this reason is it important for the ministry, with its close contacts to schools and overall

Figure 3.11: Students with computers and Internet in Western Europe

Computers per 100 students (left) and percentage of ICTs in schools (right), selected Western European countries, 2002



Note: Primary, secondary and vocational schools. Right chart: Quartile 1 refers to the 25 per cent of schools with the lowest number of PCs by 100 pupils, median refers to the 50 per cent of schools with median number of PCs, and quartile 3 refers to the top 25 per cent of schools with the highest number of PCs by 100 pupils.

Source: ITU adapted from Gallup Europe.

Box 3.2: Northern Tiger Shining Bright

Estonia's efforts to make a developmental leap by introducing information and communication technologies (ICT) in the educational sector go as far back as 1996, the year it launched the Tiger Leap National Programme. Its name refers to the Asian Tigers and their economic success, and symbolizes Estonia's desire to use ICTs as a tool to boost the educational system. To measure its progress, the project identified a number of specific targets, such as the ratio of one PC per 20 students, an Internet connection for each school, and basic computer training for all teachers. The project made rapid progress and reduced the number of students per computer from over 50 in 1997 to 28 just one year later (Box Figure 3.2, left). The project also tracks the type of Internet access that schools have. Already by 2000, over 60 percent of all connected schools had at least 128 kbps connections (Box Figure 3.2, right).

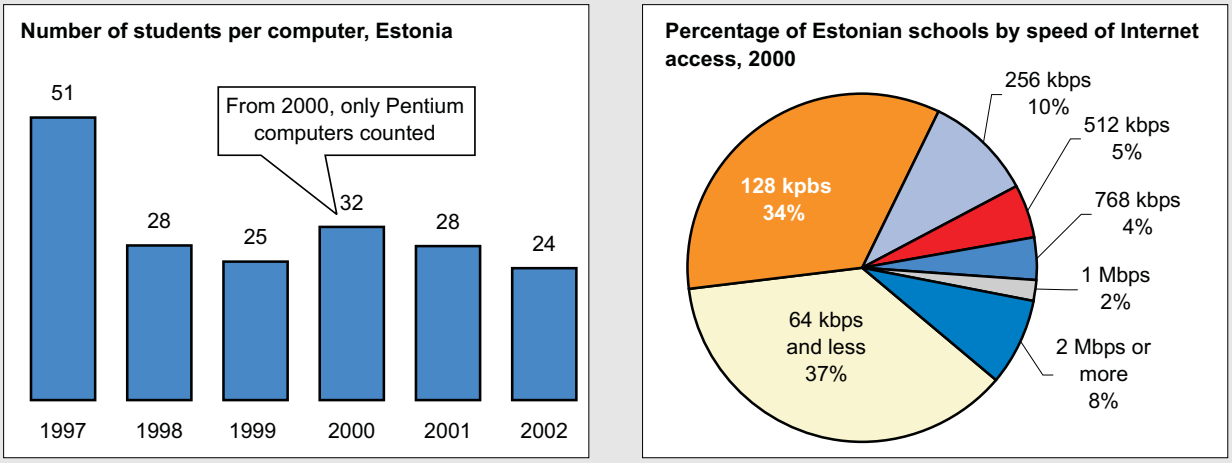
Tiger Leap has made great strides towards its goals both quantitatively and qualitatively. Not only are all schools connected to the Internet, but also 75 per cent of them have a broadband connection. By 2002 there were 24 students for every PC (Pentium or above) and more than 63 per cent of all teachers had received ICT training.

The programme, which has attracted backing from local governments, the private sector and international investors, has helped to shape Estonia's progressive reputation. Investment in ICT education and the promotion of broadband access in schools has helped to spread usage beyond the boundaries of the educational system. Seven years after the introduction of Tiger Leap, a new generation of ICT-savvy Estonians are reaching university level. As these students grow older, they will continue to expect fast access to information.

Today, 35 per cent of the Estonian population use the Internet, 38 per cent use computers, and 18 per cent of households have computers. These figures place Estonia as the leader in usage of ICTs among upper-middle income countries and its broadband penetration (3.4 subscribers per 100 inhabitants in 2002) ranks it among the world leaders.

Box Figure 3.2: ICTs in Estonian schools

Number of students per computer, 1997-2002 (left) and distribution of schools by Internet access speed, percentage, 2000 (right)



Source: ITU adapted from Estonian Informatics Center and Tiger Leap Foundation.

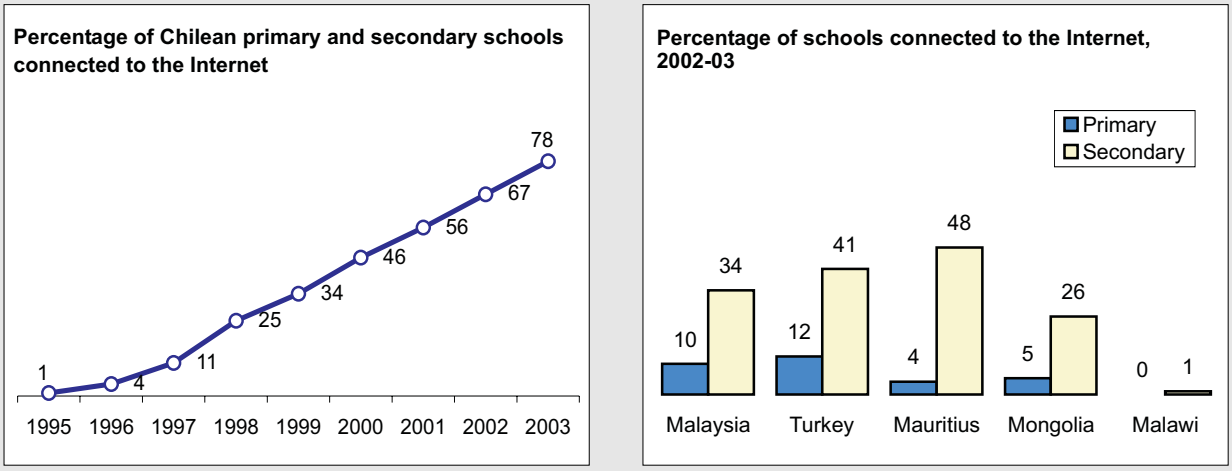
policy role, to oversee these developments, maintain ties with other partners and to gather and make available the results. Because of its nature as a central body, the education ministry is the most suitable entity to collect nationwide statistics and to liaise with other ministries on comparable ICT statistics from other sectors.

Based on the data from OECD and the EU, and the statistical information made available by some national statistical agencies, it is possible to compile a relatively comparable set of data for Internet connectivity and the students-to-computers ratio in developed countries, as well as for some developing regions, such as the Baltic States, Central Europe and East Asia. Limitations in comparability result from the different years in which the data was collected, as well as different definitions used (Box 3.3).

One effort to overcome the data dilemma in the Asia-Pacific region has been initiated by the United Nations

Figure 3.12: Connectivity varies

Schools connected to the Internet, Chile, 1995-2002 (left) and primary and secondary schools with Internet access, selected developing economies, 2002/2003 (right)



Source: ITU adapted from *Enlaces Chile* and government agencies.

Educational, Scientific, and Cultural Organization (UNESCO), which is developing a set of indicators to track the use of ICTs in education in the region.[27] Annex Table 3.4 provides an overview of one of the subsets of the indicators, which are closely related to the data discussed in this chapter. The indicators *number of schools with Internet access* and *the number of computers per 100 students* are also included. The indicators proposed by UNESCO provide a good overview of the type of indicators that more developed nations have started to collect. They reflect the aspiration to go beyond connectivity and access and to understand the impact that ICTs are having on the educational system and the way that knowledge is transmitted. Given the limited data that is available in many developing countries though, the task looks to be a daunting one.

3.2.5 Methodological considerations

Examples from national and international efforts point to a number of methodological questions that need to be addressed with regard to the collection of ICT statistics in the educational sector. Two points seem particularly important regarding the student to computer ratio:

- The ratio of students to computers can vary considerably (Figure 1.3, left) and a national ratio says little about the way computers are distributed among schools. By disaggregating data into three percentiles, it is possible to see whether all schools have more or less the same ratio—indicating an equal distribution—or whether there are major differences. This is especially relevant for developing countries that are just starting to connect their schools, since it can highlight the progress made in some schools.

- The number of computers included in this indicator should be limited to computers that are used for educational purposes. Both the EU and the OECD apply this definition. It prevents the inclusion of computers that are used by administrative staff, which would not serve the purpose of the indicator.

One point seems particularly important regarding the collection of data on school connectivity:

- Many countries collecting data on school connectivity distinguish between different types of connectivity, such as dial-up, broadband, ISDN, DSL and cable modem. To simplify the collection of this data, a distinction could be made between broadband and non-broadband, a criterion that helps to identify the quality of access. The type of access will also determine the kind of applications that schools will be able to provide to their students.

Finally, data for both indicators should be disaggregated according to different characteristics:

Box 3.3: Trends in school connectivity and student-to-computer ratios

In March 1999 Canada became the first country in the world to connect all its public schools to the Inernet.[28] Since then, other developed and developing economies have followed suit, including Denmark; Iceland; Estonia; Hong Kong, China; Singapore and the Republic of Korea. Most developed countries are approaching 100 per cent connectivity, although performance is uneven. In 2002, Luxembourg and Switzerland, two highly developed nations, had no more than 67 and 66 per cent respectively of all schools connected.

Annex Table 3.5 provides an overview of ICTs in schools. The results only allow limited comparisons, though, since data do not always refer to identical underlying definitions and frequently refers to different years. Also, the table does not give a complete overview of all existing country data but should be seen as an indication of how countries have started to measure ICTs in education. The table also points to some of the difficulties in comparing national data. For example, the results show that the situation changes quickly. In 2001 Slovenia had connected 75 per cent of all schools. Today, only two years later, all schools were connected to the Internet. Japan moved from 57 per cent connectivity in 2000, to 100 per cent less than two years later, in 2002. This suggests that international comparisons can only be made if the numbers are collected and updated regularly.

It is not possible to say with certainty how many countries have still to connect the majority their schools to the Internet, since little information is available, especially for the least developed countries (LDCs). ITU research in a few LDCs however, suggests that connectivity is very limited. In Ethiopia for example, at the end of 2001 only nine out of a total of 12'000 (less than 0.1 per cent) primary schools and ten out of 424 (about 2.4 per cent) secondary schools had access to the Internet. Government initiatives with regard to ICTs in education are often non-existent and selected schools are connected through development projects.

Similar to school connectivity, the existing data suggests that while a limited number of countries are approaching a one-to-one ratio, a large number of students do not use computers at all. In the Asia Pacific region there are more and more computers for students. In Singapore, for example, there is one computer for every two students. Compared to the school connectivity indicator (a school is either connected or not) the indicator measuring student/PC ratio is scaled. Consequently the variations regarding the student–to-computer ratio in advanced economies are greater than for the connectivity indicator. In Europe alone, the data show variations from over 30 PCs per 100 students (in Denmark, 2002) to only 6.7 computers per 100 students (in Italy, 2002).

The main conclusion from the existing data is that on a global level there are great disparities in school connectivity, as well as in student to PC ratios. Some countries, especially in the Baltic States and among the Asian Tigers, and others such as Chile, have done extremely well, with a majority of their schools connected and low student to PC ratios, similar to most developed countries. This shows that ICTs in education are not irrevocably bound to development status, and that major achievements can be made where there is sufficient political will and determination.

Another conclusion is that analysing trends is not enough. In order to evaluate progress, to highlight the countries that are doing exceptionally well (or not) and to draw reliable conclusions, the data need to be comparable and up to date. Action also needs to be taken given the fact that the World Summit on the Information Society (WSIS) is expected to agree upon concrete goals regarding the ICT connectivity of educational institutions, which is to be achieved by 2015 at the latest (see discussion in chapter four).

- Data should be collected separately for primary and secondary schools. The data from the EU show that there are major differences between primary and secondary schools. While the report does not give country details, it shows that on average the percentage of PCs connected to the Internet for all EU countries (plus Norway and Iceland) in primary schools is much lower than for secondary schools, at 49.4 per cent for primary and 69.9 per cent for secondary schools. Data in developing countries show similar results. In Thailand, 14 per cent of all schools are connected to the Internet, but this disguises the fact that the connectivity rate in secondary schools is around 100 per cent but considerably lower in primary schools.
- The educational system in many nations is marked by a national digital divide that separates urban from rural areas. This is the case, for example, in Malaysia, where the uneven distribution of Internet services across the country is reflected in the education sector. While all of the schools within the area around the capital, Kuala Lumpur, are connected the Internet, only a few schools in the rural areas have connectivity.[29] This suggests that countries also need to disaggregate their data geographically.

3.2.6 Conclusions

Providing schools with ICTs promises a high return on investment. The presence of computers and Internet access raises ICT literacy and skills, better preparing

the future population to participate in the information society. Schools represent ideal access points because they cover a large part of the population, especially in developing countries. Connecting schools also brings online that part of the population that can quickly learn how to use ICTs.

Efforts to analyze developments in school access to ICTs are still in an orientation phase, as illustrated by the fact that organizations such as the OECD and the EU are just starting to come to terms with the kind of indicators they need to collect. An overview of the existing data in developed and particularly in developing countries highlights the need to agree on a limited number of indicators that can reflect global developments and include as many countries as possible. The two indicators that seem most appropriate are the *student-to-computer ratio* as well as *the percentage of schools connected to the Internet*. Data for both indicators should be collected for primary and secondary schools and for rural and urban areas. Statistics on the ratio of *students-to-computer* should be broken down by percentiles and only consider computers that are actually used by students. It would also be very useful to indicate the type of connectivity that schools have (i.e. broadband or non-broadband).

Surveys involve organizational efforts, are generally expensive, and are therefore not an option in most developing countries. Furthermore, the collection of data through surveys cannot guarantee continuity of information. Data should therefore be collected through government ministries of education. Ministries across the world already collect a number of educational statistics, such as the number of schools, students and teachers. These statistics are widely available, and often extend to private schools and vocational institutions. Since statistics are collected at the school level and then sent to the ministry responsible for education, adding ICT-related questions should be relatively easy. The two indicators therefore do not require any detailed surveys but would simply rely on the existing channels of information flow within the educational system. Like other education statistics, ICT school statistics should be collected annually. Given the rapid changes, this is particularly important for meaningful international comparisons to be made.

To measure progress towards the proposed targets of the draft WSIS Plan of Action, which is to connect all educational institutions by 2015 at the latest, countries should also provide information on the connectivity of tertiary institutions.

3.3 Measuring government access to ICTs

3.3.1 Why measure?

ICT use in government has a major impact on enhancing efficiency, accountability and transparency. Electronic media such as the Internet can deliver information and services instantaneously and at a low cost. Online public services such as filing taxes, downloading forms and obtaining information from government websites are examples of the benefits (Figure 3.13, left). Thanks to initiatives that are already under way, a growing number of citizens around the world are accessing government websites (Figure 3.13, right).

In 2001, the United Nations conducted an e-government survey covering 190 Member States.[30] The results showed that almost 90 per cent have government websites (Figure 3.14, left). While most countries now have at least one government site, the level of truly interactive service is much lower (Figure 3.14, right). The ability to update and provide quality information to the public varies from country to country, depending in particular on the availability of ICT infrastructure, the level of ICT-literacy among government personnel, and the level of pro-activeness in bringing citizens online.

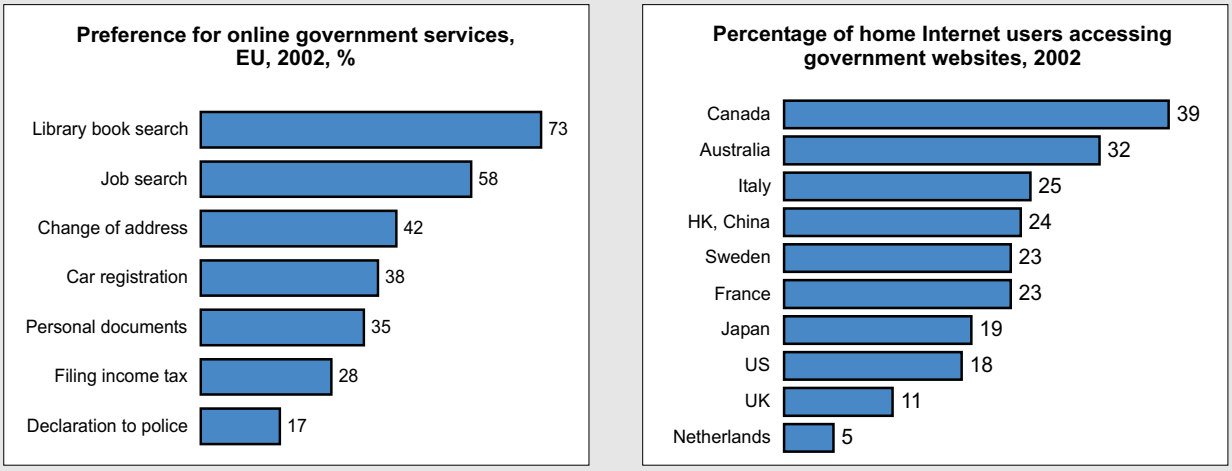
There are three roles that the government plays in the area of ICT adoption. First, as a *user* where it utilizes ICTs to improve internal processes. Second, as a *provider* where it makes available online services to the public. Lastly, as a *promoter* by formulating policies and actions to encourage ICT use by the public. Each of these roles needs specific indicators to gauge government performance. For the purpose of this report, with its focus on access to ICTs, indicators that measure government as user are emphasized.

Unlike households and businesses, there are no standardized international surveys for measuring ICTs in government. One reason is that there is no homogeneity among countries in the definition of government units. The size and functions of government entities vary widely, both within and among countries.[31] For most countries, official surveys that collect statistics on ICT availability in government are lacking, and standard indicators are not available.[32]

A few countries have conducted surveys to collect data on ICT usage in government. However, historical comparison is limited and international benchmarking

Figure 3.13: Better online than in line

Preference for online government services in European Union (left) and per cent of home Internet users accessing government websites (right) 2002

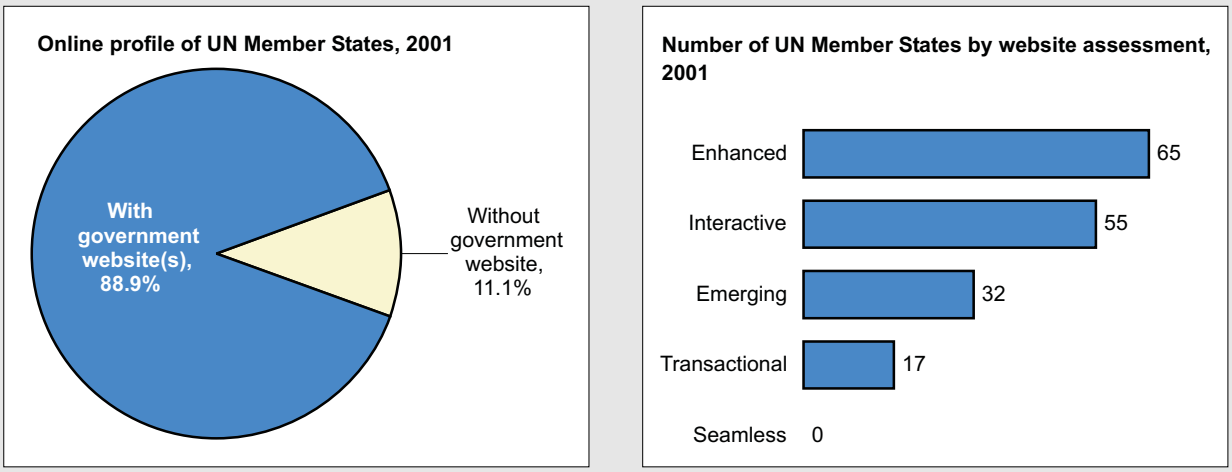


Source: ITU adapted from SIBIS and National Office for the Information Economy (NOIE), Australia.

is hampered by differences in the timing of the surveys and data definitions. Administrative records, such as government supply inventories are also used by some countries, but are often unreliable and out of date. Another difficulty is determining which entity is responsible for compiling statistics on the use of ICTs in government. For example, sources include the agency responsible for government computerization in the Philippines;[33] the Ministry of Finance in Finland; and the national statistical office in Peru.[34]

Figure 3.14: Governments online

Percentage of UN Member States with government websites (left) and distribution of countries by website assessment (right) 2001



Note: The right chart shows the results of an assessment of the 169 (out of 190) Member States with websites. Emerging = mainly static information; Enhanced = more sites, more dynamic information; Interactive = downloading, e-mailing; Transactional = online payments; and Seamless = full integration of services across administrative boundaries.

Source: ITU adapted from UNPAN.

3.3.2 What to measure

Data describing ICT use in government can be classified into four areas:

- Availability of computers or the Internet;
- Access such as whether civil servants use computers or the Internet;
- Usage such as type of Internet connection and whether a website exists;
- Electronic transactions such as use of the Internet to purchase and sell goods and services.

The *number of computers in government* is a common indicator. A computer is a prerequisite for storing, processing and accessing information electronically. Although it is the easiest indicator to measure, it is often not reported. Administrative records on the number of computers in government offices might be available, but likewise are often not reported.

In some countries, data are available on the breakdown of computers (e.g. mainframe, minicomputer, microcomputer, laptop or notebook). To avoid ambiguity as to what type of computer should be counted, some countries report the *number of workstations.* This counts terminals used to enter and retrieve electronic information without differentiating their types.

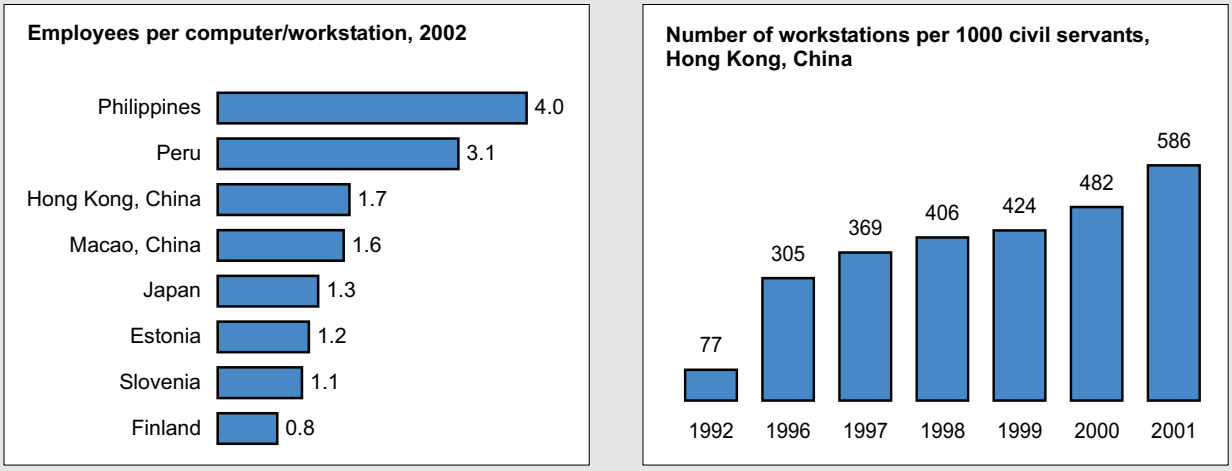
Since practically every government agency in the world has at least one computer, it is more interesting to measure the relative share among employees. Here there is some ambiguity since some countries report the number of employees per computer while others report employees per workstation. A computer can have more functionality than a workstation. The latter may simply be a terminal to a larger computer with no local processing capability of its own. Another cause of ambiguity relates to the status of the employee. Some countries report computers/ workstations per all employees while others report only the ratio among civil servants.

A comparison of countries in terms of *employees per computer/workstation* shows that availability varies. In the Philippines, there are four employees to each computer/workstation. For Slovenia and Estonia, the ratio is close to one computer/workstation per employee. In Finland, by contrast, there are more computers than employees (Figure 3.15, left). In Hong Kong, China, historical data is available on the *number of workstations per 1'000 civil servants* allowing an analysis of progress over time (Figure 3.15, right).

Another indicator of government adoption of ICTs is the *availability of an Internet connection.* Ideally this should be expressed as the *percentage of government entities with Internet access*. Few countries report this statistic. One that does is Peru, and there the data

Figure 3.15: Employees, computers and workstations

Employees per computer/workstation, selected economies, 2002 (left) and number of workstations per 1'000 civil servants, Hong Kong, China (right)



Note: Data for Japan and for Hong Kong, China and Peru refer to 2001, 2003 for Philippines and 2002 for the rest of the countries.
Source: ITU adapted from country reports.

provide striking evidence of the digital divide among government entities. Local governments, which account for 62 per cent of all government entities are the least connected, with only 21 per cent of local government offices having Internet access. Meanwhile, all legislative and judicial offices are connected. Overall, around 60 per cent of all government agencies are connected to the Internet (Figure 3.16, left). More than half of all computers in the government are concentrated in the executive agencies, while local offices have the lowest share of computers (Figure 3.16, right).

It also needs to be taken into account that countries differ in terms of technological advancement, and that Internet connections can include any of dial-up, ISDN, broadband and leased lines. The *type of Internet connection used in government* is a useful indicator of the speed and sophistication of government connectivity. While broadband access is already the main type of access for government agencies in European and advanced Asian countries, in the Philippines and Peru, almost half of government agencies access the Internet through a dial-up connection.

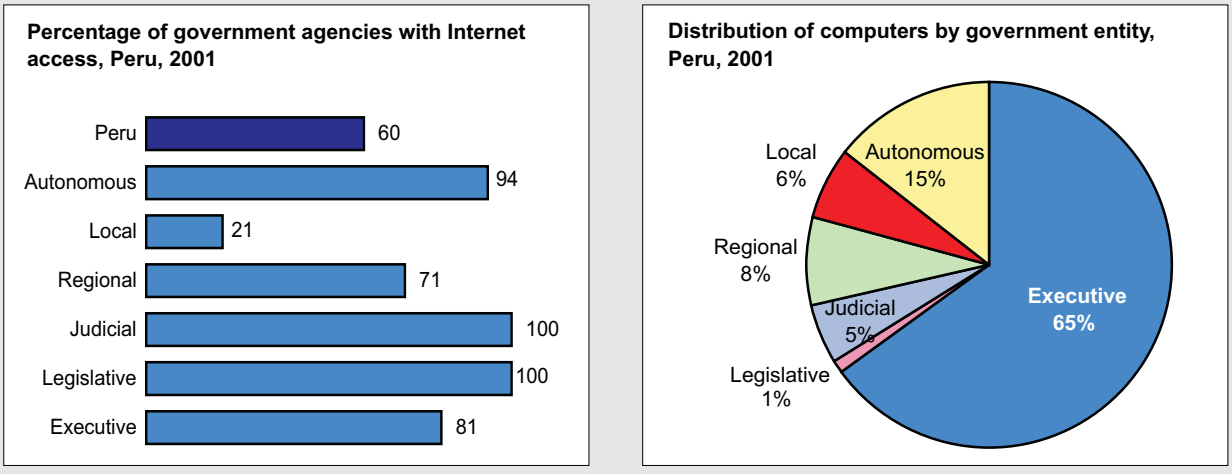
For a government to utilize the full benefits that ICTs can offer, it is critical to have a workforce that that is able to use ICTs, in particular computers, the Internet and e-mail. Several economies report the *percentage of civil servants using a PC* (Figure 3.17, left) to measure this. It is important to know the proportion of civil servants that are computer users since not all civil servants receive proper training in PC use, and some may not be able to obtain such training outside the workplace. Another consideration is that some tasks may not necessarily require use of a computer. Furthermore, the definition of a user differs between countries. The extent of computer use can also range from simple data entry, typing of documents or managing large databases. In Hong Kong, China where almost every civil servant has access to a computer, only 68 per cent of all employees were PC users in 2002.

The *percentage of civil servants using the Internet* is a useful accessibility measure. Like access to computers, in some developing countries, access to the Internet is restricted to higher officials or is available only to those with certain duties. In some nations, the reason for this is high Internet access costs, which deter governments from extending access to more employees. Some countries report the *percentage of civil servants using email*. In Canada, there are more civil servants using e-mail than the Internet (Figure 3.17, right). This difference may be explained by users having intranet rather than Internet access, with users able to send e-mail to government accounts but not elsewhere.

There are a number of other indicators on government ICT use. The *number of hits per month to government*

Figure 3.16: Digital government divide in Peru

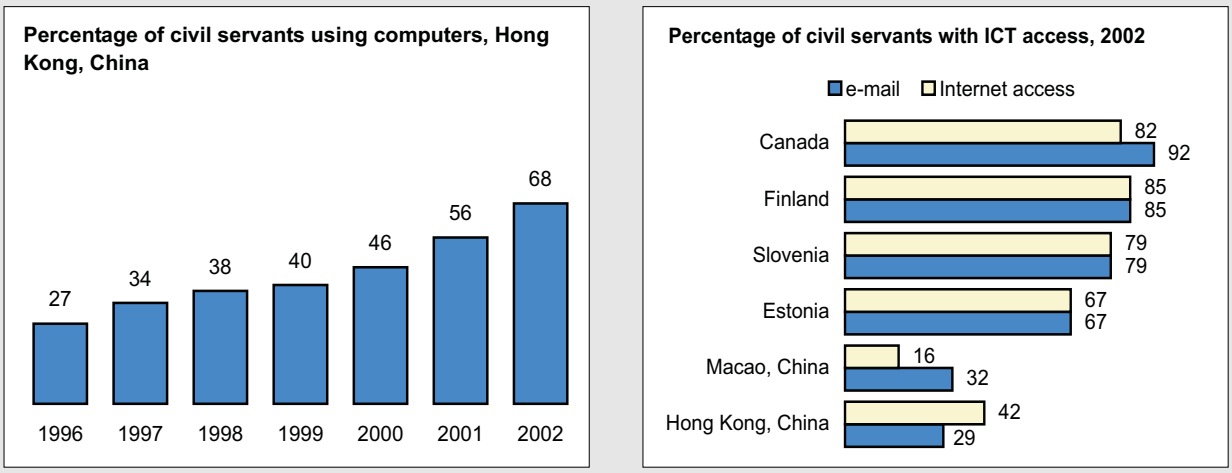
Percentage of government agencies with Internet access, by type of entity (left) and percentage distribution of computers by type of government entity (right), Peru 2001



Source: ITU adapted INEI, Peru.

Figure 3.17: ICT usage among civil servants

Percentage of civil servants using computers, Hong Kong, China (left) and percentage of civil servants with Internet access or using e-mail, selected economies (right) 2002



Source: ITU adapted from country reports.

websites measures the importance of the service that a government agency renders. The *amount spent on e-government programmes* measures government commitment to achieving an e-ready environment. *Government use of the Internet to purchase or sell goods and services is* also important in illustrating the capacity of governments to conduct online business. While these indicators are important, countries should strive first to collect basic e-government indicators such as access to PCs and the Internet, and to refine country surveys to achieve internationally comparable data.

3.3.3 Conclusions

Not only can government adoption of ICTs increase ICT usage and skills among its workforce, but it can lead the way in encouraging other sectors and the public at large to make greater use of ICTs. In this respect, government adoption of ICTs is one of the fundamentals for countries to fully integrate themselves in the future information society. ICT use has been seen to help increase efficiency, accountability and transparency in government processes, enhancing good governance.

Although the importance of government ICT indicators is not disputed, few developing nations compile statistics on ICT use in government. While there are numerous statistics for measuring government ICT penetration, the most useful set of basic indicators would include:

- Percentage of government offices connected to the Internet;
- Percentage of government offices with a website;
- Percentage of civil servants who use personal computers at their job;
- Percentage of civil servants who use the Internet at their job.

For the indicators to be sufficiently meaningful, it is crucial to provide the breakdown and definition of government offices, as well as the number of entities in each of the categories. Surveys to collect these indicators should be conducted on a regular basis. Developed nations might consider assisting developing nations by providing resources so that a comprehensive survey of the level of government ICT adoption can be measured on a global level. Countries that have already conducted comprehensive surveys could also assist other countries with regard to the methods and model of questionnaire used.

Results of surveys on ICT use in government should also be made easily available. One solution would be to create an information society portal featuring a special government section. Under this section, links to agencies in each country responsible for government ICT statistics could be listed, together with the methodologies and results.

Box 3.4: ICT in the health sector

Although information and communication technologies (ICTs) are impacting the health sector in developing countries, the main effect is limited to basic applications and administrative use. For instance, e-mail improves communication between health care staff; the Internet allows doctors to research online; and the computerization of patient information enhances treatment. The ability to bridge the physical distance between patients in remote areas and medical specialists has been very limited in developing countries, where simple, low-cost technology works best. More sophisticated ICT health applications such as telemedicine remain largely limited to developed countries.

An important prerequisite for most telemedicine applications is access to the Internet. An indicator to measure progress would therefore be "*the percentage of health institutions connected to the Internet*". Using the term "health institutions" rather than "hospitals" makes a great difference since many developing countries have few hospitals (sometimes just one or two, in the Capital and perhaps one other major city). In many nations, they are generally inaccessible for the majority of the population where health care tends to be provided through smaller clinics. While many countries are able to provide data on hospital connectivity this information is therefore only of limited value. Where data are available, they should be disaggregated between broadband and non-broadband connections, as this makes a great difference to the kind of telemedicine applications that can be carried out. Access to the Internet allows doctors to obtain consultative information, and staff to search information. Therefore indicators on the *percentage of health staff using computers* and *using the Internet* would be useful.

Ministries of health across the world already collect a variety of statistics such as the number of patients, hospital beds and health professionals. Since statistics are collected at the local level and then sent to the ministry, it should be possible to include data on ICT availability.

Annex Table 3.1: eEurope indicators

Indicators to monitor progress of European Union eEurope 2005 Action Plan

Business	*Education*	*Government*
H.1 e-business index (composite indicator) *Definition*: A mathematical function (to be defined in 2003) combining a number of key internal and external business processes, which enterprises in Member States conduct using integrated digital means. *Components of Index*: Adoption of ICTs by business a1. Percentage of enterprises that use Internet a2. Percentage of enterprises that have a website / home page a3. Percentage of enterprises that use at least two security facilities at the time of the survey a4. Percentage of total number of persons employed using computers in their normal work routine (at least once a week) a5. Percentage of enterprises having a broadband connection to the Internet a6. Percentage of enterprises with a LAN and using an Intranet or Extranet Use of ICTs by business b1. Percentage of enterprises that have purchased products / services' via the internet, EDI or any other computer mediated network where these are >1 per cent of total purchases b2. Percentage of enterprises that have received orders via the internet, EDI or any other computer mediated network where these are >1 per cent of total turnover b3. Percentage of enterprises whose IT systems for managing orders or purchases are linked automatically with other internal IT systems b4. Percentage enterprises whose IT systems are linked automatically to IT systems of suppliers or customers outside their enterprise group b5. Percentage of enterprises with Internet access using the internet for banking and financial services b6. Percentage of enterprises that have sold products to other enterprises via a presence on specialised internet market places	E.1 Number of pupils per computer with Internet connection (broadband/ non-broadband) *Definition:* Only computers used for teaching purposes to be included *Supplementary statistical indicators:* E.2 Percentage of individuals having used the Internet in relation to training and educational purposes – broken down by: normalized educational activities (school, university etc.); post-educational courses; other courses related specifically to employment opportunities E.3 Percentage of enterprises using e-learning applications for training and education of employees	D.1 No. of basic public services fully available on-line *Definition:* 20 basic services as approved by the Internal Market/Consumers/Tourism Council of 12 March 2001 *Supplementary statistical indicators:* D.2 Percentage of individuals using the Internet for interacting with public authorities broken down by purpose (purposes: obtaining information, obtaining forms, returning filled in forms) D.3 Percentage of enterprises using the Internet for interacting with public authorities broken down by purpose (purposes: obtaining information, obtaining forms, returning filled in forms) Additional supplementary indicators to be the subject of pilot studies with a view to examination of their feasibility at the mid-term review or earlier if possible: D.4 No. of available basic public on-line services with integrated digital back office processes D.5 Public procurement processes that are fully carried out online (electronically integrated) in % (by value) of overall public procurement D.6 Percentage of public authorities using open source software

Source: ITU adapted from European Commission.

Annex Table 3.2: ICTs in Business

			Companies with (per cent)			
	Source	*Year*	*PC*	*Internet*	*Website*	*Note*
EU						
Austria	ES	2000/01	92	84	54	Businesses with 10 or more employees.
Belgium	EB	2001		93	61	Businesses with 10 or more employees.
Denmark	ES	2000/01	95	91	67	Businesses with 10 or more employees.
Finland	ES	2000/01	98	94	64	Businesses with 10 or more employees.
France	EB	2001		73	59	Businesses with 10 or more employees.
Germany	ES	2000/01	96	88	66	Businesses with 10 or more employees.
Greece	ES	2000/01	85	54	29	Businesses with 10 or more employees.
Ireland	NSO	2003	95	86	59	Businesses with 10 or more employees.
Italy	ES	2000/01	86	72	9	Businesses with 10 or more employees.
Luxembourg	ES	2000/01	91	55	41	Businesses with 10 or more employees.
Netherlands	ES	2000/01	88	79	47	Businesses with 10 or more employees.
Portugal	ES	2000/01	89	71.78	30.26	Businesses with 10 or more employees.
Spain	ES	2000/01	91	67.04	6.93	Businesses with 10 or more employees.
Sweden	ES	2000/01	97	89.89	67.67	Businesses with 10 or more employees.
United Kingdom	ES	2000/01	92	63.37	49.85	Businesses with 10 or more employees.
Other W. Europe						
Iceland	NIS	2001	98	92	64	Businesses with 10 or more employees.
Norway	NIS	2001	94	81	55	Businesses with 10 or more employees.
Switzerland	NSO	2000	94	78	55	Businesses with at least 5 employees.
C&E Europe & Baltics						
Estonia	BIS	2001	91	92	45	Per cent of enterprises using computers
Hungary	OGS	2001		70	39	Not stated
Latvia	BIS	2001	78	51	19	Not stated
Lithuania	BIS	2001	84	66	27	Not including NACE 45 and 92.
Poland	BIS	2001		75	54	50+, selected industries.
Russia	BIS	2001	76	29	9	
Advanced Asia-Pacific						
Australia	NSO	2001	93	79	38	5+ employees
Hong Kong, China	NSO	2002	79	68	36	10+ employees.
Japan	OGS	2001		68		All businesses.
Korea, Rep.	OGS	2001	71	60	24	15+
Macao, China	OGS	2001	30	16		All businesses.
New Zealand	NSO	2001	88	79	36	> 5 employees
Singapore	OGS	2002	83	78		All businesses.
Taiwan, China	OGS	2002		62	23	All business.
N. America						
Canada	NSO	2002		76	32	All businesses.
USA	NSO	2000		75		Manufacturing only.
Developing						
Argentina	OGS	2002		90	46	4+ employees.
Bahrain	NSO	2001		12		All establishments.
Chile	OGS	2002	64	44	14	Excluding micro enterprises and very large firms.
Mexico	NSO	1999	34	10	1	All businesses.
Mauritius	OGS	2001	83	75	21	10+ employees.
Peru	NSO	2000	80	64	15	5+ employees.
SMEs						
Costa Rica	CAATEC	2002	40			1-100 employees.
Indonesia	AF	2001		67	26	12 cities. 5-300 employees.
Kenya	ZEF	2000	30			Food processing, textile and tourism.
Malaysia	NECC	1999	90	55	17	<150 employees.
Philippines	AF	2002	90	70	25	3 cities.
Sri Lanka	AF	2001		83	43	Major business cities.
Tanzania	ZEF	2000	31			Food processing, textile and tourism.
Thailand	AF	2001	93	76	39	5 regions. 5-200 employees.
USA	DB	2002	85	71		Small business.

Note: AF = Asia Foundation; BIS = Baltic Information Society; CAATEC = Comisión Asesora en Alta Tecnología de Costa Rica; DB =Dunn & Bradstreet; EB = Eurobarometer; ES = Eurostat; NECC = National E-Commerce Committee; NIS = Nordic Information Society; NSO = National Statistical Office; OGS = Other official government source; ZEF = Zentrum für Entwicklungsforschung (Center for Development Research).

Source: ITU adapted from sources shown above.

Annex Table 3.3: UNESCO: Proposed Set of Indicators for ICTs in Education

A. Enabling Environment				
Indicators	*Definition*	*Purpose*	*From whom to Collect*	*How to Collect*
1. *No. of schools with electricity computers telephone intranet Internet TV/VCR/VCD/DVD radio	These should be used for educational purposes	Context of ICT development	Ministry of Education, Schools	Questionnaire
2. * Number of computers per 100 students *Data must be in bands* *Open to guesstimates*		Measure of implementation	Ministry of Education, Schools	Questionnaire
3. Number of hours per week for ICT-aided instruction *Data must be banded*			Ministry of Education, Schools	Questionnaire
4. Percentage of schools using the following equipment for educational purposes: - Scanner - Colour printer - Dot matrix printer - Digital camera - LCD projector	These should be for educational purposes		Ministry of Education	Interview, questionnaire
B. Internet Connectivity				
Indicators	*Definition*	*Purpose*	*From whom to Collect*	*How to Collect*
1. * Number of computers connected to the Internet *Data must be in bands*		Measure of connectivity	Ministry of Education, Schools	
2. * Hours a month the school uses the Internet		School heads / ICT coordinators of schools		Questionnaire
3. * Number of schools with websites produced by students		School heads / ICT coordinators of schools		
C. Speed / Bandwidth / Satellite / Wireless				
Indicators	*Definition*	*Purpose*	*From whom to Collect*	*How to Collect*
1. Percentage of schools with broadband, ADSL, narrowband, wireless		Measure of quality of connectivity	Ministry of Education	Interview, questionnaire
D. Systems and Hardware				
Pre-Pentium	*Definition*	*Pentium*	*Non-Pentium*	
1. *Number of PCs running on the Windows platform		*Number of PCs with pre-Pentium processors		Does your school have the following equipment that you use for educational purposes: - Color printer - Dot Matrix printer - Scanner - Multimedia projector - UPS

Note: * Data is to be disaggregated into formal, non-formal, primary and secondary education.
Source: UNESCO.

Annex Table 3.4: ICTs in schools

			A) PCs per students		No. schools	B) Schools with Internet access		Note
	Source	*Year*	*Students/ PC ratio*	*PCs for 100 students*	*Sample*	*Total/ per cent*	*Primary/ Secondary*	
EU (+Norway and Iceland)					**7007**	93%		
Austria	EB	2002	8	12.3	500	94%		A): Median student/PC ratio
Belgium	EB	2002	9	11.1	512	93%		A): Median student/PC ratio
Denmark	EB	2002	3.2	31.2	467	100%	100%/ 100%	A): Median student/PC ratio
Finland	EB	2002	6.3	16.0	499	99%		A): Median student/PC ratio
France	EB	2002	8.3	12.1	519	94%		A): Median student/PC ratio
Germany	EB	2002	13.5	7.4	478	99%		A): Median student/PC ratio
Greece	EB	2002	12.5	8.0	500	59%		A): Median student/PC ratio
Ireland	EB	2002	10.3	9.7	499	99%		A): Median student/PC ratio
Italy	EB	2002	14.9	6.7	505	88%		A): Median student/PC ratio
Luxembourg	EB	2002	7.0	14.2	45	67%		A): Median student/PC ratio
Netherlands	EB	2002	7.9	12.6	500	92%		A): Median student/PC ratio
Portugal	EB	2002	12.7	7.9	500	92%		A): Median student/PC ratio
Spain	EB	2002	8.2	12.2	500	94%		A): Median student/PC ratio
Sweden	EB	2002	7.4	13.6	500	99%		A): Median student/PC ratio
United Kingdom	EB	2002	6.9	14.5	483	99%		A): Median student/PC ratio
Iceland	A) EB B) OGS	2002	6.5	15.5	228	100%	100%/ 100%	A): Median student/PC ratio
Norway	EB	2002	4.2	23.6	503			A): Median student/PC ratio
Other Western Europe								
Switzerland	NSO	2002	13	7.7	All	66%	53%/ 93%	
Liechtenstein	SV	2003	P) 4.4 :1 S) 4:1	P) 22.7 S) 25	All	100%	100%/ 100%	A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.B): Refers to public schools
Central and Eastern Europe and Baltics								
Cyprus	MOF	2002		P) 6.3 S)12.2	All			Data refers to public schools only.
Czech Republic	OECD	2000	15:1	6.7	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Estonia	TLF	2002	24:1	4.2	All	98%		
Hungary	OECD	2000	9:1	11.1	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Latvia	OECD	2000	5:1	20	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Lithuania	STD	2002	P) 2.1 :1 S) 5.0:1	P) 47.6 S) 20	See Note		4.6%/ 95.4%	
Poland	OECD	2000	26:1	3.8	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.

Annex Table 3.4: ICTs in Schools (cont'd)

			A) PCs per students		*No. schools*	*B) Schools with Internet access*		*Note*
	Source	*Year*	*Students/ PC ratio*	*PCs for 100 students*	*Sample*	*Total/ per cent*	*Primary/ Secondary*	
Russia	OECD	2000	10:1	10	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Slovakia	OGS	2002			All		16%/44%	
Slovenia	RIS	2000/ 2001	27:1	3.7	All	75%		A): Methodology for PCs based on EB (EU), with some variations
Turkey	MoE	2002			All	16.7%	12.4%/41%	
Advanced Asia-Pacific								
Australia	OECD	2000	5:1	20	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Hong Kong, China	ITU CS	2002			All	100%	100%/ 100%	
Japan	OECD/ MoE	2000	12:1	8.3	See Note	57%		A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Korea, Rep.	A) OECD B)ITU CS	A) 2000 B) 2002	9:1	11.1	See Note	100%	100%/ 100%	A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Macao, China	EYAD	2002/ 2003	P)21:1 S)12:1	P)4.7 S)8.3	All		61%/88%	Besides the Primary and Secondary schools, there are also schools administering both (primary and secondary) schools. In these 96% of all schools are connected to the Internet and the students to PC ratio is 19:1.
Malaysia	ITU CS	2000			All		10%/ 34%	
New Zealand	MoE	A)2003 B)2002	P)7:1 S)4:1	P)14.3 S)25	All		97%/100%	68% of all primary and 92% of secondary schools had broadband access
Singapore	MoE	2002	2:1	50	All	100%	100%/ 100%	
Thailand	ITU CS, School-net Thailand	2003			All	14%		
N. America								
Canada	OECD	2000	6:1	16.7	See Note	100%	100%/ 100%	A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
USA	NCES	2001	5.4:1	19	All	99%		Covers public schools. A): Refers to computers with Internet access only.
Developing								
Brazil	OECD	2000	26	3.9	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Cape Verde	ITU CS	2002			All		0/33%	
Chile	Mineduc MoE	2003	P:51:1 S:31:1	P:2.0 S:3.2	All		71%/ 76%	
Ethiopia	ITU CS	2001			All	0.2%	<1%/ 2.4%	

Annex Table 3.4: ICTs in Schools (cont'd)

			A) PCs per students		*No. schools*	*B) Schools with Internet access*		*Note*
	Source	*Year*	*Students/ PC ratio*	*PCs for 100 students*	*Sample*	*Total/ per cent*	*Primary/ Secondary*	
Jordan	MICT	2003			All		N/A/100%	Currently all secondary schools in Jordan have fully equipped computer labs, and ADSL connectivity has reached over 600 of Jordan's 3000 public schools
Malawi	OGS	2002			All	0.05%	0%/0.4%	
Mauritius	ITU CS	2002	N/A		All	18.7%	4.2%/ 48.3%	
Mexico	OECD	2000	23:1	4.4	See Note			A): Student/PC ratio refers to median and only to schools where 15-year olds are enrolled.
Mongolia	OGS	2002			All	19%	5.3%/ 25.5%	
Philippines	Project TAO CARES	2001			45'811	2%		Private and public elementary and secondary schools
St. Kitts	OGS	2002			All	N/A	100%/ N/A	
Tunisia	ATI	2003			All		10%/100%	B): Connectivity is 10% for Primary, 40% for Preparatory, and 100% for Secondary schools

Note: This table does not provide a perfect picture of the situation of ICT in schools today. Comparability is limited given that data refer to different years and the rapid change. Also, many developed countries have more recent data but EB or OECD data was chosen for comparability. The table should therefore be seen as a rough overview of what kind of data countries collect. It also points to the methodological difficulties connected to collecting data, as well as the different players involved. There are probably additional countries that collect information on the number of PCs per students and the number of schools with Internet access but for which the data is not readily available.
A) Data refers to the Indicator *PCs per students*
B) Data refers to the Indicator *Schools with Internet access*
P) = Primary schools
S) = Secondary schools
OECD data on PC/student ratio is calculated in the following way: Total number of students enrolled in the school divided by the total number of computers for the school in which 15-year-olds are enrolled, by quartile, type of institution and location of school, weighted by student enrolment.
ATI: Agence Tunisienne d'Internet
EB = Eurobarometer
ES= Eurostat
EYAD = Education and Youth Affairs Department, Macao, China
MICT = Ministry of Information and Communication Technology, Jordan
MoE = Ministry of Education
NCES = US National Center for Educational Statistics.
NIS = Nordic Information Society
NSO = National Statistical Office
OECD = Organization for Economic Cooperation and Development
OGS = Other official government source
RIS = Research on Internet for Slovenia
STD = Statistics Lithuania
SV = Schulamt Vaduz, Liechtenstein
TLF = Tiger Leap Foundation, Estonia

Source: ITU adapted from sources shown above.

Annex Table 3.5: ICTs in Government

	Source	Year	Per cent of government offices connected to the Internet	Percentage of employees using ICTs at their job		Note
				PC	Internet	
Canada	NSO	1999		94	82.2	Federal and provincial employees
Estonia	OGS	2002			67.3	
Finland	MF	2000			85.0	
Hong Kong, China	ITSD	2003		68	41.5	
Japan	NSO	2002	76	70		Central government
Macao, China	OGS	2002			16.0	
Malawi	OGS	2002			5.2	
Peru	NSO	2001	60		13.4	As % of all offices that responded to the survey
Philippines	NCC	2003	79			National government agencies
Romania	OGS	2002			21.5	
San Marino	OGS	2002			85.7	
Slovenia	OGS	2002			79.2	
Taiwan, China	OGS	2001			100.0	

Note: INEI = Instituto Nacional de Estadística y Informática.
ITSD = Information Technology Services Department.
MF = Ministry of Finance.
NCC = National Computer Center.
OGS = Other official government source.
Source: ITU adapted from sources shown above.

[1] A nine-country survey found that: "Over the past two decades, ICT contributed between 0.2 and 0.5 percentage points per year to economic growth, depending on the country. During the second half of the 1990s, this contribution rose to 0.3 to 0.9 percentage points per year". See OECD. (2001, October). *ICT Investment and Economic Growth in the 1990s: Is the United States a Unique Case? A Comparative Study of Nine OECD Countries*. Available from: http://www.olis.oecd.org/olis/2001doc.nsf/linkto/dsti-doc(2001)7; accessed December 1, 2003.

[2] For example see the description of the "OECD Model Questionnaire on ICT Usage and Electronic Commerce in Enterprises" in OECD. (2002). *Measuring the Information Economy 2002.* Available from: http://www.oecd.org/dataoecd/34/15/2771167.pdf; accessed December 1, 2003. A copy of the questionnaire is available from: http://www.voorburg.scb.se/Model%20survey%20ICT%20annex%201.doc; accessed December 1, 2003. The Statistical Office of the European Communities (EUROSTAT) carried out a pilot study based on a questionnaire (see Annex 2).

[3] See data available under "Measuring the Information Economy: Access to and use of Information Technologies" available from the OECD website at: <www.oecd.org/document/62/0,2340,en_2649_34449_2766782_1_1_1_1,00.html>; accessed December 1, 2003.

[4] Gallup Europe. (2002, February). E-Commerce. Flash Eurobarometre 116. Available from: http://www.eosgallupeurope.com/webreports/Report%20FL%20136%20E-commerce%202.pdf; accessed December 1, 2003.

[5] Eurostat is the Statistical Office of the European Communities (see: http://europa.eu.int/comm/eurostat; accessed December 1, 2003).

[6] *Statistics Denmark, et. Al. (2002). Nordic Information Society Statistics 2002*. Available from: http://www.stat.fi/tk/yr/tietoyhteiskunta/index_en.html; accessed December 1, 2003.

[7] A noticeable exception is the United States. The US Bureau of Census publishes regular data on the value of e-commerce transactions. However, except for the manufacturing sector, there is no official data on the availability of ICT in companies. A private organization carries out surveys on the level of ICTs in SMEs.

[8] Northern eDimension Action Plan. (July 2003). *Indicators for the Information Society in the Baltic Region*. Available from: http://www.ssb.no/english/magazine/art-2003-07-14-01-en.html; accessed December 1, 2003.

[9] Instituto Nacional de Estadística y Informática (Peru). (2001, November). *Indicadores de Tecnologías de Información y Comunicación en las Empresas*. Available from: http://www.inei.gob.pe/biblioinei.htm; accessed December 1, 2003.

[10] See National Computer Board (Mauritius). (2002). *ICT Usage Survey 2001*. Available from: http://ncb.intnet.mu/ncb/survey/ict2001.htm; accessed December 1, 2003.

[11] Matambalya, F. and Wolf, S. (2001, December). *The Role of ICT for the Performance of SMEs in East Africa*. Available from: http://www.zef.de/publications.htm; accessed December 1, 2003.

[12] For example see The Asia Foundation, "Regional Survey of SMEs' use of eCommerce in Indonesia, the Philippines, Sri Lanka, and Thailand" available from: http://www.asiafoundation.org/ICT/surveys.html; accessed December 1, 2003.

[13] For an overview of the project see the "Global Junior Challenge" website at http://www.gjc.it/2002/en/mostra.asp?ID=352; accessed December 1, 2003.

[14] For example, see ICT Success Stories on digital education, at: www.itu.int/osg/spu/wsis-themes/ict_stories/DigitalEducation.html; accessed December 1, 2003.

[15] "Internet Access in U.S. Public Schools and Classrooms: 1994 – 2001" available from the U.S. Department of Education's National Center for Educational Statistics website at http://nces.ed.gov/pubs2002/internet; accessed December 1, 2003.

[16] The Swedish Institute for Transport and Communications Analysis. (2003). *Facts about Information and Communication Technology in Sweden 2003*. Available from http://www.sika-institute.se/english_fr.html; accessed December 1, 2003.

[17] Nurmela J., Heinonen R., Ollila, P., and Virtanen, V. (2000, May). *Mobile Phones and Computer as Parts of Everyday Life in Finland.* Available from: www.stat.fi/tk/el/stty2r1e.html; accessed December 1, 2003.

[18] OECD. (2003). *Education at a Glance 2003*. Available from: http://www.oecd.org/document/52/0,2340,en_2649_37455_13634484_1_1_1_37455,00.html; accessed December 1, 2003.

[19] The OECD and others disaggregate the student to computer ratio into three percentiles to highlight the distribution of computers among schools. This kind of disaggregation would be useful for developing countries since it could highlight progress made in some schools instead of using only averages that often give a generally negative picture.

[20] European Commission. (2002, November). *eEurope 2005: Benchmarking Indicators*. http://europa.eu.int/information_society/eeurope/2002/news_library/documents/index_en.htm; accessed December 1, 2003.

[21] Gallup Europe. (2002, January). *Head Teachers & Internet*. Available from: http://www.eosgallupeurope.com/webreports/internet.htm; accessed December 1, 2003.

[22] See the Enlaces website at www.redenlaces.cl/paginas/index.htm; accessed December 1, 2003.

[23] See the "ITU Internet Case Study Project" available from: http://www.itu.int/ict/cs; accessed December 1, 2003.

[24] ITU. (2002). *Internet on the Mekong: Lao PDR Case Study*. Available from: http://www.itu.int/ITU-D/ict/cs/laos/index.html; accessed December 1, 2003.

[25] Ministry of Education (Singapore). (1997). *Masterplan for IT in Education.* Available from: http://www1.moe.edu.sg/iteducation/masterplan/summary.htm; accessed December 1, 2003.

[26] In Indonesia, for example, the Indonesian Internet Service Providers Association and other organizations have been the key drivers to connect secondary schools to the Internet. In Cape Verde, a government agency other than the Ministry of Education took over the responsibility of ICT in education.

[27] Indicators are divided into the five groups: Policy; Technological infrastructure and access; ICT Curriculum; Teaching and Teaching Support Staff; Learning Process and Outcomes. See the "Proposed Set of Indicators for ICT in Education" available from: www.unesco.org/bangkok/education/ict/unesco_projects/JFIT/perf_indicators/proposedind.htm; accessed December 1, 2003.

[28] See the Industry Canada SchoolNet website at http://www.schoolnet.ca/home/e/whatis.asp; accessed December 1, 2003.

[29] ITU. (2002). *Bits and Bahts: Thailand Internet Case Study*. Available from: www.itu.int/ITU-D/ict/cs/thailand/index.html; accessed December 1, 2003.

[30] UN Division for Public Economics and Public Administration. (2002). *Benchmarking E-government: Assessing the United Nations Member States*.

[31] Another issue is the classification of government "corporations" such as telecom operators. It is not clear whether corporations should be classified as government or business.

[32] It is hoped that further efforts on defining indicators will lead to improved and comparable data in the future. The OECD Working Party on Indicators for the Information Society (WPIIS) has been working on harmonizing the definition of indicators on measuring ICT usage by governments.

[33] National Computer Center (Philippines). (2003, June). *2003 ICT Resources Survey*. Available from: http://www.ncc.gov.ph/files/ICTResourcesSurveyResult1.PDF; accessed December 1, 2003.

[34] Instituto Nacional de Estadística y Informática (Peru). (2002, October). *Encuesta Nacional de Recursos Informaticos y Technologicos de la Administracion Publica*. Available from: http://www.inei.gob.pe/biblioinei.htm; accessed December 1, 2003.

4. ICTs and the Millennium Development Goals

4.1 The Millennium Declaration

The turn of a century is often marked by reflection on the past and fresh aspirations for a better future. One way this has been addressed at the global level is through the Millennium Declaration, adopted by 189 Member States of the United Nations at its fifty-fifth General Assembly in September 2000.[1] Through the Declaration, some 147 Heads of State and Government reaffirmed their commitment to working together to uphold the principles of human dignity, equality and equity at the global level, and to reducing poverty.

The Declaration makes a commitment that the number of people who live on less than one dollar a day should be halved by the year 2015. This forms part of the eight Millennium Development Goals (MDGs) that outline specific areas for achieving improvement in people's lives, including poverty reduction, education, gender, health and the environment. The last goal, developing a global partnership for development, proposes a means of achieving the first seven. Along with the eight goals, 18 specific targets are set out for achieving the MDGs (Table 4.1). Monitoring is based on 48 indicators formulated to measure the 18 targets.

4.2 Target 18: Information and communications

The Millennium Declaration acknowledges that ICTs are an important tool to achieve its overall goals; ICTs can help alleviate poverty, improve the delivery of education and health care, make government services more accessible, and much more. Target 18 of Goal 8 calls upon the Declaration's adherents to: "*In cooperation with the private sector make available the benefits of new technologies, specifically information and communications*".

ITU was charged with providing the indicators to help measure this particular target. However, of all the different targets, number 18 is the most vague (raising the questions of which ICTs should be made available, to whom and by when). A trade-off between the ideal indicator and widespread availability had to be considered. In addition, the number of indicators for the MDG targets had to be kept to a manageable amount. Given these constraints, three indicators were chosen to measure ICT availability in countries: *total number of telephone subscribers per 100 inhabitants*, *personal computers per 100 inhabitants* and *Internet users per 100 inhabitants*. In light of the fact that the goal states: "…benefits of *new* technologies", the indicators are targeted around ICTs such as mobile phones, computers and the Internet. Fixed telephone lines can also be included under "new" technologies, because, besides being an ICT in their own right, they are the main conduits for, and therefore integral to, accessing the Internet. Indeed, there is a certain synergy between the three indicators in that the predominant way of accessing the Internet is via a fixed telephone line using a personal computer. The indicators are infrastructure-based since networks and connectivity are prerequisites for making available the benefits of ICTs as specified in the goal. However, this report endeavours to highlight the fact that infrastructure is not the only factor that can impact the availability of ICTs. The next chapter of this report, Chapter 5, sets out a composite measure that could be used to track Target 18.

Table 4.1: Eight Goals, 18 Targets, 48 Indicators

Millennium Development Goals, targets, indicators

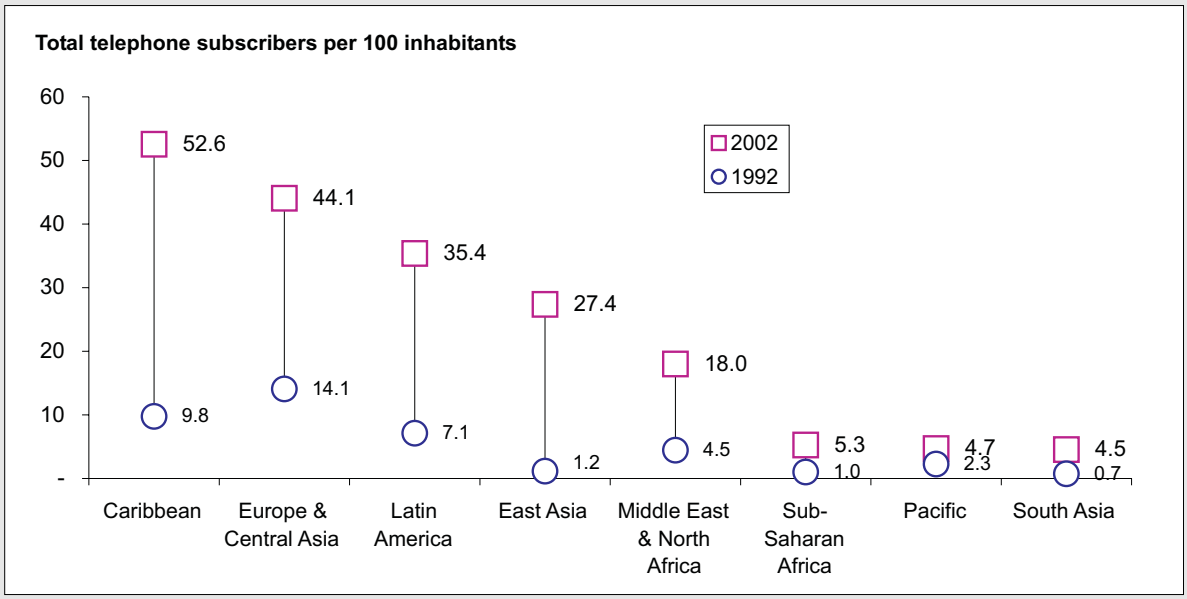
Goals and Targets	*Indicators for monitoring progress*
Goal 1: Eradicate Extreme Poverty and Hunger	
Target 1: Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day	1. Proportion of population below $1 (PPP) per day 2. Poverty gap ratio (incidence x depth of poverty) 3. Share of poorest quintile in national consumption
Target 2: Halve, between 1990 and 2015, the proportion of people who suffer from hunger	4. Prevalence of underweight children under-five years of age 5. Proportion of population below minimum level of dietary energy consumption
Goal 2: Achieve universal primary education	
Target 3: Ensure that, by 2015, children everywhere, boys and girls alike, will be able to compete a full course of primary schooling	6. Net enrolment ratio in primary education 7. Proportion of pupils starting grade 1 who reach grade 5 8. Literacy rate of 15-24 year-olds
Goal 3: Promote gender equality and empower women	
Target 4: Eliminate gender disparity in primary and secondary level education preferably by 2005 and to all levels of education no later than 2015	9. Ratio of girls to boys in primary, secondary and tertiary education 10. Ratio of literate women to men 15-24 year-olds 11. Share of women in wage employment in the non-agricultural sector 12. Proportion of seats held by women in national parliament
Goal 4: Reduce child mortality	
Target 5: Reduce by two-thirds, between 1990 and 2015, the under-5 mortality rate	13. Under-five mortality rate 14. Infant mortality rate 15. Proportion of 1 year-old children immunised against measles
Goal 5: Improve maternal health	
Target 6: Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio	16. Maternal mortality ratio 17. Proportion of births attended by skilled health personnel
Goal 6: Combat HIV/AIDS, malaria and other diseases	
Target 7: Have halted by 2015 and begun to reverse the spread of HIV/AIDS	18. HIV prevalence among 15-24 year old pregnant women 19. Condom use rate of the contraceptive prevalence rate 19a. Condom use at last high-risk sex 19b. Percentage of population aged 15-24 with comprehensive correct knowledge of HIV/AIDS 20. Ratio of school attendance of orphans to school attendance of non-orphans aged 10-14
Target 8: Have halved by 2015 and begun to reverse the incidence of malaria and other major diseases Goal 7: Ensure environmental sustainability	21. Prevalence and death rates associated with malaria 22. Proportion of population in malaria risk areas using effective malaria prevention and treatment measures 23. Prevalence and death rates associated with tuberculosis 24. Proportion of tuberculosis cases detected and cured under DOTS (internationally-recommended TB control strategy)

Goals and Targets	*Indicators for monitoring progress*
Goal 7: Ensure environmental sustainability	
Target 9: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	25. Proportion of land area covered by forest 26. Ratio of area protected to maintain biological diversity to surface area 27. Energy use (kg oil equivalent) per $1 GDP (PPP) 28. Carbon dioxide emissions (per capita) and consumption of ozone-depleting CFCs 29. Proportion of population using solid fuels
Target 10: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation	30. Proportion of population with sustainable access to an improved water source, urban and rural 31. Proportion of urban and rural population with access to improved sanitation
Target 11: By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers	32. Proportion of households with access to secure tenure
Goal 8: Develop a global partnership for development	
Target 12: Develop further an open, rule-based, predictable, non-discriminatory trading and financial system Includes a commitment to good governance, development and poverty reduction – both nationally and internationally	*Official Development Assistance (ODA)* 33. Net ODA, total and to LDCs, as percentage of OECD/ Development Assistance Committee (DAC) donors' gross national income (GNI) 34. Proportion of total bilateral, sector-allocable ODA of OECD/DAC donors to basic social services (basic education, primary health care, nutrition, safe water and sanitation)
Target 13: Address the special needs of the least developed countries Includes: tariff and quota free access for least developed countries' exports; enhanced programme of debt relief for HIPC and cancellation of official bilateral debt; and more generous ODA for countries committed to poverty reduction	35. Proportion of bilateral ODA of OECD/DAC donors that is untied 36. ODA received in landlocked countries as proportion of their GNIs 37. ODA received in small island developing States as proportion of their GNIs
Target 14: Address the special needs of landlocked countries and small island developing states (through the Programme of Action for the Sustainable Development of Small Island Developing States and the outcome of the twenty-second special session of the General Assembly)	*Market Access* 38. Proportion of total developed country imports (by value and excluding arms) from developing countries and LDCs, admitted free of duties 39. Average tariffs imposed by developed countries on agricultural products, textiles and clothing from developing countries 40. Agricultural support estimate for OECD countries as percentage of their GDP 41. Proportion of ODA provided to help build trade capacity
Target 15: Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term	*Debt Sustainability* 42. Total number of countries that have reached their Heavily Indebted Poor Countries Initiative (HIPC) decision points and number that have reached their HIPC completion points (cumulative) 43. Debt relief committed under HIPC initiative, US$ 44. Debt relief as a percentage of exports of goods and services
Target 16: In co-operation with developing countries, develop and implement strategies for decent and productive work for youth	45. Unemployment rate of 15-24 year-olds, each sex and total
Target 17: In co-operation with pharmaceutical companies, provide access to affordable, essential drugs in developing countries	46. Proportion of population with access to affordable essential drugs on a sustainable basis
Target 18: In co-operation with the private sector, make available the benefits of new technologies, especially information and communications	**47. Telephone lines and cellular subscribers per 100 population** **48. Personal computers in use per 100 population and Internet users per 100 population**

Source: Adapted from the United Nations Statistics Division.

Figure 4.1: A decade of ICT progress

Total teledensity (main telephone lines and mobile users per 100 inhabitants), in 1992 and 2002, in developing regions



Note: Developed countries are excluded. For definitions of regions, see: www.worldbank.org/data/countryclass/classgroups.htm.
Source: ITU World Telecommunication Indicators database.

Of all the MDG targets, number 18 is perhaps where the most progress was made during the 1990s. As shown in Figure 4.1, all of the developing regions of the world have grown their fixed and mobile telephone networks at a faster rate since 1992 than in the entire period before that date. In the exceptional case of East Asia (which includes China), the number of telephone subscribers per 100 inhabitants (i.e. total teledensity) in 2002 was 24 times higher than in 1992. In all cases except in the developing Pacific, total teledensity was at least three times higher in 2002 than it was in 1992.

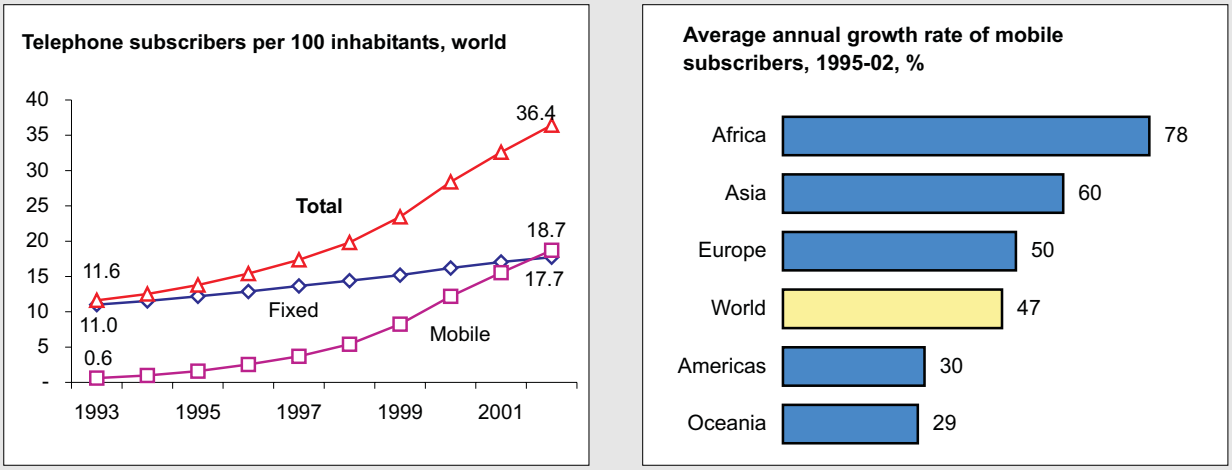
4.2.1 Total telephone subscribers per 100 inhabitants

The *total number of telephone subscribers per 100 inhabitants (total teledensity)* is the sum of fixed lines in operation and cellular mobile subscribers divided by the population of a country, and multiplied by 100. The possibility of double counting is the major drawback of using total teledensity since a subscriber could have both a fixed and mobile telephone. One way to overcome this is to use *effective teledensity* which may be defined as *either* fixed telephone subscribers *or* cellular mobile telephone subscribers per 100 inhabitants, whichever is highest. Effective teledensity is a better measure of total *coverage*, but not necessarily of *access*. In a home that has both a mobile phone and a fixed-line, there is more likely to be improved access between household members of different age or gender. For that reason, total teledensity is the preferred measure in the context of the MDGs.

Globally, access to telephone networks (fixed and mobile) tripled in the ten-year period 1993-2002 from 11.6 subscribers per 100 inhabitants to 36.4 (Figure 4.2, left). The most rapid growth occurred in the use of mobile phones due to the evolution towards second-generation wireless systems, liberalization of mobile telecommunication markets and introduction of prepaid cards. By the end of 2002, there were more mobile cellular subscribers than fixed telephone lines in the world.[2] Growth has been particularly strong in Africa (Figure 4.2, right), the first region where mobile overtook fixed and where almost all countries now have more mobile phones than fixed telephones. Mobile phones seem to grow faster in countries where incomes are declining than where they are growing (Box 4.1). Although this seems counter-intuitive, it indicates the high and often inelastic demand for mobile communications. Developing countries now account for almost half (49 per cent) of total telephone subscribers in the world, up from just 19 per cent in 1990.

Figure 4.2: Telephone subscribers

Main lines, cellular mobile and total telephone subscribers per 100 inhabitants, 1993-2002, world (left) and annual average growth in mobile cellular subscribers, 1995-2002, world regions, per cent (right)



Source: ITU World Telecommunication Indicators database.

4.2.2 Personal computers per 100 inhabitants

The second indicator for Target 18 is p*ersonal computers per 100 inhabitants*. Unlike data for telephone subscribers, obtaining data on PCs is often difficult. Few countries compile statistics on the number of computers in their country (although more do compile data on the number of computer users). Data collected from countries are supplemented by sales and import figures, adjusted to take into account the average life of a computer. However, these data are not widely available for developing nations. Sales and import figures can also be misleading because of re-shipment, re-assembly and evasion.

It is estimated that there were 615 million computers in the world at the end of 2002, up from just 120 million in 1990. One reason for this increase is that computers are the leading access devices for the Internet. Falling prices, reductions in trade barriers, domestic production, and greater functionality have driven computer sales. While developing countries accounted for around 20 per cent of computers in the world in the early 1990s, they now own about 30 per cent.

4.2.3 Internet users per 100 inhabitants

The third indicator used to monitor target 18 is the *number of Internet users per 100 inhabitants*. For most developed and larger developing nations, Internet user data are based on surveys conducted by national statistical agencies or market research associations. For economies where Internet user surveys are not available, data are generally estimated derived from average multipliers for the number of users per subscriber.

Cross-country comparison of the number of Internet users should be carried out with caution. The data for this indicator can be misleading and can be affected by the differences in the frequency of use (i.e. last week, last month, last year) and the services used (e.g. e-mail only). Also, different surveys carried out in the same country often show conflicting results due to differing sampling sizes and interview techniques. Convergence has also contributed to methodological ambiguity in counting Internet users, as in some countries Internet can be accessed using a mobile phone, personal digital assistant (PDA) or video game console.

In just over a decade since the first World Wide Web (WWW) browsers became available, the Internet has become an important means of communication for many. From only 27 economies that had a direct connection to the Internet in 1990, the figure grew to almost every country in the world by the end of 2002, corresponding to some 600 million users. Unsurprisingly, developed countries account for the lion's share of connected users: over half the adult

Box 4.1: For richer, for poorer

The United Nations Development Programme (UNDP) labelled the 1980s a "lost decade" for development and the 1990s a "decade of despair". Although average income per capita among developing and transition economies grew by three per cent per year during the 1990s, it declined in 54 developing economies. The majority of the economies that fared poorly during this period are in sub-Saharan Africa, though this group also includes the republics of the former Soviet Union. The developing countries of Asia and the Americas generally fared better. In other words, the decade was good for some, but bad for others, and the average figure disguises a wide variation in performance.

To what extent is the general economic performance of a particular economy correlated with its performance in ICTs? One answer to that question is to divide developing countries into two groups: those that grew richer during the period (as measured by gross national income (GNI) per capita), and those that grew poorer. The relative performance of the ICT sector can then be compared for the two groups.

The results are revealing (see the table below):

- For fixed-line networks, the first group (richer) grew their networks by almost ten per cent per year, which is more than three times the growth rate achieved by the second group (poorer).
- For mobile networks, the two groups performed at about the same level, with the second group (poorer) marginally outperforming the first group (richer).
- For Internet services, the first group (richer) outperformed the second group (poorer), though by not as much as for fixed lines.

Groups		*Compound annual growth rate in:*		
Based on change in GNI per capita, 1990-2001	*# of economies in each group*	*Fixed lines, 1990-2001*	*Mobile users 1995-2001*	*Internet users, 1997-2001*
1. Economies getting richer	78	9.3%	62.7%	71.8%
2. Economies getting poorer	54	2.8%	68.8%	58.7%

How can these differences in performance in different parts of the ICT sector be explained? It seems that the role of the State is the critical factor. For historical reasons, the government is usually closely involved in fixed-line telecommunications (through State-ownership of incumbents and regulation). It is not so involved in mobile communications, where the private sector usually plays the dominant role, typically in a more competitive environment. Internet is half way between the two, with the State often involved in providing the dial-up network, but the private sector involved in acting as Internet service providers (ISP).

In those economies whose citizens are getting poorer, the government may be regarded as failing, with the relative performance of different ICT sectors reflecting the level of State involvement. In those economies whose citizens are getting richer, the performance of the State does not hinder ICT market growth.

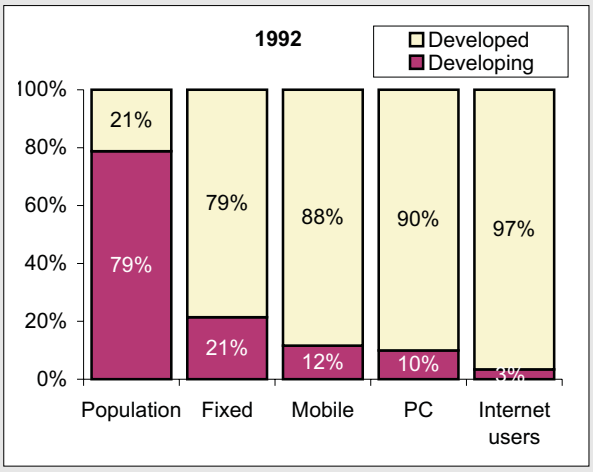
Given the focus in the Millennium Declaration on alleviating poverty, one could infer that mobile phones are likely to be more useful to poor households as there seems to be less price elasticity for mobiles than for fixed lines. Ultimately, it is the ability to communicate that is important, and mobile phones are more readily available to poor people in failing States than fixed-line telephones.

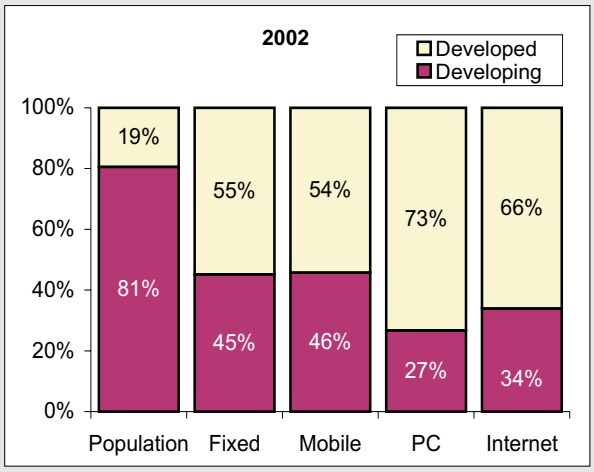
population is online in most developed countries. Just over ten per cent of all Internet users, and 22 per cent of all Internet subscribers have access to broadband connections, and the signs are that this figure is set to grow rapidly.

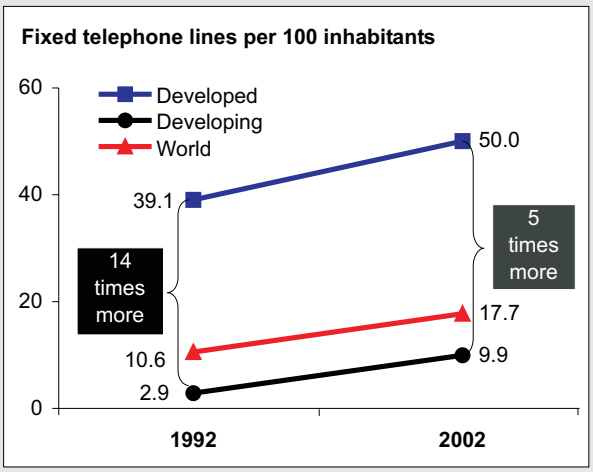
In some countries, third-generation mobile services have been launched that provide Internet access via mobile networks at speeds higher than a dial-up telephone line. At the same time, there are a growing number of locations around the world providing high-speed wireless Internet access for suitably equipped laptop computers at special locations (so-called "hotspots"). While developing countries' share of Internet users is less than their share of telephone subscribers (Figure 4.2, top left), the Internet has been growing fastest in these nations. In 2002, 34 per cent of users were in developing countries, a big jump from the three per cent in 1992.

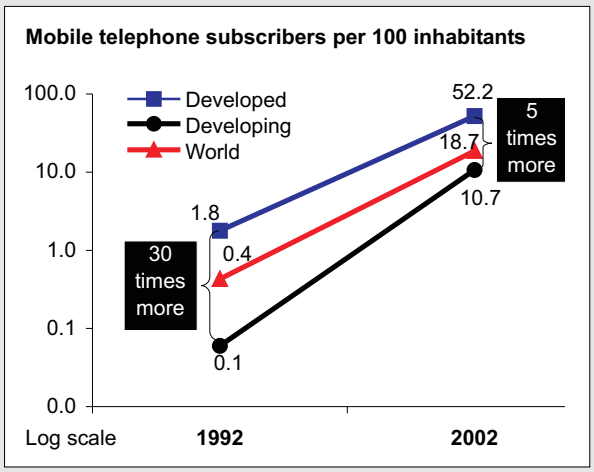
Figure 4.3: How wide the divide?

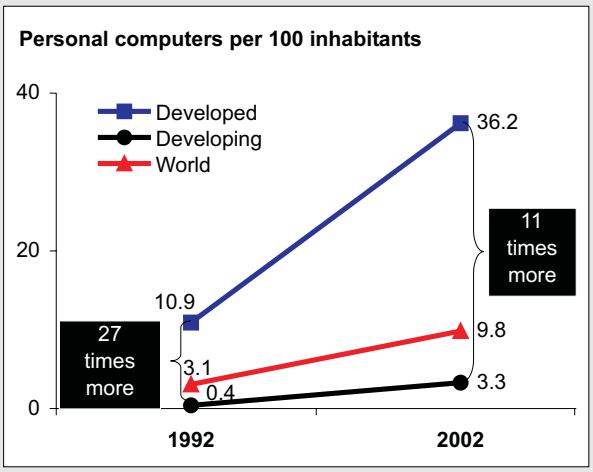
Distribution of population, fixed and mobile telephone subscribers, personal computers and Internet users and fixed and mobile telephone subscribers, personal computers and Internet users per 100 inhabitants, by economic grouping, 1992 and 2002

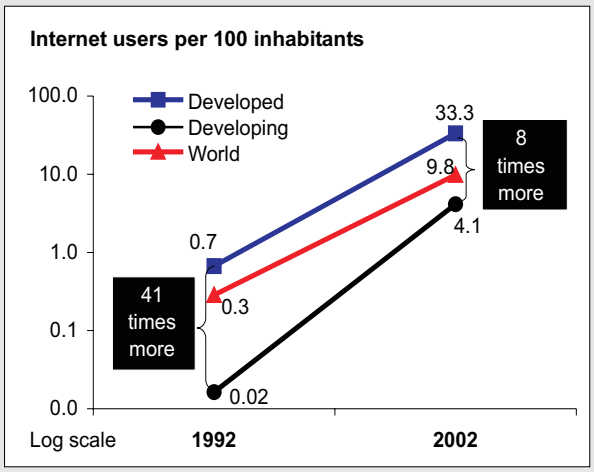












Note: Developed includes Western Europe, Australia, Canada, Japan, New Zealand and the United States. Developing refers to all other countries.
Source: ITU World Telecommunication Indicators database.

Box 4.2: ICT gender statistics

Like other indicators selected for the Millennium Development Goals (MDGs), a breakdown by gender is significant for information and communication technologies (ICTs). It was recognized that the achievement, measurement and analysis of MDGs differ according to the gender of the population. An agreement was made by statisticians and policy analysts to present the MDG indicators disaggregated by gender whenever possible.

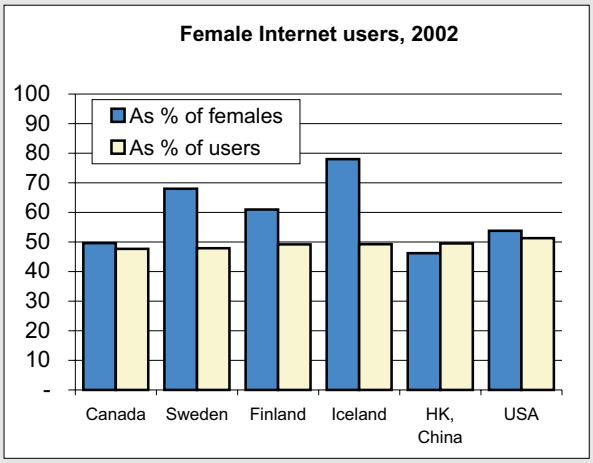
Unfortunately, the availability of gender-disaggregated statistics for ICT indicators is limited.[3] Data for the number of telephone subscribers and computers come from administrative records that do not break down the data by gender. Instead, analysis must rely on survey data. In the case of Internet users, surveys can show the profile of users, for instance by age, gender, frequency of use and educational attainment. Within gender, two indicators are relevant: *females using the Internet as a percentage of all Internet users* and *females using the Internet as a percentage of the female population*.

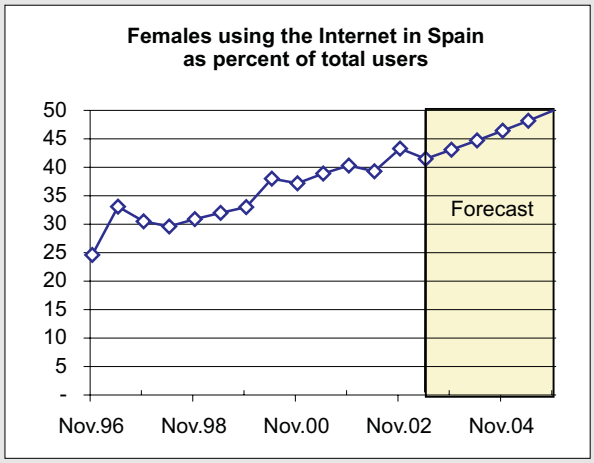
In the case of 39 economies where surveys are available with a breakdown by gender, a simple average indicates that 43 per cent of Internet users are female. The highest levels are found In North America and the Nordic nations (Box Figure 4.2, left). The latter group of countries is noteworthy for having the highest level of females online. For those economies where a time-series is available, the trend is towards an increasing proportion of female users over time (Box Figure 4.2, right).

The analysis of ICT gender aspects is in its infancy. One serious limitation is the lack of surveys in most developing countries. Only when surveys are in place will it be possible to go beyond the simple analysis of the share of women online to more serious reflection, such as why they are or are not online, the type of applications they use and the impact of ICTs on gender.

Box Figure 4.2: Internet use by gender

Top economies by highest percentage of females among total Internet users, 2002 (left) and percentage of females using the Internet among total Internet users, Spain (right)





Note: Data for Canada (2002) refer to age 15 and above; Sweden, Finland and Iceland (2001) age 16 and above; Hong Kong, China age 10 and above; and the United States (2001), age 3 and above. Data for Spain refer to age 14 and above.
Source: ITU World Telecommunication Indicators database.

4.3 Measuring the impact of ICTs on the Millennium Development Goals

On a general level, there is little doubt that ICTs are generating social, economic, cultural and political changes. However, it is difficult to quantify the impact of ICTs and to separate their influence from those of other factors, such as governance or economic growth. Although there is a growing body of evidence that ICTs have a significant macroeconomic impact (Box 4.3), it is not clear to what extent ICTs have helped to directly reduce major development concerns reflected in the MDGs such as poverty, hunger or sickness.

One reason for the lack of evidence is that MDG monitoring only started recently. Although possible impacts of ICTs have been identified by researchers (Table 4.2), the real effects of ICTs on the MDGs may never be fully known, and in any case will only

become clearer in the long term. Where monitoring and collecting data on the impact of ICTs on the MDGs is concerned though, the role of ICTs as tools for storing, processing and disseminating the statistics used to monitor the targets is indispensable. There are already several international MDG websites and it seems likely that national databases will be developed.[4]

There are numerous anecdotal accounts about ICTs dramatically improving and even saving lives. While useful for raising awareness, in order to provide a firm basis for evaluation these stories need to be translated into indicators to measure the impact of ICTs within and across countries. This is more difficult than it sounds, because of the lack of quantifiable information. Even where measures can be made, one-off data is not sufficient; in order to be useful, such data needs to be collected over a period of time for an accurate, and comparable measure of impact. Also, while the net effect of ICTs is generally perceived as positive, they can also have negative impacts on health and the environment, and can aggravate existing disparities (Box 4.4). Measurements of these effects are also worth carrying out.

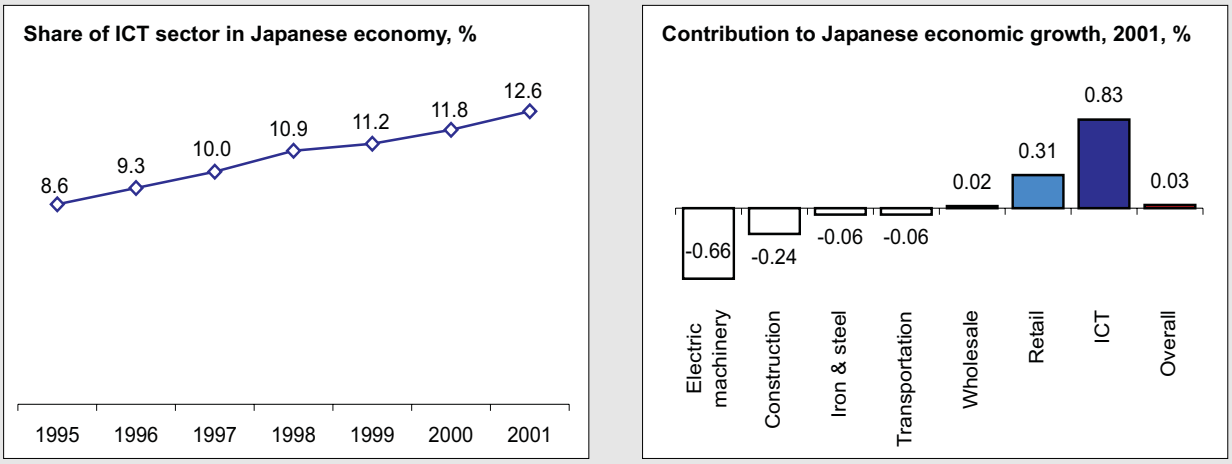
This section outlines indicators that could help measure the impact of ICTs on specific MDGs, although of course the range of impacts of ICTs on poverty, health, education and the environment is very wide. As one of the aims of these proposals, it is hoped to stimulate discussions among policy-makers, sector specialists and statistical experts, for example on the feasibility and refinement of these indicators and methods for collecting them.

Box 4.3: ICTs and the Japanese economy

Information and communication technologies (ICTs) are an important and growing part of the Japanese economy. Growth in the ICT sector in Japan has risen 9.3 per cent a year from 1995-2001 compared to just 1.2 for the overall economy. Indeed if it had not been for the ICT sector, the Japanese economy would have been in recession in 2001 (Box Figure 4.3, right). The rapid growth of ICTs has seen that sector's share of Gross Domestic Product (GDP) rise four percentage points from 8.6 in 1995 to 12.6 in 2001 (Box Figure 4.3, left). The ICT sector employs 3.8 million, 7.1 per cent of the labour force and is now Japan's third largest employer. It is not only the ICT sector itself which is important but also investment by other industries in telecommunications and computer hardware and software. The Japanese government reckons that the ¥ 25'024 (US$ 206) billion investment in ICTs in 2001, generated some ¥ 40'692 (US$ 335) billion and created 1.5 million jobs. No wonder the Japanese government is keen about ICTs being a core component of its drive to a "New Japan-Inspired IT Society".[5]

Box Figure 4.3: Towards the new, Japan-Inspired IT Society

Share of ICT sector in Gross Domestic Product, 1995-2001 (left) and contribution of different sectors to GDP growth, 2001(right), per cent, Japan



Source: ITU adapted from MPHPT (Japan).

Box 4.4: The downside of ICTs

While it is generally agreed that the net effect of information and communication technologies (ICTs) on reducing poverty and hunger, enhancing education and gender equality, and improving health and environmental sustainability is positive, ICTs do have their downsides.

In the area of health, for example, there have been numerous allegations over the years about the dangers of excessive use of ICTs. Electromagnetic fields from antennas and mobile phones are alleged to emit radiation that can cause cancer and other illnesses.[6] Other studies have shown links between extensive computer use and physical ailments such as poor eyesight due to flickering and reflection on the screen and muscular pain caused by static and poor posture. Excessive movement of the wrist and hand have been said to lead to inflammation of the tendon and carpal tunnel syndrome.[7] Another modern-day illness related to increased use of computers and the Internet is *infostress* related to an overwhelming load of information.[8] Excessive use of modern ICTs can even be deadly. In the Republic of Korea, where online game addiction has become a serious problem, a teenager died at his terminal in an Internet café after three days of continuous playing.

Also with regard to health, while the Internet has afforded greater public information and autonomy in understanding health matters, not all the information available on the Internet is reliable. The danger is that false or misleading information may be harmful to those seeking to diagnose and treat themselves, or even to treat others.[9] Similarly, the growing amount of spam, viruses and hacking incidents are not only bad for the constructive benefits of ICTs and an inconvenience to users, but can also have serious safety consequences.

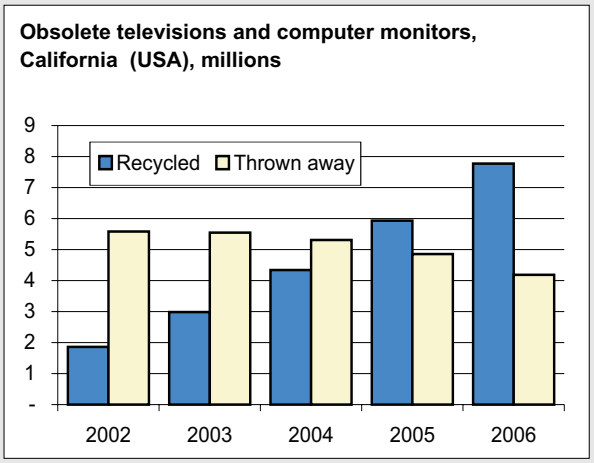
While there has been much talk about e-government, e-education, and e-health, e-waste is perhaps a less-documented, but increasingly distressing area of concern. Rapidly expanding ICT diffusion and more computers brings with it new environmental and related health problems. The number of worldwide PCs in use has doubled, from 288 million units in 1997 to 584 in 2002. With the average life span of a computer constantly shrinking, the number of obsolete PCs is increasing.[10] ICT devices such as computers, scanners and screens are made with lead, arsenic, hexavalent chromium and other toxins. Only some parts are recyclable and toxic waste can leach into groundwater and pose serious health hazards. In the US state of California alone it is estimated that some 7.4 million Cathode Ray Tubes (CRTs) from televisions and computer monitors became obsolete in 2002.[11] This figure is projected to rise to 12 million by 2006. Even under the most optimistic recycling assumptions, some four million CRTs will still be dumped in the garbage by 2006 (Box Figure 4.4, left). Particularly distressing and working against achieving the MDGs is the fact that some e-waste, instead of being recycled, is simply exported from rich to poor nations. According to studies, in 2002 over 50 per cent of the United States' e-waste was shipped to developing countries where environmental regulations are weak or non-existent.[12]

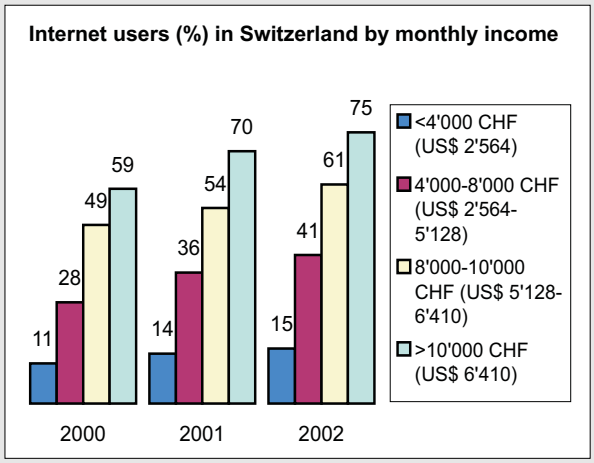
On a social level, ICTs can also exacerbate existing inequalities. Access to ICTs remains largely a function of affordability in many countries, with the risk that existing inequalities are reinforced or exacerbated. Indeed, an analysis of the digital divide between, but also within, countries shows that those with higher incomes are the biggest users of the Internet (Box Figure 4.4, right). Telework and ICT-based distance training have been cited as major opportunities for women to work or be educated from home and thus increase gender equality. Sceptics might argue that these online replacements keep women at home, reinforcing existing barriers to equality.

Only a clear understanding of these issues can help limit the negative effects of ICTs. Identifying hazards, designing indicators and collecting data must be part of this undertaking.

Box Figure 4.4: ICTs working against the MDGs

Number of obsolete televisions and computer monitors, California (USA), 2002-2006 (left) and Internet users by income group, Switzerland (right)





Source: ITU adapted from Silicon Valley Toxics Coalition and Swiss Federal Statistical Office.

Table 4.2: How ICTs can help achieve the Millennium Declaration Goals

Goal/Target	*Role of ICTs*
1. Eradicate extreme poverty and hunger Halve, between 1990 and 2015, the proportion of people whose income is less than one dollar a day Halve, between 1990 and 2015, the proportion of people who suffer from hunger.	Increase access to market information and reduce transaction costs for poor farmers and traders. Increase efficiency, competitiveness and market access of developing country firms. Enhance ability of developing countries to participate in global economy and to exploit comparative advantage in factor costs (particularly skilled labour).
2. Achieve universal primary education Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling	Increase supply of trained teachers through ICT-enhanced and distance training of teachers and networks that link teachers to their colleagues. Improve the efficiency and effectiveness of education ministries and related bodies through strategic application of technologies and ICT-enabled skill development. Broaden availability of quality educational materials/resources through ICTs.
3. Promote gender equality and empower women	Deliver educational and literacy programmes specifically targeted to poor girls and women using appropriate technologies. Influence public opinion on gender equality through information or communication programmes using a range of ICTs.
4. Reduce child mortality 5. Improve maternal health 6. Combat HIV/AIDS, malaria, and other diseases Reduce infant and child mortality rates by two-thirds between 1990 and 2015 Reduce maternal mortality rates by three-quarters between 1990 and 2015 Provide access to all who need reproductive health services by 2015	Enhance delivery of basic and in-service training for health workers. Increase monitoring and information-sharing on disease and famine. Increase access of rural caregivers to specialist support and remote diagnosis. Increase access to reproductive health information, including information on AIDS prevention, through locally appropriate content in local languages.
7. Ensure environmental sustainability Implement national strategies for sustainable development by 2005 so as to reverse the loss of environmental resources by 2015 Halve, by 2015, the proportion of people without sustainable access to safe drinking water. Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers.	Remote sensing technologies and communications networks permit more effective monitoring, resource management, mitigation of environmental risks. Increase access to/awareness of sustainable development strategies, in areas such as agriculture, sanitation and water management, mining, etc. Greater transparency and monitoring of environmental abuses/ enforcement of environmental regulations. Facilitate knowledge exchange and networking among policy-makers, practitioners and advocacy groups.

Source: ITU adapted from Department for International Development (United Kingdom).

4.3.1 ICTs and eradicating extreme poverty and hunger

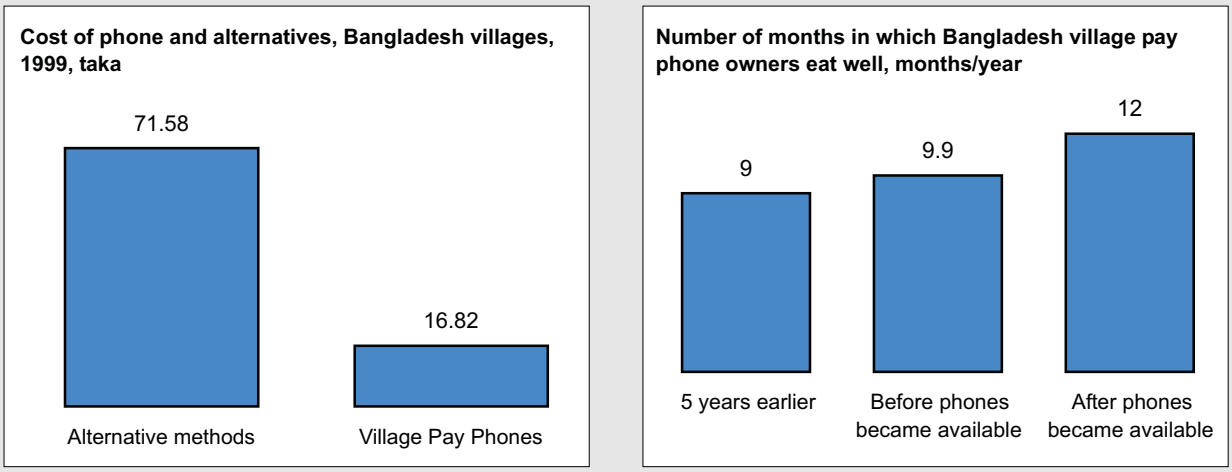
Goal one of the MDGs has the targets of halving the proportion of people whose income is less than one dollar a day, and halving the proportion of people who suffer from hunger. A number of macroeconomic indicators currently are used to measure the impact of ICTs on creating wealth and employment. These include the contribution of the ICT sector to the economy, the contribution of ICT investment to economic growth and the number of workers in the ICT sector. These statistics help to quantify the link between ICT and wealth creation at the level of the national economy in a general way. But while capturing the global picture, these indicators fail to measure specific, micro-level and people-oriented indications of the role of ICTs in lessening poverty and hunger.

One way in which ICTs do have a direct impact on people's livelihoods — particularly for many developing countries where agriculture is the main source of family income — is by raising crop and livestock yields, thereby reducing both poverty and hunger. ICTs improve agricultural practice through access to information on crop selection, irrigation, fertilizers and fishing and livestock conditions. "Village Knowledge Centres"—facilities with ICTs including Internet access—have, for example, been established at several locations in the Indian state of Pondicherry. Information in the centres' agricultural databases have helped save farmers' crops from pests and increased yields. Weather information such as wave heights is also downloaded and disseminated to fishermen, contributing to maritime safety and increasing fish catches.[13] The *use of ICTs by farmers/ fishermen* could be an indicator of how use of ICTs improves agricultural practice.[14]

Another way that ICTs assist agricultural workers is through price information. There are numerous examples of ICTs being used to relay market information to farmers and fishermen, helping them get a better price for their products and minimizing costly and time-consuming trips to market. The result is increased incomes.[15] These benefits also accrue to other poor households, allowing them to increase earnings or save, resulting in more money available for necessities such as food. Research from a "Village Pay Phone" project in Bangladesh indicates that providers of telephone service managed to eat well 12 months of the year compared to only 9.9 months prior to when telephones became available (Figure 4.4, right).[16] The study also suggests that users of Village Pay Phones save up to four times more in terms of opportunity costs (considering the time spent and transport costs if telephones were not available, Figure 4,4, left). The indicator: *increase in incomes and savings of poor households from the use of ICTs* could measure this.

Figure 4.4: Phones, poverty and hunger in Bangladesh

Impact of the Village Pay Phone project in Bangladesh, 1999



Note: The left chart shows opportunity costs of alternative methods to phones in terms of time spent and transport.
Source: ITU, adapted from ZEF Bonn, Germany.

4.3.2 ICTs and achieving universal primary education

There are a number of barriers to achieving the MDG target of all children receiving primary school education. One of the most pervasive is a shortage of facilities and teachers, often due to financial constraints.[17] ICTs can help overcome these shortages in an efficient and economical way for countries facing budgetary limitations.[18]

ICT-based distance training can help overcome a lack of primary school teachers by accelerating instruction.[19] This is particularly relevant for countries with large rural areas where potential teachers have difficulty travelling to formal learning centres. There are a number of examples of primary teacher distance-education programmes in developing nations.[20] ICTs can enhance distance education through more rapid and interactive dissemination of learning materials compared to traditional correspondence-based formulas. Several nations have integrated old and new ICTs into primary teacher education programmes. Examples include Nepal where training is delivered over radio to around 9'000 aspiring teachers[21] , as well as Latin America, where a course from Mexico is beamed over satellite and the Internet to some 1'800 teachers throughout the region.[22] Widespread adoption of ICT-based training could help alleviate the teacher shortage and increase the capacity of countries to enrol more primary school students. One indicator to measure this would be the *number of primary school teachers trained through ICT-based education.*

ICTs can also supplement primary school teaching, thereby helping to overcome shortages. For example, a number of countries use radio programmes to broadcast subjects to primary schools while others have gone further integrating ICTs such as CD-ROMs and web-based software into the daily instruction time.[23] An indicator that could measure the impact of new technologies for teaching students might be the *number of primary school pupils using ICTs for learning*.

ICTs could also be used to emphasize the importance of primary school attendance particularly where there are strong social or cultural barriers to doing so. Radio and television broadcasts could be used to emphasize this with a possible indicator of the *number of students enrolled in primary school as a result of radio / television broadcasts*.

Finally, many countries suffer from a shortage of primary school textbooks that affects learning and causes students to drop out.[24] ICTs can help overcome this limitation through electronic learning materials. Students in a rural primary school in the United States used the Internet to get information about geography with the teacher noting "You would need a couple dozen textbooks to get through all the information they wanted".[25] The growing trend towards the production of electronic textbooks could alleviate shortages in developing countries through innovative distribution techniques. The indicator *number of primary school learning materials provided through ICTs Internet* could measure this.

4.3.3 ICTs and promoting gender equality and empowering women

Goal three of the MDGs has the specific target to "eliminate gender disparity in primary and secondary education preferably by 2005 and in all levels of education no later than 2015". ICTs promote gender equality by providing online opportunities to women that are not always available in the "off-line" world. A woman's traditional role as homemaker and mother can inhibit the ability to attend school. In some countries, social customs make it difficult for women to participate in activities that involve mixing with men.[26] In some cases, female school enrolment begins to taper off at childbearing age due to pressure to marry and have children. ICT can help overcome these barriers through applications such as distance education.

One area of measuring the impact ICTs on promoting gender equality is in ICT-based training. This is particularly relevant for tertiary education where students are not only mature enough to participate in ICT-based training but also where other activities such as employment or caring for children prevent them from participating in campus based education. Studies have found that female participation in distance education outnumbers men in many countries.[27] The *number of females enrolled in ICT-based distance education* can help evaluate the impact of ICT on enhancing equality in education. In Australia, data show that four fifths of employed women enrolled in distance-education are members of family; of those, one-third have children under the age of 15.[28] Open Learning Australia (OLA) offers higher education through a combination of distance and on-line teaching. In 2002, there were 6'129 students enrolled in OLA of which 3'485 were females (56.9 per cent). This is higher share than in overall higher education (54.9 per cent). As a result of OLA enrolment, female tertiary school enrolment is 0.8 per cent higher. The impact would be far greater in developing nations than in Australia where there are already a large number

of higher educational institutions with a large share of female enrolment.

4.3.4 ICTs and improving maternal health and combating HIV/AIDS, malaria, and other diseases

MDG goals 4-6 deal with health and have the specific targets of reducing infant and maternal mortality and halting and reversing the spread of HIV/AIDS, malaria and other major diseases. One of the main causes of death among young children is a lack of knowledge regarding childhood diseases. Access to information through the Internet could help medical practitioners and parents find solutions to treat sick children. In the United States, a telemedicine project found those parents who used the facility reported a 10 per cent higher quality of child care than those who did not.[29] The *percentage of parents using ICT-based health tools* could measure the impact of ICTs for enhancing infant health.

In a similar area, research has shown that the main factor impacting successful births is the presence of skilled attendants.[30] Midwives, nurses or doctors attend some 60 per cent of the births around the world. The challenge is to raise this figure and to enhance the training of skilled attendants. ICTs can help in this effort through more rapid diffusion of information about good maternal practice. The World Health Organization's (WHO) electronic Reproductive Health Library (RHL) consists of pregnancy information on diskettes and CD-ROMs accessible through computers. This assists health workers who do not have access to the latest reliable information because of the high cost of journals or unreliable delivery. The interactive RHL is being trialled in 22 hospitals in Mexico, and 18 in Thailand, to determine if interactive dissemination of information improves obstetric practice. Computer databases can also model the impact of the existing situation in maternal health calculating how many lives could be saved and disabilities avoided through proper attention. For example a computer-modelling tool showed that 5'500 infants died each year in Ghana due to sub-optimal breast-feeding.[31] The Dreyfus Health Foundation Communications for Better Health (CBH) program has established interactive centres in 14 countries for the dissemination of computerized health information. The CBH system contains a vast amount of computerized information for example on local practices, and some of it is in local languages. It has been distributed to some 1'000 health facilities in Ghana including maternal and child centres. The system is being further expanded to localize information and create digital videos aimed at enhancing maternal health.[32] A July 1999 evaluation of a maternal health project in the Tororo district of Uganda based on radio technology, found that maternal mortality dropped 50 per cent following implementation of the project.[33] The *decrease in the number of maternal/infant deaths because of use of ICTs* is an indication that ICTs have an important role in saving both mother and child.

An often overlooked, older ICT, radio, can be an important vehicle to improve awareness about the prevention of deadly diseases. A broadcast campaign aimed at reducing the incidence of HIV/AIDS among the young in the Dominican Republic found that a majority of listeners and viewers remembered the advertisements, retaining messages such as the need for protection and fewer partners.[34] Radio soap operas that dramatize the impact of HIV/AIDS also have an effect. In Tanzania, 82 per cent of listeners surveyed said they had adopted a method of prevention as a result of listening to a radio soap opera, while in South Africa a majority of respondents indicated that they gained the most useful information about the disease from a radio dramatization.[35] A January 1995 - September 1998 evaluation of an entertainment-education radio soap opera on family planning and HIV prevention in St. Lucia found that condom imports rose 143 per cent after the programme was aired.[36] A possible indicator for measuring the impact of media campaigns on HIV/AIDS (as well as other diseases) prevention could be the *number of people that adopted healthy lifestyles as a result of broadcasting*.

The Internet also plays a role in HIV/AIDS prevention. It has vastly expanded the amount of information available for health workers and the public. The Internet also offers anonymity to those that might be embarrassed about discussing sexually related diseases in person. It allows users to contact others, establish support groups and obtain advice.[37] A possible survey-based indicator for measuring the impact of ICTs on preventing disease could be the *percentage of population who feel the Internet has helped them adopt a healthy lifestyle*.[38]

4.3.5 ICTs and environmental sustainability

MDG Goal 7 has three associated indicators: integrating the principles of sustainable development into country policies and reverse loss

of environmental resources; halve the proportion of people without access to safe drinking water and achieve a significant improvement in the lives of slum dwellers.

ICTs enable greater participation by the population in activities to protect the environment through networking, and information exchange.[39] ICTs also provide researchers with critical tools for the observation, simulation, and analysis of environmental processes.[40] Environmentally friendly work habits are promoted through ICTs in areas such as the reduction of paper and working from home. All of these contribute to sustainable development and protecting environmental resources.

ICTs also allow activities such as work, shopping, personal finance, health and education to be carried out online. This can reduce vehicular traffic to offices, shops, banks, doctors and schools, resulting in less pollution. Indicators such as the number of teleworkers, Internet banking subscribers, consumer-to-business e-commerce transactions and students enrolled in ICT-based distance training already exist in some countries. The challenge is to map these statistics to environmental change. For example, in Ireland, the 2.3 per cent of the employed population who are teleworkers have no need to drive to work (Figure 4.5, left). More teleworkers could help reduce Ireland's greenhouse gas emissions that rose 82 per cent between 1994 and 2000.[41] Another area of research would be to determine if the promise of the paperless office—one of the oft-cited benefits of ICTs—is being fulfilled. Has there been a reduction in paper production—and a corresponding reduction in the destruction of forest areas—as a result of increased use of electronic documentation and communication (Figure 4.5, right)?[42]

Water is an important environmental resource that is threatened in many parts of the world. ICTs improve access to safe water in a number of ways. Computerized monitoring combined with geographical information systems and databases can measure water quality and pinpoint sources of pollution; satellites can locate new sources of water and information technology helps consumers use water more efficiently.[43] These give rise to a number of indicators such as *number of polluted water supplies found through the use of ICTs, new sources of fresh water discovered through ICTs* and *the amount of drinkable water conserved through ICTs*.

Other roles played by ICTs include the facilitation of improvement of human living conditions and access to fundamental life resources. The environment

Box 4.5: No Smoking

The World Health Organization (WHO) estimates that four million people die around the world annually due to tobacco use. If unchecked, the figure could reach ten million by 2030. There are numerous studies indicating a strong link between tobacco advertising and product sales. Just one example was a 1988 RJ Reynolds media campaign aimed at the youth market. It featured 'Joe Camel', a cartoon figure to advertise their cigarettes. Within two years, Camel sales grew from $ 6 million to $476 million — a 80 — fold increase.[44]

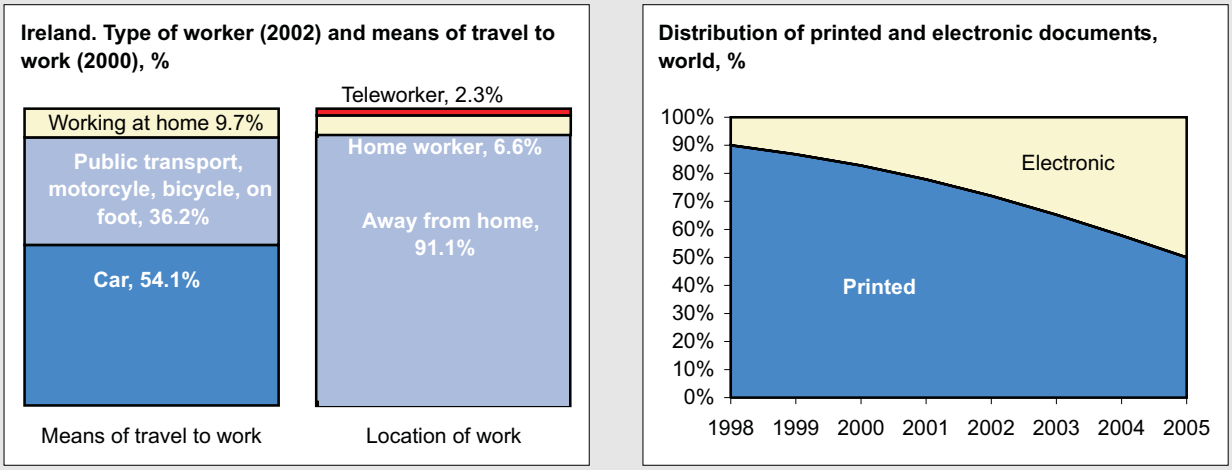
The challenge is whether anti-smoking campaigns can equal or even exceed the effectiveness of smoking advertisements. In fact, it was as early as the 1960s that the effects of public anti-smoking campaigns began to be felt. The Fairness Doctrine carried out between 1967-1970 in the United States, required television networks to provide one anti-smoking messages for every three cigarette advertisements.[45] Research has shown that the anti-smoking messages resulted in a decline in per capita cigarette consumption of at least five per cent, and a reduction in the prevalence of teenage smoking of three per cent. The Fairness Doctrine came to an end in 1970; smoking began to rise in 1971.

Using different media to publicize the same message multiple times can maximize the impact of smoking cessation messages. Most commonly, each message is disseminated through broadcast media, print advertising and other forms (e.g. outdoor billboards). These approaches need to be supplemented not only by non-traditional advertising outlets (e.g. the Internet), but also through telephone help lines. The latter give smokers who are trying to quit, personalised, anonymous, and expert support when needed. Help lines can also be popular. In New Zealand, for example, the numbers of calls to telephone help lines increased by almost 400 per cent as a result of increased advertising on television. In California, non-smoking messages had to be withdrawn several times because the resulting call volumes were too high for help line staff to manage.

The use of the Internet for advertising has increased and this new media has become a new battleground for tobacco control advocates and pro-tobacco forces. More research is required to measure the impact of strategies conducted by both sides on websites and chat rooms.

Figure 4.5: Is there a link?

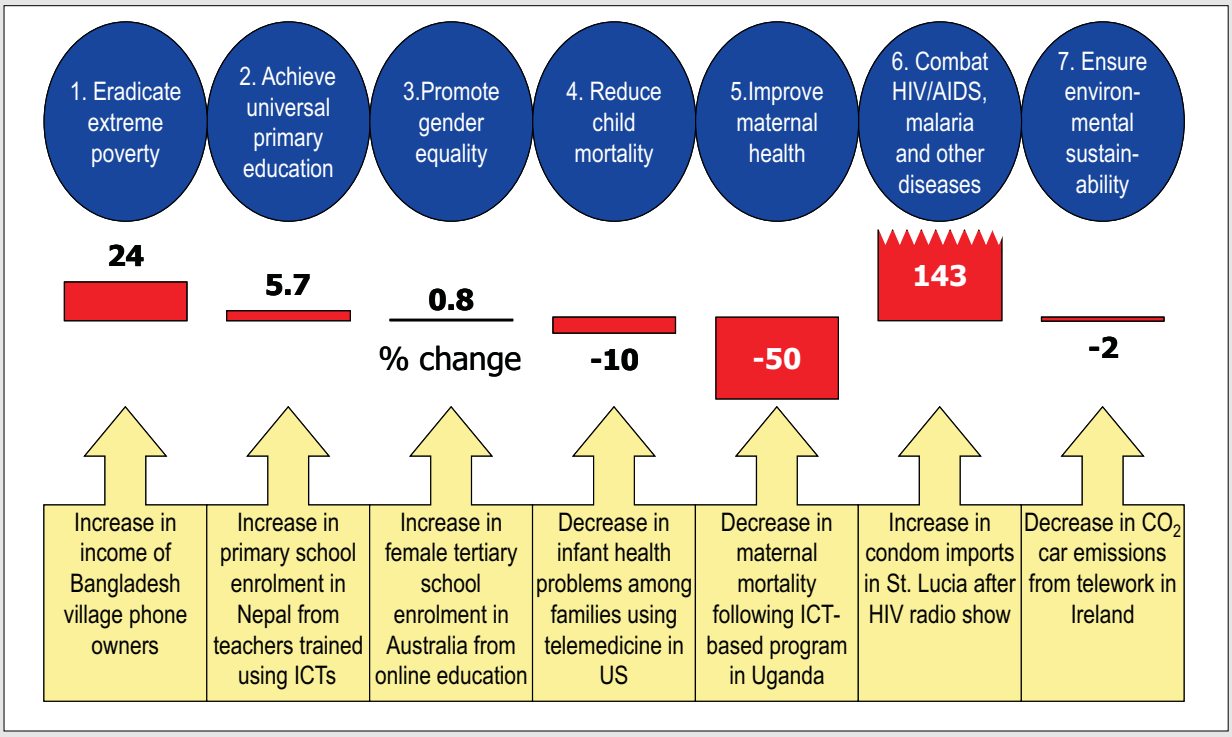
Means of travel to work (2000) and location of work (2002), Ireland (left) and distribution between printed and electronic documents, 1998-2005 (right)



Note: Data in the right chart have been estimated based on the trend between 1998 and forecast for 2005.
Source: ITU adapted from Central Statistics Office (Ireland) and Microsoft.

Figure 4.6: The impact of ICTs on the MDGs

Percentage change in different MDG indicators caused by ICT-based activities



Source: ITU.

of slum dwellers is characterized by poor infrastructure and poor access to services. ICTs can enhance monitoring of existing housing and the design and construction of new houses in poor urban areas.[46] ICTs can also benefit the quality of life of slum dwellers by delivering services such as government, education and health information online. ICTs also create economic opportunities through online promotion and sale of products, access to employment information and training. Slums in Brazil, India and Kenya are three examples where innovative ICT projects are working to improve the lives of the local community.[47] Suitable indicators include *number of slum dwellers trained in ICTs*, *number of slum dwellers using ICTs* and *number of slum dwellers whose lives have improved because of ICTs*.

Table 4.3: How ICTs can impact the MDGs
Selected examples

MDG	*Indicator*	*Impact*
Goal 1. Eradicate extreme poverty and hunger	Increase in income from ICTs	A 1999 study of so-called Village Pay Phone (VPP) owners in 50 villages in Bangladesh found that income from providing phone service constitutes 24 per cent of these households' total income.
Goal 2. Achieve universal primary education	Primary school teachers trained by ICT-based education	In Nepal an average of 4'430 people were being trained as primary school teachers using radio-based distance education in 2001. Based on the current student-to-teacher ratio of 40, an additional 176'616 new primary school students could be enrolled once these teachers complete their training. This would raise the net primary school enrolment rate 5.7 per cent.
Goal 3. Promote gender equality and empower women	Females enrolled in ICT-based education as percentage of total female tertiary enrolment	Open Learning Australia (OLA) offers higher education through a combination of distance and on-line teaching. In 2002, there were 6'129 students enrolled in OLA of which 3'485 were females (56.9 per cent). This is higher share than in overall higher education (54.9 per cent). As a result of OLA enrolment, female tertiary school enrolment is 0.8 per cent higher.
Goal 4. Reduce child mortality	Percentage of parents of small children using ICT-based health tools	Baby CareLink is a telemedicine program for parents of infants in the United States. A 1997-99 evaluation of 56 patients found those parents who used Baby CareLink reported a 10 per cent higher quality of care than those who did not use Baby CareLink.
Goal 5. Improve maternal health	Percentage of maternal health workers using ICTs	A July 1999 evaluation of a maternal health project in the Tororo district of Uganda based on radio technology, found that maternal mortality dropped 50 per cent following implementation of the project.
Goal 6. Combat HIV/AIDS, malaria and other diseases	Percentage of adult population adopting health lifestyle after exposure to ICT-based health information	A January 1995 - September 1998 evaluation of an entertainment-education radio soap opera on family planning and HIV prevention in St. Lucia found that condom imports rose 143 per cent after the program was aired.
Goal 7. Ensure environmental sustainability	Teleworkers as percentage of total in employment	There are 38'700 teleworkers (Q3 2002) in Ireland (2.3 per cent of total in employment). A little over half (54.1 per cent) of those employed in Ireland drive to work. On average, a private car emits 0.00582 kilograms of CO_2 emissions per year. Therefore those who telework—and therefore work at home—cause a reduction of 2 per cent in CO_2 emissions by not having to drive to work. If all those in Ireland who say there job lends itself to teleworking (28 per cent of total employment) could telework, there would be a 30 per cent reduction in CO_2 emissions.

Source: ITU.

4.4 WSIS objectives, goals and targets

While the MDGs set out goals and targets relating to ICTs, they omitted specifying global deadlines and targets in this regard. This is remedied to some extent in the WSIS draft Plan of Action. The latest draft contains ten targets relating to ICT access, to be achieved at the latest by 2015.[48] These targets derive from the different inputs to the drafting process. How realistic are the targets? And how can they be monitored? One issue is that many of the targets are vague, making it difficult to define precise indicators for measuring them. Another issue is that most are infrastructure based. As is obvious from the analysis below, many of the targets have already been, or are close to being, achieved in terms of infrastructure availability. Thus while a majority of the world's inhabitants will have theoretical access to most ICTs in the future, their ability to use them will depend on knowledge and affordability.

Target 1: To connect villages with ICTs and establish community access points.

In monitoring this target, there are several methodological difficulties:

- What constitutes a village? For instance, in Mexico, there were 197'930 localities with a population of less than 4'999 tabulated in the 2000 Census. Of those, three quarters are in localities with a population of less than 100, of which practically none has telephone service (Figure 4.7, left). However, the population living in those small villages only accounts for 2.7 per cent of the total in the country. Overall, only six per cent of the population is without access to telephone service. For the purposes of measurement, it might be necessary to specify a minimum village size of, say, 100 people, for international comparisons (Figure 4.7, right).

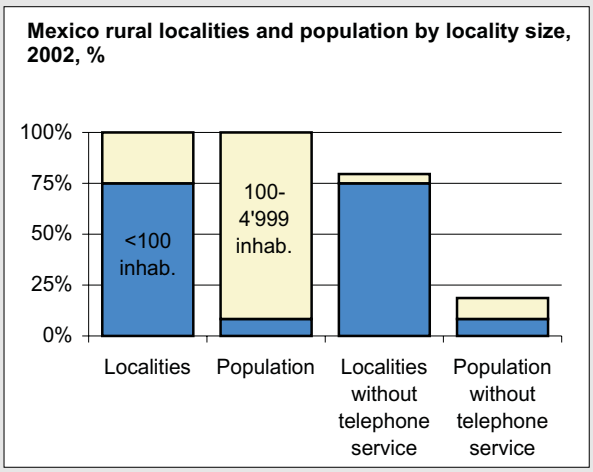
- What are the boundaries of a village? In areas of highly dispersed or migrant populations, a central access point may not be very useful.

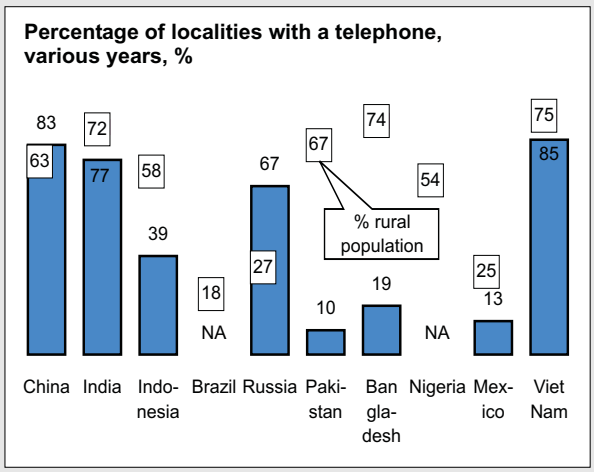
- What does it mean to be "connected"? The vagueness in the WSIS draft Plan of Action is deliberate in the sense that it seeks to be technologically neutral (not specifying if the connection should be fixed or mobile and not specifying a minimum connection capacity). However, the costs of providing every village with an Internet connection (which would normally require a computer and modem) would be higher than just providing a telephone connection.

- What is a community access point? Again there is some ambiguity over this target, but the main intention is to highlight the importance of shared access (for instance, through a school, post office, Internet café, public call box, etc). Technological

Figure 4.7: Connecting villages

Distribution of rural localities by population size and availability of telephone service, Mexico, 2002 (left) and percentage of localities with telephone service, top ten countries with largest rural population, various years (right)





Source: ITU research and SCT (Mexico).

neutrality again dictates that the precise means of access, and the quality, is left open to local interpretation and implementation.[49]

- How many villages are there? It is hard to say because there is no comprehensive database about the number of villages worldwide, let alone about those with telephone service. ITU has carried out research in South Asia and Africa with mixed results. Many telecommunication authorities and national statistical offices were unable to provide the necessary data. It is clear that a starting point for measuring this target would be a broad effort to tabulate the existing status.

Is this target realistic? Extrapolating from available data, it is estimated that some 1.5 million villages in developing nations remain unconnected to telephone networks.[50] Assuming a figure of around US$ 750 per village for telephone service or up to US$ 4'200 per village including Internet access, the total amount would be US$ 1.1 billion for telephone service or up to US$ 6.3 billion including Internet access.[51] This works out at between US$ 90 – 525 million per year from 2004-2015. Global coordination of the project would help to bring down costs significantly, for instance by providing a standardized solution and allowing for bulk purchasing of equipment and capacity. But it does require a political commitment, at both national and international level.

Target 2: To connect universities, colleges, secondary schools and primary schools with ICTs.

Target 3: To connect scientific and research centres with ICTs.

Target 4: To connect public libraries, cultural centres, museums, post offices and archives with ICTs.

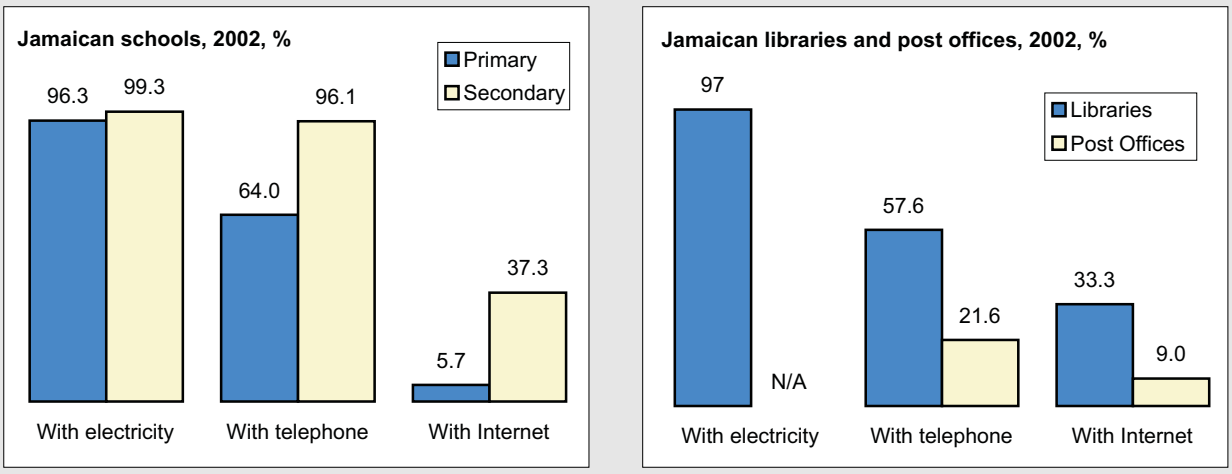
Target 5: To connect health centres and hospitals with ICTs.

Target 6: To connect all local and central government departments and establish websites and e-mail addresses.

Targets 2-6 are concerned with the availability of ICTs in different sectors such as education, health and government, an area dealt with at more length in Chapter three of this report. These targets can be seen as being closely related to target one, which calls for all villages to be connected, and to target ten, which aims for half of the world to have access to ICTs. The widespread availability of ICTs in schools, libraries and post offices would significantly enhance access around the globe. As with target one, the definition of what it means to be "connected … with ICTs" is vague, with the emphasis therefore being on the infrastructure capability to connect rather than specifying any particular service.

Figure 4.8: Connecting schools, libraries and post offices in Jamaica

Percentage of primary and secondary schools with electricity, telephone service and Internet access (left) and percentage of post offices and libraries with electricity, telephone service and Internet access (right) Jamaica, 2002



Source: ITU adapted from Office of Utility Regulation, Jamaica.

Most developed countries and some developing ones have already achieved these targets. They also remain relevant for the majority that have not. Even for those that have high levels of achievement, getting connected is just the first step to using ICTs efficiently and effectively. The existence of these targets is an important element in the action plan because it shows that governments and other stakeholders have recognized the importance of public access in a world where commercial access to ICTs is unaffordable for many in developing nations. There is no mention of connecting business, presumably because this is not something governments would do. However, government policies can significantly impact the ability of businesses to get connected.

As noted in chapter three, there is a grave measurement problem with targets 2-6. Although some developing countries compile the necessary statistics (Figure 4.8), most do not. Resources are needed to take stock of exactly where the world is in accomplishing these targets.

Target 7: To adapt all primary and secondary school curricula to meet the challenges of the Information Society, taking into account national circumstances.

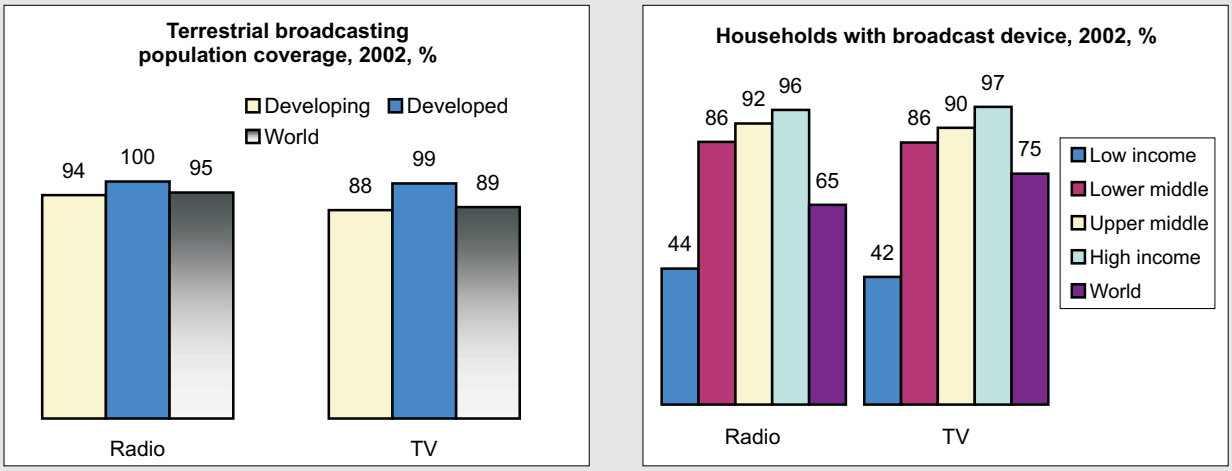
This target is one of the most sensitive. During the WSIS Preparatory Committee meetings, several developed nations expressed uneasiness about their ability to meet the target. If developed countries feel unable to meet this target, what hope is there for developing countries? In reality, this is not a target with an end date but rather a commitment to continually update curricula. The challenges of the information society in 2015 will be much greater than they are now. It will be essential to introduce children to the basic tenets of how to maintain their privacy and apply principles of security. It would also be good to teach them about proper etiquette. And, of course, the basics of computer use should be an important part of any educational curriculum.

Target 8: To ensure that all of the world's population has access to television and radio services.

Target 8 has two aspects: access to broadcast signals and to devices (i.e. radio and television sets). The first of these has already almost been achieved, with terrestrial radio and television coverage figures at 95 and 89 per cent respectively. Access to devices is not far off. Surprisingly, among all income groups except the lowest, more households around the world have a television than a radio.[52] Even in the lowest income groups, the levels are close, with 44 per cent having a radio and 42 per cent having a television. Globally, 75 per cent of households have a television while 65 per

Figure 4.9: Broadcasting coverage

Percentage of population covered by terrestrial radio and television broadcasting (left) and households with a radio or television (right) by income group, 2002



Source: ITU World Telecommunication Indicators database.

cent have a radio. An important factor to bear in mind is that a major barrier to higher levels of television ownership is the lack of electricity, whereas a radio can be battery run.

New technologies impact measurement of this target. Practically all parts of the globe are covered by satellite radio and television signals. However, in practice, in some countries it is not legal to receive the signals. Also satellite television and radio signals are broadcast in a limited number of languages. The cost of receiving satellite services is also higher than for terrestrial services. Worldwide, there are only an estimated 100 million home satellite antennas, or one for every ten households with television. Another consideration is the availability of broadcast services over the Internet. This makes it possible for those with access to the Internet to listen to or watch broadcast services even if terrestrial based coverage is not available. Another ramification is the availability of mobile phones with built-in radios. If this was made a standard feature, it could have a significant impact on increasing access to radio services since mobile phones outnumber fixed ones in developing nations.

In conclusion, the target has been largely reached in the theoretical sense that the majority of the world is covered by radio and television services. In a real sense, the biggest barriers to actual achievement of this target is the lack of electricity for powering television sets, and the lack of income to purchase a set and/or satellite receiving equipment and services.

Target 9: To encourage the development of content and to put in place technical conditions in order to facilitate the presence and use of all world languages on the Internet.

This target contains three separate elements:

- encouraging the development of content;
- establishing the technical conditions for all world languages to be present on the Internet;
- using all world languages on the Internet.

The first of these is not really a "target" as such, but rather a principle.

The second of these elements is more significant as a target and has a number of dimensions. Probably the most important is the coding of all major scripts into computer formats. This is a task that is partly undertaken by the private sector (e.g. when developing computer applications in different languages). However, for language groups that have fewer speakers, the economics of coding are more problematic. Furthermore, there remain many languages that exist in spoken form only. So a more accurate interpretation of this target would be for "all the scripts of the world languages …" A second aspect of this target is to allow all the world's scripts to be used in the uniform resource locator (URL) (e.g. www.itu.int). There are a number of different initiatives to facilitate this, but there is no real agreement on how to do it.[53] Nevertheless, within the next few years, it should be possible. The conversion from Internet Protocol (IP) version 4 (in current use) to version 6 will facilitate this, as it will significantly expand the number of IP addresses available for use.

The third element above—actually using all languages on the Internet—is probably not realistic. There are over 5'000 world languages. Many are non-written languages and others have only a small number of speakers.

Target 10: To ensure that more than half the world's inhabitants have access to ICTs within their reach.

This target refers specifically to coverage of ICTs in terms of both demography (half the world's inhabitants) and geography (within easy reach). But the target is vague about which ICTs are meant and what "easy reach" means. There is some overlap of this target with targets 1-7 that deal with connecting villages and public institutions. Target 8 would already cover radio and television. Thus, this target could be focussed towards fixed and mobile telephones, computers and the Internet.

At one level at least, the target is already met in that more than half the world's *households* have fixed telephone service (57 per cent in 2002*)*. The figure is even higher if those having only mobile phones are included. Wireless communications provides a useful indicator for monitoring this target: the *percentage of the population within range of a mobile cellular signal*. This indicator avoids difficulties surrounding the definition of "within reach" since a mobile phone can in principle be used anywhere there is a signal. Unfortunately, not all countries compile this useful indicator. Extrapolating from the some 100 countries that do, the global mobile population coverage is estimated at 80 per cent at the end of 2002. ITU calculates that over four fifths of the world's

population has theoretical access to telephone service, including 78 per cent of developing nations (65 per cent excluding China and India, Figure 4.10). This estimate is based on various measures depending on availability of data for countries. If mobile population coverage is available, that figure is used. Otherwise either the urban population percentage—on the grounds that considerable research suggests that all urban areas of the world have telephone service—or the percentage of households with a telephone is used.

Another interpretation would be that the target refers specifically to Internet access. The total number of estimated Internet users in 2002 was around 600 million, or just under ten per cent of the world's population. However "having access" to the Internet is not the same thing as actually using it. Data are not widely available on those having access to the Internet. Even the number of Internet users is based on rough estimates for many developing nations. Thus, monitoring of this target will require efforts to enhance existing information through the use of surveys.

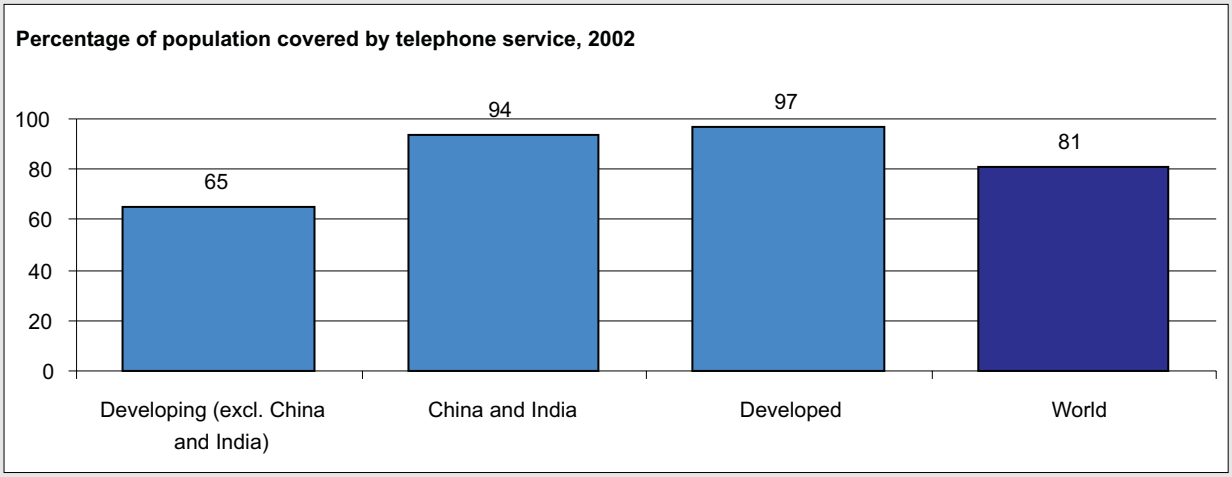
4.5 Conclusions

Information and communication technologies are recognized as playing an important role in achieving the Millennium Development Goals, with target 18 setting the specific objective of making available to all the benefits of ICTs. In this chapter, we have seen how the indicators that have been selected and proposed for the monitoring of this target are of necessity a compromise — chosen because of their wide data availability — and they do not necessarily measure the extent to which individuals have access to or use the technologies. Those indicators also reflect a long-standing tendency to base assessments on availability of infrastructure, which, it is now becoming apparent, often fail to give an accurate picture. More applicable indicators of universal access should therefore be measured, as outlined in the indicative targets established by the World Summit on the Information Society. These provide a broad set of targets for accessibility, connectivity and coverage.

ICTs also have a big role to play in achieving the other MDGs. To begin with, ICTs are indispensable for providing the databases and web-based information for tracking the MDGs. On a deeper level, there is a need for more quantifiable evidence of the impact of ICTs on the MDGs, including well-defined indicators.

Existing data suggest that large strides have been made over the last decade towards enhancing access to ICTs. The MDG indicators for ICT availability show a large increase while many of the indicators proposed for monitoring progress towards the information society are more than half achieved. These indicators suggest that although much progress has been made in infrastructure, there are growing bottlenecks in terms

Figure 4.10: World telephone coverage
Percentage of the world's population with access to telephone service, by income group, 2002



Source: ITU.

Box 4.6: Measuring the information society

The draft World Summit on the Information Society (WSIS) Plan of Action contains a full section on follow-up and evaluation that focuses mainly on benchmarking and indicators. There are several elements under this item:

- Developing and launching a composite information and communication technology (ICT) Development Index.
- Publishing an ICT Development Report.
- Developing measures of the digital divide, including community connectivity indicators.
- Reporting on the universal accessibility of ICTs.
- Developing and measuring gender-specific indicators.
- Developing and launching a website of ICT success stories.
- Developing coherent and international comparable indicators for the information society.

A special workshop just prior to WSIS organized by six international organizations— Monitoring the Information Society: Data, Measurement and Methods—aims to tackle some of these issues.[54]

of actual usage due to knowledge and affordability. For instance, an estimated 800 million of the world's population survive on less than US$ 1 per day. Many more live on less than the annual income of US$ 1'340 per year that is estimated to be the minimum level of affordability for telephone ownership. It is likely that, without a significant and sustained rise in levels of household wealth, this group will never be able to own a telephone, a mobile phone or a computer with an Internet connection.

Much more needs to be done to enhance the capacity of both developed and developing nations to collect the necessary indicators. While the starting point should be indicators for measuring access, the information society is an evolving concept and measurement of it needs to focus on people and how they use ICT tools. The draft WSIS Plan of Action contains a number of suggestions for further work in benchmarking and monitoring (Box 4.5). Beyond that, there is a commitment to develop and present, during the second phase of the WSIS, to be held at Tunis from 16 to 18 November 2005, "a Framework Document for Information Society Measurements and Analysis". For those concerned with indicators, this is the major challenge that lies ahead.

[1] Resolution adopted by the General Assembly. (2000, September 8). "United Nations Millennium Declaration". Available from: http://www.un.org/millennium/declaration/ares552e.htm; accessed November 7, 2003.

[2] For a discussion of this phenomenon, see ITU. "Mobile overtakes fixed". Available from: http://www.itu.int/osg/spu/ni/mobileovertakes/index.html; accessed November 7, 2003.

[3] Minges, M. ITU. (2002, November). "Gender and ICT Statistics". 3rd World Telecommunication/ ICT Indicators Meeting. Available from: http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/Doc07_E.pdf; accessed November 7, 2003.

[4] Millennium Development Goal websites include UNDP available from: http://www.undp.org/mdg/; accessed November 7, 2003; UN available from: http://unstats.un.org/unsd/mi/mi_goals.asp; accessed November 7, 2003 and World Bank available from: http://www.developmentgoals.org; accessed November 7, 2003.

[5] Ministry of Public Management, Home Affairs, Posts and Telecommunications (Japan). (2003). *Information and Communications in Japan. Building a "New Japan-Inspired IT Society"*. Available from: http://www.soumu.go.jp/joho_tsusin/eng/index.html; accessed November 30, 2003.

[6] A 1998 article warns about health risks; see Blackice (Prague). (October 1, 1998). "Mobile Phones Can 'Cook' Your Brain". Available from: www.rfsafe.com/articles/blackice_prague_100198.htm; accessed November 30, 2003. According to a 2002 article a research project in Switzerland found that mobile phone radiation disturbs sleep patterns and an Australian study claimed that mobile phones might cause damage to nerves around ears. In 2000, the World Health Organisation (WHO) advised making short calls and using hands free devices, even though it saw no definite evidence of health risk; see: Guardian Online (UK). (January 25, 2002). "Mobile phones safety fears". Available from: www.guardian.co.uk/theissues/article/0,6512,639561,00.html; accessed November 30, 2003. Today still there is no clear evidence that confirms any health consequences from exposure to low level electromagnetic fields, including mobile phones. According to the WHO, more research is needed. For more information, see: WHO's "International Electro Magnetic Fields Project (EMF)" available from: www.who.int/peh-emf/research/en; accessed November 30, 2003.

[7] Carpal tunnel syndrome, which has been linked to work-related cumulative trauma of the wrist, occurs when tendons or ligaments in the wrist become enlarged, often from inflammation, after being aggravated. See National institute of Neurological Disorders and Stroke. (2001). Available from: http://www.ninds.nih.gov/health_and_medical/disorders/carpal_doc.htm; accessed November 7, 2003.

[8] The Age. (2003, June 30). "Computer Users to be screened for 'Infostress'". Available from: http://www.theage.com.au/articles/2003/06/30/1056825311456.html?from=storyrhs; accessed November 7, 2003.

[9] For a study on the quality of health information, see: Butler, L. and Foster, N. (2003). "Back Pain Online: A Cross-Sectional Survey of the Quality of Web-Based Information on Low Back Pain". *Spine*. Available from: http://ipsapp006.lwwonline.com/content/getfile/1140/178/17/abstract.htm; accessed December 1, 2003. To help people distinguish between "good" and "bad" online information, the National Cancer Institute offers some guidelines. See: National Cancer Institute. (2002, August). "How to evaluate health information on the Internet: Questions and Answers". Available from: http://cis.nci.nih.gov/fact/2_10.htm; accessed November 10, 2003.

[10] It is estimated that by 2005 there will be one obsolete computer for every new one sold. Silicon Valley Toxics Coalition. (June 2002). *Information Technology and Sustainability: Enabling the Future*. Available from: www.svtc.org/cleancc/pubs/it_sustain_natstep.htm; accessed November 30, 2003.

[11] Silicon Valley Toxics Coalition. (June 2001). *Poison PCs/Toxic TVs*. Available from: http://www.svtc.org/cleancc/pubs/pctvexecsum.htm; accessed November 30, 2003.

[12] Wired News. (June 5, 2003). "You make it. You take it: PC law". Available from: www.wired.com/news/print/0,1294,58850,00.html. For an overview of e-waste, see: Silicon Valley Toxics Coalition. *Just say no to e-waste: background document on hazards and waste from computers*, at www.svtc.org/cleancc/pubs/sayno.htm.

[13] MS Swaminathan Research Foundation. (2003, April). "Information Village Research Project". Available from: http://www.mssrf.org/informationvillage/infovil.html; accessed November 10, 2003.

[14] This information might be collected through agricultural surveys like in Australia where the national statistical office compiles data on the number of farms with computers and Internet access. The data could be analyzed to see if farms with ICTs have higher output than those without. Australian Bureau of Statistics. (10 June 2000). "Australian farms are using information technology more". *Media Release*. Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/ACD1C9BDF56D6CF9CA25696F0079BED6; accessed November 30, 2003.

[15] Motorola. "The new mobile world". Available from: http://motoinfo.motorola.com/motoinfo/20th_anniversary/docs/six_stories.doc; accessed November 10, 2003.

[16] Bayes, A., von Braun, J. and R. Akhter, R. (1999, June). *Village Pay Phones and Poverty Reduction: Insights from a Grameen Bank Initiative in Bangladesh.* ZEF Discussion Papers on Development Policy Number 8. Bonn (Germany). Available from: http://www.zef.de/publications/publ_zef_dp.htm; accessed November 30, 2003.

[17] "Countries can usually spend more on education as their economies grow. But the poorest countries need to spend more on education to escape their poverty traps—and do not have enough resources to make such basic investments". UNDP. (2003). *Human Development Report*. Available from: http://www.undp.org/hdr2003; accessed November 30, 2003.

[18] "Unit costs have tended to be lower than conventional teachers' courses because of savings in residential costs and economies of scale that can be achieved through distance education. Costs per successful student have often been between one-half and two-thirds of conventional teacher education programmes". Perraton, H. (2000). "Teaching the Teachers". *Imfundo Project Background Paper #5*, UK Department for International Development (DFID). Available from http://www.id21.org; accessed December 1, 2003.

[19] "…e-learning can help to train teachers who then go out to primary and secondary level schools…that will help towards meeting the Millennium Development Goals". See: Rowe, M. (2003). "E for education". *The International Development Magazine*. Issue 22. Available from: http://www.developments.org.uk/data/Issue22/e-for-education.htm; accessed November 30, 2003.

[20] Shrestha, G. (1997, March). *A Review of Case Studies Related to Distance Education in Developing Countries*. Available from: http://www.undp.org/info21/public/review/pb-revke.html; accessed November 11, 2003.

[21] Ministry of Education (Nepal) "Distance Education Centre" webpage at: http://www.moe.gov.np/central/dec.php; accessed November 30, 2003.

[22] Constance, P. (1999,January – February). "1,800 teachers, one classroom". *IDB America*. Available from: http://www.iadb.org/idbamerica/archive/stories/1998/eng/cont.htm; accessed November 30, 2003.

[23] "The South African Radio Learning Programme" at http://www.sn.apc.org/olset; accessed November 11, 2003. OECD/CERT ICT Programme. (2001, May). *A Case Study of ICT and School Reform at School 5*. Available from: http://www.oecd.org/dataoecd/60/21/2740065.pdf; accessed November 11, 2003.

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[26] "In traditional societies where female enrollment in formal education is faced by unease of conservative cultures, elearning may present a channel of education that is neutral and does not involve direct interaction between the sexes thus facilitating female participation". See: Fillip, B. (2002, September 12). *Gender and Global E-learning*. Available from: http://www.worldbank.org/gender/digitaldivide/020912fillip.ppt; accessed December 1, 2003.

[27] Thompson, M. *Distance Learners in Higher Education*. Available from: http://www1.worldbank.org/disted/Teaching/Design/kn-02.html; accessed December 1, 2003.

[28] Australian Bureau of Statistics. (2001, January 25). "Participation in Education: Home-based higher education". *Australian Social Trends 1995*. Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/0/584124099e6239d1ca2569ee0015d8ab?OpenDocument; accessed November 30, 2003.

[29] Gray, J, et al.(2000, December). "Baby CareLink: Using the Internet and Telemedicine to Improve Care for High-Risk Infants". *PEDIATRICS*. Available from: http://www.yi.com/home/EysenbachGunther/teach/had7001-2003a; accessed December 1, 2003.

[30] "The skilled attendant, working in a continuum of care, is the single most important factor in keeping women healthy and safe in pregnancy". See the "Maternal and newborn health" webpage at http://www.who.int/reproductive-health/mpr/attendants.html; accessed November 30, 2003.

[31] AED "Profiles" webpage at: http://ict.aed.org/portfolio/sectors/health.htm; accessed November 30, 2003.

[32] Dreyfus Health Foundation. (2003, April-June). *Connections*. Available from: http://www.dhfglobal.org/connections/AprJun03/AprJun03_p1.pdf; accessed November 30, 2003.

[33] Musoke, M. "Maternal Health Care in Rural Uganda". *IK Notes*. No. 40. January 2002. Available from: www.worldbank.org/afr/ik; accessed November 30, 2003.

[34] The Dominican Republic campaign combined ICTs by including a telephone number people could call for additional information after hearing or seeing the HIV/AIDS commercial on the radio or television. See Family Health International. *Meeting the Challenge of the HIV/AIDS Epidemic in the Dominican Republic: The AIDSCAP Response, 1992-1997*. Available from: http://www.fhi.org/en/HIVAIDS/Publications/Archive/aidscapreports/DominicanRepublicMeetingTheChallenge/Mtng_Chall_HIV_Epid_DR_Reaching_Youth.htm; accessed November 30, 2003.

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[36] Vaughan, P., Regis, A. and E. St. Catherine, E. (2000, December). "Effects of an Entertainment-Education Radio Soap Opera on Family Planning And HIV Prevention in St. Lucia". *International Family Planning Perspectives*. Available from: www.agi-usa.org/pubs/journals/2614800.html; accessed November 30, 2003.

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[39] Task Force on Environmental Sustainability. (2003, April 18). *Background Paper*. Available from: http://www.unmillenniumproject.org/documents/tf06_july10.pdf; accessed November 30, 2003.

[40] "ICT and Environment: Friends or Foes" at the Development Gateway web page: http://www.developmentgateway.org/node/133831/sdm/docview?docid=569225; accessed November 30, 2003.

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[42] A US government agency carried out its 2001 procurement exercise in a paperless environment using only the Internet and CDs. It is estimated that this resulted in a savings of paper equivalent to five stories high. As of 21October 2003, the US Government Paperwork Elimination Act requires all agencies to provide the option of electronic document submission when practicable as a substitute for paper. See: US General Service Administration. "Appendix II to OMB Circular No. A-130". Available from: http://estrategy.gov/omb_appendix.cfm; accessed November 11, 2003.

[43] In Ghana, a water database helped pinpoint a large source of pollution. See: Gamos & Big World Research. (2003)."Kumasi Information Database (KUMINFO)". *Sustainable initiatives*. Available from: http://www.sustainableicts.org/KUMINFO%20F.pdf; accessed November 11, 2003. In Egypt, satellite technology has been used to located new sources of fresh water. See: World Water Vision. (2001, September). *Report of the Thematic Panel on Information and Communication Technology and its Implications for Water Resources*. Available from: http://www.worldwatercouncil.org/Vision/Documents/ICT-report.PDF; accessed November 11, 2003. In Japan, it is estimated that there would be at least a five per cent savings in home energy consumption through household monitoring systems. See: Ministry of Public Management, Home Affairs, Posts and Telecommunications (Japan). (2003).

[44] Walsh, D. (2002, April). *Marketing and Addictive Behaviour — A Neuroscientific Perspective*. Available from: http://www.who.int/health-mktg/presentations/david_walsh.ppt; accessed December 1, 2003.

[45] Schar, E. and Gutierrez, K. (2001, November). *Smoking Cessation Media Campaigns from Around the World: Recommendations from Lessons Learned*. Available from http://www.who.dk/document/e74523.pdf; accessed December 1, 2003.

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[47] For example some 60'000 children living in Brazilian slums have been trained in ICTs. See Baggio, R. (2001, February). "The real Digital Revolution". *CDI*. Available from: http://www.cdi.org.br/midia/midia_20010205.htm; accessed November 11, 2003. In Nairobi, Kenya, slum dwellers create sandals from recycled tires and sell them over the Internet. See INET. (2002, June). *ICT Stories Competition*. Available from: http://inet2002.org/CD-ROM/lu65rw2n/papers/u06-a.pdf; accessed November 11, 2003. In a New Delhi, India slum, young children are acquiring ICT skills via an Internet kiosk. See Barden, R. (2000, September). "The children of a New Delhi Slum and a PC/Internet Kiosk". *Sustain IT*. Available from: http://www.sustainit.org/cases/PDFcases/newdelhi.pdf; accessed November 11, 2003

[48] At the time of writing, the latest version of the draft Plan of Action was document WSIS03/PC-3/DT/5 (Rev. 1). Available from: http://www.itu.int/wsis; accessed November 30, 2003.

[49] The 2002 ITU Plenipotentiary Conference adopted a resolution calling for the development of a new "community connectivity indicator", to measure the number of villages with community access points. A workshop on measuring community access to ICTs including the definition of a digital community centre was held 6-8 October 2003. See "Indicators workshop on community access to ICTs" webpage at http://www.itu.int/ITU-D/ict/mexico03/index.html; accessed November 30, 2003.

[50] This figure is derived from developing country rural population and an estimate of 1'000 inhabitants per village. It also assumes that 80 per cent of villages are not connected. China and India are excluded as most of their villages already have telephone service.

[51] The figures for telephone service are derived from estimates of the cost of connecting Philippine villages using Global Mobile Personal Communication Satellite Systems while the cost for Internet access is derived from estimates for Very Small Aperture Terminals. These are highly general costs, depend to a large extent on economies of scale and would not be applicable to all countries. See ITU. (2002, March). *Pinoy Internet: Philippines Case Study*. Available from: http://www.itu.int/ITU-D/ict/cs/philippines/index.html; accessed November 30, 2002 and Gilat. (2002, April). *Broadband IP over DVB for IP Connectivity*. Improving IP Connectivity in the Least Developed Countries. Available from: http://www.itu.int/osg/spu/ni/ipdc/index.html; accessed November 30, 2003.

[52] One reason for the statistical data showing relatively low household availability of radios may be due to flaws in questionnaire design. For example surveys typically ask if the respondent has a stand alone radio set which may cause confusion about whether this includes radios in stereo systems, alarm clocks or automobiles.

[53] A workshop was held on this topic in December 2001. See "Multilingual Domain Names: Joint ITU / WIPO Symposium" available from: http://www.itu.int/mlds/resources/WIPO; accessed November 30, 2003. For a more recent description of the issues, see the "APT-ITU Joint Workshop on ENUM and IDN" available from: http://www.aptsec.org/seminar/meeting-2003/workshop/default.htm; accessed November 30, 2003.

[54] See "Monitoring the Information Society: Data, Measurement and Methods" website at http://www.unece.org/stats/documents/2003.12.wsis.htm; accessed November 30, 2003.

5. A NEW, INCLUSIVE ICT INDEX

As the world moves towards a global information society, countries are becoming increasingly aware of the central importance of extending access to information and communication technologies (ICTs) to their populations. With the growing recognition of ICTs as an effective tool for social development and economic growth, there are ever-greater incentives for countries to foster higher access levels. Alongside countries' desire to increase ICT access at the national level, there is a growing international demand for reliable and comprehensive statistical information to help countries set their own targets, measure progress and make useful international comparisons. For this, a selection of indicators — usually compiled into an index — gives a far better overview than any single indicator.[1]

While a number of existing indices go some way to meeting this need, almost all of them concentrate primarily on developed economies, and many do not systematically use internationally comparable indicators. In earlier chapters, this report has attempted to identify a basic set of indicators — aimed at striking an optimum balance between detailed information, and broad applicability across all countries — for measuring access to the information society. In this chapter, existing indices developed by various organizations are reviewed. In light of the strengths and weaknesses of these indices, and building on the previous work by ITU on developing indicators and indices, the framework for a new, inclusive *Digital Access Index* (DAI) is set out.

5.1 Why indices are important

An index combines multiple indicators into a single overall value. The values obtained for ICTs, for instance, can be used to generally represent the state of ICT development in a country. One of the main benefits of an index is that ICT development can be compared between individual countries, categories or regions. Comparisons are particularly valuable between countries of similar income level, or with similar geographic, social or regional characteristics, because they can provide an excellent basis for realistic targets or policy decisions to be established. Indices are equally useful in measuring ICT developments over time. A time series index allows for comparisons from one year to the next in an economy, permitting policy-makers to judge the effectiveness of ICT programmes and initiatives. Furthermore, nations often struggle in certain areas of ICT but may excel in others. An index can capture multiple effects and produce results that tell a wider, more complete story about the economy than a single indicator. Other factors such as social and demographic conditions or affordability also have an impact, which can be reflected to some extent by using an index.

While the advantages of an index are undeniable, it is also important to bear in mind the limitations of narrowing a large amount of information into a single figure. An index is useful for simplifying comparisons but should not be used to draw overly simplistic conclusions. This is true of all scores and rankings of this nature, which are always imperfect due to methodological assumptions that may not be applicable to every country, and to missing or incorrect data.

A trade-off has to be made by index designers between breadth of coverage and level of detail. Data collection

is rarely symmetric. In other words, different economies provide different levels of detail in different data areas. Indices aimed at providing greater detail will use a higher number of variables, resulting in a smaller set of "well-covered" economies. Covering a wide range of economies on the other hand, requires limiting the number of variables used. Data omissions or errors will have a stronger relative influence on the overall index score.

5.2 Existing ICT indices

A number of organizations—intergovernmental, private and academic—compile ICT indices.[2] This section briefly examines some of the most popular ones.

The World Economic Forum (WEF) publishes a Network Readiness Index (NRI) that measures "*the degree of preparation of a nation or community to participate in and benefit from ICT developments*".[3] Categories include environment, readiness and usage. The 2002-03 index covers 82 countries over a range of 120 indicators, and offers a mixture of qualitative and quantitative data, with a large number of variables coming from surveys. Benefits of the index include coverage over a wide range of variables, a detailed methodology, and the use of statistical tools to build categories and impute missing data. One drawback is use of survey results for data that are susceptible to respondent bias. Although the index covers more countries than most other indices, it still is limited to less than half of the nations in the world.

The latest version of the market research firm International Data Corporation's (IDC) Information Society Index, which claims to be the oldest of all ICT indices, examines and ranks countries according to their ability to "*absorb and utilize Information and Information Technology*".[4] The index covers 53 countries and contains 15 variables organized into four categories: computers, Internet, telecommunication and social. While the latest set of variables are quite relevant and the categories logical, indicators for social aspects tend to be qualitative, making comparisons more difficult. Unfortunately, the IDC does not make its detailed methodology publicly available so it is difficult to analyse. The methodology also changed in 2003, implying that results cannot necessarily be compared with previous years, and rankings cover only a limited number of countries.

The Economist Intelligence Unit publishes an annual index — now in its fourth year — of e-readiness rankings.[5] Covering the sixty largest economies, the index allows "*countries to compare and assess their e-business environments*" and determines "*the extent to which a market is conducive to Internet-based opportunities*". The index uses around 100 variables organized into the following six categories: connectivity and technology infrastructure; business environment; consumer and business adoption; social and cultural environment; legal and policy environment, and supporting e-services. The index focuses primarily on business adoption of ICT and there are a large number of qualitative variables, making objective analysis more difficult.

As another example, the Mosaic Group provides a framework for measuring the state of Internet diffusion in an economy.[6] Six factors are rated: pervasiveness, sector absorption, connectivity, organizational structure, geographic dispersion, and sophistication of use. Each factor is ranked on a scale of zero (non-existent) to four (highly developed). The Mosaic group does not combine the six factors to compute an overall index score for a country although others, notably ITU, have done so (Box 5.1). The methodology is well documented, so that values can and have been computed by different groups. However, the lack of an overall score makes it more difficult to make broad comparisons of the overall state of Internet diffusion in different countries. Also, the mix of quantitative and qualitative data in the analysis means that scores are more vulnerable to subjective interpretation.

Another interesting index comes from Orbicom.[7] Their "Infostate" Index ranks 139 economies based on 17 indicators across two categories. What makes the Orbicom index different is that it compiles each country's index in relation to the average of all of the other countries' indicators. The index has been constructed so that one can observe changes over time and index values going back several years are provided. All data used is quantitative so that subjective bias is avoided. One drawback is that some of the indicators selected such as Internet hosts or secure servers may not be optimum for representing the actual situation in a country.

There have also been several one-off indices. The United Nations Development Programme (UNDP), for instance, included a Technology Achievement Index (TAI), in its 2001 *Human Development Report*.[8] Using eight variables spread over four categories the TAI measured the technological capacity in a country. While the TAI did not solely measure ICTs, many of its variables were ICT related. The TAI, in keeping with the methodology of UNDP's other indices, used

a limited number of variables. One interesting element was the attempt to measure the developmental chain of technology in a country. The first category looked at the creation of technology, the second and third at diffusion, and the last at how prepared users were for the technologies. The index put more emphasis on fewer variables, with the disadvantage that the choice of indicators and data omissions or discrepancies had a large impact on the score. For example, the selection of "Internet hosts per capita" instead of measuring actual Internet users falls prey to the unreliability of Internet hosts. This is because Internet hosts may be registered within a country, but they may equally be registered outside it, leading to a distortion of the national figures. Despite the low number of variables, the index could be compiled for only 72 countries, providing a limited picture of global ICT levels.

The United Nation Conference for Trade and Development (UNCTAD) has produced several indices measuring the development of ICTs in economies.[9] As with Mosaic, UNCTAD does not combine the category scores to produce an overall ICT score. Rather, the work presents four separate indices that can be used to measure certain elements of development, namely connectivity, access, policy environment, and usage. In addition to building the four indices, UNCTAD averages the scores from the connectivity and access indices to create an ICT Diffusion Index. UNCTAD's methodology uses a

Box 5.1: ITU indices

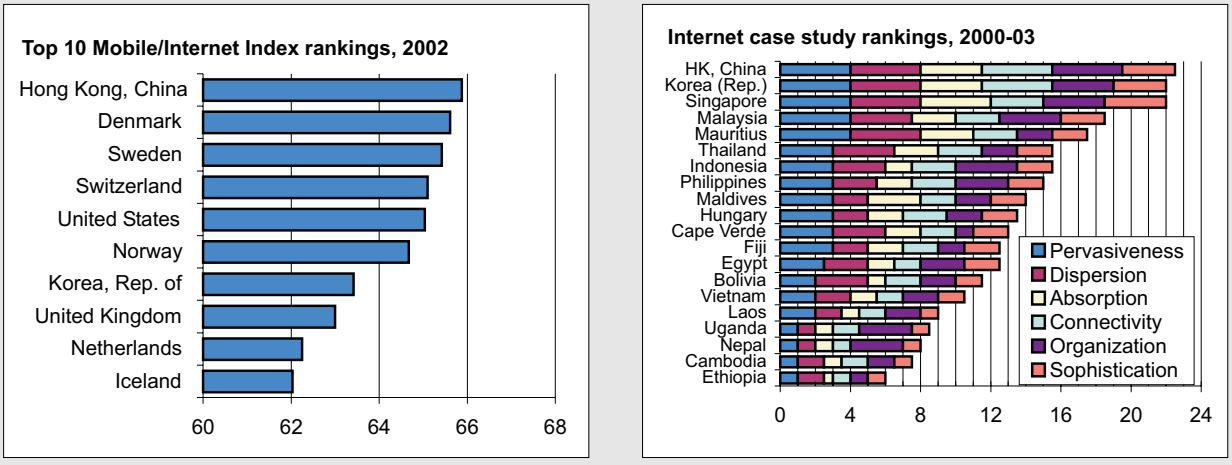
As the United Nations' agency responsible for telecommunications, and as part of its mandate to help extend the benefits of ICTs to the world's populations, ITU has long been involved in developing statistics and in analysing ICT developments. While many other indices have drawn upon ITU resources, ITU itself has recently developed its own indices.

In its fourth Internet Report, *Internet for a Mobile Generation*, ITU published a Mobile/Internet index in 2002 measuring the relative levels of mobile and Internet development (Box Figure 5.1, left).[10] This index also attempted to predict how well each economy might take advantage of ICTs in the future. The index covered 177 economies with 26 quantitative variables broken into three clusters: infrastructure, usage and market structure. Benefits of the Mobile/Internet Index methodology include the use of strictly quantitative data, a significant number of variables and wide coverage. Among improvements identified for this index are the use of a weighting structure for categories and inclusion of a method for testing the robustness of rankings.

As part of the Internet Case Studies project, ITU used the Mosaic Group framework for measuring the state of Internet diffusion in different economies.[11] Overall scores for the six categories: - pervasiveness, sector absorption, connectivity infrastructure, organizational infrastructure, geographic dispersion, and sophistication of use - have been compiled for 20 economies (Box Figure 5.1, right).

Box Figure 5.1: ITU indices

Top ten economies in Mobile/Index, 2002 (left) and Mosaic values of ITU Internet Case Study economies, 2000-03 (right)



Source: ITU Internet for a Mobile Generation and ITU Internet Country Case Studies.

Box 5.2: "Lies, Damned Lies and Statistics"[12]

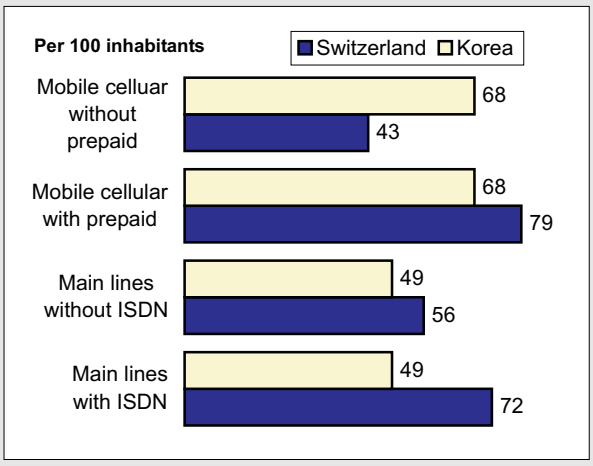
The Republic of Korea is well advanced in information and communication technology (ICT) development. It leads the world in broadband Internet access, is ranked fourth in overall access to the Internet and was one of the first countries to launch third-generation mobile Internet services. It has achieved universal access, not only with practically every household having telephone service, but also with two-thirds having broadband Internet access. Korea also has one of the leading ICT manufacturing sectors in the world. Related to the high level of ICT development is the fact that Koreans rank high in literacy and overall educational achievement. Yet, on most international ICT rankings, Korea is not in the top ten. Why the discrepancy between the statistics and the rankings?

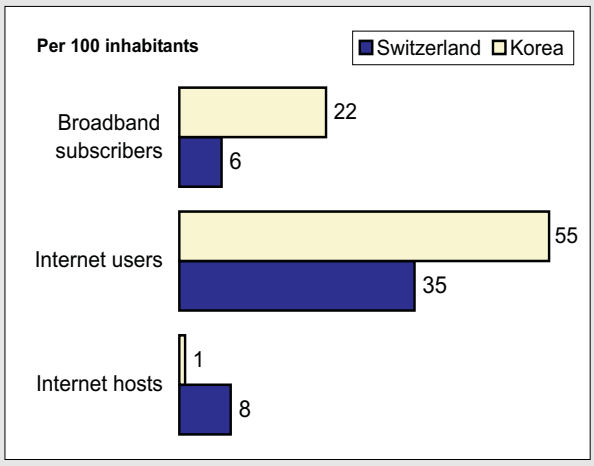
For one thing, there is often a bias of quantity over quality. The rankings are typically designed to favour a common denominator of widely available indicators, rate high per capita values without adjusting for methodological discrepancies, and do not include adjustments for qualitative differences. The potential inaccuracies of such an approach can easily be illustrated by comparing Korea and some usually higher-ranking countries, for example Switzerland.[13] Like many European nations, Switzerland includes Integrated Services Digital Network (ISDN) channels in the number of main lines—a common indicator in all of the indices, which effectively inflates the total figure reached. Korea on the other hand, does not include ISDN channels. If the number of physical telephone lines were compared, Korea would in fact rank relatively higher (Box Figure 5.2, left). A similar situation exists for mobile cellular subscriber figures that include prepaid cards. This figure is distorted because not all prepaid cards are active. As Switzerland has a high proportion of prepaid cards, it appears to rank higher than Korea on this indicator. Korea on the other hand, has few mobile prepaid subscribers and consequently has a more realistic, but relatively lower, figure for total mobile penetration.

Another methodological weakness is that many surveys use the number of Internet hosts per capita to measure Internet usage. This is misleading since host computers can be located anywhere and are not necessarily in the country of their domain name. On a per capita basis, the number of Internet host computers in Korea—based only on the .KR domain name—is relatively low, affecting its ranking. On the other hand, Korea's high level of Internet and broadband penetration is rarely reflected in the standings (Box Figure 5.2, right).

Global rankings also appear to be biased in favour of theoretical perceptions of competitiveness rather than actual achievement. In general, few Asian nations rank among the top ten. Hypothetical assumptions appear to have more weight with the rankings more focused on the means rather than the ends. For example, a nation that supposedly allows a greater degree of competition than another would be ranked higher even though the latter might have a far greater level of infrastructure. Another shortcoming is that the rankings tend to weight per capita income highly. In the case of Korea, it is doing exceedingly well in ICTs despite a relatively low per capita income. If anything, Korea's ranking should be raised because of this fact. In terms of purchasing power parity, Korea's per capita income is twice that of the conventional measurement. The case of Korea suggests that these scorecards are not very useful in accurately measuring ICT achievements in some countries.

Box Figure 5.2: Re-comparing Korea and Switzerland





Source: ITU World Telecommunication Indicators database.

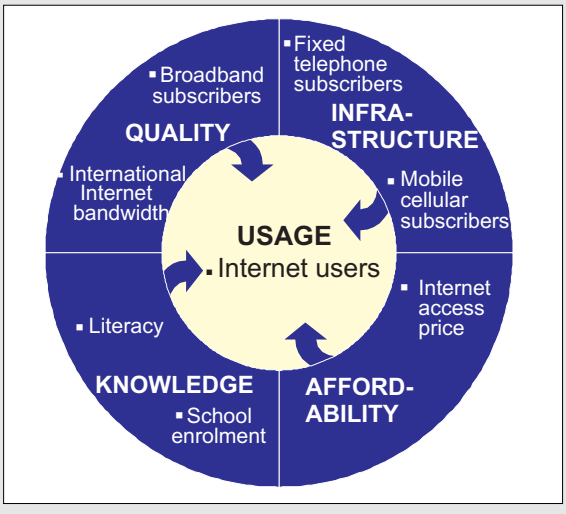
limited but robust group of variables to capture ICT effects, with the risk of some distortions owing to the small number of variables used.

The indices described above are not the only ones available, of course, but they do provide an idea of the major ones developed to date, and of the pitfalls encountered in the design of such indices. While there is no shortage of ICT indices then, none is completely satisfactory for measuring access to ICTs, especially with regard to the low number of countries covered. Furthermore, most are not specifically targeted at measuring ICT access, and some have methodological snags or are susceptible to distortions due to the use of qualitative variables (see Box 5.2). While there are also a number of commercial organizations that compile indices, these often make only general summaries available to the public and charge substantially more for complete data. Wherever these indices use too many variables, transparency and comparability are compromised.

5.3 The Digital Access Index

ITU has developed a Digital Access Index (DAI) to measure the overall ability of individuals in a country to access and use ICTs. Among other things, it can be used to track Target 18 of Millennium Development Goal 8, which calls upon governments to: "make available the benefits of *new* technologies, specifically information and communications" (see Chapter four).

Figure 5.1: Factors affecting ICT access
Indicators making up the Digital Access Index



Source: ITU.

The DAI overcomes limitations of earlier indices, in terms of its specific focus on access, country coverage and choice of variables. The DAI has three main aims. One is to measure a country's capacity for using ICTs. The second is to be digitally *inclusive*, that is, to embrace as many countries as possible in the index. A third is to make the index as transparent as possible. These considerations suggest that the index would be composed of a few, but well chosen variables, in order to include the widest number of countries and enhance clarity.

Four fundamental factors impact a country's ability to access and use ICTs (Figure 5.1 and Box 5.3). These are availability of infrastructure, affordability, educational level and quality. If the infrastructure is not available, there can be no access. If the population cannot afford to pay for ICT products and services, there can be no access. If citizens do not have a certain level of education, they will not be able to use newer ICTs such as computers or the Internet. If the ICT experience is poor, people will either cease using them or be incapable of using them effectively or creatively. Finally, in addition to the aforementioned four factors, a fifth — actual usage of ICTs — is critical for matching reality with theory. As described later, the inclusion of usage also captures other aspects not explicitly accounted for in the other four factors.

Beyond this range of factors, it can of course be argued that others also affect ICT access. However, it is important to concentrate on only those factors that affect immediate availability. For example, a liberalized ICT market could result in more competition that might lead to additional infrastructure or a drop in prices. But that impact does not affect what a country has today in terms of infrastructure, people's ability to pay for it or the skills that are in place to do so. Moreover, although levels of liberalization may have an impact, it is unclear how that affects ICT development. In reality, there are countries that measure up as having a restrained regulatory environment, but that are doing well in ICTs, and vice versa. The degree of market liberalization is also difficult to quantify objectively. Conversely, other policy areas that are not directly related to the ICT sector, also have an impact on ICT access. One such example is a country's educational system. External factors will therefore be more useful for the interpretation of the results, rather than as actual indicators, for example by using them as explanatory variables for why some countries are doing better than others.

Box 5.3: Factors impacting ICT access

Although the impact of infrastructure, pricing and education on Information and Communication Technology (ICT) access seems obvious from an intuitive angle, it is useful to match these assumptions with the reasons people give for not using ICTs. In order to do this, Internet user surveys were analysed. Some surveys have questions asking non-users why they do not currently use computers or the Internet. The most common reasons given are affordability, lack of infrastructure and lack of skills.

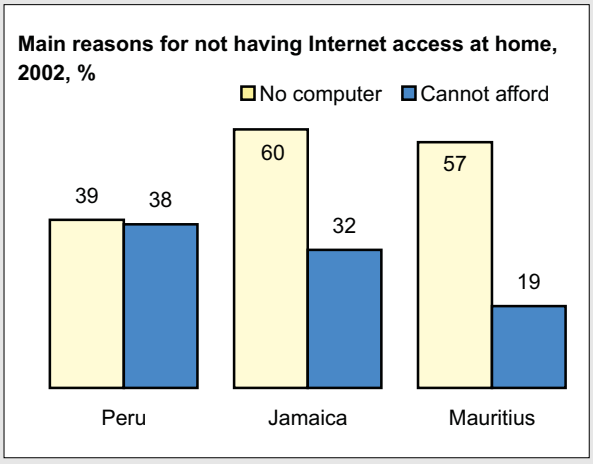
Unavailability of *infrastructure* is often cited as a main barrier. This is borne out in data from Jamaica where the main reason (60 per cent of cases) for not having home Internet access was the lack of a personal computer (PC). The lack of a PC is also the main reason given in Peru (39 per cent). Likewise in Mauritius, the main reason cited for not having Internet access was "No equipment" (57 per cent of respondents).

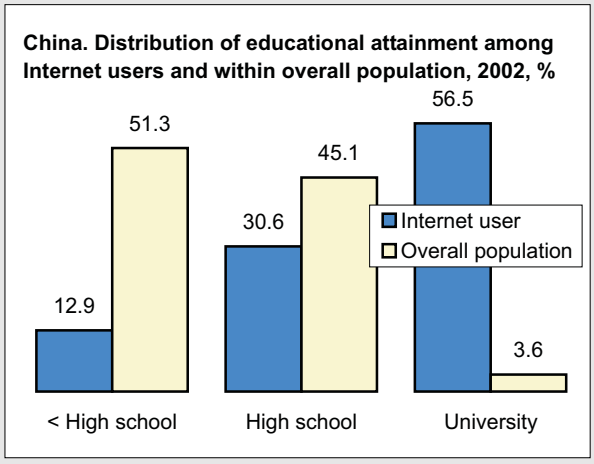
Affordability is also a major barrier. In Peru, 38 per cent of respondents say they cannot afford Internet access while in Jamaica the corresponding figure is 32 per cent. In Mauritius, affordability was the third largest reason for not having Internet access, cited by 19 per cent of respondents.

The impact of *knowledge* on PC and Internet use is striking, as shown by the educational profiles of users. In China, those with some university education account for over half the Internet users even though they only account for four per cent of the overall population. Students also have a disproportionate share with 28 per cent being Internet users though they represent only 18 per cent of the population. The contrast is similarly striking in developed nations. In the Netherlands, where 90 per cent of those with a university education use a PC, twice as many highly educated people use the Internet as less educated persons. The influence of knowledge is also reflected in barriers to ICT use questions where a common answer is that the respondent does not know how to use computers. In Venezuela the main reason given for not using the Internet is that the respondent does not know how to (27 per cent).

Quality is also an important issue, particularly for those already online. In many surveys, quality is typically a major complaint and often revolves around speed. In China, thirty per cent of users are unsatisfied or disappointed with the speed of the Internet. In Thailand, speed is the main subject of complaint, cited by 63 per cent of respondents.

Box Figure 5.3: Factors impacting ICT access





Source: ITU World Telecommunication Indicators database.

5.3.1 Selection of variables

In an ideal index, the variables for measuring infrastructure would include availability of ICTs in homes, schools, businesses and the government, as well as in public locations such as post offices, libraries and Internet cafés. Affordability variables would consist of various ICT service prices in relation to income, ideally from household expenditure surveys. Educational variables would comprise measurements of the digital literacy of the population. Quality variables would incorporate objective measurements of the service reliability and speed of networks. Unfortunately most of the variables suggested above are available only for a limited number of countries. At the present time, an "ideal" index built on this basis would exclude so many countries that its usefulness would be very limited.

The need for the DAI to be inclusive and intuitively understandable has an impact on the variables selected. The use of too many variables poses problems in terms of data collection and verification, and can lead to overlap. Careful consideration of a few well-thought out variables can suffice to represent ICT access, a case of "quality rather than quantity". This also reinforces the goal that users of the index should understand it easily. The actual values of the variables used can be presented together with the index, thereby enhancing transparency.

With a view to achieving an optimum balance, the DAI consists of a selection of eight variables categorized into five areas: infrastructure, affordability, knowledge, quality and usage. The variables to be included in the DAI have been selected as proxies for the categories they represent (Table 5.1). The categories and variables have been chosen based on extensive case study research and previous literature on ICT indices.

Although the DAI aims to capture the ability of individuals to access and use ICTs, there is a bias towards Internet access. One reason is that access to the Internet is often put forward as a major policy goal. Much of the discussion behind the information society revolves around the ability of citizens to access information and online business and government services that are delivered over the Internet. The MDGs also refer to making available "new technologies." While other ICTs such as radio or television may be perceived as more relevant for some developing countries, they do not offer the same range and interactivity as telephones or the Internet. The inclusion of broadcasting variables in the index would have had little relevance for a number of economies and work against inclusiveness by limiting the usefulness of the DAI to a particular group of countries. In any case, inclusion of broadcasting statistics would have practically no effect on a country's relative ranking since there is a direct relation between availability of newer technologies and older ones. On the other hand, access to the Internet is an issue in every country. The focus on the Internet also has the advantage that it encompasses other ICTs. For example, computers are not included in the index but since the vast majority of Internet access is via a computer, their availability is captured. Similarly, telephone service is reflected in both its selection as an infrastructure indicator, and as a component of pricing when applicable. Mobile cellular service is also included in the DAI while cable television is covered when used for Internet access.

The *infrastructure* category contains variables that proxy overall network development. The variables included are the number of *fixed telephone subscribers* and *mobile cellular subscribers*. Fixed and mobile telephones provide the means for voice, fax and data communications. Dial-up Internet access is the prevalent means of Internet access in most countries. In others, where broadband access is growing, digital subscriber line (DSL) technology also uses the conventional telephone line. While cable television, leased lines and fixed wireless access paths are important, they are not included because they currently are not a predominant form of ICT access in most countries. In any case, the effect of these alternative access networks is largely captured in the *quality* category described below.

The *knowledge* level of a country has a significant impact on the ability to use new technologies. The educational attainment of the adult population (as reflected by literacy statistics) and the number of students both impact ICT take-up. *Adult literacy* and *overall school enrolment*—widely available for many countries from international sources—are used as proxies for the capacity of the population to use new ICTs. There are weaknesses with these indicators. For example, the definition of literacy varies widely among nations. Furthermore skills beyond basic literacy are needed to use newer ICTs such as the Internet. Research has shown that even among countries with high levels of basic literacy, true levels of literacy are lower.[14] ITU has carried out research on development of knowledge indicators for the information society.[15] Unfortunately the required indicators are not widely available for most countries.

Affordability plays a key role in determining users' digital opportunities. Although infrastructure may be widely available, it must also be affordable if it is to be used. Affordability is measured by the *price of Internet access as a percentage of per capita income.* Internet access prices generally reflect the relative prevailing tariffs for other methods of access such as Internet cafés or leased lines. The dial-up price would also include telephone usage charges if applicable, serving as a proxy to some extent for telephone service charges. Internet access prices used in the DAI assume a usage factor of one hour per workday per month. In most countries, the price of dial-up access (averaged over ten hours of peak time and ten hours of off-peak time) is used since it is often the only method of consumer access or is cheaper than broadband access. If broadband prices are cheaper than dial-up then they are used instead. Pricing cannot be viewed in isolation

and the speed of the connection to the Internet affects the price. However, the major objective is to establish affordability so the cheapest Internet access prices were selected regardless of the speed offered. The speed factor is also covered by the next category: quality.

The *quality* category deals with the impact that the experience of using ICTs has on access. If the experience is poor because of slow speed, then either people will not use ICTs, or they will not be able to use them effectively and creatively. This category also allows for greater distinction to be introduced in the index. For example, many developed nations have high values for infrastructure, affordability and education. The inclusion of a quality category allows for finer granularity. The variables selected for quality are the amount of *international Internet bandwidth* and the number of *broadband subscribers*.[16] In many developing countries, most Internet access is to sites abroad and therefore the amount of international bandwidth has a major impact on performance. In many developed countries, people visit domestic sites so that international bandwidth is not as important as "last mile" bandwidth. The number of broadband subscribers measures this, with broadband defined as access technologies faster than 128 kbit/s in at least one direction. This includes DSL, cable modem and wireless technologies.

The *usage* category measures the actual utilization of ICTs. Given the infrastructure, affordability, education and quality aspects of a country's ICTs, a variable is needed to gauge the extent of their utilization. The number of Internet users is selected as the usage variable. In addition to capturing usage, the variable also incorporates aspects of access not easily captured by the other categories or where additional variables would have been necessary. For example, Internet users can proxy for the number of computers, as well as the prevalence of Internet cafés. If a country has many users accessing the Internet from Internet cafés and other public locations, this would be reflected in the number of users. While usage does to some extent reinforce the impact of other categories its explanatory power for socio-cultural aspects and other variables not included in the DAI more than merit its inclusion.

Table 5.1: DAI Indicators
Indicators used to construct the DAI

Category	*Variable*	*Indicator ~*
1. Infrastructure	Fixed telephone subscribers § Mobile cellular subscribers	1. Fixed telephone subscribers per 100 inhabitants 2. Mobile cellular subscribers per 100 inhabitants
2. Affordability	20 hours per month of Internet access*	3. Internet access as percentage of Gross National Income (GNI) per capita **
3. Knowledge	Literacy ^ School enrolment ^	4. Adult literacy 5. Combined primary, secondary and tertiary school enrolment level
4. Quality	International Internet bandwidth (Mbit/s) Broadband subscribers #	6. International Internet bandwidth per capita 7. Broadband subscribers per 100 inhabitants
5. Usage	Internet users	8. Internet users per 100 inhabitants

Note: § = Public Switched Telephone Network (PSTN) + Integrated Services Digital Network (ISDN) subscribers.
* = Cheapest dial-up or broadband plan averaged over 20 hours of peak and 20 hours of off-peak usage.
** = Annual average exchange rates from the International Monetary Fund are used to convert the Internet tariffs to United States dollars. GNI per capita data is from the World Bank.
^ = Obtained from the United Nations Development Programme's Human Development Index.
# = Including Digital Subscriber Line (DSL), cable modem and other technologies faster than 128 kbit/s in at least one direction.
~ = BankPopulation data for converting the variables to indicators is obtained from the national statistical agency.
Source: ITU.

5.3.2 Methodological issues

The variables selected for the DAI must be made comparable before they are combined. This is done by converting the variables into indicators, generally by dividing them by the population does this. The indicators are then "normalized", a process, which transforms the indicators into a value between zero and 1, so they can be added or averaged. "Goalposts" (i.e. minimum and maximum values that may be achieved) are used to normalize each country's data. Care must be taken in choosing the goalposts to avoid the index becoming outdated.[17] If the goalpost is surpassed, the index must either assign a value of 1 to the variables or increase the goalpost, requiring all previous years to be recalculated.

Normalizing telecommunication variables is more difficult than for other kinds of data since the values change so frequently with technological development. As stated above, variables such as *mobile subscribers per 100 inhabitants* can now reach levels greater than the total population, making it difficult to establish long-term goalposts. Also, as technology changes, new ICTs emerge. For example an index designed five years ago most probably would not have included broadband. The definition of high-speed today could be too slow for applications ten years from now. At the same time, some technologies can reach a peak or go into decline.

The goalposts for the DAI are designed partly through logic and partly through examining existing values. This was influenced by the objective that countries should be able to achieve a perfect ranking. It was also assumed that countries could and do start from zero in any variable (e.g. a country that does not yet have a mobile cellular network) so this was established as a minimum goalpost. The goalposts chosen are shown in Table 5.2 and Figure 5.2 and are further described below.

A single index value is computed for each of the five DAI categories. Weights must be assigned to each indicator for categories that have multiple indicators. The logic behind the weights chosen for multiple indicator categories is described below. An example showing how the DAI is compiled is given in Box 5.6.

One aspect of building an index is ensuring that values for all the variables are included. In other words, it can prove impossible to gather identical, fully compatible variables for every single country. In general, this is not an issue with the DAI as it uses widely available data. Nonetheless, some data is not officially collected by some countries, the latest data is not always available, and data for some economies is not available from the standard source. These difficulties have generally been overcome by using reliable secondary source data, by estimating the latest data based on past years values and using national data when internationally comparable data is not available.

The *infrastructure* category consists of the two indicators *main telephone lines per 100 inhabitants* (teledensity) and *mobile cellular subscribers per 100 inhabitants* (mobidensity), both of which come from the ITU World Telecommunication Indicators database. In order to enhance comparability, main telephone lines are defined as fixed telephone subscribers plus payphones. This means that Integrated Services Digital Network (ISDN) subscribers rather than channels are included.[18] The goalpost for teledensity has been set at 60. The highest observed value was 69.3 back in 1998; since then teledensity has been declining due to mobile substitution as well as less need for second lines due to broadband. The goalpost for mobidensity has been set at 100. Though this figure has already been exceeded as noted above, this is mainly due to inactive prepaid accounts and second mobile phones. A mobidensity of over 100 implies that all adults (and many youth) would have at least one mobile phone. Teledensity and mobidensity are given equal weight (50 per cent) in computing the infrastructure category value. The reason is that even though in most countries there are now more mobile subscribers than fixed telephone lines, most Internet access is still via fixed lines. At the same time, mobile phones can be used to provide Internet access and this is likely to grow in the future.

The *affordability* category is compiled from the price of twenty hours of monthly Internet access divided by monthly per capita gross national income (GNI). The cheaper of dial-up or broadband is used. The Internet price data were collected by the ITU during the third quarter of 2003 using information from the largest Internet service provider (ISP) in each country, and incumbent telephone operators. The tariffs are converted to the United States dollar equivalent using the 2002 annual average exchange rate. The GNI per capita income data come from the World Bank.[19] National data is used for economies for which World Bank data is not available. Subtracting the proportion of monthly income that Internet tariffs consume from 1 creates an *affordability indicator*. The logic behind this conversion is to create an indicator where a high value is desirable so that it is consistent with the other indicators. The goalpost for this indicator is 1, a situation where the Internet would be free. On the other hand, where the affordability indicator is negative (e.g. prices are more than per capita income), no points are awarded since a person cannot spend more on Internet access than they earn.

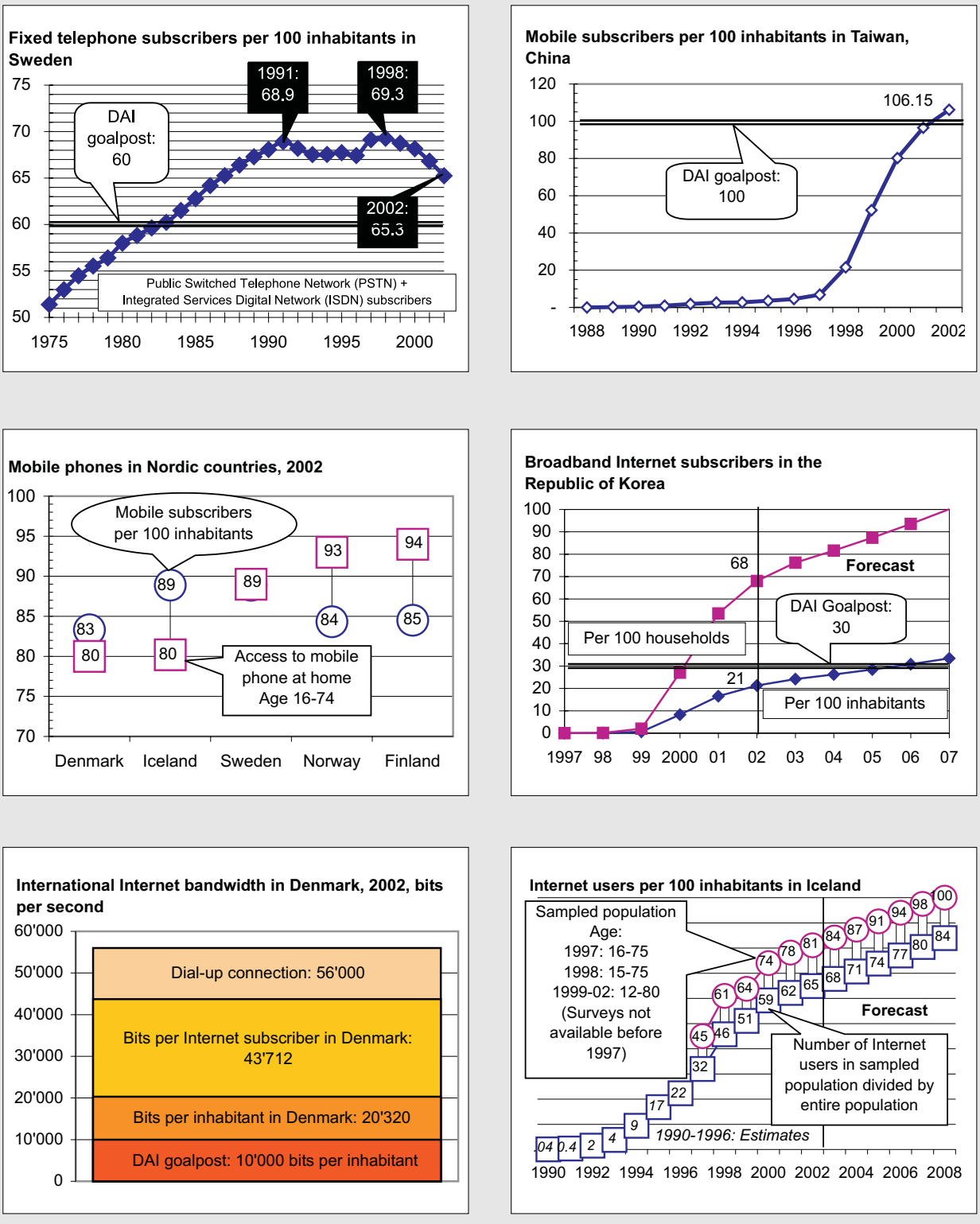
Table 5.2: DAI goalposts
Maximum values for DAI indicators

Indicator	*Value*	*Note*
Main telephone lines per 100 inhabitants	60	The number of fixed telephone line subscribers has been in decline since 2000.[22] The highest record value for this indicator was 69.3; by Sweden in 1998. This has since declined to 65.3. It seems unlikely therefore that the highest value will ever again be attained. It appears that much of the decline in fixed telephone lines is due to substitution by mobile phones, a fairly recent phenomenon as well as replacement of second lines used for Internet access by higher speed alternatives, which share the same line. It will take some years before the high value for main lines per 100 inhabitants reaches a stable level. A goalpost of 60 implies a very well developed fixed line network.
Mobile subscribers per 100 inhabitants	100	Mobile phones are a more personal possession than fixed telephone lines that tend to be shared in households or offices. Thus it is logical to set a higher threshold. The value of 100 has already been reached by two economies: Luxembourg and Taiwan, China. This level implies that all inhabitants have a mobile phone. Of course in practice this is not realistic since infants and very young children would not use mobile phones. Thus there is some duplication (e.g. from people having more than one phone, from non-residents that may take out a mobile subscription in the country they work). Duplication could also arise from delays in administrative records between when a subscriber stops using a subscription on one network and switches to another. Though a lower value might be set at which it might be estimated that all inhabitants that are able to use a mobile phone would have one, this would vary among countries. A limit of 100 implies that all adults have at least one mobile phone.
Literacy	100	The United Nations Development Programme establishes these values.[23]
School enrolment	100	
Affordability	1	The goalpost for this indicator is 1, a situation where the Internet would be free. On the other hand, where the affordability indicator is negative (e.g. prices are more than per capita income), no points are awarded since a person cannot spend more on Internet access than they earn. Some people make much more than the average and could afford access. However when affordability exceeds the average income in the country, the Internet is clearly out of the financial reach of most inhabitants.
Broadband subscribers per 100 inhabitants	30	Broadband access is still evolving so the penetration limit is unknown. The Republic of Korea leads the world with 21 broadband subscriptions per 100 inhabitants at the end of 2002. This translates into a household broadband connection rate of 68 per cent. At a level of 30 per 100 inhabitants, more than ninety per cent of households would have a broadband connection in Korea.
International Internet bandwidth per capita	10'000	This level has already been exceeded in three countries and most notably Denmark, where the value is more than twice the goalpost. This indicator is computed on a per capita basis but in reality the actual amount of international bandwidth available to an Internet user would be much higher.
Internet users per 100 inhabitants	85	The highest value for Internet penetration over the entire population occurs in Iceland with a rate of 65. This corresponds to 81 per cent of Icelanders aged 12-80. A goal post of 85 for this indicator implies that all in that age range are using the Internet.

Note: Minimum goalposts are always 0.
Source: ITU.

Figure 5.2: Economies shaping the DAI goalposts

Fixed telephone subscribers in Sweden 1975-2002 (top left); Mobile telephone subscribers per 100 inhabitants in Taiwan, China, 1988-2002 (top right); Mobile phones per 100 inhabitants and access to mobile phone at home (age 16-74), Nordic countries, 2002 (middle left); Broadband internet subscribers per 100 inhabitants and 100 households, Republic of Korea, 1997-2007 (middle right); International Internet bandwidth in Denmark, bits, 2002 (bottom left); and Internet users per 100 inhabitants, Iceland 1990-2008 (bottom right)



Source: ITU World Telecommunication Indicators database, Nordic Information Society Statistics, Statistics Iceland, TeleGeography.

The *knowledge* index is computed from the adult literacy rate and the gross school enrolment. Adult literacy is defined by the UNDP as "*The percentage of people aged 15 and above who can, with understanding, both read and write a short, simple statement related to their everyday life.*"[20] Overall school enrolment refers to the gross rate and is defined as the number of students in primary, secondary and tertiary schools divided by the population of that school age. The figure can exceed 100 due to repeaters or those older or younger than the official school age being enrolled. These data are from the UNDP and are used in its Human Development Index (HDI). The goalposts (both 100) and weighting (two thirds for literacy and one third for school enrolment) correspond to the HDI methodology.

The *quality* index consists of two indicators, bits per capita and broadband subscribers per 100 inhabitants, both from the World Telecommunication Indicators database.[21] Bits per capita are computed by dividing the international Internet bandwidth by the population of the country. There are some definitional issues with international Internet bandwidth. This includes what value to assign when the bandwidth is not symmetrical (e.g. the incoming bandwidth is greater than the outgoing). Some countries add the incoming and outgoing bandwidth while others use one or the other. Another point is that international bandwidth may not be as relevant in countries that have a large amount of domestic content. This category of countries would tend to have less need for international bandwidth and this will be reflected in a lower score. The goalpost for bits per capita is set at 10'000, a considerable amount considering not all of the population will be accessing the Internet at the same time. Because the international Internet bandwidth per capita varies tremendously and is arguably more important at initial stages of Internet development—when not much local content is available—the value is transformed using a logarithmic function. If the data were not transformed, the value would be close to zero for many developing nations because of the high goalpost. The goalpost for broadband subscribers per 100 inhabitants

Box 5.4: Testing the robustness of the DAI

The weighting methodology of an index can have a large impact and should be tested to ensure robustness. Spearman rank and Pearson correlation tests are statistical tools that can be used to measure how sensitive an index is to changes in category weights. Essentially, they test whether different weighting scenarios produce overall index values that are statistically different from one another.

The robustness of the DAI is tested using several variations on the weighting structure. The scores are first calculated by simply averaging the categories. Second, the weights are determined by a principal components analysis. Lastly, five variations assign 40 per cent of the weight to one cluster and 15 per cent to each of the remaining categories. Once the scores for each weighting scheme are calculated, a Spearman rank test and Pearson correlation are run over all possible weighting schemes.

	Infrastructure	*Affordability*	*Knowledge*	*Use*	*Quality*
Averages	20%	20%	20%	20%	20%
Principal components	21%	19%	18%	20%	21%
Variation 1	40%	15%	15%	15%	15%
Variation 2	15%	40%	15%	15%	15%
Variation 3	15%	15%	40%	15%	15%
Variation 4	15%	15%	15%	40%	15%
Variation 5	15%	15%	15%	15%	40%

The resulting Pearson and Spearman coefficients indicate that all the weighting methods are statistically identical in terms of the overall DAI value. The lowest Pearson coefficient is 0.96 between variations 2 and 4 and the lowest Spearman coefficient is 0.98 between variations 2 and 3. These high scores do not imply that the values for individual economies will not change. Rather, the changes will be so slight that they will have no statistically significant effect on the overall rankings of the index. Therefore, the most appropriate weighting scheme for the DAI is the method of averaging categories, as it is more transparent than more complex schemes.

is set at 30, a value implying that all households would have a connection. Each indicator is given equal weight in the category.

The *usage* index consists of Internet users per 100 inhabitants with the data from the World Telecommunication Indicators database. The goalpost is set at 85. The reason is that it is unrealistic to assume that all inhabitants will use the Internet. The question of at what age the Internet becomes relevant is difficult to answer. Although some surveys compile the number of Internet users from the age of two it seems questionable how many very small children could use the Internet effectively. Also, the limit of the number of Internet users per 100 inhabitants will vary depending on the age structure of the country. The value of 85 is an estimate of the average percentage of the worldwide population aged ten and over.

The majority of indices simply average category scores to obtain an overall index value, the same practice followed by the DAI (i.e. each category is assigned equal weight of 0.2). This technique has several advantages. First, it is the most transparent weighting method. Each category receives the same amount of weight in the final calculation, regardless of the number of variables it contains. Indices computed this way are easy to decompose and understand for users. It is worth noting that an equally weighted index causes a high score in one category to compensate for a deficiency in another.

The DAI was continually revised and refined throughout the construction process. There was an iterative process between the logic of test results and the selection of variables and weighting. The DAI was also subjected to various statistical tests measuring the weightings and correlation of the variables (Box 5.4).

5.4 Results

The results of the DAI lend themselves to a particular categorization of economies (Table 5.4 and Figure 5.3):

- **High (0.7 and above).** Economies in this category have achieved a high level of access to digital technologies for a majority of their inhabitants. There is sufficient infrastructure, prices are affordable, knowledge levels are high and efforts are being placed on enhancing quality through the provision of faster access. The main criterion that distinguishes economies in this category is usage. This often seems be more related to the social-cultural characteristics of the population than any of the DAI factors. For example, why is Iceland's Internet penetration highest in the world when it is not top-ranked in any of the other DAI categories? The individual rankings for economies in this group are close so that a minor change in calculation can shift a country's ranking a few notches. The statistical calculations are based on general assumptions that sometimes do not reflect the underlying realities of individual countries, adversely affecting their score. For example, countries such as Canada, the Republic of Korea, Japan and the United States score relatively low on international Internet bandwidth per capita. One reason is that they have extensive domestic content so there is less need for users to access overseas sites. The usage category is most susceptible to comparability since Internet user surveys differ in measurement of age ranges and the frequency of use.

Of note is the select group of five countries that have a DAI value of above 0.800. These include four Nordic countries: Sweden, Denmark, Iceland and Norway. Their presence at the top reflects that region's traditional emphasis on equitable access, affinity for technology and top-notch infrastructure. Perhaps one surprise is the Republic of Korea, ranked fourth in the DAI. This should not be unexpected since Korea was the first nation to launch a third generation mobile network and is the world leader in broadband penetration. Korea is an inspiring message to other countries of how quickly progress can be made in lifting digital access (see Section 5.5.3).[24]

The group of high DAI economies is homogenous, almost all emanating from the developed regions of Western Europe, North America, East Asia and the Pacific. The International Monetary Fund classifies them as advanced economies. The one exception is Slovenia. That Central European nation has been an early adopter of technology. It connected to the Internet back in 1992 and government sponsored Internet access encouraged many Slovenes to go online in the mid 1990s. Mobile phone growth has also been rapid and literacy and school enrolment levels are close to those of European Union members. The establishment of a Ministry of Information Society[25] and ongoing liberalization of the telecommunication industry suggest that Slovenia could raise its level of digital access even higher in the years to come.[26]

- **Upper (0.5-0.69).** Countries in this group have achieved an acceptable level of access for a majority of their inhabitants. What often sets this group apart from the high category is imbalance in a specific category. For example some countries in this group may have a high level of infrastructure availability but score low in affordability. Analyzing the separate category values can be useful for policy-makers seeking to find out where their countries are weak in access to the information society.

  This group of economies have a degree of homogeneity. For the most part the upper DAI group consists of countries from Central and Eastern Europe, the Caribbean, Gulf States and emerging Latin American nations. Many of these nations have a strong interest in ICTs as a development enabler. In Central and Eastern Europe, this is reinforced by European Union trends and ICT objectives for candidate countries.[27] The potential of ICT industries to generate economic growth is a focus among Caribbean nations. They are particularly keen about offshore software development and ICT services support which are viewed as complementary to the island states location, English-speaking population, knowledge levels and good quality infrastructure. Other upper DAI governments are committed to major ICT projects such as the *Dubai Internet City* in the United Arab Emirates (the highest ranked non-advanced, non-European nation in the DAI), the *Multimedia Super Corridor* in Malaysia (the highest ranked developing Asian nation in the DAI) and the *Cyber City* in Mauritius (along with Seychelles, the highest ranked African nation in the DAI).[28]

  This is a competitive collection of countries, with many aiming to graduate to a higher level of digital readiness. Some are eager to accomplish this through ambitious government projects while others are hoping market liberalization will provide the impetus. Most are combining the two. It is clear that this is one group where complacency risks falling behind. The DAI will provide a useful yardstick for measuring their progress over the coming years.

- **Medium (0.3-0.49).** The biggest barrier to higher levels of digital access in this group is a shortage of infrastructure. Nations in this group are primarily Latin American and South East Asian, along with some from Africa and the Middle East and North Africa. They would benefit from greater liberalization of their ICT markets to make them attractive for investors.

  The presence of three least developed countries (LDCs) in this group is notable (Cape Verde, Maldives and Samoa). Cape Verde and the Maldives have partly privatized their telecommunication operators resulting in increased effectiveness and access to networks. In Cape Verde over 90 per cent of the country is covered by mobile cellular whereas in the Maldives, all inhabitants are within walking distance of a telephone. What these countries need to do is to leverage their infrastructure accomplishments into higher levels of digital access. This includes increasing training and awareness and launching innovative services to tempt a larger portion of the population online.

  Peru ranks high despite a relatively low level of infrastructure. It is positioned between two countries that have twice the level of telephone penetration. The explanation is Peru's high level of Internet access compared to other countries in this group. This is due to the widespread availability of Internet cafés. This raises Peru's level of usage, helping to compensate for low values in other categories.

  Other countries in this group are attempting to replicate Peru's success with mass Internet access. For example "free" Internet access was introduced in Egypt in January 2002. Instead of Internet access provider charges, users now only pay a nominal rate for dial-up telephone usage. As a result Egypt now has among the lowest Internet access prices in the world, reflected in the affordability category of its DAI. In Tunisia, all tertiary and secondary schools are connected to the Internet and there are plans to connect all primary ones. There are also 280 public access facilities. The Government is hoping that expansion of public access facilities will lift the number of Internet users by a factor of six, from half a million at end 2002 to three million by the end of 2006. This would boost Tunisia's DAI to just below the upper level. Perhaps with an extra effort, Tunisia could reach that level when it hosts the second World Summit on the Information Society in 2005.

- **Low (less than 0.3)**. Countries in this category are the poorest in the world and most are LDCs. They have a minimal level of access to the information society. Their lack of digital access is one more deprivation along with poverty and hunger and shortages of basic human needs such as good

shelter, clean water and adequate health care. Apart from low levels of communication infrastructure, a factor that almost all countries in this group have in common is relatively high access prices. In most nations in this group, an hour a day of Internet access exceeds the average daily income. There is little hope of this group joining the information society unless prices are dramatically reduced. This should be a primary focus of development assistance, particularly since greater use of ICTs in these countries could help achievement of the Millennium Development Goals (see Chapter four).[29]

Although this group has the common factor of high communication charges, there are significant variations among other DAI categories, notably knowledge. Indeed the major factor having an impact on a country's rank among this group is its level of literacy and school enrolment. This suggests that there is significant potential for countries with high knowledge levels if other barriers could be overcome. For example, contrast Syria and Zimbabwe, two of the highest ranked economies of this group. Zimbabwe's Internet penetration is more than three times higher than Syria's. One reason is because Zimbabwe has a high knowledge level—its literacy rate is the highest in Africa—preconditions for a higher level of digital access.[30] If Zimbabwe had Syria's level of infrastructure, it would be in the medium DAI category. Conversely, if Syria had Zimbabwe's literacy level and Internet penetration, it too would be in the medium category. Hence the DAI helps to identify different solutions for these two different countries to raising their level of digital access.

5.5 Future work

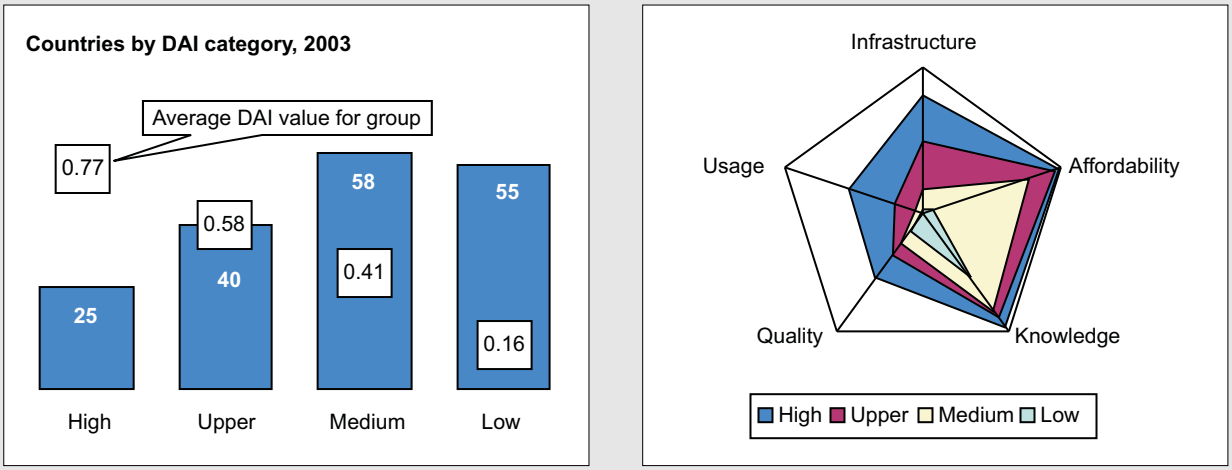
The DAI has been presented as an initial attempt to create a transparent way of measuring access to newer ICTs. As it is still in its infancy, this index will be further developed on the basis of comments and inputs from countries and researchers. We envision that this feedback will help ITU to optimize the usefulness of the index. Hopefully, the DAI will also generate an improvement in the data. While most of the data for the variables are widely available, there are some for which the quality is uncertain. This includes the number of Internet users that is not based on surveys for around half the countries. There are three areas where additional work on the DAI would be useful: national indices, gender disaggregated indices and the construction of time series.

5.5.1 National DAIs

While comparisons between countries will be one of the main purposes of the DAI, the index can equally be used to measure the level of access within a nation. One problem many countries have is selecting an appropriate indicator to measure internal access to ICTs. The DAI can identify internal digital divides so

Figure 5.3: The digital divide through the DAI

Average country Digital Access Index (DAI) value by DAI classification and category, 2002



Source: ITU.

that priority can be focussed on underserved areas to promote equitable nationwide access. Few countries today have all of the data needed to carry out such analysis. Some, such as Chile publish most of the needed indicators on a disaggregated national level that can be used to calculate a DAI sub-index for its 13 regions.[31] Calculating regional DAIs uncovers a number of challenges. In terms of infrastructure, many countries have a breakdown of main telephone lines by region. However the availability of disaggregated mobile cellular subscribers is more problematic. This is due to the widespread popularity of prepaid cards. While the number of prepaid subscribers can be ascertained at a country level this is practically impossible at the provincial level. This is because prepaid cards do not require a subscription so the residence of the purchaser is unknown. Thus while administrative records exist for subscription-based subscribers in Chile, there is no such data for prepaid subscribers. A proxy could be obtained from surveys by querying respondents about whether they have a mobile subscription. This has been done in Chile at both the individual and household level but the survey is not carried out on an annual basis.

Another challenge is the computation of regional affordability. Internet access prices are not always uniform nationwide. In some countries, the absence of points of presence (POPs) and lack of nationwide calling numbers can mean that those in rural areas pay long distance calling charges for Internet access. Internet tariffs can also vary because the same ISPs may not operate nationally. Another challenge is to obtain per capita GNI on a regional basis. Instead, regional incomes are usually computed on a household income basis as is the case in Chile.

Knowledge indicators can also be difficult to obtain. The UNDP has carried out national human development reports for a number of countries where these data are available. However this is often not carried out on a regular basis. In the case of Chile, disaggregated indicators for adult literacy and school enrolment at the regional level are available from the UNDP for 1998.[32]

Quality indicators also pose a challenge. Like main lines, broadband subscriptions can be derived from administrative records at a regional level as is the case of Chile. More difficult is a regional measure of international Internet bandwidth. This is because in many countries, international Internet gateways only exist in a few locations. Traffic is then distributed via local networks to their destination. Thus the concept of international bandwidth is not so logical in a regional sense. A proxy might be the amount of national bandwidth available at the regional level. Although Chile has several domestic fibre optic and satellite networks, data could not be obtained on the regional distribution of bandwidth. In many cases, national backbone speeds are uniform so the bandwidth would be the same. In Chile, nine provincial capitals and the national capital are linked by a 155 Mbps fibre optic asynchronous transfer mode (ATM) backbone. The other provinces use slower speed satellite connection.

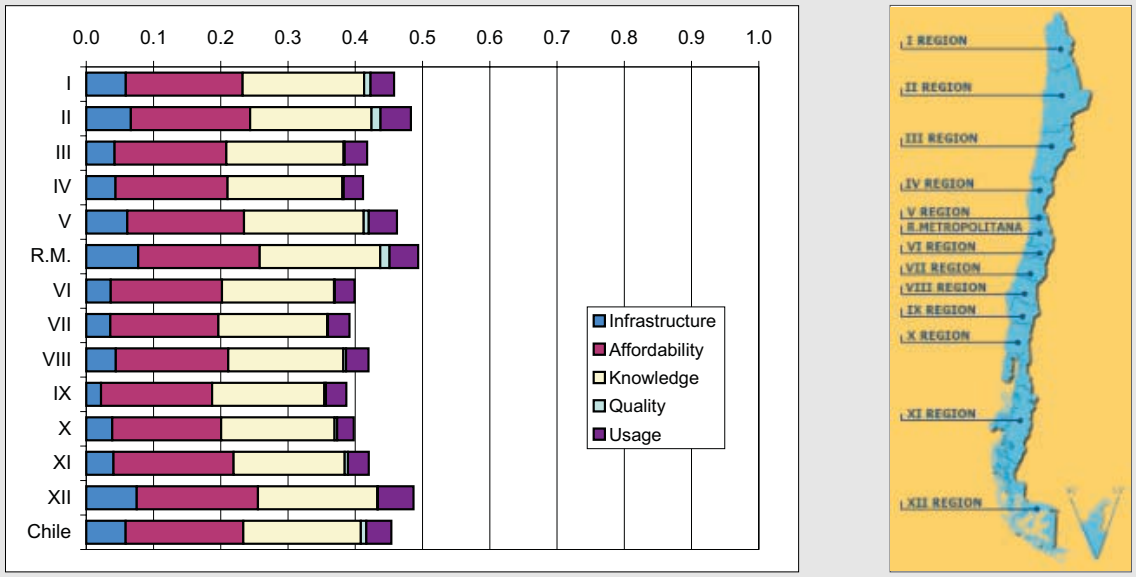
As mentioned throughout the report, many developing nations do not carry out Internet surveys and therefore do not have disaggregated provincial-level data. Though Internet subscriptions by province are sometimes available, these are not an ideal proxy because of the variations that can exist between the number of subscriptions and actual users. Other countries may carry out surveys but not on an annual basis. This is the case of Chile where a nationwide survey with data disaggregated at a regional level was carried out in November 2000 but has not been updated since.

To summarize the Chilean situation, DAI indicators or reasonable proxies are available at a provincial level except international Internet bandwidth. The main limitation is that the data set is not consistent across time. The indicators on main telephone lines and broadband subscriptions are from December 2002, mobile subscribers and Internet users from November 2000 and the other indicators from 1998. It is nonetheless possible to derive regional indices since the data are from the same date for all provinces with the caveat that this would not be comparable to Chile's actual country level DAI and hence to other countries. The results indicate that though there are variations in the DAI across Chile's regions, they are not glaring. The difference between the highest DAI value—in the capital Santiago—and the lowest — in Araucanía in Region 9— is 28 per cent (Figure 5.4). The main reason for the discrepancy is infrastructure (including broadband Internet access) rather than affordability or knowledge. This would suggest that efforts should be devoted to enhancing infrastructure in Chile's remote provinces.

5.5.2 A gender disaggregated DAI

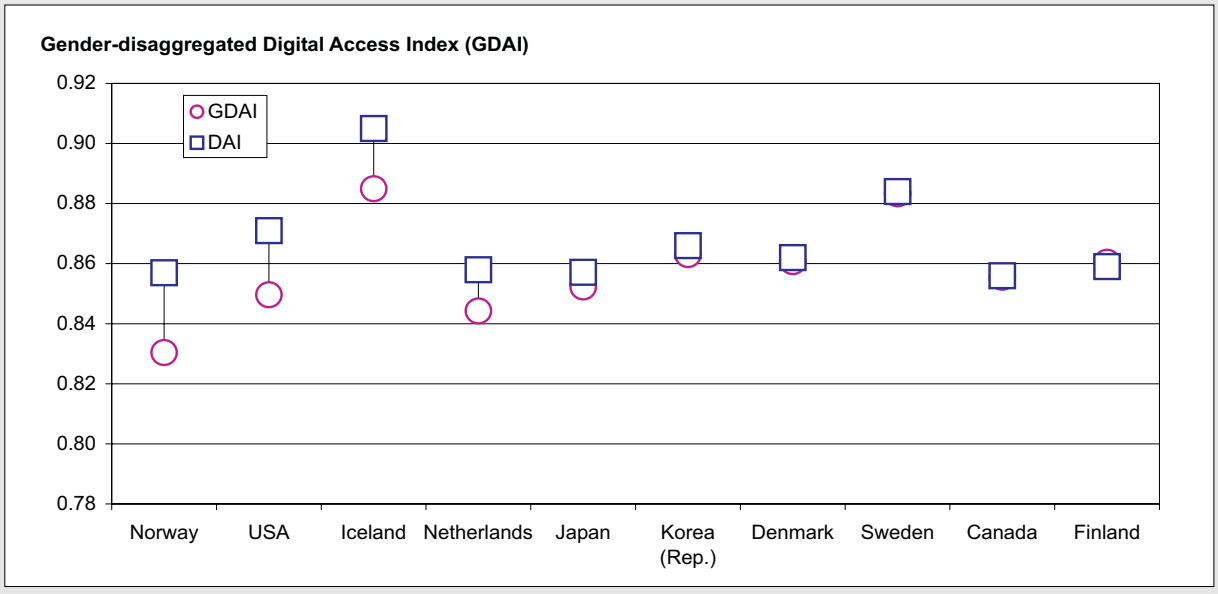
Just as the DAI can be disaggregated at a regional level within a country, it could theoretically be split along other characteristics such as age, income and gender. With regards to gender, it is important to have

Figure 5.4: National DAI
DAI in Chile's regions, 2002



Note: See text for modifications to DAI necessary for a regional index for Chile.
Source: ITU.

Figure 5.5: A gender modified DAI



Note: The DAI was reconstructed along the same categories as those used for the gender-disaggregated version (i.e. affordability, knowledge and usage). A gender-disaggregated index was then calculated for the resulting top ten ranked economies.
Source: ITU.

an understanding of the level of access between males and females (Box 5.5). One limitation is data availability. Infrastructure data such as fixed, mobile telephone and broadband subscriptions are obtained from administrative records and are not available on a gender disaggregated basis. In any case their inclusion in the DAI was meant to show the availability of infrastructure rather than how it is used. Trying to create gender-disaggregated data for this category of indicators would therefore be contrary to their purpose. It is much like measuring a country's transport network. The main criterion is the availability of roads rather than who is using them. Another issue is conceptual. Some indicators do not lend themselves to clear gender delineation. For example, fixed telephones are typically shared in offices or homes and not "owned" by a specific person.

Parts of the DAI do lend themselves to disaggregation by gender. This includes social indicators such literacy and school enrolment as well as the Internet users in the usage category. In addition, per capita income is available by gender. These indicators can be used to create a gender sub-index: affordability, knowledge and usage. Thus three of five DAI categories (excluding infrastructure and quality) can be calculated along gender lines. The major problem is data availability, particularly for Internet users disaggregated by gender. A gender sub-index has been calculated for selected economies to illustrate the possibilities (Figure 5.5).[33] The results show that there is not always a relationship between a country's DAI result and equity in access.

Another possibility is to design a modified DAI using proxies for the indicators. These proxies do not always support the strict purpose of the DAI but nonetheless would give a more complete picture of female access to ICTs (Table 5.3).

5.5.3 DAI over time

One of the most important uses for the DAI will be to measure progress over time. While monitoring future change is important, it is also insightful to extend the index into the past to analyse the historical performance of countries. One drawback is that time series for Internet access prices and international Internet bandwidth are lacking for many countries. When the former are available, they often have not been calculated using the same methodology as the DAI, making comparisons difficult.

Comparable data for 1998 have been obtained for 40 economies covering most developed and major developing nations. Despite the short time span of four years (1998 compared to 2002) there were noteworthy differences in relative DAI rankings, illustrating how rapid technological diffusion has been (Figure 5.6). The most striking development is the improvement of Asian economies particularly the Republic of Korea and Taiwan, China. The Republic of Korea improved its rank the most, moving up 20 places among the 40 economies examined. Taiwan, China was next, moving up 13 places. Korea's rapid progress reflects strong government commitment to ICTs with the payoff noticeable in high levels of broadband connectivity and Internet usage. Taiwan, China's jump shows the effect of telecommunication liberalization, particularly in the mobile sector, moving the economy to the number one position in the world in terms of penetration. Several predominantly Anglophone nations dropped in the rankings. This may mark a turning point in the internationalisation of ICTs with English becoming less of an advantage than it was in the past. Indeed one observation from the Asian economies that have improved their rankings is the growth of digital content. The development of local content in non-Latin scripts, such as Chinese, Korean and Japanese, has progressed at a fast pace. These three languages make up eleven per cent of Internet content a higher figure than either French or Spanish.[37]

Box 5.5: Thai Women Online

A glance at Internet penetration shows that the gap between developing and developed nations is substantial. Thailand, for example, had 4.8 million Internet users in 2002 – a mere 7.8 per cent of the population. However, if the data is gender disaggregated, a different picture emerges. Thai women account for 45 per cent of the total Internet users in the country. When compared to developed European nations this is impressive (Box Figure 5.5, left).

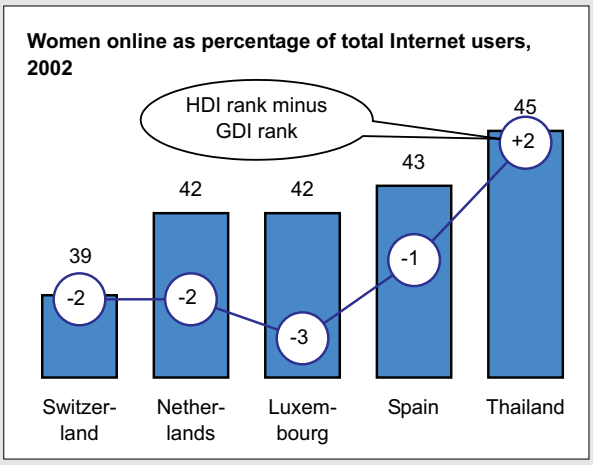
Women's ability to take advantage of ICTs is dependent upon a number of cultural and structural factors, such as education, affordable access, impediments to usage, etc. What makes the measurement of such factors imperative is that average education or income levels assume gender neutrality. For example, the United Nations Development Programme (UNDP) has calculated a gender-related development index (GDI) out of its popular human development index (HDI). A comparison of the difference between GDI and HDI ranks shows that Thailand performs better in gender (+2) compared to countries such as Luxembourg (-3), the Netherlands (-2) and Spain (-1).

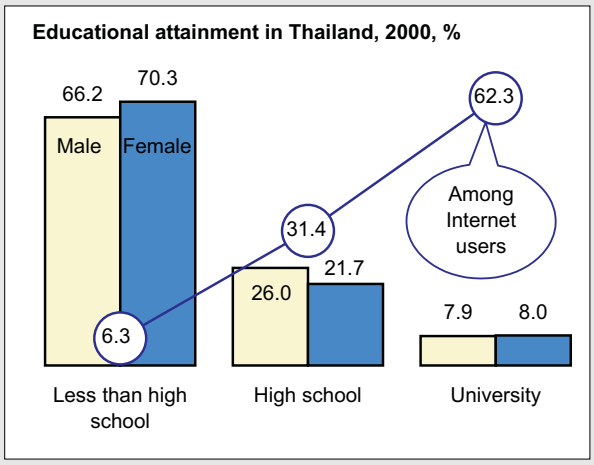
Delving deeper into the causes behind the relatively high figure for female Thai Internet users highlights a number of factors. Education, for instance, is essential for gender equality. It allows women to participate in the decision-making process within the family, the community, at work and in the political arena. There is also a close link between education—the number of students a country has or the educational level of its population—and Internet use. In Thailand, opportunities for females improve as they move up the educational ladder. Gender disaggregated school enrolment figures show that more women than men enrol in secondary and tertiary institutions. Males have a slight advantage in the overall educational level of the population with around a three per cent higher rate in literacy. However this lead is dissipating and already there are slightly more college-educated women than men (Box Figure 5.5, right).

The Internet in Thailand is mainly accessed from either the household or work and men and women log on in almost exactly the same proportions from these locations. Unlike other countries, there are also no social barriers preventing Thai women going online from places such as Internet cafés. Within the household, Thai women wield a significant amount of economic power and have historically controlled family finance.[34] Because they are encouraged to contribute to the economic well being of the family unit, women contribute significantly to the country's economy. Female labour force participation in Thailand stands at an astounding 73 per cent as compared to the figure for the United States — 59 per cent. Thai women are encouraged to participate in the economic well being of the family unit, and have thus worked alongside men. High Internet use from the place of work, and the high proportion of women working point to an important factor leading to the high numbers of Thai women on the Internet.

Box Figure 5.5: Thai Women Online

Women online as a percentage of total Internet users, selected economies, 2002 (left) and educational attainment by sex, Thailand, 2000 (right)





Note: In the left chart, HDI = UNDP Human Development Index and GDI = UNDP Gender-related Development Index. In the right chart, educational attainment refers to population age 6 and over.

Source: ITU adapted from national Internet surveys, National Statistical Office — Thailand, National Electronics and Computer Technology Center — Thailand (NECTEC), United Nations Development Programme (UNDP).

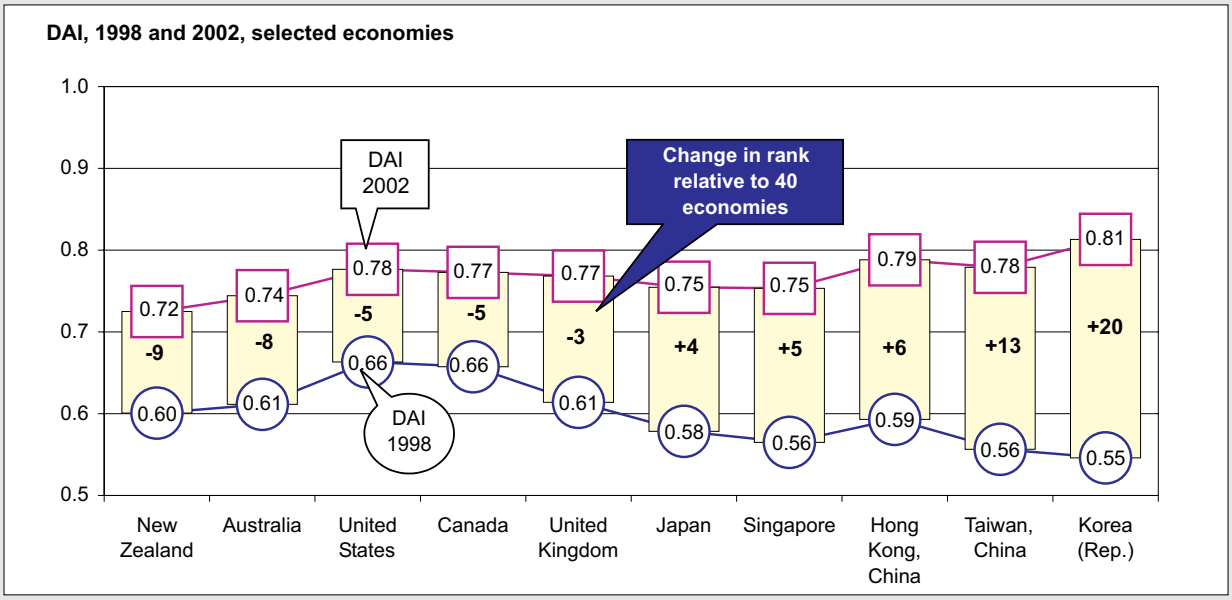
Table 5.3: Substitutes of DAI indicators for gender analysis

DAI indicator	*Substitute gender indicator*	*Note*
Main telephone per 100 inhabitants	Not available	Available data suggest that women tend to use fixed telephones more than men.[35] However there is scarce research on female access to fixed telephone lines.
Mobile cellular subscribers per 100 inhabitants	Percentage of females with access to mobile phone at home	A number of countries have compiled this statistic through surveys.
Internet access tariffs as % of GDP per capita	Internet access tariffs as % of female estimated earned income	UNDP provides income data disaggregated by gender.
Adult literacy School enrolment	Female adult literacy rate Female overall school enrolment ratio	UNDP provides literacy and school enrolment data disaggregated by gender.
Broadband subscribers per 100 inhabitants	Percentage of female broadband Internet users	Singapore has compiled this statistic through a survey.[36]
International Internet bandwidth per capita	Not available	There is scarce research on access or usage of international Internet bandwidth by gender.
Internet users per 100 inhabitants	Percentage of females using the Internet	A number of countries compile this statistic in national Internet user surveys.

Source: ITU.

Figure 5.6: Reversal of fortune

DAI values in 1998 and 2002, selected economies



Source: ITU.

Box 5.6: Compiling the Digital Access Index

The following example shows how the Digital Access Index (DAI) is compiled for Hong Kong, China. The Office of the Telecommunications Authority (OFTA) provided all ICT infrastructure data. Population and Internet usage statistics are from the national statistical agency, the Census and Statistics Department (C&SD). The Internet access prices are from i-Cable. Hong Kong is a role model for data availability with all of these indicators freely available on the OFTA, C&SD and i-Cable websites.[38] As for other economies, GNI per capita, exchange rates, literacy and school enrolment are from international sources.

DAI data for Hong Kong, China

2002

Indicator	*Value*
Population	6'786'100
Gross National Income (GNI) per capita in United States dollars (US$)	US$ 24'750 (2'063 month)
Annual average exchange rate (Hong Kong Dollar (HK$) to one (US$)	7.80
Fixed telephone subscribers	3'841'787
Fixed telephone subscribers per 100 inhab.	56.6
Mobile cellular subscribers	6'218'984
Mobile subscribers per 100 inhabitants	91.6
20 hours Internet access per month	HK$ 30 (US$ 3.85)
Adult literacy (age 15 and over)	93.5
Combined school enrolment (gross primary, secondary and tertiary)	63
International Internet bandwidth	12'668 Mbps
Bits per capita	1'866.8
Broadband subscribers	989'115
Broadband subscribers per 100 inhabitants	14.6
Internet users	2'918'800
Internet users per 100 inhabitants	43.0

Source: OFTA, C&SD, i-Cable, World Bank, IMF, UNDP.

Infrastructure

The goalpost for fixed telephone subscribers per 100 inhabitants is 60: 56. 6 / 60 = 0.94.

The goalpost for mobile cellular subscribers per 100 inhabitants is 100: 91.6 / 100 = 0.92.

Each indicator is weighed equally:
0.94 x (1/2) + 0.92 x (1/2) = 0.47 + 0.46 = 0.93.

Affordability

Affordability indicator:
1 - (20 hours of Internet access / Monthly GNI * 100) = 1 - (US$ 3.85 / US$ 2'063 = 0.2998).

The goalpost for affordability is 0.1 : 1 - (0.2998 / 100) = 0.998.

Knowledge

The goalpost for literacy and enrolment is 100[39]: 93.5 / 100 = 0.935 and 63 / 100 = 0.63.

Literacy is given two-thirds weight and enrolment one third: 0.935 x (2/3) + 0.63 x (1/3) = 0.83.

Quality

The goalpost for bits per capita is 10'000. Because of the extreme range among economies and the fact that international bandwidth is more critical at early stages of development, logarithms are used to transform the values: (LOG (1'866.8) – LOG (0.01)) / (LOG (10'000) – LOG (0.01)) = 0.88.

The goalpost for broadband subscribers per 100 inhabitants is 30: 14.6 / 30 = 0.49.
Each indicator is weighed equally: 0.88 x (1/2) + 0.49 x (1/2) = 0.44 + 0.24 = 0.68.

Usage

The goalpost for Internet users per 100 inhabitants is 85: 43.0 / 85 = 0.51.

DAI

The Digital Access Index is the average of the five categories above:
(0.93 x 0.2) + (0.998 x 0.2) + (0.83 x 0.2) + (0.68 x 0.2) + (0.51 x 0.2) = **0.79.**

Table 5.4: DAI results

Economy	*Sub. lines p. 100 inhab.*	*Mobile sub. p. 100 inhab.*	*Internet tariff as % of GNI*	*Adult literacy*	*School enrol-ment*	*Int'l Internet band-width P. 100 inhab.*	*Broad-band sub-scribers p. 100 inhab.*	*Internet users p. 100 inhab.*	*INFRA-STRUC TURE*	*AF-FOR-DABI-LITY*	*KNOW-LEDGE*	*QUAL-ITY*	*USAGE*	*DAI*
HIGH														
Sweden	65.2	88.9	1.1	98.5	113	10'611.2	8.0	57.3	0.94	0.99	0.99	0.64	0.67	0.85
Denmark	57.4	83.2	0.7	99.5	98	20'284.9	8.2	51.2	0.89	0.99	0.99	0.66	0.60	0.83
Iceland	51.9	90.7	0.9	98.5	91	236.5	8.2	64.9	0.89	0.99	0.96	0.50	0.76	0.82
Korea (Rep.)	48.6	67.9	1.2	97.9	91	361.5	21.9	55.2	0.74	0.99	0.96	0.74	0.65	0.82
Norway	50.4	84.3	0.8	99.5	98	4'981.6	4.5	50.2	0.84	0.99	0.99	0.55	0.59	0.79
Netherlands	48.5	74.5	1.2	99.0	99	10'327.5	6.6	50.6	0.78	0.99	0.99	0.61	0.60	0.79
Hong Kong, China	56.6	91.6	0.2	93.5	63	1'866.8	14.6	43.0	0.93	1.00	0.83	0.68	0.51	0.79
Finland	46.3	84.5	1.1	98.5	103	3'185.5	5.3	50.9	0.81	0.99	0.99	0.55	0.60	0.79
Taiwan, China	57.4	106.4	0.7	96.0	93	658.6	9.4	38.3	0.98	0.99	0.95	0.56	0.45	0.79
Canada	61.3	37.7	0.7	98.5	94	2'841.8	11.1	51.3	0.69	0.99	0.97	0.64	0.60	0.78
United States	65.0	47.3	0.5	98.5	94	1'323.6	6.9	55.1	0.74	0.99	0.97	0.54	0.65	0.78
United Kingdom	53.4	83.9	1.1	98.5	112	5'402.8	3.1	42.2	0.86	0.99	0.99	0.53	0.50	0.77
Switzerland	55.7	78.4	0.7	98.5	88	8'991.7	6.2	34.9	0.86	0.99	0.95	0.60	0.41	0.76
Singapore	46.2	79.4	0.6	92.5	75	1'414.0	6.5	50.3	0.78	0.99	0.87	0.54	0.59	0.75
Japan	47.7	63.7	0.8	99.5	83	237.7	6.2	54.5	0.72	0.99	0.94	0.47	0.64	0.75
Luxembourg	53.4	105.3	0.9	98.5	73	3'271.7	1.3	36.7	0.94	0.99	0.90	0.48	0.43	0.75
Austria	40.4	80.9	1.7	99.5	92	4'421.6	5.5	40.9	0.74	0.98	0.97	0.56	0.48	0.75
Germany	48.2	72.7	0.7	99.5	89	3'155.8	3.9	41.2	0.76	0.99	0.96	0.52	0.48	0.74
Australia	51.7	64.0	1.1	98.5	114	533.9	1.8	48.2	0.75	0.99	0.99	0.42	0.57	0.74
Belgium	42.4	78.6	1.5	98.5	107	8'121.4	8.4	30.9	0.75	0.99	0.99	0.63	0.36	0.74
New Zealand	45.3	62.2	1.1	99.0	99	584.7	1.4	45.7	0.69	0.99	0.99	0.42	0.54	0.72
Italy	41.5	92.5	1.0	98.5	82	1'179.8	1.9	34.7	0.81	0.99	0.93	0.45	0.41	0.72
France	52.0	64.7	0.8	98.5	91	3'269.8	2.8	31.4	0.76	0.99	0.96	0.51	0.37	0.72
Slovenia	44.0	83.5	3.1	99.6	83	539.7	2.8	37.6	0.78	0.97	0.94	0.44	0.44	0.72
Israel	43.5	95.5	2.1	95.1	90	213.7	2.0	30.1	0.84	0.98	0.93	0.39	0.35	0.70
UPPER														
Ireland	40.1	76.3	1.4	98.5	91	3'434.5	0.3	27.1	0.72	0.99	0.96	0.47	0.32	0.69
Cyprus	62.4	58.5	1.7	97.2	74	236.4	0.8	29.4	0.79	0.98	0.89	0.38	0.35	0.68
Estonia	35.1	65.0	3.9	99.8	89	409.6	3.4	32.8	0.62	0.96	0.96	0.44	0.39	0.67
Spain	44.6	80.1	1.7	97.7	92	1'112.7	3.0	15.2	0.77	0.98	0.96	0.47	0.18	0.67
Malta	52.3	69.9	2.3	92.3	76	391.4	4.5	20.9	0.79	0.98	0.87	0.46	0.25	0.67
Czech Republic	33.4	84.9	4.5	98.5	76	2'189.1	0.2	25.6	0.70	0.96	0.91	0.45	0.30	0.66
Greece	52.4	84.5	2.4	97.3	81	222.0	0.0	15.5	0.86	0.98	0.92	0.36	0.18	0.66
Portugal	35.4	81.9	2.3	92.5	93	386.2	2.5	19.2	0.71	0.98	0.93	0.42	0.23	0.65
United Arab Emirates	34.2	75.9	0.8	76.7	67	339.1	0.5	36.7	0.66	0.99	0.73	0.39	0.43	0.64
Macao, China	39.8	62.5	1.0	91.3	55	489.1	3.8	26.0	0.64	0.99	0.79	0.45	0.31	0.64
Hungary	32.6	67.6	4.1	99.3	82	1'048.3	1.1	15.8	0.61	0.96	0.94	0.44	0.19	0.63
Bahamas	40.6	39.0	2.0	95.5	74	464.7	6.3	19.2	0.53	0.98	0.88	0.49	0.23	0.62
Bahrain	26.3	58.3	4.1	87.9	81	292.4	0.7	24.7	0.51	0.96	0.86	0.38	0.29	0.60
St. Kitts and Nevis	50.0	31.9	4.2	97.8	70	42.2	1.1	21.3	0.58	0.96	0.89	0.32	0.25	0.60
Poland	29.5	36.3	4.1	99.7	88	163.6	0.0	23.0	0.43	0.96	0.96	0.35	0.27	0.59
Slovak Republic	26.8	54.4	6.3	100.0	73	1'516.0	0.0	16.0	0.50	0.94	0.91	0.43	0.19	0.59
Croatia	39.0	53.5	4.4	98.4	68	41.2	0.3	18.0	0.59	0.96	0.88	0.31	0.21	0.59
Chile	23.0	42.8	6.1	95.9	76	131.6	1.3	23.8	0.41	0.94	0.89	0.36	0.28	0.58
Antigua & Barbuda	47.8	32.1	2.8	86.6	69	359.0	0.0	12.8	0.56	0.97	0.81	0.38	0.15	0.57
Barbados	47.9	19.7	3.2	99.7	89	24.2	0.0	11.2	0.50	0.97	0.96	0.28	0.13	0.57
Malaysia	19.3	37.7	2.9	87.9	72	53.8	0.1	32.0	0.35	0.97	0.83	0.31	0.38	0.57
Lithuania	26.4	47.6	11.2	99.6	85	94.8	0.6	14.5	0.46	0.89	0.95	0.34	0.17	0.56
Qatar	28.9	43.8	0.9	81.7	81	254.1	0.0	11.5	0.46	0.99	0.81	0.37	0.14	0.55
Brunei Darussalam	25.1	38.9	1.4	91.6	83	170.5	0.0	9.9	0.40	0.99	0.89	0.35	0.12	0.55
Latvia	30.1	39.4	20.0	99.8	86	181.6	0.4	13.3	0.45	0.80	0.95	0.36	0.16	0.54
Uruguay	28.0	19.3	7.3	97.6	84	128.9	0.0	13.6	0.33	0.93	0.93	0.34	0.16	0.54
Seychelles	26.2	53.9	16.9	91.0	79	72.3	0.1	14.1	0.49	0.83	0.87	0.32	0.17	0.54
Dominica	33.3	13.1	6.3	96.4	65	70.2	0.8	17.5	0.34	0.94	0.86	0.33	0.21	0.54
Argentina	21.9	17.8	3.9	96.9	89	149.6	0.3	11.2	0.27	0.96	0.94	0.35	0.13	0.53
Trinidad & Tobago	25.0	27.8	2.5	98.4	67	73.8	0.0	10.6	0.35	0.98	0.88	0.32	0.12	0.53
Bulgaria	36.8	33.3	8.3	98.5	77	10.1	0.0	8.1	0.47	0.92	0.91	0.25	0.10	0.53
Jamaica	17.2	53.5	16.9	87.3	74	28.0	1.0	22.9	0.41	0.83	0.83	0.30	0.27	0.53
Costa Rica	25.1	11.1	7.6	95.7	66	114.7	0.0	19.3	0.26	0.92	0.86	0.34	0.23	0.52
St. Lucia	32.0	8.9	6.9	90.2	82	93.8	0.0	11.3	0.31	0.93	0.87	0.33	0.13	0.52
Kuwait	20.4	51.9	2.0	82.4	54	25.0	0.0	10.6	0.43	0.98	0.73	0.28	0.12	0.51
Grenada	31.6	7.1	7.6	94.4	63	37.7	0.5	14.2	0.30	0.92	0.84	0.31	0.17	0.51
Mauritius	27.0	28.9	4.7	84.8	69	28.1	0.0	9.9	0.37	0.95	0.80	0.29	0.12	0.50
Russia	23.9	12.0	5.6	99.6	82	61.2	0.0	4.1	0.26	0.94	0.94	0.32	0.05	0.50
Mexico	14.6	25.3	4.6	91.4	74	56.9	0.2	9.8	0.25	0.95	0.86	0.32	0.12	0.50
Brazil	22.3	20.1	11.8	87.3	95	53.7	0.4	8.2	0.29	0.88	0.90	0.32	0.10	0.50

Table 5.4: DAI results (cont'd)

Economy	Sub. lines p. 100 inhab.	Mobile sub. p. 100 inhab.	Internet tariff as % of GNI	Adult literacy	School enrol-ment	Int'l Internet band-width P. 100 inhab.	Broad-band sub-scribers p. 100 inhab.	Internet users p. 100 inhab.	INFRA-STRUC TURE	AF-FOR-DABI-LITY	KNOW-LEDGE	QUAL-ITY	USAGE	DAI
MEDIUM														
Belarus	29.9	4.7	11.3	99.7	86	4.4	0.0	8.2	0.27	0.89	0.95	0.22	0.10	0.49
Lebanon	19.9	22.7	11.1	86.5	76	17.6	1.0	11.7	0.28	0.89	0.83	0.29	0.14	0.48
Thailand	10.4	26.0	4.2	95.7	72	16.3	0.0	7.8	0.22	0.96	0.88	0.27	0.09	0.48
Romania	18.7	22.9	16.4	98.2	68	87.2	0.1	8.1	0.27	0.84	0.88	0.33	0.09	0.48
Turkey	26.9	33.6	9.5	85.5	60	10.6	0.0	7.0	0.39	0.90	0.77	0.25	0.08	0.48
TFYR Macedonia	27.1	17.7	13.3	94.0	70	24.2	0.0	4.8	0.31	0.87	0.86	0.28	0.06	0.48
Panama	12.4	19.2	10.7	92.1	75	210.1	0.0	4.1	0.20	0.89	0.86	0.36	0.05	0.47
Venezuela	11.2	25.5	5.7	92.8	68	27.3	0.3	5.0	0.22	0.94	0.85	0.29	0.06	0.47
Belize	12.4	20.4	23.1	93.4	76	181.8	0.0	11.9	0.21	0.77	0.88	0.36	0.14	0.47
St. Vincent	23.4	8.5	9.5	88.9	58	34.2	0.9	6.0	0.24	0.91	0.79	0.31	0.07	0.46
Bosnia	22.0	18.3	6.9	93.0	64	6.1	0.0	2.4	0.27	0.93	0.83	0.23	0.03	0.46
Suriname	16.5	22.8	18.5	94.0	77	25.2	0.0	4.2	0.25	0.82	0.88	0.28	0.05	0.46
South Africa	9.5	30.4	15.4	85.6	78	12.4	0.0	6.8	0.23	0.85	0.83	0.26	0.08	0.45
Colombia	17.4	10.6	12.2	91.9	71	12.7	0.1	4.6	0.20	0.88	0.85	0.26	0.05	0.45
Jordan	12.7	22.9	18.0	90.3	77	16.9	0.0	5.8	0.22	0.82	0.86	0.27	0.07	0.45
Serbia & Montenegro	23.1	25.7	11.3	91.7	52	0.9	0.0	6.0	0.32	0.89	0.78	0.16	0.07	0.45
Saudi Arabia	14.4	21.7	4.9	77.1	58	12.9	0.0	6.2	0.23	0.95	0.71	0.26	0.07	0.44
Peru	7.6	8.6	19.2	90.2	83	45.6	0.1	9.3	0.11	0.81	0.88	0.31	0.11	0.44
China	16.7	16.1	12.9	85.8	64	7.3	0.2	4.6	0.22	0.87	0.79	0.24	0.05	0.43
Fiji	11.7	10.8	17.6	93.2	76	9.6	0.0	6.0	0.15	0.82	0.87	0.25	0.07	0.43
Botswana	8.3	24.1	10.9	78.1	80	15.1	0.0	2.9	0.19	0.89	0.79	0.26	0.03	0.43
Iran (I.R.)	18.7	3.3	4.2	77.1	64	8.4	0.0	4.8	0.17	0.96	0.73	0.24	0.06	0.43
Ukraine	21.6	8.4	26.0	99.6	81	6.3	0.0	1.8	0.22	0.74	0.93	0.23	0.02	0.43
Guyana	9.2	9.9	29.8	98.6	84	3.5	0.0	14.2	0.13	0.70	0.94	0.21	0.17	0.43
Philippines	4.2	19.4	20.1	95.1	80	11.2	0.1	4.4	0.13	0.80	0.90	0.26	0.05	0.43
Oman	8.4	17.1	3.8	73.0	58	14.0	0.0	6.6	0.16	0.96	0.68	0.26	0.08	0.43
Maldives	10.2	14.9	29.6	97.0	79	32.0	0.1	5.3	0.16	0.70	0.91	0.29	0.06	0.43
Libya	11.9	1.3	3.8	80.8	89	1.1	0.0	2.3	0.11	0.96	0.84	0.17	0.03	0.42
Dominican Rep.	10.4	19.5	17.1	84.0	74	5.9	0.0	3.4	0.18	0.83	0.81	0.23	0.04	0.42
Tunisia	11.7	5.1	10.4	72.1	76	7.6	0.0	5.2	0.12	0.90	0.73	0.24	0.06	0.41
Ecuador	11.4	12.6	26.3	91.8	72	6.1	0.1	4.3	0.16	0.74	0.85	0.23	0.05	0.41
Kazakhstan	13.0	6.4	27.4	99.4	78	4.3	0.0	1.6	0.14	0.73	0.92	0.22	0.02	0.41
Egypt	11.5	6.7	4.5	56.1	76	10.9	0.0	2.8	0.13	0.96	0.63	0.25	0.03	0.40
Cape Verde	15.6	9.5	28.4	74.9	80	17.8	0.0	3.6	0.18	0.72	0.77	0.27	0.04	0.39
Albania	7.1	25.9	24.8	85.3	69	3.9	0.0	0.4	0.19	0.75	0.80	0.22	0.00	0.39
Paraguay	4.7	28.8	37.3	93.5	64	17.3	0.0	1.7	0.18	0.63	0.84	0.27	0.02	0.39
Namibia	6.5	10.7	22.5	82.7	74	4.5	0.0	2.7	0.11	0.77	0.80	0.22	0.03	0.39
Guatemala	7.1	13.1	21.4	69.2	57	72.9	0.0	3.3	0.12	0.79	0.65	0.32	0.04	0.38
El Salvador	10.3	13.8	27.8	79.2	64	6.7	0.0	4.6	0.15	0.72	0.74	0.24	0.05	0.38
Palestine	8.7	9.3	32.8	89.2	77	5.8	0.0	3.0	0.12	0.67	0.85	0.23	0.04	0.38
Sri Lanka	4.7	4.9	21.5	91.9	63	4.8	0.0	1.1	0.06	0.79	0.82	0.22	0.01	0.38
Bolivia	6.8	10.5	29.8	86.0	84	2.2	0.0	3.2	0.11	0.70	0.85	0.19	0.04	0.38
Cuba	5.1	0.2	29.8	96.8	76	4.6	0.0	1.1	0.04	0.70	0.90	0.22	0.01	0.38
Samoa	5.7	1.5	36.3	98.7	71	11.1	0.0	2.2	0.06	0.64	0.89	0.25	0.03	0.37
Algeria	6.1	1.3	12.4	67.8	71	5.0	0.0	1.6	0.06	0.88	0.69	0.22	0.02	0.37
Turkmenistan	7.7	0.2	20.0	98.0	81	0.1	0.0	0.2	0.07	0.80	0.92	0.06	0.00	0.37
Georgia	13.1	10.2	46.4	100.0	69	6.1	0.0	1.5	0.16	0.54	0.90	0.23	0.02	0.37
Swaziland	3.3	6.1	21.0	80.3	77	1.0	0.0	1.9	0.06	0.79	0.79	0.17	0.02	0.37
Moldova	17.0	7.7	49.6	99.0	61	7.7	0.0	3.4	0.18	0.50	0.86	0.24	0.04	0.37
Mongolia	5.3	8.9	48.6	98.5	64	7.0	0.0	2.1	0.09	0.51	0.87	0.24	0.02	0.35
Indonesia	3.7	5.5	37.6	87.3	64	2.7	0.0	3.8	0.06	0.62	0.80	0.20	0.04	0.34
Gabon	2.5	21.6	46.9	71.0	83	12.6	0.0	1.9	0.13	0.53	0.75	0.26	0.02	0.34
Morocco	3.8	20.9	25.5	49.8	51	10.5	0.0	2.4	0.14	0.74	0.50	0.25	0.03	0.33
India	4.0	1.2	21.9	58.0	56	1.6	0.0	1.6	0.04	0.78	0.57	0.18	0.02	0.32
Kyrgyzstan	7.9	1.1	54.0	97.0	79	0.2	0.0	3.0	0.07	0.46	0.91	0.10	0.04	0.32
Uzbekistan	6.6	0.7	53.8	99.2	76	0.2	0.0	1.1	0.06	0.46	0.91	0.11	0.01	0.31
Viet Nam	4.8	2.3	55.4	92.7	64	1.8	0.0	1.8	0.05	0.45	0.83	0.19	0.02	0.31
Armenia	14.3	1.9	68.0	98.5	60	2.1	0.0	1.6	0.13	0.32	0.86	0.19	0.02	0.30

Table 5.4: DAI results (cont'd)

Economy	*Sub. lines p. 100 inhab.*	*Mobile sub. p. 100 inhab.*	*Internet tariff as % of GNI*	*Adult literacy*	*School enrol-ment*	*Int'l Internet band-width P. 100 inhab.*	*Broad-band sub-scribers p. 100 inhab.*	*Internet users p. 100 inhab.*	*INFRA-STRUC TURE*	*AF-FOR-DABI-LITY*	*KNOW-LEDGE*	*QUAL-ITY*	*USAGE*	*DAI*
LOW														
Zimbabwe	2.5	3.0	58.3	89.3	59	0.9	0.0	4.3	0.04	0.42	0.79	0.16	0.05	0.29
Honduras	4.8	4.9	52.9	75.6	62	1.5	0.0	2.5	0.06	0.47	0.71	0.18	0.03	0.29
Syria	12.3	2.3	58.6	75.3	59	0.9	0.0	1.3	0.11	0.41	0.70	0.16	0.02	0.28
Papua New Guinea	1.1	0.2	45.3	64.6	41	1.1	0.0	1.4	0.01	0.55	0.57	0.17	0.02	0.26
Vanuatu	3.2	2.4	51.9	34.0	54	9.8	0.0	3.4	0.04	0.48	0.41	0.25	0.04	0.24
Pakistan	2.5	0.8	45.7	44.0	36	2.8	0.0	1.0	0.03	0.54	0.41	0.20	0.01	0.24
Azerbaijan	12.2	10.7	183.0	97.0	69	0.3	0.0	3.7	0.15	0.00	0.88	0.12	0.04	0.24
S. Tomé & Principe	4.1	1.3	287.7	83.1	58	13.2	0.0	7.3	0.04	0.00	0.75	0.26	0.09	0.23
Tajikistan	3.7	0.2	362.3	99.3	71	0.3	0.0	0.1	0.03	0.00	0.90	0.12	0.00	0.21
Equatorial Guinea	1.8	6.4	177.1	84.2	58	2.0	0.0	0.4	0.05	0.00	0.75	0.19	0.00	0.20
Kenya	1.0	4.2	152.4	83.3	52	1.8	0.0	1.3	0.03	0.00	0.73	0.19	0.01	0.19
Nicaragua	3.2	3.8	138.6	66.8	65	6.0	0.0	1.7	0.05	0.00	0.66	0.23	0.02	0.19
Lesotho	1.6	4.2	110.7	83.9	63	0.5	0.0	1.0	0.03	0.00	0.77	0.14	0.01	0.19
Nepal	1.4	0.1	70.3	42.9	64	0.4	0.0	0.3	0.01	0.30	0.50	0.14	0.00	0.19
Bangladesh	0.5	0.8	66.8	40.6	54	0.3	0.0	0.2	0.01	0.33	0.45	0.12	0.00	0.18
Yemen	2.8	2.1	75.3	47.7	52	0.3	0.0	0.5	0.03	0.25	0.49	0.12	0.01	0.18
Togo	1.1	3.6	134.9	58.4	67	2.6	0.0	4.3	0.03	0.00	0.61	0.20	0.05	0.18
Solomon Islands	1.5	0.2	191.9	76.6	50	1.2	0.1	0.5	0.01	0.00	0.68	0.17	0.01	0.17
Cambodia	0.3	2.8	212.8	68.7	55	1.5	0.0	0.2	0.02	0.00	0.64	0.18	0.00	0.17
Uganda	0.2	2.0	464.4	68.0	71	0.4	0.0	0.4	0.01	0.00	0.69	0.13	0.00	0.17
Zambia	0.8	1.3	118.7	79.0	45	0.5	0.0	0.5	0.01	0.00	0.68	0.14	0.01	0.17
Myanmar	0.7	0.1	180.9	85.0	47	0.2	0.0	0.1	0.01	0.00	0.72	0.11	0.00	0.17
Congo	0.7	6.7	207.8	81.8	57	0.0	0.0	0.2	0.04	0.00	0.74	0.05	0.00	0.17
Cameroon	0.7	4.3	110.7	72.4	48	0.6	0.0	0.4	0.03	0.00	0.64	0.15	0.00	0.16
Ghana	1.3	2.4	177.8	72.7	46	0.6	0.0	0.8	0.02	0.00	0.64	0.15	0.01	0.16
Lao P.D.R.	1.1	1.0	123.4	65.6	57	0.3	0.0	0.3	0.01	0.00	0.63	0.12	0.00	0.15
Malawi	0.7	0.8	465.0	61.0	72	0.2	0.0	0.3	0.01	0.00	0.65	0.11	0.00	0.15
Tanzania	0.5	1.9	501.4	76.0	31	0.5	0.0	0.2	0.01	0.00	0.61	0.14	0.00	0.15
Haiti	1.6	1.7	354.5	50.8	52	4.2	0.0	1.0	0.02	0.00	0.51	0.22	0.01	0.15
Nigeria	0.6	1.3	353.7	65.4	45	0.6	0.0	0.3	0.01	0.00	0.59	0.15	0.00	0.15
Djibouti	1.5	2.3	153.2	65.5	21	3.1	0.0	0.7	0.02	0.00	0.51	0.21	0.01	0.15
Rwanda	0.3	1.4	348.3	68.0	52	0.2	0.0	0.3	0.01	0.00	0.63	0.10	0.00	0.15
Madagascar	0.4	1.0	336.7	67.3	41	0.4	0.0	0.3	0.01	0.00	0.59	0.13	0.00	0.15
Mauritania	1.2	9.2	113.1	40.7	43	3.5	0.0	0.4	0.06	0.00	0.41	0.21	0.00	0.14
Senegal	2.3	5.6	103.7	38.3	38	8.1	0.0	1.1	0.05	0.00	0.38	0.24	0.01	0.14
Gambia	2.8	7.3	116.2	37.8	47	1.5	0.0	1.8	0.06	0.00	0.41	0.18	0.02	0.13
Bhutan	2.8	0.0	148.5	47.0	33	2.9	0.0	1.4	0.02	0.00	0.42	0.21	0.02	0.13
Sudan	2.1	0.6	550.8	58.8	34	0.3	0.0	0.3	0.02	0.00	0.51	0.12	0.00	0.13
Comoros	1.4	0.0	206.0	56.0	40	0.3	0.0	0.4	0.01	0.00	0.51	0.13	0.00	0.13
Côte d'Ivoire	2.0	6.2	132.1	49.7	39	0.4	0.0	0.5	0.05	0.00	0.46	0.13	0.01	0.13
Eritrea	0.9	0.0	200.9	56.7	33	0.5	0.0	0.2	0.01	0.00	0.49	0.14	0.00	0.13
D.R. Congo	0.0	1.1	986.7	62.7	27	0.2	0.0	0.1	0.01	0.00	0.51	0.11	0.00	0.12
Benin	1.0	3.3	146.5	38.6	49	0.3	0.0	0.8	0.02	0.00	0.42	0.13	0.01	0.12
Mozambique	0.5	1.4	233.1	45.2	37	0.5	0.0	0.2	0.01	0.00	0.42	0.14	0.00	0.12
Angola	0.6	0.9	143.3	42.0	29	0.5	0.0	0.3	0.01	0.00	0.38	0.14	0.00	0.11
Burundi	0.3	0.7	703.2	49.2	31	0.1	0.0	0.1	0.01	0.00	0.43	0.08	0.00	0.10
Guinea	0.3	1.2	185.2	41.0	34	0.2	0.0	0.5	0.01	0.00	0.39	0.11	0.01	0.10
Sierra Leone	0.5	1.3	857.1	36.0	51	0.1	0.0	0.2	0.01	0.00	0.41	0.08	0.00	0.10
Central African Rep.	0.2	0.3	807.9	48.2	24	0.1	0.0	0.1	0.00	0.00	0.40	0.09	0.00	0.10
Ethiopia	0.5	0.1	329.0	40.3	34	0.1	0.0	0.1	0.00	0.00	0.38	0.10	0.00	0.10
Guinea-Bissau	0.9	0.0	840.0	39.6	43	0.1	0.0	0.4	0.01	0.00	0.41	0.06	0.00	0.10
Chad	0.2	0.4	375.7	44.2	33	0.1	0.0	0.2	0.00	0.00	0.40	0.07	0.00	0.10
Mali	0.5	0.5	289.8	26.4	29	0.6	0.0	0.2	0.01	0.00	0.27	0.15	0.00	0.09
Burkina Faso	0.5	0.8	247.5	24.8	22	0.7	0.0	0.2	0.01	0.00	0.24	0.15	0.00	0.08
Niger	0.2	0.1	683.6	16.5	17	0.0	0.0	0.1	0.00	0.00	0.17	0.05	0.00	0.04

Note: DAI values are shown to hundreds of a decimal point. Economies with the same DAI value are ranked by thousands of a decimal point.
Source: ITU.

[1] For example, measuring per capita computer numbers or mobile phone penetration alone provides only a partial, and potentially misleading, glimpse of the whole picture (as described in Chapter two of this report). A combination of such indicators, on the other hand, can be a very valuable tool.

[2] For detailed examinations of ICT indices see UNCTAD. (2003). *Information and communication technology development indices*. Available from: www.unctad.org/en/docs/iteipc20031_en.pdf; accessed November 11, 2003. Also see Reynolds, T. (2003). "Quantifying the evolution of copyright and trademark law." American University (USA).

[3] World Economic Forum. (2002-2003). The Global Information Technology Report: Readiness for a Networked World. Available from : www.weforum.org/site/homepublic.nsf/Content/Global+Competitiveness+Programme%5CGlobal+Information+Technology+Report%5CGlobal+Information+Technology+Report+2002-2003+-+Readiness+for+the+Networked+World - index; accessed November 11, 2003.

[4] IDC. *Building a Brave New World. The IDC Information Society Index 2003*. June 2003. <www.idc.com/getdoc.jhtml?containerId=TB20030619>, accessed December 8, 2003.

[5] Economist Intelligence Unit. (2003, March). "The 2003 E-Readiness Rankings". eBusiness Forum. Available from: www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=6427; accessed November 11, 2003.

[6] Mosaic Group. The Global Diffusion of the Internet Project. Available from: http://mosaic.unomaha.edu/gdi.html; accessed November 11, 2003. Also see McHenry, W. (2003, January). "Studying the Digital Divide with the Mosaic group Methodology". 3rd World Telecommunication/ICT Indicators Meeting. Available from: http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/Doc28_Erev1.pdf; accessed November 11, 2003.

[7] Orbicom. (2003). *Monitoring the Digital Divide … and beyond*. Available from: http://www.orbicom.uqam.ca; accessed December 1, 2003.

[8] UNDP. (2001). *Human Development Report 2001*. Chapter 2, "Today's technological transformations — creating the network age". Available from: http://hdr.undp.org/reports/global/2001/en/pdf/chaptertwo.pdf; accessed November 11, 2003.

[9] Biggs, P. (2003, January). "ICT Development Indices". 3rd World Telecommunication/ICT Indicators Meeting. Available from: http://www.itu.int/ITU-D/ict/WICT02/doc/pdf/Doc40_E.pdf; accessed November 11, 2003.

[10] ITU. (2002). *Internet Report: Internet for a Mobile Generation*. Available from: http://www.itu.int/osg/spu/publications/sales/mobileinternet/index.html; accessed November 11, 2003.

[11] ITU. Internet Country Case Studies. Available from: http://www.itu.int/ITU-D/ict/cs; accessed November 11, 2003.

[12] The phrase lumps statistics in with lies implying that the former can be used misleadingly. Leonard Henry Courtney, a British Baron, coined the term. See University of York (UK). "Lies, Damned Lies and Statistics". Available from: www.york.ac.uk/depts/maths/histstat/lies.htm; accessed November 11, 2003.

[13] Indeed the Swiss themselves are concerned about the results of various rankings: "This respectable ranking, however, should be treated with caution". R. Gerster and A. Haag. (2003, October). *Diminishing the Digital Divide in Switzerland*. Swiss Agency for Development and Cooperation. Available from: http://www.gersterconsulting.ch/asp/NCurrent.asp; accessed December 4, 2003.

[14] For example Australia's level of adult literacy is reported as close to 100 per cent. However an assessment carried out in 1996 found that "about 20 per cent of Australians aged 15-74 had very poor literacy skills and could be expected to experience considerable difficulties in using many of the texts and documents…that they encounter in daily life". Australian Bureau of Statistics. (1998). "Educational Attainment: Literacy Skills". Available from: http://www.abs.gov.au/Ausstats/abs@.nsf/0/7551ea164d95600cca2569ad000402b4?OpenDocument; accessed November 15, 2003.

[15] Gray, V. (2003, June). "Knowledge indicators: measuring information societies in Asia-Pacific". International Telecommunications Society. Asia-Australasian Regional Conference. Perth, Australia. Available from: http://www.itu.int/ITU-D/ict/papers/2003/Knowledge%20indicators%20-%20measuring%20information%20societies%20in%20AP.pdf; accessed November 15, 2003.

[16] "One indicator that is becoming increasingly popular is the amount of international Internet bandwidth used by a country — the 'size of the pipe', most often measured in Kilobits per second (Kbps), or Megabits per second (Mbps). Most of the Internet traffic in a developing country is international (75-90 per cent), so the size of its international traffic compared to population size provides a ready indication of the extent of Internet activity in a country". See International Development Research Centre. "The Internet: Out of Africa" available from http://web.idrc.ca/ev.php?ID=6568_201&ID2=DO_TOPIC; accessed November 15, 2003.

[17] For example, take mobile telephone penetration. Taiwan, China has the highest mobile penetration rate in the world at 106 per 100 inhabitants. An absolute goalpost chosen in the early 1990's would have assumed that the highest possible penetration rate was 100 mobile phones per 100 inhabitants.

[18] ISDN is a technology that increases the capacity of a standard telephone line. Basic rate ISDN converts a telephone line into two lines or "channels" whereas primary rate adds 30 channels. Many European nations include the number of channels in their main line statistics even though there is no increase in actual physical telephone lines.

[19] World Bank. "GNI per capita 2002". Available from: http://www.worldbank.org/data/databytopic/GNIPC.pdf; accessed November 11, 2003.

[20] UNDP. *Human development Report 2003*. "Technical Note". Available from: http://www.undp.org/hdr2003/pdf/hdr03_backmatter_2.pdf; accessed November 11, 2003.

[21] A number of primarily developed nations do not compile aggregated figures for the international bandwidth of all Internet connectivity providers. Data for these economies was provided by TeleGeography. See TeleGeography. (2003, August). *Global Internet Geography Database and Report*. Available from http://www.telegeography.com/pubs/internet/reports/ig_gbl/index.html; accessed December 1, 2003.

[22] This is not a phenomenon restricted to developed nations. Fixed telephone lines declined in 29 developing nations between 2001 and 2002.

[23] For methodology, see UNDP. *Human development Report 2003*. "Technical Note". Available from: http://www.undp.org/hdr2003/pdf/hdr03_backmatter_2.pdf; accessed November 11, 2003.

[24] For more on ICT developments in the Republic of Korea, see ITU. (2003, March). *Broadband Korea: Internet Case Study*. Available from: http://www.itu.int/ITU-D/ict/cs/korea/material/CS_KOR.pdf; accessed November 11, 2003.

[25] Ministry of Information Society, Slovenia, at www2.gov.si/mid/mideng.nsf; accessed November 11, 2003.

[26] For more on ICT developments in Slovenia see University of Ljubljana (Slovenia). (2003, July). *SIBIS Country Report*. Available from: http://www.sisplet.org/ris/uploads/publikacije/2003/slovenia_cremonti.pdf; accessed November 11, 2003.

[27] For example the eEurope+ initiative reflects EU ICT objectives and targets for candidate countries. See European Union. (2001, June). *eEurope+ Action Plan*. Available from: europa.eu.int/information_society/topics/international/regulatory/eeuropeplus/doc/eEurope_june2001.pdf; accessed November 11, 2003.

[28] According to its website <www.dubaiinternetcity.com> the Dubai Internet City "provides a Knowledge Economy Ecosystem that is designed to support the business development of Information and Communications Technology (ICT) companies. It is the Middle East's biggest IT infrastructure, built inside a free trade zone, and has the largest

commercial Internet Protocol Telephony system in the world". For more on the Malaysian Multimedia Super Corridor and the Mauritius Cyber Park see the country reports on the ITU Internet Case Study page at http://www.itu.int/ITU-D/ict/cs/; accessed November 11, 2003.

[29] One cause for the high retail Internet access prices in this group of economies is the relatively steep prices they pay for wholesale international Internet connections. This stems from having to pay the full cost of the connection though the country on the other end of the link benefits. Other contributory factors to the high prices are constrained domestic competition, lack of traffic exchanges and small economies of scale. Landlocked countries are at an even greater disadvantage since their international connectivity options are restricted to satellite. For more on problems low income nations face in reducing international Internet connectivity costs and possible solutions see the "Improving IP Connectivity in the least developed countries" web page at http://www.itu.int/osg/spu/ni/ipdc/index.html; accessed November 11, 2003.

[30] According to the manager of a Zimbabwean information technology company, "There is tremendous intellectual talent in Zimbabwe …". See Center for International Development at Harvard University. "ZW". Available from: http://www.cid.harvard.edu/cr/profiles/Zimbabwe.pdf; accessed November 11, 2003.

[31] Subsecretaría de Telecomunicaciones (Chile). (2003, September). *Informe de Estadísticas Septiembre 2003 (Informe N°8)*. Available from http://www.subtel.cl; accessed November 30, 2003.

[32] UNDP (Chile). (2000). *Desarrollo Humano en Las Comunas de Chile*. Available from: http://www.desarrollohumano.cl/otraspub_grl.htm; accessed December 1, 2003.

[33] The gender-disaggregated DAI sub-index is based on the methodology used by the UNDP for the Gender–related development index.

[34] UNDP and UNIFEM. (2000). *Gender and Development: Facts and Figures in Thailand*.

[35] "Current research in France and Germany informs that women use the domestic telephone twice as much as men…" http://www.telegeography.com/resources/essay_archive/telephony/tg1992_women_calling.html. A 1996 French study found that women originated 63 per cent of calls from home telephones. Z. Smoreda and C. Licoppe. (2000). "Gender-Specific Use of the Domestic Telephone". *Social Psychology Quarterly*.

[36] Infocomm Development Authority of Singapore. (2002). "Survey on Broadband and Wireless Usage". Available from: http://www.ida.gov.sg/idaweb/doc/download/I2389/Survey_on_BB_and_wireless_usage_in_Spore_2002.pdf; accessed November 11, 2003.

[37] ITU. (2002, December). *Asia-Pacific Telecommunication Indicators 2002*. Available from: http://www.itu.int/ITU-D/ict/publications/asia/2002/index.html; accessed December 1, 2003.

[38] Apart from featuring monthly time series OFTA is one of the few regulators that also compiles international Internet bandwidth. See the "Data and Statistics" web page under the "Telecom Facts" menu on the OFTA website. www.ofta.gov.hk; accessed November 15, 2003. Bi-annual (mid and end of year) population data and annual survey data on Internet users are available from the C&SD website at www.info.gov.hk/censtatd/eng/hkstat/hkinf/it/it_2_index.html; accessed November 15, 2003. Internet access prices are from i-Cable's website: http://www.i-cable.com/ourservices/dialup/e-home.html; accessed November 15, 2003.

[39] The United Nations Development Programme establishes the goalposts and weights for the indictors in the Knowledge category. See http://www.undp.org/hdr2003/pdf/hdr03_backmatter_2.pdf; accessed November 15, 2003.

6. CONCLUSIONS

The world is still a long way from agreeing upon a common and extensive set of information society access indicators. Where data do exist, they are sometimes unreliable, confusing, incomplete, out of date or not internationally comparable. They are also often difficult to locate. The problem is particularly acute for developing nations, some of which lack the technical expertise or resources to collect, compile and disseminate ICT statistics.

In an effort to standardize a minimum set of information society access indicators that every country should collect, ITU proposes its basket of *e-ITU indicators* (Table 6.1). These have been selected as the most relevant for a wide range of economies based on the analysis in this report. Adoption of these indicators would significantly enhance the ability to compare country performance over time and to benchmark one economy to another. These indicators can also be disaggregated. For example, the percentage of households with Internet access could be broken down by homes with broadband access. This is relevant for countries that require a greater degree of precision or to compare more advanced economies amongst themselves. This is particularly interesting for indicators that might appear mundane such as the percentage of households with a radio. In this case, the indicator could be analysed by the availability of digital reception or Internet-enabled radios.

In addition, the following recommendations are made to improve the collection of the required indicators and enhance international comparability:

- Model surveys such as those designed by Eurostat exist for collecting data on business and individual and household use of ICTs. These should be followed to enhance international comparability. In cases where household or business surveys are already conducted by national statistical offices, efforts should be made to include ICT access questions.

- Developed nations and multilateral agencies should assist developing nations to compile ICT indicators by providing technical assistance and material resources. Developing economies that have already conducted ICT surveys could assist other countries with methods and questionnaire construction. International assistance should be provided to get more national statistical offices from the developing world online and to provide material resources for conducting ICT surveys in developing nations.

- Government ICT agencies such as the telecommunication regulator are ideally best placed to collect and disseminate administrative records on ICTs in the country (e.g. number of telephone subscribers, number of Internet subscribers, international Internet bandwidth). ICT policy-makers should also liase with their national statistical offices to ensure that other survey-based data are collected such as the percentage of households with ICTs or the percentage of the population using ICTs. There is also a need to make available data more visible. Countries should identify a prominent website location for information society statistics. One excellent example is Australia where the Bureau of Statistics regroups a number of ICT indicators on a dedicated webpage (Figure 6.1). Another example is the Cyprus Statistical Service that combines individual,

Table 6.1: e-ITU indicators

Key indicators for measuring access to the information society

Indicator	*Category*	*Note*
1. Percentage of households with electricity	Universal service	The percentage of households with electricity.
2. Percentage of households with a radio	Universal service	The percentage of households with a radio receiver. This should include radios built-in to other devices such as stereo systems or alarm clocks as well as mobile phones and automobiles.
3. Percentage of households with a television	Universal service	The percentage of households with a television receiver. This should include both colour and black and white.
4. Percentage of households with a telephone	Universal service	The percentage of households that have a telephone. This should be broken down by households with both a fixed and mobile subscription, only a fixed subscription and only a mobile subscription. For the percentage of households with a mobile phone, it would be useful to know if it is Internet-enabled.
5. Percentage of households with a personal computer	Universal service	The percentage of households that have a personal computer used in the home.
6. Percentage of households with Internet access	Universal service	The percentage of households that have Internet access available in the home. A breakdown by the type of access (e.g. dial-up, broadband) would be useful.
7. Percentage of population covered by mobile telephony	Universal access	The percentage of the population that is covered by a mobile cellular signal. This should not be confused with the percentage of the land area covered by a mobile cellular signal or the percentage of the population that subscribe to mobile cellular service. Note that this measures the theoretical ability to use mobile cellular services if one has a handset and a subscription.
8. Percentage of population that use a computer	Universal access	The percentage of population that use a personal computer at any location (e.g. home, school, work).
9. Percentage of population with access to the Internet	Universal access	The percentage of the population that has easy access (e.g. at home, work or school or within a convenient distance of a public facility). This is not the same as an Internet user: although a person may have access to the Internet, they may not use it.
10. Percentage of businesses with computers	Business	The percentage of businesses that have computers at their location. This should be broken down by size of business (small, large, etc.).
11. Percentage of businesses with Internet access	Business	The percentage of businesses that have computers at their location. This should be broken down by size of business (small, large, etc.).
12. Percentage of businesses with a website	Business	The percentage of businesses that have computers at their location. This should be broken down by size of business (small, large, etc.).
13. Student to computer ratio	Education	The number of students to a computer. This should be broken down by primary, secondary and tertiary schools. It should also only include computers available to students and not those used for administrative purposes. This indicator could be further disaggregated by whether or not the computers are connected to the Internet.
14. Percentage of schools with Internet access	Education	The percentage of schools with Internet access. This should be broken down by primary, secondary and tertiary schools. This indicator could be further disaggregated by the type of Internet connection.
15. Percentage of government offices with Internet access	Government	The percentage of government offices with Internet access. This should be broken down by the number of employees as well as the type of government office (e.g. central, local).

Table 6.1: e-ITU indicators (cont'd)
Key indicators for measuring access to the information society

Indicator	*Category*	*Note*
16. Percentage of government offices with a website	Government	The percentage of government offices with a website. This should be broken down by the number of employees as well as the type of government office. This indicator could be further disaggregated by whether the website offers interactive services.
17. Percentage of government employees with Internet access	Government	This includes only employees with Internet access from the office.
18. Fixed telephone subscribers per 100 inhabitants	DAI§	Fixed telephone subscribers refer to persons that pay for a telephone line connecting a customer's equipment (e.g. telephone set, facsimile machine) to the Public Switched Telephone Network (PSTN) and which have a dedicated port on a telephone exchange. Per 100 inhabitants is calculated by dividing the number of fixed telephone subscribers by the population and multiplying by 100.
19. Mobile cellular subscribers per 100 inhabitants	DAI	Cellular mobile telephone subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology that provides access to the PSTN. Per 100 inhabitants is obtained by dividing the number of cellular subscribers by the population and multiplying by 100.
20. Internet access tariff (20 hours per month) as percentage of per capita income	DAI	The costs associated with 20 hours dial-up Internet use per month. If broadband prices are cheaper, these should be used instead. The data should include any associated telephone usage charges but not the telephone line rental. Gross National Income is used as the divisor.
21. International Internet bandwidth per inhabitant	DAI	International Internet bandwidth refers to the speed of data flows from the country to international Internet connection points measured in bits per second. Bits per inhabitant is calculated by dividing the international Internet bandwidth by the population.
22. Broadband subscribers per 100 inhabitants	DAI	Broadband subscribers refer to the sum of DSL, cable modem and other broadband subscribers where the speed is greater than 128 kbps in at least one direction. Per 100 inhabitants is calculated by dividing the total number of broadband subscribers by the population and multiplying by 100.
23. Internet users per 100 inhabitants	DAI	Internet users are those who regularly use the Internet (preferably at least once a month). The best measure of determining the number of users is through a survey. Information about the age, frequency of use and type of access should be provided. Per 100 inhabitants is calculated by dividing the number of Internet users by the population and multiplying by 100.

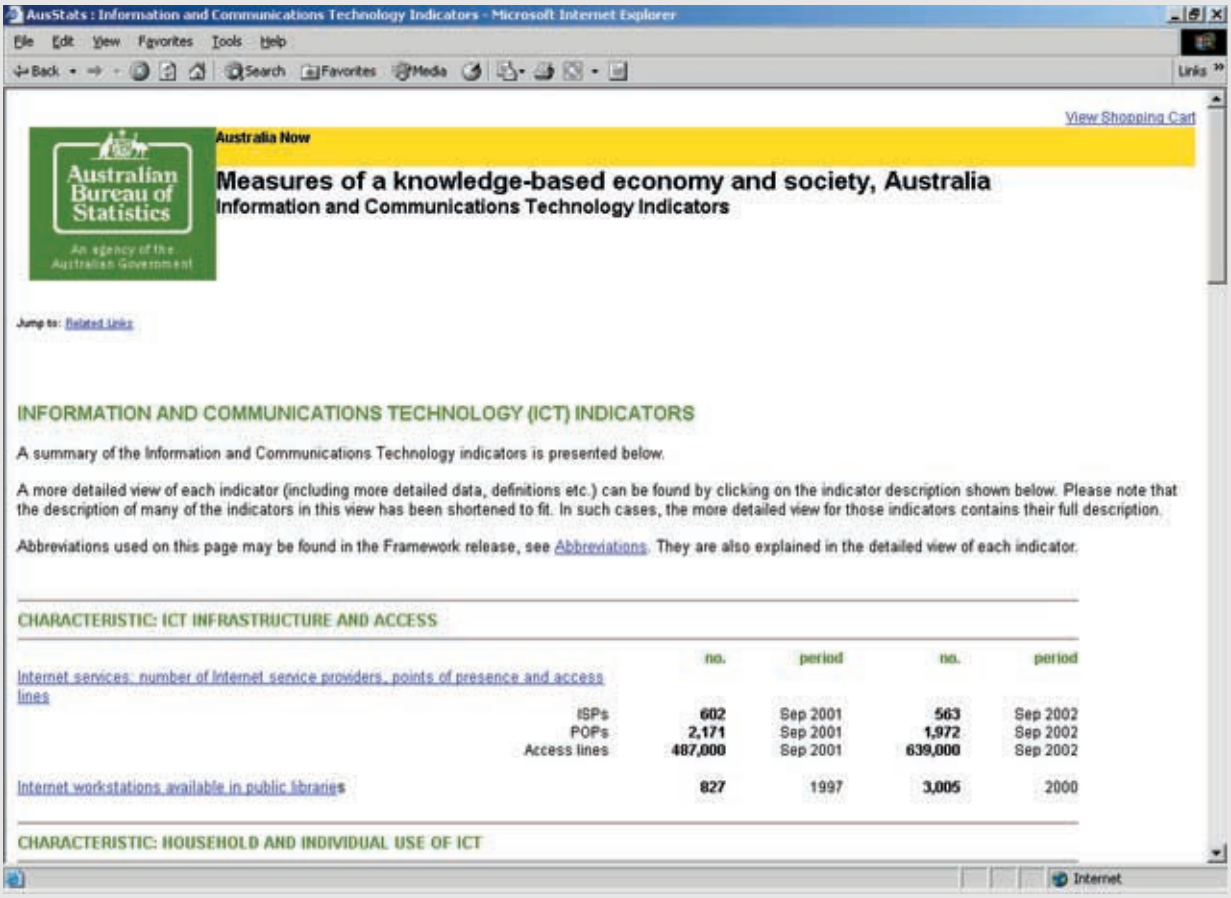
Note: § These indicators are needed to compile the Digital Access Index.
Source: ITU.

household, business and education ICT access statistics in a one-page spreadsheet.[1] At the international level, a portal for information society indicators could be created, with links to national data, model questionnaires and methodological information.

- Good statistical practice is important; transparency, clarity, timeliness and relevance are critical. Some countries provide regional breakdowns but do not provide a country total, and sometimes dates to which the data pertain are not clear. Terms such as access, subscriber and user are often loosely employed though they mean different things. Some data cannot be collected through administrative records and surveys are indispensable. This is particularly the case with Internet user surveys, which should be conducted on a regular basis, and at least annually.

A partnership between international organizations, national statistical agencies and ICT policy-makers can help achieve the objective of a core set of

Figure 6.1: National information society indicators portal
Australian Bureau of Statistics information and communication technology indicators



Source: www.abs.gov.au/Ausstats/abs%40.nsf/94713ad445ff1425ca25682000192af2/7599f94ffdbadccbca256d97002c8636!OpenDocument.

information society access indicators for a large number of countries. The second phase of the World Summit on the Information Society (WSIS), scheduled to take place in Tunis, Tunisia, in 2005, is a particularly appropriate deadline for this. If this can be achieved, the world will have taken a giant step towards better measuring and understanding the information society.

Box 6.1: Sources and analysis of ICT data

ITU is endeavouring to enhance the availability of ICT data by expanding its compilation of indicators from administrative records to include also household surveys. One problem has been that the traditional data correspondents (typically national telecommunication ministries, regulators or incumbent operators) often have scarce contact with national statistical offices and are therefore not aware of what data are available. ITU has had to devote extra resources to locating census and household surveys to update the database.

A starting point are those national statistical offices that are online.[2] Some provide the results of surveys and censuses online including, when available, data on ICTs in households. Limitations include sites where very few data are available online, the data are only available in national languages and locating the data is difficult.

One solution to finding official data is the use of regional reports. In Europe, governmental ICT statistical publications are available for the Baltic and Nordic countries. The European Union disseminates some ICT data on its existing and prospective members. The OECD also publishes household ICT data for its member countries.

Another solution is the use of websites that have libraries of household surveys and census publications or that compile data from these. The World Bank's Africa Household Survey Databank has electronic versions of census and survey documents for countries in that region, many of which do not have websites.[3] The Demographic and Health Surveys (DHS+) programme is a worldwide project initiated by the US Agency for International Development (USAID) to provide data and analysis on the population, health, and nutrition of women and children in developing countries.[4] A benefit of this is that data on television, radio and telephone in households has been compiled for a number of countries and is available from the DHS+ database.

Several steps could be taken to enhance the availability of official ICT data. International assistance should be provided to get more national statistical offices online as well as to get them collecting ICT statistics. ICT policy-makers should liase with their statistical offices to ensure the needed data are collected. Either government offices responsible for ICT or the statistical office should create a website where information society statistics are kept.

While few countries are able to provide a complete set of useful ICT indicators, even fewer analyse the indicators in great detail. There are exceptions whereby either the national statistical office or the government agency responsible for ICT publish reports analysing the data.

For instance, the Republic of Korea produces what is perhaps the most comprehensive analysis of computer and Internet use anywhere, in a number of government publications. The Korea National Statistical Office publishes the annual 400-page *Report on the Computer and Internet Use Survey*. The report contains detailed statistics on ICT use disaggregated by dozens of variables. The Korea Network Information Centre (KRNIC), the government agency responsible for Korea's domain name, also publishes the twice-yearly *Survey on the Number of Internet Users and Internet Behaviour*.

As long as the situation persists whereby many nations profess the importance of access to ICTs, but very few developing governments actually compile and analyse the needed data, so too will the digital divide persist. Meaningful policies for enhancing access to ICTs cannot be designed without detailed statistics to provide a clear picture of the situation. Alternatively, we may be bridging the divide without knowing about it!

[1] See the "Information Society" spreadsheet available on the Cyprus Statistical Service website at http://www.mof.gov.cy/mof/cystat/statistics.nsf/All/378096EF4CC2ADC3C2256D41001E4714/$file/INFORMATION%20SOCIETY-EN-080803.xls?OpenElement; accessed December 7, 2003.

[2] The Statistics Division of the United Nations maintains a list of links to online statistical offices. When consulted in September 2003, there were 116 entries. See: http://unstats.un.org/unsd/methods/inter-natlinks/sd_natstat.htm; accessed September 6, 2003.

[3] The World Bank Group. Africa Household Survey Databank. Available from: http://www4.worldbank.org/afr/poverty/databank/default.cfm; accessed November 6, 2003.

[4] Demographic and Health Surveys. Country Statistics. Available from: http://www.measuredhs.com; accessed November 6, 2003.

GLOSSARY, ACRONYMS AND ABBREVIATIONS

3G: Third-generation mobile communication system. Generic name for mobile network/service based on the IMT-2000 family of global standards.

Access: The capability or opportunity to use an ICT device or service, by for example, having access at home; being within walking distance of a location that has ICTs or being within coverage of wireless ICT services. Access to ICTs does not mean that a person is using them.

ADSL: *Asynchronous Digital Subscriber Line*. A DSL variant in which traffic is transmitted at different rates in different directions (upstream and downstream). See also *DSL*.

Administrative record: Data stored for operational purposes such as inventories or billing. For example an ICT service provider typically maintains administrative records on the number of its subscribers.

Affordability: Pricing of an ICT service so that most citizens can pay for it.

AIDS: *Acquired Immune Deficiency Syndrome.*

Analogue: Communications signal represented by the pitch and volume of a voice.

Asian Tigers: Refers to the following group of economies: Hong Kong, China; Korea (Rep.); Singapore; Taiwan, China.

ASCII: *American Standard Code for Information Interchange.*

ATI: *Agence Tunisienne d'Internet.*

ATM: *Asynchronous Transfer Mode*. A very fast data transmission method. It dynamically allocates bandwidth and uses a fixed-size data packet.

Baltic countries: Estonia; Latvia; Lithuania.

Bandwidth: The capacity of a communications path. Affects both the quantity and the speed of information transmitted. Usually measured in bits per second.

BDT: *ITU Telecommunication Development Bureau*.

BIS: *Baltic Information Society.*

Bps: *Bits per second.* Measurement of the transmission speed of units of data (bits) over a network.

Broadband: Transmission capacity with sufficient bandwidth to permit combined provision of voice, data and video. There are various definitions of broadband. In this report the term refers to DSL and cable modem services with bandwidth greater than 128 kbps in at least one direction.

C&SD: *Census and Statistics Department,* Hong Kong, China.

Cable modem: A technology, which allows high-speed interactive services, such as Internet, to be delivered over a cable TV network.

CATV: *Cable Television.*

CD-ROM: *Compact Disk Read Only Memory*.

Cell: The geographic area covered by a single base station in a cellular mobile network.

Cellular: A mobile telephone service provided by a network of base stations, each of which covers one geographic cell within the total cellular system service area.

CIS: *Commonwealth of Independent States.*

CNNIC: *China Internet Network Information Centre.*

COFETEL: *Comisión Federal de Telecomunicaciones* (México).

CONATEL: *Comisión Nacional de Telecomunicaciones.*

Consumer durable: Product or service found in households. Often used by national statistical agencies to refer to ICTs such as televisions and personal computers.

Coverage: Refers to the range of a terrestrial mobile cellular network. Measured in terms of land coverage (the percentage of the territorial area covered by mobile cellular) or population coverage (the percentage of the population living within range of a mobile cellular network).

DAI: *Digital Access Index.*

DCC: *Digital Community Centre.*

de facto: In reality or fact; actually.

de jure: According to law; by right.

DEL: *Direct Exchange Line*.

Density: The amount in relation to the population. Typically derived per 100 inhabitants.

DHS: *Demographic and Health Survey.*

Digital: Representation of voice or other information using digits 0 and 1.

Distance education: Teaching and learning, in which learning normally occurs in a different place from teaching.

DSL: *Digital subscriber line*. A high-speed Internet connection using telephone lines.

DVD: *Digital Video Disk.*

EC: *European Commission.*

EDI: *Electronic Data Interchange.* Transmission of information between computers using standardized electronic versions of common business documents.

Effective teledensity: The number of fixed telephone subscribers *or* cellular mobile telephone subscribers per 100 inhabitants, whichever is highest.

Electronic commerce: Use of the Internet for sales and purchases.

E-mail: *Electronic mail*.

EU: *European Union.*

Eurostat: Statistical Office of the European Commission.

FCC: *Federal Communication Commission*, United States.

Fixed line: A physical line connecting the subscriber to the telephone exchange. Also includes wireless local loop (WLL) where the user's terminal equipment is located in a fixed location.

Frequency: The rate at which an electrical current alternates, usually measured in Hertz (see Hz). It is also used to refer to a location on the radio frequency spectrum, such as 800, 900 or 1800 Mhz.

FTTH: *Fibre to the Home.*

GDAI: *Gender-disaggregated Digital Access Index.*

GDI: *Gender Development Index.*

GDP: *Gross domestic product*.

GNI: *Gross national income.*

GNP: *Gross national product*.

GSM*: Global System for Mobile communications*.

HDI: *Human Development Index.*

HIV: *Human Immunodeficiency Virus.*

Hz: *Hertz*. The frequency measurement unit equal to one cycle per second.

ICT: *Information and communication technology.*

IDC: *International Data Corporation.*

IMF: *International Monetary Fund.*

Index: A numerical scale that combines multiple indicators into a single overall value.

Indicator: A ratio derived from a statistic.

INEI: *Institute Nacional de Estadistica y Informatica*, Peru.

Interconnection: The physical connection of telecommunication networks owned by two different operators.

Internet café: A facility offering access to the Internet for the general public.

Internet host: A computer connected to the Internet, which has an Internet Protocol address.

IP: *Internet Protocol*.

ISDN: *Integrated Services Digital Network.* A digital switched network, supporting transmission of voice, data and images over conventional telephone lines.

ISP: *Internet service provider*.

IT: *Information technology.*

ITU: *International Telecommunication Union.*

Kbps: *Kilo bits per second.* See also Bps.

KRNIC: *Korea Network Information Centre.*

LAN: *Local Area Network.*

LDCs: *Least developed countries.*

Local loop: The connection that runs from the subscriber's telephone set or telephone system to the telephone company's central office.

Main telephone line: Telephone line connecting a subscriber to the telephone exchange equipment. This term is synonymous with the term fixed line used in this report.

Mbps: *Mega bits per second*. See also Bps.

MDG: *Millennium Development Goals.*

MENA: *Middle East and North Africa.*

MCT: *Multipurpose Community Telecentre*.

Mobile density: Number of mobile subscribers per 100 inhabitants.

MoE: *Ministry of Education.*

MoH: *Ministry of Health.*

MTN: *Mobile Telephone Network,* South Africa.

NGO: *Non-governmental organization.*

NIS: *Nordic Information Society.*

NOIE: *National Office for the Information Economy*, Australia.

Nordic Countries: Refers to the following group of countries: Denmark; Finland; Iceland; Norway; Sweden.

NRI: *Network Readiness Index.*

NSFNet: *National Science Foundation Network,* United States.

NSO: *National Statistical Office.*

OGS: *Other official government source.*

OECD: *Organisation for Economic Co-operation and Development.*

Ownership: *Possessing an ICT device.*

PIAP: *Public Internet Access Point.*

PBX: *Private Branch Exchange.*

PC: *Personal Computer.*

PDA: *Personal Digital Assistant.*

Penetration: A measurement of access to telecommunications. It is usually calculated by dividing the number of subscribers by the population, and multiplying by 100. Also referred to as density.

POP: *Point of Presence.*

Portal: A single website through which users navigate the Internet.

PPP: *Purchasing power parity*.

PrepCom: *Preparatory Committee* (see *WSIS*).

PSTN: *Public Switched Telephone Network.* See fixed lines.

PTO: *Public Telecommunication Operator*.

Questionnaire: A form for entering information.

RCC: *Regional Computer CentreCommonwealth for Communications.*

RHL: *Reproductive Health Library.*

RIPE: *Réseaux IP Européens.*

SCT: *Secretary of Communications and Transport*, Mexico.

SIBIS: *Statistical Indicators for Benchmarking the Information Society*.

SIDS: *Small Island Developing States.*

SIM: *Subscriber Identity Module.*

SME: *Small and Medium Sized Enterprise.*

SMME: *Small, Medium sized and Micro Enterprise.*

SMS: *Short Messaging Service*.

Spectrum: The radio frequency spectrum of hertzian waves used as a transmission medium for cellular radio, radiopaging, satellite communication, over-the-air broadcasting and other services.

Subscription: A licensing agreement in which the licensee makes a payment to the service provider for access to ICTs.

Survey: The process of acquiring information from a sample of the population that is statistically representative of the entire population.

TAI: *Technology Achievement Index.*

Telecentres: Public call offices equipped to provide services, which may range from basic telephony to Internet access.

Teledensity: Number of main telephone line subscribers per 100 inhabitants.

Telework: Work carried out from home through a telecommunication connection.

Total teledensity: Total telephone subscribers (main telephone lines and mobile subscribers) per 100 inhabitants.

UN: *United Nations*.

UNCTAD: *United Nations Conference on Trade and Development.*

UNDP: *United Nations Development Programme.*

UNESCO: *United Nations Educational, Scientific and Cultural Organisation.*

UNIFEM: United Nations Development Fund for Women.

Universal access: Refers to reasonable access to ICTs for all. Includes universal service for those that can afford individual ICT service and widespread provision of ICTs within a reasonable distance for others. Statistically measured as the percentage of the population covered by information and communication technologies.

Universal service: Refers to availability and widespread affordability of ICTs. The level of universal service is statistically measured as the percentage of households with ICTs.

UNPAN: *United Nations Online Network in Public Administration and Finance.*

URL: *Uniform Resource Locator.*

Use, User: Using an ICT, and the person using an ICT.

Usage: Actual utilisation of a given service.

WEF: *World Economic Forum.*

WHO: *World Health Organisation.*

Wireless: Generic term for communication services that do not use fixed-line networks but transmit information using radio signals.

WLL: *Wireless local loop*.

Workstation: A terminal used to enter and retrieve electronic information; it may or may not have a central processing unit.

WSIS: *World Summit on the Information Society.*

ZEF: *Zentrum für Entwicklungsforschung*, Germany.

ANNEX 1

General outline for Eurostat's planned household surveys on ICT usage

Main survey subject:	ICT usage of households and individuals
Survey type:	Household survey
Survey technique:	Recommended techniques: Telephone survey (computer assisted) or face to face interview
Sampling unit:	Households and individuals (questions A1-3 on household level, questions A4-5 and modules B-D on individual level) Individuals can be targeted when drawing sample.
Age limit:	Lower age limit: 16 years Upper age limit: (at least) 74 years Member states can widen these age bands but should report results outside these limits separately
Survey period:	Second quarter 2002
Reference period:	First quarter 2002
Questions to be included:	At least those included in the Eurostat proposal enclosed Member States can include additional questions
Scaling of questions:	The scaling of some of the multiple choice questions (e.g. great importance, some importance, no importance) is optional (in some countries this might be necessary for telephone interviews)
Layout of questionnaire:	The order and layout in which the questions are set out is up to the contracting country. It is, however, recommended to use the order shown in the list of variables enclosed. A model layout will be made available.
Sample size, stratification:	The sample size should be appropriate for obtaining representative results for the socio-demographic groups shown at the end of the list of variables and for Internet users specifically. At least 4000 filled in questionnaires is recommended to be normally collected in total per country. Pre-test: a small pre-test of the questionnaire should be carried out by participating countries. Eurostat encourages Member States with a common language to co-operate in pre-testing.
Glossary questionnaire **Interviewer instructions**	A glossary and interviewer instructions linked to the should be developed.

List of questions for Eurostat household surveys on ICT usage

(version 26/3/2002)

Module A: Access to selected IC technologies

Questions directed to households

A1 Does your household have any of these at home?

a) Internet enabled mobile phone	
b) Other mobile phone	
c) Conventional analogue (terrestrial) TV	
d) Digital terrestrial TV	
e) Satellite dish connected to TV	
f) Cable TV	
g) Desktop computer	
h) Portable computer	
i) Handheld computer (palmtop)	
j) Car with a traffic navigation system	

A2 Does any member of this household have access to the world wide web (Internet) at home (regardless of whether it is used)?

Yes No (go to A4) Do not know

A3 If yes, on which device is the Internet accessed at home? (Multiple choice)

a) Desktop computer	
b) Portable computer	
c) Handheld computer	
d) TV set (digital TV or set top box)	
e) Mobile phone alone (WAP, GPRS)	
f) Games console	
g) Other means	
h) Don't know	

Questions directed to individuals

A4 If no, what are the main reasons for you not having access to the Internet at home? (Multiple choice)

(Optional question)

a) Have access to Internet elsewhere	
b) Don't want/Internet content not useful	
c) Equipment costs too high	
d) Access costs too high (telephone etc.)	
e) Lack of confidence or skills	
f) Language barriers *(optional)*	
g) Physical disability *(optional)*	
h) Privacy or security concerns	
i) Other (Please, specify……)	
j) Don't know	

A5 Do you have a personal home page/web site on the Internet?

Yes No Do not know

The following questions are directed to individuals

Module B: Use of computers and Internet: location, frequency of use

B1 In the last 3 months, did you use a computer?

Yes No

B2 On average how often and when did you use a computer in the last 3 months?

	At least once a day	At least once a week but not every day	At least once a month but not every week	Less than once a month
a) At home				
b) At place of work (others than home)				
c) At place of education				
d) At other places				

B3 In the last 3 months, did you access the Internet?

Yes No (If no, end of survey)

B4 How often and where did you access the Internet in the last 3 months?

	At least once a day	At least once a week but not every day	At least once a month but not every week	Less than once a month
a) At home				
b) At work				
c) At place of education				
d) At other places				

B5 At which of these other places did you access the Internet in the last 3 months?

a) Public Library	
b) Postal Office	
c) Public Office, town hall, community centre	
d) Internet Café	
e) Neighbour, friend or relatives house	

B6 Approximately how many hours per week did you spend on the Internet* at home or elsewhere in the last 3 months?

…… hours (per week)

(*active use only)

Module C: Purpose and nature of activities on the Internet

C1 For which of the following activities did you use the Internet (all places of use) in the last 3 months for private purposes?

Communication

a) Sending / receiving e-mails	
b) Telephoning over the Internet / Videoconferencing	
c) Other (use of chat sites etc.)	

Information search and on-line services

d) Finding information about goods and services	
e) Using services related to travel and accommodation (optional)	
f) Using services related to training / education	
g) Using health related services	
h) Listening to Web radios / watching web television	
i) Playing/downloading games and music	
j) Reading/downloading online newspapers/news magazines	

Purchase of goods and services, banking

k) Financial services (e.g. Internet Banking, share purchasing)	
l) Purchasing / ordering goods or services (excl. shares / financial services)	
m) Selling goods and services (e.g. via auctions)	

Interaction with public authorities

n) Obtaining information from public authorities web sites	
o) Downloading official forms	
p) Sending filled in forms	

C2 For which of the following work related activities carried out at home did you use the Internet in the last 3 months?

Employment related activities carried out at home

a) Internet not used for work related activities at home	
b) Finding information relating to your work or business	
c) Looking for a job / sending job applications	
d) Sending work carried out at home to work place (teleworking)	
e) Other work related activities	

(optional: adding a filter question on the use for work related activities)

Module D: Internet commerce details: activities and barriers

D1 In the last 3 months, did you buy or order goods and services for non-work use over the Internet?

Yes (go to question D4) No (Survey ends after question D3)

D2 If no, have you ever bought or ordered goods or services for non work use over the Internet?

Yes No

D3 What were the main reasons for not buying / ordering any goods or services for your own private use? (multiple choice) ***(Optional question)***

a) Have no need	
b) Prefer to shop in person, like to see product	
c) Force of habit / customer loyalty to shops /or suppliers	
d) Too expensive	
e)Too long delivery times	
f) Problematic to receive ordered goods at home	
g) Goods and services needed not available on the Internet	
h) Security concerns, worried about giving credit card details over the Internet	
i) Privacy concerns / worried about giving personal details over the Internet	
j) Trust concerns / concerned about receiving or returning goods	
k) Complaint / redress concerns, worried about difficulty for redress	
l) Other (Please, specify……)	

D4 Via which technology did you access the Internet for buying or ordering goods and services in the last three months? ***(Optional question***
(Multiple choice)

a) Via PC (desktop, portable, palmtop)	
b) Via mobile phone (WAP, GPRS)	
c) Other technologies (TV with Internet access, Minitel, etc)	

D5 What types of goods and services did you buy or order over the Internet for non-work use in the last 3 months?

		Estimated number of purchases ***(Optional)***
a) Food / Groceries		
b) Films, music		
c) Books / Magazines/ E-learning material		
d) Clothes, sports goods		
e) Computer software (incl. Video games)		
f) Computer hardware		
g) Electronic equipment (incl. cameras)		
h) Share purchases / Financial services/Insurance		
i) Travel and holiday accommodation		
j) Tickets for events		
k) Lotteries and betting		
l) Other (Please, specify ……..)		

D6 What was the total value of goods and services (excluding financial investments) you bought or ordered (non-work use) over the Internet in the last 3 months?

…… (currency…….) (optional: introduction of expenditure classes/tick boxes)

D7 Did you pay for any of those goods or services by giving your credit card details over the Internet?

Yes No (Optional: breakdown by types of payment)

D8 Did you buy or order goods over the Internet from:

(Optional question)

a) Retailers you knew from outside the Internet (physical store, catalogues)	
b) Retailers known from the Internet or found on the Internet	

D9 What % of your purchases / orders in the last 3 months would you estimate were

(Optional question)

a) From companies based in your own country		
b) From companies based in other European Union countries[1]		%
c) From rest of world		%

D10 What, if any, problems have you encountered when making purchases over the Internet?

(Optional question)

a) Speed of delivery longer than indicated	
b) Delivery costs higher than indicated	
c) Final price higher than indicated	
d) Wrong goods delivered	
e) Damaged goods delivered	
f) Lack of security of payments	
g) Uncertainty concerning guarantees	
h) Complaints and redress were difficult	
i) No satisfactory response received after complaint	
j) Others (Please, specify……..)	

[1] [1] The EU countries are: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden and United Kingdom.

Socio - demographic background variables

Household characteristics

Household type	Number of adults in household Number of dependent children (Children <16 years old and economically inactive children 16-24 years old)
Home based business	-Household members running a home based business -Household members teleworking -No home based business and no teleworking

Individual characteristics

Age	Concrete age should be asked, age classes will be aggregated later
Sex	Male Female
Education level	Low: Primary education/lower secondary Medium: Upper Secondary education High: Tertiary (University) education
Employment Situation	Student Employee Self employed Family worker In compulsory military service Fulfilling domestic tasks (housewife etc) Unemployed Retired person Other inactive person
Location	Objective 1 region / other region (DK,L,NL have no objective 1 regions)

Glossary

Module A

Internet enabled mobile phone:	Mobile phone that can access the world wide web (Internet) via GPRS, WAP or other standards
Desktop computer:	A non-portable personal computer that fits on top of a desk
Portable computer:	Battery powered easily transportable flat screen computer also called laptop or notebook computer; doesn't include handheld computers
Handheld computer	Battery powered wallet-sized computer that can be held in one hand also called palmtop computer, includes electronic organisers
Personal homepage/web site:	Personal site on the web (www) with personal or non-work related information (e.g. hobby sites) and a specific URL

Module C

Public authorities web sites:	Web sites of public authorities like central government, regional and local administration**,** police and social security organisations

Module D

Goods and services	goods and services bought or ordered via a site on the Internet,
bought or ordered over the	goods and services bought or ordered via manually typed e-mails
Internet	should not be included

Socio-demographic variables

Household:	Refers either to one person living alone or a group of people living together in the same dwelling unit.
Number of adults in household:	All persons in household that are not children
Number of dependent children:	Children < 16 years old and economically inactive children 16-24 years old)
Home based business:	Business mainly carried out at home.
Teleworking:	Telework occurs when employees, who are expected to work normally from fixed locations, carry out all, or part of their work at home and transfer the product of their work to the employer using information and communication technologies. The person can either be the owner of the computer or not and it is not necessary that the totality of his work is produced and transmitted to the employer through a PC
Education level:	Low: (ISECD 1 and 2) primary education and lower secondary education, These two steps normally represent compulsory education

Medium: (ISCED 3 and 4) upper secondary education and post secondary non-tertiary education. This level generally begins at the end of compulsory education.

High: (ISECD 5 and 6) tertiary programmes which normally require the successful completion of ISCED 3 or 4 and second stage tertiary education that leads to an advanced research qualification

Objective 1 regions:
(the inclusion of phasing out objective 1 regions has been requested by DG INFSO, these regions are shown in italics)

Belgium: *Hainaut*

Germany: Brandenburg, Mecklenburg-Western Pomerania, Saxony, Saxony-Anhalt and Thuringia, *East Berlin*

Greece: the whole country

Spain: Galicia, Principado de Asturias, Castille-Leon, Castille-La Mancha, Extremadura, Valencia, Andalusia, Murcia, Ceuta-Melilla and the Canary Islands, *Cantabria*

France: Guadeloupe, Martinique, French Guyana and Reunion, *Corsica, region bordering Hainaut*

Italy: Campania, Puglia, Basilicata, Calabria, Sicilia and Sardegna, *Molise*

Ireland: the whole country

Austria: Burgenland

Portugal: the whole country

Finland: East Finland, Central Finland (parts of) and North Finland (parts of)
Sweden: North-Central (parts of), Central Norrland (parts of) and Upper Norrland (parts of)

United Kingdom: South Yorkshire, West Wales and the Valleys, Cornwall and Isles of Scilly and Merseyside, *Scotland: Highlands and Islands*

Countries with no objective 1 regions: Denmark, Luxembourg, The Netherlands

Ultra-peripheral regions:

France: Guadeloupe, Martinique, French Guyana and Reunion

Portugal: Acores and Madeira

Spain: Canary Islands

Interviewer instructions

A small pretest is recommended in order to identify questions difficult to understand and to develop interviewer instructions. A few points are listed here, where interviewer instructions seem necessary.

Module A

A1: At home includes here mobile equipment (e.g. mobile phone) used at home or privately used elsewhere

Module B

B1: Interviewer could assist by giving the starting date of the last 3 month period.

B2, B4: Interviewer should read the place and then mention the frequency alternatives line by line in order to allow answering line by line

B6: If it is difficult for the respondent to give an unassisted answer, interviewer should help by providing usage brackets (proposal: less than one hour, 1-2 hours, 3-5 hours, 6-10 hours, 11-14 hours, 15-21 hours, more than 21 hours)

Module C

C1: Interviewer should make brakes between question blocks. To facilitate answering interviewer could ask to answer each line with yes or no.
For lines n-p interviewer should give examples for public authorities (see definition)

Module D

D1: Interviewer should mention that goods and services bought or ordered by manually typed e-mails should not be included.

D3: To facilitate answering interviewer could ask to answer each line with yes or no.

D4: The examples to be provided to illustrate ' other technologies' depend on the country.
The example 'Minitel' should only be mentioned in France.

D5: To facilitate answering interviewer could ask to answer each line with yes or no. If the number of purchases is included in the questionnaire

D6: If it is difficult for the respondent to give an unassisted answer, interviewer should help by providing usage brackets, proposal of Eurostat

0-29 Euro
30-99 Euro
100-199 Euro
200-299 Euro
300-499 Euro
500-999 Euro
1000-2499 Euro
2500- Euro

D9: If respondent has difficulties identifying 'EU countries' interviewer could help by giving a list of EU countries:
The EU countries are: Belgium, Denmark, Germany, Greece, Spain, France, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden and United Kingdom.

Socio-demographic background variables
Some of these background variables might be taken from the population register or when drawing the sample and do not need to be asked by the interviewer.

Household type: Interviewer should explain what 'dependent children' means

Education level: Interviewer should ask for the level achieved and classify it according to the highest level achieved

ANNEX 2

5.4 VARIABLES - DATA TRANSMISSION QUESTIONNAIRE

The following pages show the list of variables for the pilot surveys provided by Eurostat. The list was the basis for preparing the national questionnaires in the participating countries. In some cases the layout in the national questionnaires followed closely the layout in the list of variables.

MODULE A: USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

A1 Does your enterprise use personal computers, workstations or terminals? yes no
If no go to the end of the survey

A2 Does your company use/plan to use the following technologies?

	Use	Since (year)	Plan to use (in 2001)	Do not use (and do not plan to use in 2001)
Intranet				
EDI				
Web access				

Note: the results of question A2 asking about the year since when the technologies have been used was compiled under the following categories: since 2000; since 1999; since 1998 or earlier.

A3 Does your company have a presence on the web?

via	Available	Plan to have (in 2001)	Do not have (and do not plan to have in 2001)
Own web site			
Third party web site			

A4 If your company uses Internet, what is the type of connection used (several answers possible)?

Mobile phone	
Analogue modem (dial up)	
ISDN	
xDSL (ADSL,…)	
Other broadband connection (> 2Mbps)	

A5 What are the problems or barriers your company faces using the Internet?

(multiple choice)	Very important	Some importance	Not important	Do not know
Costs to make it available too high				
Internet access charges too high				
Lacking qualification of personnel/lack of specific know how				
Lack of perceived benefits for the company				
Lost working time because of irrelevant surfing				
Data communication too slow or unstable				
Lack of security (viruses, hackers)				

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MODULE B: USE OF ELECTRONIC COMMERCE FOR PURCHASES

B1 Does your company use electronic commerce to make purchases? yes no
If no you do not need to answer questions B4 to B8.

B2 What are the problems or barriers your company faces as regards making purchases using e-commerce?

	Very important	Some importance	Not important	Do not know
Goods and services required cannot be purchased using e-commerce				
Stock of (potential) suppliers too small				
Delivery costs				
Logistic problems (speed and timeliness of delivery)				
Uncertainty in making payments				
Uncertainty concerning contracts, terms of delivery and guarantees				

B3 If your company does not make e-commerce purchases, do you plan to use it in 2001?

	Internet	EDI
Plan to use		

B4 If your company makes e-commerce purchases, since how long?

	Internet	EDI
Less than 1 year		
1-2 years		
More than 2 years		

B5 For which of the following business processes related to purchases does your company use e-commerce?

	Internet	EDI
Ordering		
Payment		
Electronic Delivery		

B6 If you make purchases by e-commerce, which are the perceived benefits in it?

Cost savings	
Speed of processing	
Simplification of tasks	
Offers from a large number of suppliers available	

B7 Does your company make purchases through specialised business to business Internet market places? yes no

B8 What proportion of the value of all purchases of your company would you estimate is made by e-commerce?

	Using Internet	Using all networks
% of all purchases	%	%

Note: the results of question B8 were compiled to show the number of enterprises using e-commerce for a proportion of their purchases. The following proportions were used: 1% or more of purchases; 2% or more; 5% or more; 10% or more; 25% or more; 50% or more.

MODULE C: USE OF ELECTRONIC COMMERCE FOR SALES

C1 Does your company use e-commerce facilities to make sales? yes no
If no you do not need to answer questions C4 to C8.

C2 What are the problems or barriers your company faces as regards making sales using e-commerce facilities?

	Very important	Some importance	Not important	Do not know
Goods and services available not suitable for sales by e-commerce				
Stock of (potential) customers too small				
Uncertainty in payments				
Uncertainty concerning contracts, terms of delivery and guarantees				
Cost of developing and maintaining an e-commerce system				
Logistic problems				
Consideration for existing channels of sales				

C3 If your company does not make e-commerce sales, do you plan to use it by the end of 2001?

	Internet	EDI
Plan to use		

C4 If your company makes e-commerce sales, since how long?

	Internet	EDI
Less than 1 year		
1-2 years		
More than 2 years		

C5 For which of the following business processes does your company provide e-commerce facilities?

	Internet	EDI
Product information		
Price information		
Taking orders		
Payment		
Electronic Delivery		

C6 If you make sales by e-commerce, which are the perceived benefits in it?

Cost reductions (rationalisation)	
Reaching new/more customers	
Geographic expansion of market	
Improvement of service quality	
Speed of processing	
Simplification of tasks	
Avoiding loss of market shares to companies already using e-commerce	

C7 Does your company make sales through specialised business to business Internet market places? yes no

C8 If you make sales by e-commerce, what would you estimate is the value of the sales of your company made by electronic commerce?

Clients located in:	Using Internet	Using all networks
Total		
- of which own country		
- of which other EU		
- of which rest of world		
- of which to households (end consumers)		

What proportion of the value of all sales by your company would you estimate is made by e-commerce?

	Using Internet	Using all networks
% of all purchases	%	%

Note: the results of this second part of question C8 were compiled to show the number of enterprises using e-commerce for a proportion of their sales. The following proportions were used: 1% or more of sales; 2% or more; 5% or more; 10% or more; 25% or more; 50% or more.

WORLD TELECOMMUNICATION INDICATORS

December 2003

INTERNATIONAL TELECOMMUNICATION UNION

CONTENTS

INTRODUCTION

Data are presented for 182 economies with populations greater than 100'000 and where sufficient data are available. Summary data for economies not listed in main tables are shown in Box 1.

Economies are grouped by 2002 United States dollar (US$) income levels: *low*, Gross National Income (GNI) per capita of US$ 735 or less; *lower middle*, US$ 736–2'935; *upper middle*, US$ 2'936–9'075; and *high*, US$ 9'076 or more. The income level classification is based on World Bank methodology whereas the Gross Domestic Product (GDP) per capita shown in Table 1 is based on the methodology described in the *Technical notes*. Economies are shown in alphabetical order within their income group in the tables. See Table A for a list of economies in alphabetical order and their location in the tables.

The data cover the public telecommunications sector. Due to differing regulatory obligations for the provision of data, a complete measurement of the sector for some economies cannot be achieved. Data for major telecommunication operators covering at least 90 per cent of the market are shown for all economies. More detailed information about coverage and country specific notes together with a full time-series from 1960, 1965, 1970, 1975-2002 is contained in a CD-ROM version available separately.

Data refer to the reporting period that is closest to the end of year indicated. See Table A for the fiscal year reporting period used in each country.

Communication data come from an annual questionnaire sent to telecommunication authorities and operating companies. These data are supplemented by annual reports and statistical yearbooks of telecommunication ministries, regulators, operators and industry associations. In some cases, estimates are derived from ITU background documents or other references. Other data are provided by the relevant international and national organizations identified in the *Technical notes*.

The following signs and symbols are used in the tables:

italic	Year other than that specified or estimate.
000s	Thousands (i.e. 1'000).
M	Millions (i.e. 1'000'000).
B	Billions (i.e. 1'000'000'000).
US$	United States dollars. See the *Technical notes* for how US$ figures are obtained.
%	Per cent.
_	Zero or a quantity less than half the unit shown. Also used for data items that are not applicable.
...	Data not available.
CAGR	Compound annual growth rate. See the *Technical notes* for how this is computed.

The absence of any sign or symbol indicates that data are in units.

Comments and suggestions relating to the *World Telecommunication Indicators* should be addressed to:

Market, Economics and Finance Unit
Telecommunication Development Bureau
International Telecommunication Union
Place des Nations
CH-1211 Geneva, Switzerland

Fax: +41 22 730 6449
E-Mail: indicators@itu.int.

Additional information about Telecommunication Indicators can be found at: http://www.itu.int/ict.

TABLE A: LIST OF ECONOMIES

Economy	*Location*	*Fiscal year*	*Region*
Albania	60	Ending 31.12	Europe
Algeria	61	Ending 31.12	Africa
Angola	1	Ending 31.12	Africa
Antigua & Barbuda	141	Beginning 01.04	Americas
Argentina	111	Ending 30.09	Americas
Armenia	62	Ending 31.12	Asia
Australia	142	Ending 30.06	Oceania
Austria	143	Ending 31.12	Europe
Azerbaijan	2	Ending 31.12	Asia
Bahamas	144	Ending 31.12	Americas
Bahrain	145	Ending 31.12	Asia
Bangladesh	3	Ending 30.06	Asia
Barbados	146	Beginning 01.04	Americas
Belarus	63	Ending 31.12	Europe
Belgium	147	Ending 31.12	Europe
Belize	112	Beginning 01.04	Americas
Benin	4	Ending 31.12	Africa
Bhutan	5	Ending 31.12	Asia
Bolivia	64	Ending 31.12	Americas
Bosnia	65	Ending 31.12.	Europe
Botswana	113	Beginning 01.04	Africa
Brazil	66	Ending 31.12	Americas
Brunei Darussalam	148	Ending 31.12	Asia
Bulgaria	67	Ending 31.12	Europe
Burkina Faso	6	Ending 31.12	Africa
Burundi	7	Ending 31.12	Africa
Cambodia	8	Ending 31.12	Asia
Cameroon	9	Ending 31.12	Africa
Canada	149	Ending 31.12	Americas
Cape Verde	68	Ending 31.12	Africa
Central African Rep.	10	Ending 31.12	Africa
Chad	11	Ending 31.12	Africa
Chile	114	Ending 31.12	Americas
China	69	Ending 31.12	Asia
Colombia	70	Ending 31.12.	Americas
Comoros	12	Ending 31.12.	Africa
Congo	13	Ending 31.12	Africa
Costa Rica	115	Ending 31.12	Americas
Côte d'Ivoire	14	Ending 31.12	Africa
Croatia	116	Ending 31.12	Europe
Cuba	71	Ending 31.12	Americas
Cyprus	150	Ending 31.12	Europe
Czech Republic	117	Ending 31.12	Europe
D. R. Congo	15	Ending 31.12	Africa
Denmark	151	Ending 31.12	Europe
Djibouti	72	Ending 31.12	Africa
Dominica	118	Beginning 01.04	Americas
Dominican Rep.	73	Ending 31.12	Americas
Ecuador	74	Ending 31.12	Americas
Egypt	75	Ending 30.06	Africa
El Salvador	76	Ending 31.12	Americas
Equatorial Guinea	16	Ending 31.12	Africa
Eritrea	17	Ending 31.12	Africa
Estonia	119	Ending 31.12	Europe
Ethiopia	18	Ending 31.12	Africa
Fiji	77	Ending 31.12	Oceania
Finland	152	Ending 31.12	Europe
France	153	Ending 31.12	Europe
French Polynesia	154	Ending 31.12	Oceania
Gabon	120	Ending 31.12	Africa
Gambia	19	Beginning 01.04	Africa
Georgia	20	Ending 31.12	Asia
Germany	155	Ending 31.12	Europe
Ghana	21	Ending 31.12	Africa
Greece	156	Ending 31.12	Europe
Grenada	121	Ending 31.12	Americas
Guatemala	78	Ending 31.12	Americas
Guinea	22	Ending 31.12	Africa
Guinea-Bissau	23	Ending 31.12	Africa
Guyana	79	Ending 31.12	Americas
Haiti	24	Ending 31.12	Americas
Honduras	80	Ending 31.12	Americas
Hongkong, China	157	Beginning 01.04	Asia
Hungary	122	Ending 31.12	Europe
Iceland	158	Ending 31.12	Europe
India	25	Beginning 01.04	Asia
Indonesia	26	Ending 31.12	Asia
Iran (I.R.)	81	Beginning 22.03	Asia
Ireland	159	Beginning 01.04	Europe
Israel	160	Ending 31.12	Asia
Italy	161	Ending 31.12	Europe
Jamaica	82	Beginning 01.04	Americas
Japan	162	Beginning 01.04	Asia
Jordan	83	Ending 31.12	Asia
Kazakhstan	84	Ending 31.12	Asia
Kenya	27	Ending 30.06	Africa
Korea (Rep.)	163	Ending 31.12	Asia
Kuwait	164	Ending 31.12	Asia
Kyrgyzstan	28	Ending 31.12	Asia
Lao P.D.R.	29	Ending 31.12	Asia
Latvia	123	Ending 31.12	Europe
Lebanon	124	Ending 31.12	Asia
Lesotho	30	Beginning 01.04	Africa
Libya	125	Ending 31.12	Africa
Lithuania	126	Ending 31.12	Europe
Luxembourg	165	Ending 31.12	Europe
Macao, China	166	Ending 31.12	Asia
Madagascar	31	Ending 31.12	Africa
Malawi	32	Ending 31.12	Africa
Malaysia	127	Ending 31.12	Asia
Maldives	85	Ending 31.12	Asia
Mali	33	Ending 31.12	Africa
Malta	167	Ending 31.12	Europe
Marshall Islands	86	Ending 31.12	Oceania
Mauritania	34	Ending 31.12	Africa
Mauritius	128	Ending 31.12	Africa

Economy	*Location*	*Fiscal year*	*Region*
Mexico	129	Ending 31.12	Americas
Moldova	35	Ending 31.12	Europe
Mongolia	36	Ending 31.12	Asia
Morocco	87	Ending 31.12	Africa
Mozambique	37	Ending 31.12	Africa
Myanmar	38	Ending 31.12	Asia
Namibia	88	Ending 30.09	Africa
Nepal	39	Ending 15.07	Asia
Netherlands	168	Ending 31.12	Europe
New Caledonia	169	Ending 31.12	Oceania
New Zealand	170	Beginning 01.04	Oceania
Nicaragua	40	Ending 31.12	Americas
Niger	41	Ending 31.12	Africa
Nigeria	42	Ending 31.12	Africa
Norway	171	Ending 31.12	Europe
Oman	130	Ending 31.12	Asia
Pakistan	43	Ending 30.06	Asia
Palestine	89	Ending 31.12	Asia
Panama	131	Ending 31.12	Americas
Papua New Guinea	44	Ending 31.12	Oceania
Paraguay	90	Ending 31.12	Americas
Peru	91	Ending 31.12	Americas
Philippines	92	Ending 31.12	Asia
Poland	132	Ending 31.12	Europe
Portugal	172	Ending 31.12	Europe
Qatar	173	Ending 31.12	Asia
Romania	93	Ending 31.12	Europe
Russia	94	Ending 31.12	Europe
Rwanda	45	Ending 31.12	Africa
S. Tomé & Principe	46	Ending 31.12	Africa
Samoa	95	Ending 31.12	Oceania
Saudi Arabia	133	Ending 31.12	Asia
Senegal	47	Ending 31.12	Africa
Serbia and Montenegro	96	Ending 31.12	Europe
Seychelles	134	Beginning 01.04	Africa
Sierra Leone	48	Ending 31.12	Africa
Singapore	174	Beginning 01.04	Asia
Slovak Republic	135	Ending 31.12	Europe
Slovenia	175	Ending 31.12	Europe
Solomon Islands	49	Beginning 01.04	Oceania
South Africa	97	Beginning 01.04	Africa
Spain	176	Ending 31.12	Europe
Sri Lanka	98	Ending 31.12	Asia
St. Kitts and Nevis	136	Beginning 01.04	Americas
St. Lucia	137	Beginning 01.04	Americas
St. Vincent	99	Beginning 01.04	Americas
Sudan	50	Ending 31.12	Africa
Suriname	100	Ending 31.12	Americas
Swaziland	101	Beginning 01.04	Africa
Sweden	177	Ending 31.12	Europe
Switzerland	178	Ending 31.12	Europe
Syria	102	Ending 31.12	Asia
Taiwan, China	179	Ending 31.12	Asia
Tajikistan	51	Ending 31.12	Asia
Tanzania	52	Ending 31.12	Africa
TFYR Macedonia	103	Ending 31.12	Europe
Thailand	104	Ending 30.09	Asia
Togo	53	Ending 31.12	Africa
Tonga	105	Ending 31.12	Oceania
Trinidad & Tobago	138	Beginning 01.04	Americas
Tunisia	106	Ending 31.12	Africa
Turkey	107	Ending 31.12	Europe
Turkmenistan	108	Ending 31.12	Asia
Uganda	54	Ending 30.06	Africa
Ukraine	109	Ending 31.12	Europe
United Arab Emirates	180	Ending 31.12	Asia
United Kingdom	181	Beginning 01.04	Europe
United States	182	Ending 31.12	Americas
Uruguay	139	Ending 31.12	Americas
Uzbekistan	55	Ending 31.12	Asia
Vanuatu	110	Ending 31.12	Oceania
Venezuela	140	Ending 31.12	Americas
Viet Nam	56	Ending 31.12	Asia
Yemen	57	Ending 31.12	Asia
Zambia	58	Beginning 01.04	Africa
Zimbabwe	59	Ending 30.06	Africa

1. Basic indicators

		Population		GDP	Total telephone subscribers		Effective
		Total (M) 2002	Density (per km2) 2002	per capita (US$) 2002	Total (000s) 2002	per 100 inhabitants 2002	tele-density 2002
1	Angola	13.94	11	715	215	1.54	0.93
2	Azerbaijan	8.14	94	*497*	1'794	22.03	11.35
3	Bangladesh	133.13	925	352	1'757	1.32	0.81
4	Benin	6.80	60	413	281	4.14	3.22
5	Bhutan	0.69	15	*734*	20	2.84	2.84
6	Burkina Faso	11.96	44	220	154	1.29	0.75
7	Burundi	6.99	251	89	74	1.06	0.74
8	Cambodia	13.79	76	*254*	415	3.01	2.76
9	Cameroon	15.83	33	*623*	787	4.97	4.27
10	Central African Rep.	3.96	6	*265*	22	0.55	0.32
11	Chad	7.87	6	*212*	46	0.58	0.43
12	Comoros	0.76	409	*303*	10	1.35	1.35
13	Congo	3.30	10	967	244	7.39	6.72
14	Côte d'Ivoire	16.49	51	711	1'363	8.27	6.23
15	D.R. Congo	52.65	22	*143*	570	1.08	1.06
16	Equatorial Guinea	0.51	18	4'289	41	8.08	6.34
17	Eritrea	3.98	42	*196*	36	0.90	0.90
18	Ethiopia	67.35	55	*96*	404	0.60	0.53
19	Gambia	1.37	128	*333*	138	10.08	7.29
20	Georgia	4.93	71	673	1'152	23.35	13.14
21	Ghana	21.67	91	*209*	724	3.34	2.07
22	Guinea	7.67	31	*381*	117	1.52	1.18
23	Guinea-Bissau	1.25	35	173	11	0.89	0.89
24	Haiti	8.30	299	380	270	3.25	1.69
25	India	1'041.85	329	494	54'108	5.19	3.98
26	Indonesia	212.11	111	860	19'450	9.17	5.52
27	Kenya	31.93	55	386	1'653	5.18	4.15
28	Kyrgyzstan	5.10	26	315	448	8.79	7.75
29	Lao P.D.R.	5.53	23	328	117	2.12	1.12
30	Lesotho	2.17	71	330	121	5.57	4.25
31	Madagascar	15.91	27	277	223	1.40	1.02
32	Malawi	10.44	111	*158*	159	1.52	0.82
33	Mali	10.63	9	318	109	1.03	0.53
34	Mauritania	2.68	3	365	279	10.39	9.22
35	Moldova	4.40	131	*337*	1'045	23.75	16.07
36	Mongolia	2.43	2	*439*	344	14.16	8.89
37	Mozambique	18.23	23	215	338	1.86	1.40
38	Myanmar	48.99	72	*148*	390	0.80	0.70
39	Nepal	23.20	164	237	350	1.51	1.41
40	Nicaragua	5.37	44	470	374	6.97	3.78
41	Niger	11.75	10	165	39	0.33	0.19
42	Nigeria	120.08	130	409	2'310	1.92	1.34
43	Pakistan	145.96	182	428	4'894	3.35	2.50
44	Papua New Guinea	5.46	12	*777*	79	1.45	1.17
45	Rwanda	8.17	310	*208*	134	1.64	1.36
46	S. Tomé & Principe	0.15	157	331	8	5.44	4.13
47	Senegal	10.08	51	506	778	7.72	5.49
48	Sierra Leone	4.95	68	*152*	90	1.82	1.34
49	Solomon Islands	0.44	15	*611*	8	1.71	1.49
50	Sudan	32.54	13	*396*	863	2.65	2.06
51	Tajikistan	6.38	45	188	251	3.93	3.73
52	Tanzania	34.44	37	*271*	832	2.41	1.95
53	Togo	4.87	86	301	221	4.54	3.49
54	Uganda	24.70	102	243	448	1.81	1.59
55	Uzbekistan	25.29	57	257	1'868	7.39	6.65
56	Viet Nam	81.25	247	429	5'832	7.18	4.84
57	Yemen	19.50	103	513	953	4.89	2.78
58	Zambia	10.70	14	*312*	227	2.12	1.30
59	Zimbabwe	11.63	30	*654*	641	5.51	3.03
	Low Income	**2'412.62**	**76**	**455**	**110'628**	**4.59**	**3.31**

		Population		GDP	Total telephone subscribers		Effective
		Total (M) 2002	Density (per km2) 2002	per capita (US$) 2002	Total (000s) 2002	per 100 inhabitants 2002	tele-density 2002
60	Albania	3.08	107	*1'332*	1'071	34.77	27.63
61	Algeria	31.29	13	*1'773*	2'308	7.38	6.10
62	Armenia	3.80	127	623	615	16.17	14.28
63	Belarus	9.91	48	1'438	3'430	34.60	29.94
64	Bolivia	8.34	8	935	1'437	17.22	10.46
65	Bosnia	3.82	75	*1'232*	1'652	43.29	23.67
66	Brazil	173.88	20	2'603	73'691	42.38	22.32
67	Bulgaria	7.80	70	1'992	5'466	70.07	36.77
68	Cape Verde	0.44	109	*1'239*	113	25.77	15.99
69	China	1'284.53	134	963	421'040	32.78	16.69
70	Colombia	43.29	38	1'874	12'363	28.56	17.94
71	Cuba	11.28	98	*1'518*	*583*	*5.19*	*5.11*
72	Djibouti	0.66	30	*894*	25	3.83	2.29
73	Dominican Rep.	8.23	170	2'586	2'610	31.71	20.66
74	Ecuador	12.94	28	*1'076*	2'987	23.08	12.06
75	Egypt	67.31	67	1'279	11'925	17.72	11.04
76	El Salvador	6.46	302	2'203	1'557	24.10	13.76
77	Fiji	0.82	45	*2'068*	187	22.87	11.90
78	Guatemala	12.00	110	1'939	2'423	20.20	13.15
79	Guyana	0.88	4	*828*	168	19.08	9.93
80	Honduras	6.70	60	980	649	9.69	4.87
81	Iran (I.R.)	65.37	40	*5'876*	14'387	22.01	18.66
82	Jamaica	2.62	229	3'216	1'844	70.45	53.48
83	Jordan	5.33	56	*1'701*	1'894	35.54	22.89
84	Kazakhstan	15.97	6	1'485	3'109	19.47	13.04
85	Maldives	0.28	943	*2'258*	71	25.11	14.91
86	Marshall Islands	0.06	31	*1'817*	5	8.72	7.74
87	Morocco	29.64	45	*1'162*	7'326	24.71	20.91
88	Namibia	1.88	2	*1'697*	271	14.48	8.00
89	Palestine	3.46	574	873	622	17.99	9.26
90	Paraguay	5.78	14	967	1'940	33.56	28.83
91	Peru	26.75	21	2'124	4'073	15.23	8.62
92	Philippines	79.48	265	969	18'512	23.29	19.13
93	Romania	21.68	91	2'107	9'326	43.01	23.57
94	Russia	146.59	9	2'370	53'109	36.23	24.22
95	Samoa	0.18	63	*1'428*	13	7.18	5.69
96	Serbia and Montenegro	10.72	105	1'451	5'243	48.91	25.66
97	South Africa	45.45	38	2'293	18'658	41.05	30.39
98	Sri Lanka	18.95	289	863	1'815	9.58	4.92
99	St. Vincent	0.12	301	*3'028*	37	31.88	23.35
100	Suriname	0.48	3	1'860	187	38.87	22.52
101	Swaziland	1.03	59	1'130	98	9.50	6.10
102	Syria	17.04	92	*1'185*	2'499	14.67	12.32
103	TFYR Macedonia	2.06	80	*1'705*	925	44.83	27.13
104	Thailand	61.89	120	2'044	22'617	36.55	26.04
105	Tonga	0.10	142	*1'322*	15	14.67	11.29
106	Tunisia	9.78	60	2'152	1'652	16.89	11.74
107	Turkey	67.27	86	2'722	42'289	62.86	34.75
108	Turkmenistan	4.85	10	*988*	382	7.88	7.71
109	Ukraine	50.14	83	827	15'033	29.98	21.61
110	Vanuatu	0.20	14	*1'113*	12	5.69	3.27
	Lower Middle Income	**2'392.58**	**44**	**1'503**	**774'262**	**32.36**	**18.52**

1. Basic indicators

		Population		GDP	Total telephone subscribers		Effective
		Total (M) 2002	Density (per km2) 2002	per capita (US$) 2002	Total (000s) 2002	per 100 inhabitants 2002	tele-density 2002
111	Argentina	36.60	13	11'180	14'509	39.64	21.88
112	Belize	0.25	11	*3'264*	83	32.82	20.45
113	Botswana	1.72	3	2'939	565	32.85	24.13
114	Chile	15.05	20	4'413	9'913	65.86	42.83
115	Costa Rica	4.14	81	4'064	1'498	36.15	25.05
116	Croatia	4.37	77	5'125	4'165	95.22	53.50
117	Czech Republic	10.14	129	6'852	12'286	121.11	84.88
118	Dominica	0.08	104	*3'478*	33	42.39	30.39
119	Estonia	1.36	30	4'732	1'356	100.07	65.02
120	Gabon	1.30	5	*3'611*	311	23.97	21.50
121	Grenada	0.11	307	*4'348*	41	38.77	31.65
122	Hungary	10.15	109	6'486	10'529	103.72	67.60
123	Latvia	2.33	37	3'597	1'618	69.49	39.38
124	Lebanon	3.42	328	*4'988*	1'454	42.58	22.70
125	Libya	5.56	3	*6'207*	*710*	*12.72*	*11.83*
126	Lithuania	3.46	53	3'977	2'581	74.56	47.53
127	Malaysia	24.53	74	3'870	13'911	56.72	37.68
128	Mauritius	1.21	649	3'957	677	55.95	28.91
129	Mexico	101.88	52	6'252	40'870	40.12	25.45
130	Oman	2.71	10	7'580	692	25.54	17.15
131	Panama	3.01	38	*3'812*	936	31.15	18.95
132	Poland	38.61	123	4'902	*21'405*	*55.41*	*36.26*
133	Saudi Arabia	23.06	10	8'163	8'326	36.10	21.72
134	Seychelles	0.08	200	*7'571*	66	82.25	55.35
135	Slovak Republic	5.38	110	4'404	4'366	81.18	54.36
136	St. Kitts and Nevis	0.05	180	*7'450*	29	60.64	50.00
137	St. Lucia	0.16	260	4'201	65	40.90	31.95
138	Trinidad & Tobago	1.30	254	7'166	687	52.78	27.81
139	Uruguay	3.39	18	3'640	1'599	47.22	27.96
140	Venezuela	25.20	28	*5'105*	9'305	36.92	25.64
	Upper Middle Income	**330.59**	**25**	**6'244**	**164'588**	**49.78**	**31.87**

		Population		GDP	Total telephone subscribers		Effective
		Total (M) 2002	Density (per km2) 2002	per capita (US$) 2002	Total (000s) 2002	per 100 inhabitants 2002	tele-density 2002
141	Antigua & Barbuda	0.08	176	*8'629*	76	97.76	48.98
142	Australia	19.66	3	20'230	23'169	117.84	63.98
143	Austria	8.16	97	25'064	10'403	127.50	78.62
144	Bahamas	0.31	23	15'442	248	79.59	40.56
145	Bahrain	0.67	941	11'399	564	84.64	58.33
146	Barbados	0.27	626	*9'500*	*182*	*67.86*	*49.44*
147	Belgium	10.36	339	23'681	13'256	128.00	78.56
148	Brunei Darussalam	0.35	61	*12'447*	*225*	*65.92*	*40.06*
149	Canada	31.41	3	23'417	31'811	101.26	63.55
150	Cyprus	0.72	77	14'194	910	127.24	68.80
151	Denmark	5.37	125	32'033	8'179	152.18	83.32
152	Finland	5.21	14	25'314	7'242	139.09	86.74
153	France	59.64	110	24'057	72'514	121.59	64.70
154	French Polynesia	0.25	62	*16'613*	143	58.04	36.66
155	Germany	82.54	231	24'122	113'763	137.83	72.75
156	Greece	11.02	83	12'084	14'727	133.66	84.54
157	Hong Kong, China	6.79	6'390	24'014	10'228	150.71	94.25
158	Iceland	0.29	3	*26'617*	449	155.88	90.60
159	Ireland	3.93	57	31'041	4'975	126.56	76.32
160	Israel	6.64	300	15'619	9'434	142.17	95.45
161	Italy	56.46	187	21'024	80'145	141.94	93.87
162	Japan	127.44	337	31'324	152'267	119.49	63.65
163	Korea (Rep.)	47.60	484	10'014	55'599	116.80	67.95
164	Kuwait	2.36	97	15'140	1'709	72.29	51.90
165	Luxembourg	0.45	172	47'255	828	185.74	106.05
166	Macao, China	0.44	18'555	15'249	452	102.41	62.53
167	Malta	0.40	1'253	9'839	484	122.25	69.91
168	Netherlands	16.20	393	25'866	22'064	136.24	74.47
169	New Caledonia	0.22	12	*13'940*	132	58.93	35.71
170	New Zealand	3.94	15	14'832	4'214	106.98	62.17
171	Norway	4.55	14	42'149	7'183	157.80	84.36
172	Portugal	10.34	112	11'800	12'884	124.65	82.52
173	Qatar	0.61	53	28'634	444	72.74	43.80
174	Singapore	4.16	6'099	20'894	5'240	125.84	79.56
175	Slovenia	2.00	99	11'020	2'677	134.14	83.53
176	Spain	40.68	81	16'091	54'126	133.04	82.42
177	Sweden	8.94	20	26'864	14'528	162.45	88.89
178	Switzerland	7.28	176	36'738	11'166	153.35	78.93
179	Taiwan, China	22.52	626	12'471	37'005	164.31	106.15
180	United Arab Emirates	3.49	42	19'944	3'522	100.97	69.61
181	United Kingdom	59.09	241	26'369	84'575	143.13	84.07
182	United States	288.37	31	36'223	326'999	113.40	64.58
	High Income	**961.18**	**30**	**27'089**	**1'200'743**	**124.93**	**71.98**
	World	**6'096.97**	**46**	**5'388**	**2'250'220**	**36.91**	**21.63**
	Africa	**807.74**	**27**	**686**	**59'416**	**7.36**	**5.40**
	Americas	**845.06**	**21**	**15'633**	**546'078**	**64.62**	**37.45**
	Asia	**3'615.96**	**122**	**2'312**	**882'776**	**24.41**	**14.01**
	Europe	**796.87**	**33**	**12'821**	**733'975**	**92.10**	**54.79**
	Oceania	**31.34**	**4**	**15'174**	**27'975**	**89.27**	**49.14**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

2. Main telephone lines

		Main telephone lines				Subscriber lines	
		Total (000s) 2002	CAGR (%) 1997-2002	per 100 inhabitants 2002	per 100 inhabitants CAGR (%) 1997-2002	Total (000s) 2002	per 100 inhabitants 2002
1	Angola	85.0	6.4	0.61	2.5	85.0	0.61
2	Azerbaijan	923.8	7.0	11.35	5.6	923.8	11.35
3	Bangladesh	682.0	13.1	0.51	11.5	682.0	0.51
4	Benin	62.7	11.4	0.92	7.9	62.7	0.92
5	Bhutan	19.6	25.0	2.84	22.3	19.6	2.84
6	Burkina Faso	64.3	12.1	0.54	9.4	64.3	0.54
7	Burundi	22.1	6.8	0.32	4.7	22.1	0.32
8	Cambodia	35.4	12.1	0.26	6.2	35.4	0.26
9	Cameroon	110.9	8.1	0.70	5.4	101.4	0.64
10	Central African Rep.	9.0	-1.7	0.23	-4.6	9.0	0.23
11	Chad	11.8	9.6	0.15	6.8	11.8	0.15
12	Comoros	10.3	13.2	1.35	9.8	10.5	1.38
13	Congo	22.0	-	0.67	-3.6	22.0	0.67
14	Côte d'Ivoire	336.1	18.8	2.04	14.6	336.1	2.04
15	D.R. Congo	10.0	1.9	0.02	0.1	10.0	0.02
16	Equatorial Guinea	8.8	18.3	1.74	14.0	8.9	1.76
17	Eritrea	35.9	10.3	0.90	9.2	35.9	0.90
18	Ethiopia	353.8	17.7	0.53	15.1	353.8	0.53
19	Gambia	38.4	9.1	2.80	5.6	38.4	2.80
20	Georgia	648.5	1.0	13.14	3.0	648.5	13.14
21	Ghana	274.3	21.1	1.27	17.3	274.3	1.27
22	Guinea	26.0	5.6	0.34	4.4	26.0	0.34
23	Guinea-Bissau	11.2	8.0	0.89	5.4	11.2	0.89
24	Haiti	130.0	16.7	1.57	14.4	130.0	1.57
25	India	41'420.0	18.4	3.98	16.4	41'420.0	3.98
26	Indonesia	7'750.0	9.2	3.65	8.1	7'750.0	3.65
27	Kenya	328.1	3.8	1.03	0.5	328.1	1.03
28	Kyrgyzstan	394.8	2.4	7.75	0.5	394.8	7.75
29	Lao P.D.R.	61.9	20.3	1.12	17.2	61.9	1.12
30	Lesotho	28.6	7.0	1.32	6.5	28.6	1.32
31	Madagascar	59.5	6.6	0.37	3.3	59.4	0.37
32	Malawi	73.1	14.7	0.70	13.2	73.1	0.70
33	Mali	56.6	18.5	0.53	16.1	56.6	0.53
34	Mauritania	31.5	19.3	1.18	16.3	31.5	1.18
35	Moldova	706.9	2.4	16.07	2.2	706.9	16.07
36	Mongolia	128.0	8.0	5.27	6.6	128.0	5.27
37	Mozambique	83.7	5.0	0.46	1.7	83.7	0.46
38	Myanmar	342.3	9.9	0.70	7.7	342.3	0.70
39	Nepal	327.7	18.5	1.41	16.6	327.7	1.41
40	Nicaragua	171.6	6.9	3.20	3.0	171.6	3.20
41	Niger	22.4	6.4	0.19	2.6	22.4	0.19
42	Nigeria	702.0	11.9	0.58	9.0	702.0	0.58
43	Pakistan	3'655.0	7.4	2.50	4.9	3'655.0	2.50
44	Papua New Guinea	64.0	3.4	1.17	0.2	64.0	1.17
45	Rwanda	23.2	14.8	0.28	7.5	23.2	0.28
46	S. Tomé & Principe	6.2	7.7	4.13	5.8	6.2	4.13
47	Senegal	224.6	14.1	2.23	11.0	224.6	2.23
48	Sierra Leone	24.0	6.7	0.48	5.2	*22.7*	*0.46*
49	Solomon Islands	6.6	-3.0	1.49	-5.7	6.6	1.49
50	Sudan	671.8	43.0	2.06	38.6	671.8	2.06
51	Tajikistan	237.6	1.0	3.73	-0.3	237.6	3.73
52	Tanzania	161.6	9.0	0.47	6.0	161.6	0.47
53	Togo	51.2	15.3	1.05	12.5	51.2	1.05
54	Uganda	55.0	0.3	0.22	-3.2	59.5	0.24
55	Uzbekistan	1'681.1	1.8	6.65	0.3	1'670.0	6.60
56	Viet Nam	3'929.1	24.1	4.84	22.7	3'929.1	4.84
57	Yemen	542.2	19.7	2.78	15.8	542.2	2.78
58	Zambia	87.7	2.5	0.82	0.0	87.7	0.82
59	Zimbabwe	287.9	6.3	2.47	5.2	287.9	2.47
	Low Income	**68'329.5**	**14.7**	**2.83**	**12.5**	**68'312.5**	**2.83**

		Main telephone lines				*Subscriber lines*	
		Total (000s)	*CAGR (%)*	*per 100 inhabitants*		*Total (000s)*	*per 100 inhabitants*
		2002	*1997-2002*	*2002*	*CAGR (%) 1997-2002*	*2002*	*2002*
60	Albania	220.0	20.4	7.14	20.7	220.0	7.14
61	Algeria	1'908.0	6.4	6.10	4.8	1'908.0	6.10
62	Armenia	542.8	-0.9	14.28	-0.9	542.8	14.28
63	Belarus	2'967.2	5.1	29.94	5.5	2'967.2	29.94
64	Bolivia	563.9	8.0	6.76	6.5	563.9	6.76
65	Bosnia	902.8	24.4	23.67	24.2	902.8	23.67
66	Brazil	38'810.0	17.9	22.32	15.9	38'810.0	22.32
67	Bulgaria	2'868.2	1.4	36.77	2.6	2'868.2	36.77
68	Cape Verde	70.2	16.1	15.99	14.4	70.2	15.99
69	China	214'420.0	25.0	16.69	24.3	214'420.0	16.69
70	Colombia	7'766.0	7.6	17.94	5.9	7'522.0	17.38
71	Cuba	*574.4*	*11.6*	*5.11*	*11.1*	*574.4*	*5.11*
72	Djibouti	10.1	4.1	1.54	2.2	10.1	1.54
73	Dominican Rep.	909.0	5.2	11.04	4.6	909.0	11.04
74	Ecuador	1'426.2	9.6	11.02	7.9	1'411.1	10.90
75	Egypt	7'430.0	16.6	11.04	14.0	7'430.0	11.04
76	El Salvador	667.7	13.1	10.34	11.2	667.7	10.34
77	Fiji	97.5	6.3	11.90	5.5	97.5	11.90
78	Guatemala	846.0	14.5	7.05	11.5	846.0	7.05
79	Guyana	80.4	7.9	9.15	7.0	80.4	9.15
80	Honduras	322.5	6.7	4.81	5.0	322.5	4.81
81	Iran (I.R.)	12'200.2	13.4	18.66	11.8	12'200.2	18.66
82	Jamaica	444.4	1.3	16.97	0.5	444.4	16.97
83	Jordan	674.5	10.8	12.66	7.6	674.5	12.66
84	Kazakhstan	2'081.9	2.9	13.04	3.5	2'082.3	13.04
85	Maldives	28.7	9.8	10.20	7.6	28.7	10.20
86	Marshall Islands	4.4	5.1	7.74	2.3	*4.2*	*7.67*
87	Morocco	1'127.4	-2.8	3.80	-4.3	1'139.3	3.84
88	Namibia	121.4	4.0	6.48	1.3	121.4	6.48
89	Palestine	301.6	22.2	8.73	17.0	300.7	8.70
90	Paraguay	273.2	4.6	4.73	2.0	273.2	4.73
91	Peru	1'766.1	1.4	6.60	-0.5	2'045.4	7.65
92	Philippines	3'310.9	9.8	4.17	7.7	3'310.9	4.17
93	Romania	4'215.2	4.4	19.44	5.2	4'171.8	19.24
94	Russia	35'500.0	4.7	24.22	4.8	35'054.9	23.91
95	Samoa	10.3	4.0	5.69	2.9	10.3	5.69
96	Serbia and Montenegro	2'493.0	2.7	23.26	2.5	2'493.0	23.26
97	South Africa	4'844.0	0.8	10.66	-1.1	4'310.0	9.48
98	Sri Lanka	883.1	20.9	4.66	19.5	883.1	4.66
99	St. Vincent	27.3	5.9	23.35	4.9	27.3	23.35
100	Suriname	78.7	4.3	16.35	1.1	78.7	16.35
101	Swaziland	35.1	6.9	3.40	5.1	34.6	3.35
102	Syria	2'099.3	9.8	12.32	7.2	2'099.3	12.32
103	TFYR Macedonia	560.0	6.6	27.13	5.8	560.0	27.13
104	Thailand	6'499.8	6.1	10.50	5.0	6'466.5	10.45
105	Tonga	11.2	8.9	11.29	8.6	11.2	11.29
106	Tunisia	1'148.0	11.9	11.74	10.6	1'148.0	11.74
107	Turkey	18'914.9	3.7	28.12	2.2	18'735.4	27.85
108	Turkmenistan	374.0	1.1	7.71	-0.7	374.0	7.71
109	Ukraine	10'833.3	2.9	21.61	3.2	10'833.3	21.61
110	Vanuatu	6.6	6.6	3.27	3.8	6.6	3.27
	Lower Middle Income	**394'271.5**	**15.3**	**16.48**	**14.4**	**393'067.0**	**16.43**

2. Main telephone lines

		Main telephone lines				Subscriber lines	
		Total (000s) 2002	CAGR (%) 1997-2002	per 100 inhabitants 2002	CAGR (%) 1997-2002	Total (000s) 2002	per 100 inhabitants 2002
111	Argentina	8'009.4	3.2	21.88	2.1	8'009.4	21.88
112	Belize	31.3	0.4	12.37	-2.2	31.3	12.37
113	Botswana	150.0	11.9	8.72	9.3	142.6	8.29
114	Chile	3'467.0	5.2	23.04	4.6	3'467.0	23.04
115	Costa Rica	1'038.0	8.7	25.05	5.8	1'038.0	25.05
116	Croatia	1'825.0	4.2	41.72	4.7	1'704.6	38.97
117	Czech Republic	3'675.5	2.3	36.23	2.6	3'388.7	33.41
118	Dominica	23.7	4.3	30.39	3.5	25.4	32.58
119	Estonia	475.0	0.3	35.06	1.8	475.0	35.06
120	Gabon	32.1	-2.9	2.47	-5.5	32.1	2.47
121	Grenada	33.5	4.8	31.65	1.7	33.5	31.65
122	Hungary	3'666.4	3.4	36.12	3.5	3'309.6	32.60
123	Latvia	701.2	-1.1	30.11	0.2	701.2	30.11
124	Lebanon	678.8	3.9	19.88	2.2	678.8	19.88
125	Libya	*660.0*	*13.3*	*11.83*	*13.2*	*660.0*	*11.83*
126	Lithuania	935.9	-2.4	27.03	-1.0	912.3	26.35
127	Malaysia	4'669.9	2.0	19.04	-0.5	4'741.1	19.33
128	Mauritius	327.2	8.0	27.03	6.7	327.2	27.03
129	Mexico	14'941.6	10.1	14.67	8.6	14'975.1	14.70
130	Oman	227.6	2.6	8.39	-0.4	227.6	8.39
131	Panama	366.7	0.1	12.20	-1.9	366.7	12.20
132	Poland	*11'400.0*	*11.0*	*29.51*	*11.0*	*11'400.0*	*29.51*
133	Saudi Arabia	3'317.5	12.1	14.39	8.4	3'317.5	14.39
134	Seychelles	21.7	4.0	26.91	3.1	21.7	26.91
135	Slovak Republic	1'442.6	0.7	26.82	0.8	1'442.6	26.82
136	St. Kitts and Nevis	23.5	6.5	50.00	4.9	23.5	50.00
137	St. Lucia	51.1	6.7	31.95	5.0	50.0	31.25
138	Trinidad & Tobago	325.1	6.0	24.98	5.5	325.1	24.98
139	Uruguay	946.5	4.5	27.96	3.6	946.5	27.96
140	Venezuela	2'841.8	0.3	11.27	-1.6	2'841.8	11.27
	Upper Middle Income	**66'305.9**	**5.6**	**20.05**	**4.4**	**65'616.1**	**19.85**

2. Main telephone lines

		Main telephone lines				Subscriber lines	
		Total (000s)	CAGR (%)	per 100 inhabitants		Total (000s)	per 100 inhabitants
		2002	1997-2002	2002	CAGR (%) 1997-2002	2002	2002
141	Antigua & Barbuda	38.0	4.2	48.78	2.1	37.3	47.77
142	Australia	10'590.0	2.2	53.86	1.1	10'174.4	51.75
143	Austria	3'988.0	0.1	48.88	-0.1	3'295.2	40.39
144	Bahamas	126.6	5.2	40.56	3.6	126.6	40.56
145	Bahrain	175.4	2.9	26.31	0.4	175.4	26.31
146	Barbados	133.0	4.2	49.44	3.9	*129.0*	*48.06*
147	Belgium	5'120.4	0.6	49.44	0.3	4'389.0	42.38
148	Brunei Darussalam	90.0	3.2	25.57	0.4	*88.4*	*25.86*
149	Canada	19'962.1	1.4	63.55	-0.2	19'256.1	61.30
150	Cyprus	492.0	5.0	68.80	3.0	446.4	62.43
151	Denmark	3'700.9	2.1	68.86	1.7	3'076.8	57.25
152	Finland	2'725.6	-1.0	52.35	-1.2	2'413.2	46.34
153	France	33'928.7	0.1	56.89	-0.3	30'994.4	51.97
154	French Polynesia	52.5	0.1	21.38	-1.8	*49.2*	*21.45*
155	Germany	53'720.0	3.5	65.09	3.4	39'795.0	48.21
156	Greece	5'412.8	-0.1	49.13	-1.0	5'768.6	52.36
157	Hong Kong, China	3'831.8	1.0	56.47	0.1	3'841.8	56.61
158	Iceland	188.0	2.3	65.28	1.2	149.1	51.78
159	Ireland	1'975.0	4.9	50.24	3.4	1'700.1	43.25
160	Israel	3'100.0	3.0	46.72	0.6	2'884.2	43.46
161	Italy	27'142.0	1.1	48.07	1.4	23'786.0	42.13
162	Japan	71'149.0	1.6	55.83	1.4	60'770.0	47.69
163	Korea (Rep.)	23'257.0	2.6	48.86	1.5	23'146.4	48.63
164	Kuwait	481.9	3.2	20.38	-0.4	481.9	20.38
165	Luxembourg	355.4	4.9	79.68	3.7	239.7	53.75
166	Macao, China	176.1	0.8	39.88	-0.2	175.7	39.79
167	Malta	207.3	2.1	52.34	1.2	207.3	52.34
168	Netherlands	10'004.0	2.5	61.77	1.8	7'852.0	48.48
169	New Caledonia	52.0	1.8	23.21	-0.3	*45.6*	*20.80*
170	New Zealand	1'765.0	-0.1	44.81	-1.3	1'783.0	45.26
171	Norway	3'343.0	4.1	73.44	3.5	2'295.3	50.42
172	Portugal	4'354.6	1.7	42.13	0.9	3'686.8	35.67
173	Qatar	176.5	4.5	28.94	3.0	176.5	28.94
174	Singapore	1'927.2	2.7	46.29	0.8	1'746.9	41.96
175	Slovenia	1'010.2	7.3	50.61	7.2	877.6	43.97
176	Spain	20'595.3	5.4	50.62	4.7	16'363.8	40.22
177	Sweden	6'579.2	1.0	73.57	0.8	5'835.0	65.25
178	Switzerland	5'419.0	2.9	74.42	2.4	4'077.0	55.99
179	Taiwan, China	13'099.4	3.8	58.17	3.1	12'900.4	57.28
180	United Arab Emirates	1'093.7	5.5	31.35	-2.2	1'093.7	31.35
181	United Kingdom	34'898.0	1.8	59.06	1.8	31'631.2	53.53
182	United States	186'232.3	1.5	64.58	0.3	187'508.8	65.02
	High Income	**562'668.9**	**1.9**	**58.54**	**1.2**	**515'470.8**	**53.63**
	World	**1'091'575.7**	**6.7**	**17.90**	**5.3**	**1'042'466.4**	**17.10**
	Africa	**22'356.5**	**8.6**	**2.77**	**6.0**	**21'820.6**	**2.70**
	Americas	**293'448.8**	**3.8**	**34.73**	**2.3**	**294'068.7**	**34.80**
	Asia	**433'647.8**	**13.2**	**11.99**	**11.8**	**422'597.4**	**11.69**
	Europe	**329'462.5**	**2.8**	**41.34**	**2.6**	**291'727.1**	**36.61**
	Oceania	**12'660.1**	**1.9**	**40.40**	**0.4**	**12'252.6**	**39.13**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

3. Waiting list

		Waiting list for telephone lines (000s)		CAGR (%)	Total demand (000s)	Satisfied demand (%)	Waiting time (years)
		1997	2002	1997-02	2002	2002	2002
1	Angola	5.4	240.3	113.3	325.3	26.1	>10
2	Azerbaijan	138.9	*55.4*	*-20.5*	*979.2*	*94.3*	*0.9*
3	Bangladesh	127.4	*199.1*	*11.8*	*881.1*	*77.4*	*2.4*
4	Benin	10.0	*23.0*	*32.0*	*85.7*	*73.2*	*3.6*
5	Bhutan	...	2.0	...	21.6	90.7	0.8
6	Burkina Faso	...	12.4	...	76.7	83.8	2.2
7	Burundi	5.1	*4.7*	*-2.0*	*26.8*	*82.5*	*4.6*
8	Cambodia	...	...	...	...	...	...
9	Cameroon	45.0	...	...	...	...	...
10	Central African Rep.	0.2	1.2	46.0	10.2	88.2	...
11	Chad	1.0	*0.6*	*-23.6*	*12.4*	*95.2*	*0.8*
12	Comoros	...	3.4	...	13.6	75.2	2.7
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	43.3	24.2	-11.0	360.3	93.3	0.6
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	...	...	...	...	...	...
17	Eritrea	42.0	38.5	-1.7	74.4	48.3	>10
18	Ethiopia	206.6	145.9	-6.7	499.8	70.8	2.7
19	Gambia	22.0	10.6	-13.6	49.0	78.3	3.5
20	Georgia	181.0	138.8	-5.2	787.3	82.4	...
21	Ghana	...	*154.8*	...	*429.1*	*63.9*	*4.0*
22	Guinea	1.9	*1.4*	*-7.2*	*27.4*	*94.8*	*0.9*
23	Guinea-Bissau	2.0	*5.1*	*37.5*	*16.3*	*68.7*	*3.0*
24	Haiti	...	...	...	...	...	...
25	India	2'705.7	*1'648.8*	*-11.6*	*43'068.8*	*96.2*	*0.3*
26	Indonesia	...	...	...	...	...	...
27	Kenya	93.9	*134.0*	*9.3*	*462.1*	*71.0*	*>10*
28	Kyrgyzstan	57.5	*37.7*	*-10.0*	*432.4*	*91.3*	*4.7*
29	Lao P.D.R.	...	*5.9*	...	*67.8*	*91.3*	*0.7*
30	Lesotho	10.0	21.1	16.1	49.7	57.6	9.0
31	Madagascar	16.9	1.8	-35.8	61.3	97.0	0.6
32	Malawi	30.9	17.4	-10.8	90.5	80.7	1.6
33	Mali	...	...	...	...	...	...
34	Mauritania	6.4	*47.8*	*173.3*	*79.3*	*39.8*	*9.6*
35	Moldova	179.1	107.3	-9.7	814.2	86.8	2.1
36	Mongolia	46.9	37.8	-4.3	165.8	77.2	4.6
37	Mozambique	17.4	12.7	-6.1	96.4	86.9	6.7
38	Myanmar	75.0	93.5	4.5	435.8	78.6	3.0
39	Nepal	243.4	317.3	5.4	645.0	50.8	>10
40	Nicaragua	29.3	*108.4*	*92.2*	*280.0*	*61.3*	*>10*
41	Niger	...	...	...	...	...	...
42	Nigeria	...	...	...	...	...	...
43	Pakistan	302.6	214.0	-6.7	3'869.0	94.5	1.0
44	Papua New Guinea	...	*0.2*	...	*64.2*	*99.7*	*0.1*
45	Rwanda	3.5	*8.0*	*52.1*	*31.2*	*74.3*	*2.3*
46	S. Tomé & Principe	...	0.6	...	6.9	90.6	1.1
47	Senegal	16.7	*9.8*	*-12.4*	*234.5*	*95.8*	*0.5*
48	Sierra Leone	17.5	...	...	...	...	...
49	Solomon Islands	-	-	*-0.9*	*6.6*	*99.5*	...
50	Sudan	320.0	*444.0*	*8.5*	*1'115.8*	*60.2*	*3.2*
51	Tajikistan	53.0	6.1	-35.2	243.7	97.5	0.7
52	Tanzania	37.2	8.0	-26.5	169.6	95.3	2.0
53	Togo	13.0	27.5	16.2	78.7	65.0	6.4
54	Uganda	8.1	*9.2*	*6.4*	*64.1*	*85.7*	...
55	Uzbekistan	230.2	*38.9*	*-35.9*	*1'720.1*	*97.7*	*1.4*
56	Viet Nam	...	...	...	...	...	...
57	Yemen	110.6	704.8	44.8	1'247.0	43.5	8.2
58	Zambia	11.6	11.6	0.1	99.3	88.3	7.6
59	Zimbabwe	109.0	*158.9*	*13.4*	*446.8*	*64.4*	*9.7*
	Low Income	**5'577.2**	**5'294.5**	**-1.0**	**60'822.7**	**92.8**	**5.1**

		Waiting list for telephone lines (000s)		CAGR (%)	Total demand (000s)	Satisfied demand (%)	Waiting time (years)
		1997	2002	1997-02	2002	2002	2002
60	Albania	45.0	98.5	17.0	318.5	69.1	3.7
61	Algeria	732.0	*727.0*	*-0.2*	*2'635.0*	*72.4*	*7.1*
62	Armenia	111.3	64.1	-10.4	607.0	89.4	...
63	Belarus	513.5	341.5	-7.8	3'308.7	89.7	3.1
64	Bolivia	...	*7.5*	...	*571.4*	*98.7*	*0.4*
65	Bosnia	...	...	...	...	...	...
66	Brazil	2'400.0	*200.0*	*-46.3*	*39'010.0*	*99.5*	-
67	Bulgaria	450.0	145.8	-20.2	3'014.0	95.2	>10
68	Cape Verde	10.8	1.7	-31.3	71.8	97.7	0.2
69	China	...	...	...	...	...	...
70	Colombia	800.3	*1'174.7*	*10.1*	*8'940.7*	*86.9*	*3.2*
71	Cuba	...	...	...	...	...	...
72	Djibouti	-	-	-	*10.1*	*100.0*	-
73	Dominican Rep.	...	...	...	...	...	...
74	Ecuador	50.0	*14.5*	*-26.6*	*1'440.7*	*99.0*	*0.1*
75	Egypt	1'277.8	206.1	-30.6	7'636.1	97.3	0.2
76	El Salvador	175.0	*38.2*	*-31.6*	*705.9*	*94.6*	*0.7*
77	Fiji	6.4	*4.0*	*-11.1*	*101.5*	*96.0*	*0.8*
78	Guatemala	...	...	...	...	...	...
79	Guyana	...	*75.6*	...	*156.0*	*51.6*	*>10*
80	Honduras	259.5	342.2	5.7	664.7	48.5	>10
81	Iran (I.R.)	1'282.0	1'480.5	2.9	13'680.7	89.2	1.2
82	Jamaica	180.5	168.6	-1.4	613.0	72.5	...
83	Jordan	161.1	1.4	-61.4	675.9	99.8	-
84	Kazakhstan	395.0	*168.3*	*-19.2*	*2'250.1*	*92.5*	*1.6*
85	Maldives	0.3	0.1	-19.1	28.8	99.6	0.1
86	Marshall Islands	...	...	...	...	...	...
87	Morocco	29.0	*5.0*	*-44.3*	*1'132.5*	*99.6*	...
88	Namibia	6.5	2.6	-16.9	124.0	97.9	0.6
89	Palestine	182.9	0.7	-66.9	302.3	99.8	-
90	Paraguay	...	...	...	...	...	...
91	Peru	50.4	*33.0*	*-10.0*	*1'799.1*	*98.2*	*1.3*
92	Philippines	...	...	...	...	...	...
93	Romania	1'037.8	542.1	-12.2	4'757.3	88.6	3.4
94	Russia	7'838.8	*5'809.6*	*-7.2*	*41'309.6*	*85.9*	*3.8*
95	Samoa	1.5	*3.6*	*24.7*	*13.9*	*73.9*	*6.2*
96	Serbia and Montenegro	153.6	*143.0*	*-1.8*	*2'636.0*	*94.6*	*2.0*
97	South Africa	116.2	*50.0*	*-24.5*	*4'894.0*	*99.0*	...
98	Sri Lanka	283.8	*257.7*	*-2.4*	*1'140.8*	*77.4*	*3.7*
99	St. Vincent	0.7	*1.6*	*33.6*	*29.0*	*94.4*	*1.3*
100	Suriname	27.8	5.7	-27.0	84.4	93.2	2.2
101	Swaziland	15.2	15.6	0.5	50.7	69.2	>10
102	Syria	2'947.0	*2'805.9*	*-1.2*	*4'905.2*	*42.8*	*>10*
103	TFYR Macedonia	...	...	...	...	...	...
104	Thailand	619.6	710.2	2.8	7'210.1	90.1	1.7
105	Tonga	1.0	*4.0*	*41.4*	*15.2*	*73.7*	*5.7*
106	Tunisia	77.5	*108.7*	*8.8*	*1'256.7*	*91.3*	*1.1*
107	Turkey	413.0	142.9	-19.1	19'057.8	99.3	0.5
108	Turkmenistan	83.3	*36.8*	*-18.5*	*410.8*	*91.0*	*7.3*
109	Ukraine	2'962.2	2'158.7	-6.1	12'992.0	83.4	8.5
110	Vanuatu	...	...	...	...	...	...
	Lower Middle Income	**25'698.3**	**18'097.7**	**-6.8**	**190'561.8**	**95.6**	**4.1**

3. Waiting list

		Waiting list for telephone lines (000s)		CAGR (%)	Total demand (000s)	Satisfied demand (%)	Waiting time (years)
		1997	2002	1997-02	2002	2002	2002
111	Argentina	19.5	*93.1*	*68.4*	*8'102.5*	*98.9*	*0.4*
112	Belize	0.3	1.1	30.0	32.4	96.5	...
113	Botswana	11.8	...	...	...	...	...
114	Chile	96.7	*32.3*	*-24.0*	*3'499.3*	*99.1*	*0.3*
115	Costa Rica	49.4	15.8	-20.4	1'053.8	98.5	0.2
116	Croatia	72.0	-	-100.0	1'825.0	100.0	-
117	Czech Republic	406.0	25.1	-42.7	3'700.6	99.3	...
118	Dominica	...	...	...	...	...	...
119	Estonia	76.9	4.1	-44.4	479.1	99.1	...
120	Gabon	10.0	...	...	...	...	...
121	Grenada	...	-	...	*33.6*	*100.0*	-
122	Hungary	40.4	7.8	-28.1	3'674.2	99.8	...
123	Latvia	72.1	14.3	-27.7	715.5	98.0	...
124	Lebanon	...	...	...	...	...	...
125	Libya	...	*80.0*	...	*740.0*	*89.2*	*1.5*
126	Lithuania	102.0	3.9	-47.9	939.8	99.6	...
127	Malaysia	...	65.9	...	4'735.8	98.6	0.8
128	Mauritius	23.2	13.5	-10.3	340.7	96.0	0.6
129	Mexico	91.0	...	...	...	...	...
130	Oman	3.9	2.1	-11.4	229.7	99.1	0.9
131	Panama	...	...	...	...	...	...
132	Poland	2'200.0	*501.6*	*-30.9*	*11'901.6*	*95.8*	*0.6*
133	Saudi Arabia	1'409.1	73.6	-44.6	3'391.1	97.8	0.4
134	Seychelles	...	*1.8*	...	*23.5*	*92.4*	*2.6*
135	Slovak Republic	109.2	*7.0*	*-49.7*	*1'449.6*	*99.5*	...
136	St. Kitts and Nevis	...	...	...	...	...	...
137	St. Lucia	...	...	...	...	...	...
138	Trinidad & Tobago	6.0	*10.0*	*29.1*	*335.1*	*97.0*	*0.6*
139	Uruguay	-	-	-	*946.5*	*100.0*	-
140	Venezuela	392.0	...	...	...	...	...
	Upper Middle Income	**5'191.5**	**953.0**	**-28.8**	**48'149.5**	**98.6**	**0.6**

3. Waiting list

		Waiting list for telephone lines (000s)		CAGR (%)	Total demand (000s)	Satisfied demand (%)	Waiting time (years)
		1997	2002	1997-02	2002	2002	2002
141	Antigua & Barbuda	...	...	...	...	...	...
142	Australia	-	-	-	10'590.0	100.0	-
143	Austria	0.5	-	-100.0	3'988.0	100.0	-
144	Bahamas	...	...	...	...	...	...
145	Bahrain	...	...	...	...	...	...
146	Barbados	1.0	*1.3*	*8.2*	*134.3*	*99.0*	*0.2*
147	Belgium	...	...	...	...	...	...
148	Brunei Darussalam	1.1	...	...	...	...	...
149	Canada	-	-	-	19'962.1	100.0	...
150	Cyprus	7.3	3.6	-13.1	495.6	99.3	0.2
151	Denmark	-	-	-	*3'700.9*	*100.0*	-
152	Finland	-	-	-	2'725.6	100.0	...
153	France	-	-	-	*33'928.7*	*100.0*	-
154	French Polynesia	...	...	...	...	...	...
155	Germany	-	-	-	53'720.0	100.0	-
156	Greece	48.5	*7.6*	*-37.1*	*5'420.4*	*99.9*	...
157	Hong Kong, China	-	-	-	3'831.8	100.0	...
158	Iceland	-	-	-	188.0	100.0	...
159	Ireland	...	...	...	...	...	...
160	Israel	...	...	...	...	...	...
161	Italy	-	-	-	*27'142.0*	*100.0*	-
162	Japan	-	-	-	*71'149.0*	*100.0*	-
163	Korea (Rep.)	-	-	-	*23'257.0*	*100.0*	-
164	Kuwait	32.2	-	*-100.0*	*481.9*	*100.0*	-
165	Luxembourg	-	-	-	*355.4*	*100.0*	-
166	Macao, China	0.3	0.1	-27.7	176.2	100.0	...
167	Malta	0.6	0.1	-29.9	207.4	100.0	-
168	Netherlands	-	-	-	*10'004.0*	*100.0*	-
169	New Caledonia	1.1	*0.8*	*-10.5*	*52.8*	*98.5*	*1.8*
170	New Zealand	-	-	-	1'765.0	100.0	...
171	Norway	-	-	-	3'343.0	100.0	-
172	Portugal	9.4	*25.6*	*64.7*	*4'380.3*	*99.4*	*0.6*
173	Qatar	...	-	...	176.5	100.0	-
174	Singapore	-	-	-	1'927.2	100.0	-
175	Slovenia	25.0	0.5	-54.2	1'010.7	100.0	-
176	Spain	3.7	*4.3*	*7.8*	*20'599.6*	*100.0*	-
177	Sweden	-	-	-	*6'579.2*	*100.0*	-
178	Switzerland	-	-	-	5'419.0	100.0	-
179	Taiwan, China	-	-	-	13'099.4	100.0	-
180	United Arab Emirates	0.6	0.4	-5.7	1'094.1	100.0	-
181	United Kingdom	-	-	-	34'898.0	100.0	-
182	United States	-	-	-	*186'232.3*	*100.0*	-
	High Income	**131.3**	**44.3**	**-19.5**	**552'035.4**	**100.0**	**0.1**
	World	**36'598.4**	**24'389.5**	**-7.8**	**851'569.4**	**97.8**	**3.2**
	Africa	**3'406.5**	**2'790.5**	**-3.9**	**24'008.3**	**88.9**	**5.0**
	Americas	**4'629.4**	**2'323.6**	**-12.9**	**274'626.8**	**99.2**	**3.4**
	Asia	**11'785.8**	**9'167.9**	**-4.9**	**209'325.9**	**97.9**	**2.4**
	Europe	**16'766.6**	**10'094.8**	**-9.7**	**330'999.1**	**97.0**	**1.5**
	Oceania	**10.1**	**12.7**	**4.7**	**12'609.3**	**99.9**	**2.4**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

4. Local telephone network

		Main telephone lines				Faults per 100 main lines per year
		Capacity used (%) 2002	Automatic (%) 2002	Digital (%) 2002	Residential (%) 2002	2002
1	Angola	...	100.0	*91.4*	...	...
2	Azerbaijan	95.0	*99.8*	42.1	91.2	*48.0*
3	Bangladesh	*82.0*	100.0	*81.4*	...	...
4	Benin	*87.3*	100.0	*83.0*	...	*6.0*
5	Bhutan	83.0	100.0	100.0	...	...
6	Burkina Faso	69.2	100.0	95.7	...	19.7
7	Burundi	...	100.0	...	*62.0*	...
8	Cambodia	64.4	100.0	100.0	...	...
9	Cameroon	80.3	100.0	...	...	...
10	Central African Rep.	...	100.0	...	60.0	...
11	Chad	*96.2*	100.0	100.0	...	*60.8*
12	Comoros	...	100.0	100.0	...	55.8
13	Congo	...	...	...	...	...
14	Côte d'Ivoire	*66.7*	100.0	100.0	*84.0*	81.0
15	D.R. Congo	...	...	...	...	...
16	Equatorial Guinea	...	100.0	...	...	...
17	Eritrea	79.0	*97.9*	80.7	55.2	53.3
18	Ethiopia	58.9	*97.3*	81.0	70.1	...
19	Gambia	...	100.0	100.0	85.0	...
20	Georgia	52.0	...	36.1	65.4	17.2
21	Ghana	*75.3*	100.0	100.0	70.0	*67.4*
22	Guinea	69.1	100.0	92.0	*46.8*	...
23	Guinea-Bissau	*96.7*	100.0	100.0	*76.2*	*70.5*
24	Haiti	...	100.0	100.0	...	...
25	India	78.4	100.0	100.0	...	126.0
26	Indonesia	85.1	100.0	100.0	81.2	*20.0*
27	Kenya	66.7	*99.0*	*67.9*	*43.6*	*220.9*
28	Kyrgyzstan	78.9	*69.0*	35.0	82.0	...
29	Lao P.D.R.	83.7	...	100.0	*62.0*	...
30	Lesotho	58.2	100.0	100.0	72.6	72.8
31	Madagascar	81.7	*93.8*	90.6	49.4	42.5
32	Malawi	65.2	*99.0*	96.0	52.3	...
33	Mali	*44.5*	100.0	100.0	*32.0*	*177.6*
34	Mauritania	...	100.0	100.0	54.7	...
35	Moldova	94.3	100.0	54.5	87.5	4.9
36	Mongolia	84.9	...	94.0	76.0	28.4
37	Mozambique	60.5	...	100.0	*80.0*	70.0
38	Myanmar	83.6	*81.5*	82.2	55.0	169.0
39	Nepal	84.1	100.0	100.0	...	88.1
40	Nicaragua	85.7	100.0	99.0	73.3	4.6
41	Niger	...	*90.0*	*79.7*	...	*104.6*
42	Nigeria	94.1	100.0	76.4	*83.0*	...
43	Pakistan	83.4	100.0	96.0	*76.0*	...
44	Papua New Guinea	*68.2*	100.0	*79.0*	...	...
45	Rwanda	...	100.0	100.0	...	...
46	S. Tomé & Principe	...	100.0	100.0	68.5	...
47	Senegal	*84.8*	100.0	100.0	*69.5*	*17.3*
48	Sierra Leone	...	...	*89.0*	*65.0*	...
49	Solomon Islands	*25.6*	100.0	100.0	*65.0*	...
50	Sudan	*59.9*	100.0	100.0	*90.0*	...
51	Tajikistan	79.3	100.0	7.5	80.3	126.0
52	Tanzania	68.9	*97.0*	96.0	63.0	24.0
53	Togo	59.4	100.0	100.0	80.0	6.2
54	Uganda	...	...	80.0	*35.0*	...
55	Uzbekistan	88.0	100.0	32.1	84.6	*87.4*
56	Viet Nam	*70.9*	100.0	100.0	...	...
57	Yemen	70.5	100.0	100.0	66.0	...
58	Zambia	60.9	100.0	83.5	51.1	90.8
59	Zimbabwe	*74.7*	100.0	*90.0*	*67.0*	...
	Low Income	**78.7**	**99.7**	**94.6**	**77.9**	**105.1**

		Main telephone lines				Faults per 100 main lines per year 2002
		Capacity used (%) 2002	Automatic (%) 2002	Digital (%) 2002	Residential (%) 2002	
60	Albania	73.3	*97.6*	97.0	94.0	57.2
61	Algeria	*68.2*	100.0	100.0	*84.0*	*6.0*
62	Armenia	78.5	100.0	26.5	90.8	60.0
63	Belarus	96.0	100.0	43.7	84.4	26.8
64	Bolivia	*74.7*	100.0	*99.3*	*72.5*	…
65	Bosnia	73.3	100.0	77.4	*90.1*	…
66	Brazil	78.8	100.0	98.3	*74.5*	*3.0*
67	Bulgaria	73.8	100.0	20.0	84.8	3.5
68	Cape Verde	*80.6*	100.0	100.0	*91.0*	*46.0*
69	China	75.6	100.0	100.0	81.1	…
70	Colombia	*81.7*	100.0	*96.3*	…	*45.6*
71	Cuba	*78.5*	*99.2*	*69.2*	*67.4*	*9.6*
72	Djibouti	29.6	100.0	100.0	70.0	8.6
73	Dominican Rep.	…	100.0	…	66.3	…
74	Ecuador	83.9	100.0	96.4	79.2	*35.3*
75	Egypt	72.0	*93.0*	100.0	89.1	*0.5*
76	El Salvador	*87.9*	100.0	100.0	*86.0*	*14.5*
77	Fiji	*87.0*	…	…	*56.0*	*117.0*
78	Guatemala	…	100.0	100.0	…	…
79	Guyana	…	100.0	100.0	*70.0*	…
80	Honduras	78.9	*100.0*	96.0	*73.7*	3.6
81	Iran (I.R.)	89.1	…	88.0	80.0	…
82	Jamaica	…	100.0	100.0	75.0	39.7
83	Jordan	79.6	100.0	100.0	*78.0*	10.7
84	Kazakhstan	86.8	100.0	45.3	81.4	…
85	Maldives	65.7	100.0	100.0	63.9	46.4
86	Marshall Islands	…	100.0	100.0	*67.0*	…
87	Morocco	*77.5*	100.0	100.0	71.0	*24.8*
88	Namibia	69.4	100.0	100.0	*60.0*	42.2
89	Palestine	70.6	100.0	100.0	*82.8*	97.0
90	Paraguay	*83.8*	*99.9*	*87.9*	*73.9*	*3.4*
91	Peru	86.3	…	96.0	…	…
92	Philippines	47.9	100.0	*99.9*	*70.0*	…
93	Romania	87.4	*96.3*	71.9	90.2	23.0
94	Russia	92.0	100.0	…	78.4	…
95	Samoa	…	100.0	100.0	…	…
96	Serbia and Montenegro	88.3	100.0	89.0	88.0	…
97	South Africa	…	…	99.8	*51.0*	48.2
98	Sri Lanka	*88.2*	100.0	100.0	*74.0*	*99.6*
99	St. Vincent	*42.1*	100.0	100.0	*80.0*	*8.6*
100	Suriname	78.5	100.0	56.5	*80.0*	30.2
101	Swaziland	…	100.0	100.0	53.4	*160.0*
102	Syria	*75.5*	100.0	*99.0*	*87.0*	*50.0*
103	TFYR Macedonia	*66.5*	100.0	…	*88.5*	…
104	Thailand	81.7	100.0	100.0	69.0	*19.8*
105	Tonga	75.6	100.0	100.0	78.0	…
106	Tunisia	*71.2*	100.0	100.0	*73.0*	*29.0*
107	Turkey	89.7	100.0	90.0	76.3	37.4
108	Turkmenistan	91.7	100.0	…	82.1	*86.4*
109	Ukraine	91.5	100.0	…	86.1	…
110	Vanuatu	…	100.0	100.0	…	…
	Lower Middle Income	**78.8**	**99.8**	**96.6**	**79.7**	**20.8**

4. Local telephone network

		Main telephone lines				Faults per 100 main lines per year
		Capacity used (%) 2002	Automatic (%) 2002	Digital (%) 2002	Residential (%) 2002	2002
111	Argentina	*94.5*	100.0	100.0	*82.8*	…
112	Belize	*89.6*	100.0	100.0	67.6	55.2
113	Botswana	*69.9*	100.0	100.0	*60.0*	…
114	Chile	…	100.0	100.0	71.4	*25.0*
115	Costa Rica	91.7	100.0	89.3	65.2	4.2
116	Croatia	76.6	100.0	100.0	74.6	12.0
117	Czech Republic	75.1	100.0	100.0	68.5	8.3
118	Dominica	*72.1*	100.0	100.0	…	…
119	Estonia	68.8	100.0	78.4	75.0	*16.3*
120	Gabon	38.9	100.0	100.0	70.0	…
121	Grenada	…	100.0	100.0	*81.0*	…
122	Hungary	73.9	100.0	90.0	76.5	…
123	Latvia	82.8	100.0	83.2	81.2	22.7
124	Lebanon	…	100.0	100.0	…	…
125	Libya	…	100.0	…	…	…
126	Lithuania	*82.1*	100.0	87.6	80.7	*17.0*
127	Malaysia	*55.2*	100.0	100.0	72.3	*40.0*
128	Mauritius	85.9	100.0	100.0	80.0	*56.8*
129	Mexico	…	100.0	100.0	73.9	*1.9*
130	Oman	76.9	100.0	100.0	90.0	…
131	Panama	*60.6*	100.0	100.0	*78.1*	*30.8*
132	Poland	*98.2*	*14.0*	*86.0*	*85.0*	*17.2*
133	Saudi Arabia	69.1	100.0	100.0	*64.0*	26.2
134	Seychelles	…	100.0	100.0	*65.0*	…
135	Slovak Republic	*71.8*	100.0	*74.3*	*74.4*	*27.0*
136	St. Kitts and Nevis	…	100.0	100.0	…	…
137	St. Lucia	…	100.0	100.0	…	…
138	Trinidad & Tobago	…	100.0	100.0	*82.3*	…
139	Uruguay	*83.1*	100.0	100.0	*81.0*	…
140	Venezuela	*83.8*	100.0	81.0	65.8	*2.0*
	Upper Middle Income	**80.0**	**85.2**	**94.9**	**76.0**	**15.1**

		Main telephone lines				Faults per 100 main lines per year
		Capacity used (%) 2002	Automatic (%) 2002	Digital (%) 2002	Residential (%) 2002	2002
141	Antigua & Barbuda	…	100.0	100.0	…	…
142	Australia	…	100.0	100.0	75.0	8.0
143	Austria	…	100.0	100.0	63.0	5.7
144	Bahamas	*70.7*	100.0	100.0	…	…
145	Bahrain	75.3	100.0	100.0	70.0	*15.0*
146	Barbados	…	100.0	100.0	*68.7*	…
147	Belgium	…	100.0	100.0	…	6.0
148	Brunei Darussalam	…	100.0	100.0	*71.0*	…
149	Canada	…	100.0	*99.7*	63.9	…
150	Cyprus	…	100.0	100.0	76.0	25.5
151	Denmark	…	100.0	100.0	…	*8.0*
152	Finland	86.8	100.0	100.0	66.0	…
153	France	…	100.0	100.0	69.2	…
154	French Polynesia	…	100.0	100.0	…	…
155	Germany	…	100.0	100.0	…	…
156	Greece	*92.4*	100.0	96.5	*65.0*	*12.1*
157	Hong Kong, China	81.2	100.0	100.0	55.6	…
158	Iceland	…	100.0	100.0	*76.0*	…
159	Ireland	…	100.0	100.0	*73.0*	7.6
160	Israel	…	100.0	100.0	*69.0*	…
161	Italy	…	100.0	*99.7*	*79.2*	…
162	Japan	…	100.0	100.0	*75.8*	…
163	Korea (Rep.)	86.7	100.0	95.2	74.1	1.5
164	Kuwait	78.2	100.0	100.0	*65.0*	…
165	Luxembourg	*73.1*	100.0	100.0	*65.0*	*7.0*
166	Macao, China	91.6	100.0	100.0	76.2	20.0
167	Malta	88.1	100.0	100.0	*76.0*	20.6
168	Netherlands	…	100.0	…	*63.0*	…
169	New Caledonia	*81.7*	100.0	100.0	…	…
170	New Zealand	…	100.0	100.0	78.5	*30.7*
171	Norway	…	100.0	100.0	66.8	…
172	Portugal	…	100.0	100.0	*80.9*	10.2
173	Qatar	84.4	100.0	100.0	*73.0*	7.3
174	Singapore	…	100.0	100.0	59.6	*2.4*
175	Slovenia	99.6	100.0	100.0	75.0	22.5
176	Spain	*88.0*	100.0	*86.8*	*83.5*	…
177	Sweden	…	100.0	100.0	67.9	…
178	Switzerland	…	100.0	100.0	*68.0*	…
179	Taiwan, China	72.0	100.0	100.0	75.3	1.3
180	United Arab Emirates	72.1	100.0	100.0	50.5	0.3
181	United Kingdom	…	100.0	100.0	71.0	11.0
182	United States	…	100.0	*96.9*	*67.6*	*12.4*
	High Income	**83.6**	**100.0**	**98.3**	**70.7**	**10.5**
	World	**79.4**	**99.0**	**97.2**	**74.7**	**23.3**
	Africa	**71.7**	**97.0**	**97.9**	**73.9**	**27.4**
	Americas	**81.4**	**100.0**	**97.3**	**69.2**	**11.7**
	Asia	**76.5**	**100.0**	**98.4**	**78.3**	**57.6**
	Europe	**88.6**	**97.0**	**95.1**	**75.5**	**16.7**
	Oceania	**73.7**	**99.9**	**99.8**	**75.3**	**12.1**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

5. Teleaccessibility

		Residential main lines		% households	Public telephones		
		Total (000s)	per 100 households	with a telephone	Total (000s)	per 1'000 inhabitants	As % of mainlines
		2002	2002	2002	2002	2002	2002
1	Angola	...	...	...	*2.11*	*0.16*	*2.6*
2	Azerbaijan	842.5	48.4	...	2.29	0.28	0.2
3	Bangladesh	...	...	*1.2*	*2.13*	*0.02*	*0.5*
4	Benin	*31.5*	*3.2*	*3.7*	*0.51*	*0.08*	*1.0*
5	Bhutan	...	...	...	...	...	...
6	Burkina Faso	...	...	*1.7*	5.04	0.42	7.8
7	Burundi	*12.4*	*0.9*	...	*0.01*	-	*0.1*
8	Cambodia	...	...	*3.6*	0.35	0.03	1.0
9	Cameroon	...	...	...	*6.56*	*0.45*	*6.9*
10	Central African Rep.	5.4	0.8	...	0.10	0.03	1.1
11	Chad	...	...	...	*0.06*	*0.01*	*0.6*
12	Comoros	...	...	...	0.30	0.39	2.9
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	*246.6*	*12.6*	17.4	*2.69*	*0.16*	*0.9*
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	...	...	...	...	...	...
17	Eritrea	19.8	2.5	...	0.44	0.11	1.2
18	Ethiopia	247.8	1.9	*1.3*	3.43	0.05	1.0
19	Gambia	32.6	18.6	...	*0.60*	*0.45*	*1.7*
20	Georgia	424.4	34.6	...	*0.72*	*0.14*	*0.1*
21	Ghana	192.0	4.3	...	*4.30*	*0.21*	*1.8*
22	Guinea	*11.9*	*1.0*	*1.7*	1.24	0.16	4.8
23	Guinea-Bissau	*8.5*	*4.9*	...	*0.20*	*0.17*	*1.8*
24	Haiti	...	...	*4.3*	...	...	...
25	India	...	...	*9.1*	2'006.49	1.93	4.8
26	Indonesia	6'293.0	11.7	...	402.87	1.90	5.2
27	Kenya	*142.3*	*2.1*	...	9.60	0.30	2.9
28	Kyrgyzstan	323.7	28.3	...	1.70	0.33	0.4
29	Lao P.D.R.	*25.3*	*3.0*	...	*0.32*	*0.06*	*0.6*
30	Lesotho	20.8	4.8	*5.6*	1.82	0.84	6.4
31	Madagascar	29.4	0.9	*2.0*	0.96	0.06	1.6
32	Malawi	38.2	1.6	...	0.56	0.05	0.8
33	Mali	*16.3*	*1.0*	*2.4*	*2.37*	*0.23*	*6.0*
34	Mauritania	17.3	3.5	*2.9*	3.66	1.37	11.6
35	Moldova	618.6	45.9	...	1.73	0.39	0.2
36	Mongolia	97.3	17.5	*17.0*	0.64	0.26	0.5
37	Mozambique	*68.6*	*1.7*	...	4.04	0.22	4.8
38	Myanmar	188.3	1.8	...	2.46	0.05	0.7
39	Nepal	...	...	*2.5*	*0.84*	*0.04*	*0.3*
40	Nicaragua	125.9	13.0	...	0.47	0.09	0.3
41	Niger	...	...	*0.6*	*0.06*	-	*0.3*
42	Nigeria	*448.6*	*1.9*	*1.8*	4.87	0.04	0.7
43	Pakistan	*2'471.5*	*12.0*	...	83.00	0.57	2.3
44	Papua New Guinea	...	...	...	*0.81*	*0.16*	*1.2*
45	Rwanda	*10.4*	*0.5*	*1.1*	*0.40*	*0.06*	*3.2*
46	S. Tomé & Principe	4.3	15.3	...	0.08	0.54	1.3
47	Senegal	*164.9*	*14.6*	*17.0*	*15.73*	*1.60*	*6.6*
48	Sierra Leone	*14.8*	*2.0*	...	...	...	...
49	Solomon Islands	*5.0*	*7.8*	...	*0.25*	*0.60*	*3.3*
50	Sudan	*407.7*	*7.8*	*10.0*	*7.35*	*0.23*	*1.6*
51	Tajikistan	190.9	16.7	...	0.43	0.07	0.2
52	Tanzania	101.8	1.5	*2.0*	2.00	0.06	1.2
53	Togo	40.9	5.0	*7.0*	12.26	2.52	24.0
54	Uganda	*21.6*	*0.4*	*2.7*	3.24	0.13	5.9
55	Uzbekistan	1'421.9	30.8	*30.7*	6.67	0.26	0.4
56	Viet Nam	...	...	...	7.77	0.10	0.2
57	Yemen	357.9	13.1	...	...	...	...
58	Zambia	44.8	2.2	3.8	0.88	0.08	1.0
59	Zimbabwe	*167.1*	*6.5*	*7.1*	*3.23*	*0.28*	*1.3*
	Low Income	**15'954.4**	**8.2**	**8.2**	**2'622.63**	**1.13**	**3.9**

		Residential main lines		*% households*	*Public telephones*		
		Total (000s)	*per 100 households*	*with a telephone*	*Total (000s)*	*per 1'000 inhabitants*	*As % of mainlines*
		2002	*2002*	*2002*	*2002*	*2002*	*2002*
60	Albania	*206.8*	*28.4*	…	*1.25*	*0.41*	*0.6*
61	Algeria	1'579.2	31.6	*37.6*	5.00	0.16	0.3
62	Armenia	492.9	58.6	*54.3*	0.81	0.21	0.1
63	Belarus	*2'504.3*	*78.0*	…	*18.95*	*1.91*	*0.6*
64	Bolivia	*380.3*	*19.8*	*23.7*	*12.47*	*1.51*	*2.4*
65	Bosnia	*763.2*	*70.0*	…	1.44	0.38	0.2
66	Brazil	27'885.9	61.2	*58.9*	1'368.00	7.87	3.5
67	Bulgaria	*2'432.5*	*83.5*	…	20.48	2.63	0.7
68	Cape Verde	56.7	60.1	…	0.45	1.02	0.6
69	China	*173'958.9*	*50.0*	…	*9'855.00*	*7.67*	*4.6*
70	Colombia	*5'207.7*	*62.9*	*51.5*	*61.31*	*1.43*	*0.8*
71	Cuba	387.2	12.3	*12.0*	20.18	1.80	3.5
72	Djibouti	7.1	7.2	*5.5*	0.04	0.06	0.4
73	Dominican Rep.	602.2	25.7	*33.4*	11.78	1.43	1.3
74	Ecuador	1'129.5	39.3	32.2	5.00	0.39	0.4
75	Egypt	*6'620.1*	*45.7*	*48.0*	*47.49*	*0.71*	*0.6*
76	El Salvador	*558.9*	*38.1*	…	*18.67*	*2.92*	*2.9*
77	Fiji	*51.6*	*38.0*	…	*1.50*	*1.84*	*1.6*
78	Guatemala	…	…	*15.6*	*37.49*	*3.21*	*5.0*
79	Guyana	*55.9*	*28.8*	…	0.65	0.75	0.8
80	Honduras	228.1	15.3	*16.0*	2.58	0.39	0.8
81	Iran (I.R.)	9'760.2	67.5	*67.0*	*119.97*	*1.84*	*1.0*
82	Jamaica	*333.3*	*45.8*	…	3.98	1.54	0.8
83	Jordan	521.0	58.3	*57.0*	7.72	1.45	1.1
84	Kazakhstan	1'694.6	42.5	*41.4*	9.37	0.59	0.4
85	Maldives	*18.3*	*42.6*	*23.3*	0.77	2.75	2.7
86	Marshall Islands	2.8	41.1	…	0.02	0.32	0.4
87	Morocco	*800.8*	*14.9*	…	*77.81*	*2.63*	*6.9*
88	Namibia	*70.4*	*20.2*	*17.0*	5.30	2.98	4.8
89	Palestine	*225.4*	*53.0*	…	*2.68*	*0.78*	*0.9*
90	Paraguay	*213.4*	*15.6*	*18.8*	8.05	1.43	2.8
91	Peru	*1'340.3*	*25.0*	*20.4*	*109.52*	*4.09*	*6.2*
92	Philippines	2'320.6	14.9	*14.2*	15.20	0.19	0.5
93	Romania	3'802.6	51.9	…	51.44	2.37	1.2
94	Russia	*27'817.8*	*53.5*	…	*185.90*	*1.27*	*0.5*
95	Samoa	7.7	32.8	…	0.15	0.86	1.8
96	Serbia and Montenegro	*2'193.8*	*86.0*	*81.3*	9.82	0.92	0.4
97	South Africa	*2'511.5*	*25.1*	*31.0*	*179.00*	*3.94*	*3.7*
98	Sri Lanka	*613.7*	*13.1*	…	*12.28*	*0.66*	*1.5*
99	St. Vincent	*19.9*	*73.8*	*90.0*	0.21	1.87	0.9
100	Suriname	60.2	66.9	…	0.30	0.63	0.4
101	Swaziland	*18.7*	*11.4*	…	*1.03*	*1.00*	*2.9*
102	Syria	*1'580.8*	*46.0*	*50.0*	*4.95*	*0.30*	*0.3*
103	TFYR Macedonia	449.0	80.0	…	*2.03*	*1.00*	*0.4*
104	Thailand	4'484.9	28.2	*27.7*	207.61	3.39	3.4
105	Tonga	*8.7*	*52.0*	*67.0*	*0.07*	*0.71*	*0.6*
106	Tunisia	772.5	37.6	*38.0*	31.61	3.27	3.0
107	Turkey	14'428.3	97.4	…	74.93	1.11	0.4
108	Turkmenistan	306.9	36.1	*41.9*	0.25	0.05	0.1
109	Ukraine	*9'324.2*	*53.0*	…	*67.20*	*1.34*	*0.6*
110	Vanuatu	…	…	…	*0.14*	*0.72*	*2.5*
	Lower Middle Income	**310'811.5**	**49.8**	**49.4**	**12'679.83**	**5.31**	**3.2**

5. Teleaccessibility

		Residential main lines		% households	Public telephones		
		Total (000s)	per 100 households	with a telephone	Total (000s)	per 1'000 inhabitants	As % of mainlines
		2002	2002	2002	2002	2002	2002
111	Argentina	*6'713.4*	*66.4*	...	*204.33*	*5.64*	*2.5*
112	Belize	21.2	38.5	*42.0*	0.48	1.90	1.5
113	Botswana	85.6	21.1	...	2.96	1.76	2.1
114	Chile	2'475.4	59.8	*54.0*	75.45	5.01	2.2
115	Costa Rica	677.2	70.5	*54.3*	21.92	5.29	2.1
116	Croatia	*1'361.5*	*72.5*	...	*12.54*	*2.87*	*0.7*
117	Czech Republic	2'515.9	65.7	*68.7*	31.50	3.11	0.9
118	Dominica	...	...	...	...	...	...
119	Estonia	*356.3*	*62.9*	...	*2.47*	*1.82*	*0.5*
120	Gabon	22.5	11.2	*12.8*	0.12	0.10	0.4
121	Grenada	26.5	...	*90.0*	0.22	2.34	0.7
122	Hungary	*2'805.2*	*68.4*	...	*40.49*	*3.99*	*1.1*
123	Latvia	*569.4*	*57.0*	*77.0*	*3.99*	*1.71*	*0.6*
124	Lebanon	428.3	62.2	...	...	...	...
125	Libya	440.0	54.3	...	*0.45*	*0.08*	*0.1*
126	Lithuania	754.8	55.6	*74.0*	6.29	1.82	0.7
127	Malaysia	3'376.3	65.2	...	*163.53*	*6.84*	*3.5*
128	Mauritius	261.8	84.4	*80.0*	2.92	2.41	0.9
129	Mexico	*11'041.9*	*44.7*	*45.3*	*708.00*	*7.05*	*5.1*
130	Oman	*204.8*	*53.5*	...	*6.34*	*2.34*	*2.8*
131	Panama	*294.0*	*42.5*	40.4	11.44	3.95	3.0
132	Poland	*9'690.0*	*73.8*	...	*96.06*	*2.49*	*0.8*
133	Saudi Arabia	*2'069.1*	*62.3*	*70.0*	*59.89*	*2.60*	*1.8*
134	Seychelles	*13.6*	*78.7*	...	*0.22*	*2.74*	*1.2*
135	Slovak Republic	*1'157.2*	*69.5*	*69.5*	*15.06*	*2.80*	*1.0*
136	St. Kitts and Nevis	...	...	...	...	...	...
137	St. Lucia	*34.0*	*76.8*	*60.2*	...	...	...
138	Trinidad & Tobago	256.6	74.0	...	2.60	2.00	0.8
139	Uruguay	*752.6*	*75.7*	*73.4*	*12.58*	*3.74*	*1.3*
140	Venezuela	1'868.7	36.0	35.6	105.04	4.17	3.7
	Upper Middle Income	**50'273.7**	**58.4**	**59.0**	**1'586.89**	**4.90**	**2.5**

		Residential main lines		*% households*	*Public telephones*		
		Total (000s)	*per 100 households*	*with a telephone*	*Total (000s)*	*per 1'000 inhabitants*	*As % of mainlines*
		2002	*2002*	*2002*	*2002*	*2002*	*2002*
141	Antigua & Barbuda	...	...	...	...	...	...
142	Australia	7'942.5	>100	*97.0*	80.00	4.07	0.8
143	Austria	*2'512.4*	*75.3*	*88.0*	*24.60*	*3.02*	*0.6*
144	Bahamas	...	...	...	0.97	3.16	0.8
145	Bahrain	*122.8*	*>100*	...	*1.97*	*2.95*	*1.1*
146	Barbados	88.6	91.3	...	0.81	3.01	0.6
147	Belgium	...	...	*84.0*	15.67	1.51	0.3
148	Brunei Darussalam	*62.8*	*>100*	...	*1.13*	*3.51*	*1.4*
149	Canada	12'755.8	>100	*97.4*	164.03	5.22	0.8
150	Cyprus	373.9	>100	...	2.77	3.87	0.6
151	Denmark	...	...	...	*5.93*	*1.11*	*0.2*
152	Finland	*1'798.9*	*75.8*	*99.0*	6.50	1.25	0.2
153	France	*23'478.7*	*95.3*	*97.0*	202.46	3.39	0.6
154	French Polynesia	...	...	...	0.85	3.61	1.6
155	Germany	...	...	*98.5*	*110.10*	*1.33*	*0.2*
156	Greece	*3'678.5*	*>100*	...	63.06	5.72	1.2
157	Hong Kong, China	*2'129.7*	*98.7*	...	*9.06*	*1.33*	*0.2*
158	Iceland	*144.8*	*>100*	...	*0.60*	*2.09*	*0.3*
159	Ireland	*1'337.4*	*>100*	*85.0*	*9.06*	*2.30*	*0.5*
160	Israel	2'092.8	>100	*96.0*	22.00	3.60	0.8
161	Italy	*21'663.6*	*>100*	...	300.00	5.17	1.1
162	Japan	*55'580.4*	*>100*	...	*714.77*	*5.63*	*1.0*
163	Korea (Rep.)	17'233.4	>100	*91.8*	515.66	10.83	2.2
164	Kuwait	*307.1*	*67.7*	...	0.69	0.29	0.1
165	Luxembourg	*225.4*	*>100*	...	*0.44*	*1.00*	*0.1*
166	Macao, China	*134.1*	*86.0*	...	*0.53*	*1.21*	*0.3*
167	Malta	157.9	>100	...	*0.86*	*2.17*	*0.4*
168	Netherlands	6'301.9	89.5	*90.0*	*17.30*	*1.07*	*0.2*
169	New Caledonia	...	...	...	1.00	4.56	2.0
170	New Zealand	*1'385.0*	*>100*	*96.0*	...	...	...
171	Norway	2'233.2	>100	...	*10.64*	*2.36*	*0.3*
172	Portugal	3'489.7	99.4	78.0	43.80	4.24	1.0
173	Qatar	*122.2*	*>100*	...	*1.00*	*1.63*	*0.6*
174	Singapore	1'148.6	>100	*97.9*	*22.00*	*5.57*	*1.2*
175	Slovenia	*757.6*	*>100*	*93.0*	3.56	1.78	0.4
176	Spain	14'640.1	>100	*90.3*	63.87	1.58	0.4
177	Sweden	4'467.3	>100	*100.0*	...	...	...
178	Switzerland	3'561.9	>100	...	36.03	4.95	0.7
179	Taiwan, China	*9'865.2*	*>100*	97.8	*134.92*	*5.99*	*1.0*
180	United Arab Emirates	*552.2*	*>100*	...	*28.28*	*8.11*	*2.6*
181	United Kingdom	*24'777.6*	...	*95.0*	*118.00*	*2.00*	*0.3*
182	United States	*129'111.7*	*>100*	*95.3*	*1'384.94*	*4.86*	*0.7*
	High Income	**356'235.5**	**120.5**	**96.1**	**4'119.85**	**4.36**	**0.7**
	World	**733'275.1**	**61.0**	**49.8**	**21'009.19**	**3.52**	**1.9**
	Africa	**15'828.7**	**11.9**	**13.0**	**455.11**	**0.62**	**2.1**
	Americas	**204'646.6**	**84.5**	**70.8**	**4'353.44**	**5.25**	**1.5**
	Asia	**304'044.6**	**51.2**	**37.6**	**14'437.03**	**4.03**	**3.3**
	Europe	**199'351.8**	**89.3**	**81.3**	**1'678.81**	**2.13**	**0.5**
	Oceania	**9'403.3**	**103.1**	**95.1**	**84.79**	**3.14**	**0.8**

Note. For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

6. Telephone tariffs

		Residential		Business		Local call (US$)	Subscription as % of GDP per capita
		Connection (US$)	Monthly subs. (US$)	Connection (US$)	Monthly subs. (US$)		
		2002	2002	1997-02	2002	2002	2002
1	Angola	46	5.7	112	11.2	0.09	9.6
2	Azerbaijan	82	0.7	123	7.2	0.10	1.6
3	Bangladesh	*330*	*2.7*	*330*	*2.7*	*0.03*	*9.3*
4	Benin	138	4.2	280	4.2	0.28	12.2
5	Bhutan	12	3.1	12	3.1	0.02	5.0
6	Burkina Faso	42	5.1	42	5.1	0.10	27.7
7	Burundi	*12*	*0.5*	*72*	*0.5*	*0.02*	*6.3*
8	Cambodia	30	7.0	60	7.0	0.03	33.0
9	Cameroon	43	2.5	43	2.5	0.06	4.8
10	Central African Rep.	79	5.7	123	5.7	0.43	25.6
11	Chad	76	5.1	76	5.1	0.11	28.8
12	Comoros	75	4.3	75	4.3	0.14	17.1
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	29	7.2	29	10.0	0.22	12.1
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	...	...	...	...	...	...
17	Eritrea	72	2.0	72	2.0	0.03	16.2
18	Ethiopia	36	0.9	36	2.0	0.02	11.7
19	Gambia	41	1.5	41	1.8	0.03	5.4
20	Georgia	91	1.8	91	2.7	0.03	3.2
21	Ghana	50	1.3	50	1.3	0.03	7.2
22	Guinea	110	3.0	110	3.0	0.08	9.4
23	Guinea-Bissau	*67*	...	*67*	...	...	...
24	Haiti	...	...	...	...	...	...
25	India	16	5.1	16	5.1	0.02	12.5
26	Indonesia	27	2.5	38	4.3	0.03	3.5
27	Kenya	29	5.6	29	5.6	0.07	17.4
28	Kyrgyzstan	12	0.8	35	1.3	0.09	2.9
29	Lao P.D.R.	*34*	*1.1*	*34*	*1.1*	*0.02*	*4.1*
30	Lesotho	30	2.8	30	2.8	0.11	10.3
31	Madagascar	30	3.7	30	3.7	0.07	16.2
32	Malawi	16	1.3	16	1.3	0.06	9.9
33	Mali	*77*	*2.6*	*77*	*2.6*	*0.07*	*10.9*
34	Mauritania	39	5.4	39	5.4	0.13	17.9
35	Moldova	43	0.9	72	2.3	0.02	3.2
36	Mongolia	54	0.7	72	5.9	0.02	1.8
37	Mozambique	21	9.5	21	9.5	...	53.0
38	Myanmar	...	...	...	...	...	...
39	Nepal	23	2.6	23	2.6	0.01	13.0
40	Nicaragua	185	7.0	281	18.8	0.08	18.0
41	Niger	*41*	*3.8*	*41*	*3.8*	*0.10*	*29.6*
42	Nigeria	...	...	...	...	...	...
43	Pakistan	31	4.4	31	4.4	0.02	12.3
44	Papua New Guinea	*15*	*1.2*	*15*	*3.2*	*0.06*	*1.8*
45	Rwanda	31	2.1	31	2.1	0.09	12.2
46	S. Tomé & Principe	44	4.4	44	11.0	0.17	16.0
47	Senegal	*32*	*3.3*	*32*	*4.3*	*0.10*	*8.4*
48	Sierra Leone	*49*	*0.5*	*49*	*1.0*	*0.03*	*4.0*
49	Solomon Islands	30	4.7	34	7.1	0.07	9.3
50	Sudan	*27*	*1.9*	*39*	*1.9*	*0.03*	*5.9*
51	Tajikistan	4	0.4	27	2.7	0.01	2.6
52	Tanzania	41	3.6	41	3.6	0.12	16.0
53	Togo	156	2.5	156	2.5	0.10	9.8
54	Uganda	61	5.6	61	5.6	0.21	27.4
55	Uzbekistan	13	0.8	35	3.3	...	3.7
56	Viet Nam	65	1.8	65	1.8	0.02	4.9
57	Yemen	97	0.6	97	0.6	0.02	1.3
58	Zambia	11	1.1	34	2.3	0.09	4.4
59	Zimbabwe	*15*	*2.9*	*24*	*5.8*	*0.04*	*5.3*
	Low Income	**54**	**3.1**	**66**	**4.2**	**0.08**	**11.8**

6. Telephone tariffs

		Residential		Business		Local call (US$)	Subscription as % of GDP per capita
		Connection (US$)	Monthly subs. (US$)	Connection (US$)	Monthly subs. (US$)		
		2002	2002	1997-02	2002	2002	2002
60	Albania	81	0.5	193	5.4	0.02	0.5
61	Algeria	*45*	*2.6*	*45*	*2.6*	*0.02*	*1.8*
62	Armenia	21	1.6	25	5.7	0.02	3.0
63	Belarus	20	0.5	52	0.9	0.01	0.5
64	Bolivia	*123*	*1.6*	*147*	*14.6*	*0.09*	*1.9*
65	Bosnia	130	1.3	130	4.4	0.03	1.3
66	Brazil	*18*	*6.5*	*18*	*10.1*	*0.03*	*2.6*
67	Bulgaria	48	3.4	48	6.5	0.02	2.0
68	Cape Verde	*24*	*2.0*	*24*	*2.0*	*0.04*	*2.0*
69	China	...	...	...	...	...	...
70	Colombia	*128*	*2.7*	*160*	*3.6*	*0.03*	*1.7*
71	Cuba	*100*	*6.3*	*100*	*9.3*	*0.09*	*4.9*
72	Djibouti	113	19.7	113	19.7	0.20	26.4
73	Dominican Rep.	54	12.1	43	14.8	0.06	5.6
74	Ecuador	60	6.2	200	12.0	0.03	6.9
75	Egypt	111	1.1	222	2.2	0.02	1.0
76	El Salvador	*248*	*8.7*	*248*	*12.7*	*0.07*	*4.9*
77	Fiji	39	1.3	131	1.9	0.05	0.8
78	Guatemala	*356*	-	*356*	*5.6*	*0.08*	-
79	Guyana	3	2.6	16	7.9	0.00	3.8
80	Honduras	21	2.4	52	6.1	0.06	3.0
81	Iran (I.R.)	145	0.0	145	0.0	0.01	0.0
82	Jamaica	14	6.4	19	15.3	0.07	2.4
83	Jordan	79	5.4	158	12.4	0.04	3.8
84	Kazakhstan	78	2.4	281	3.8	0.00	2.0
85	Maldives	134	2.3	134	2.3	0.06	1.2
86	Marshall Islands	35	12.0	35	30.0	-	7.9
87	Morocco	54	7.6	109	10.9	0.15	7.9
88	Namibia	*31*	*5.0*	*31*	*5.5*	*0.03*	*3.5*
89	Palestine	113	5.7	170	5.7	0.05	7.8
90	Paraguay	*341*	*3.0*	*341*	*4.9*	*0.09*	*3.0*
91	Peru	149	14.5	149	15.9	0.08	8.2
92	Philippines	*20*	*11.9*	*24*	*24.9*	-	*15.7*
93	Romania	10	5.4	10	5.4	0.11	3.1
94	Russia	192	3.5	345	...	...	1.8
95	Samoa	18	4.4	25	3.0	0.03	3.7
96	Serbia and Montenegro	78	0.6	156	0.6	0.01	0.5
97	South Africa	23	6.4	23	8.5	0.09	3.4
98	Sri Lanka	131	1.8	131	3.8	0.03	2.5
99	St. Vincent	*37*	*6.3*	*37*	*14.8*	*0.09*	*2.5*
100	Suriname	141	1.2	141	1.2	0.05	0.8
101	Swaziland	19	1.2	32	2.5	0.04	1.3
102	Syria	*107*	*0.7*	*214*	*1.4*	*0.01*	*0.7*
103	TFYR Macedonia	*118*	*3.0*	*118*	*6.1*	*0.01*	...
104	Thailand	78	2.3	78	2.3	0.07	1.4
105	Tonga	80	4.0	80	4.0	0.05	3.6
106	Tunisia	56	1.9	56	1.9	0.02	1.0
107	Turkey	5	4.2	5	4.2	0.13	1.8
108	Turkmenistan	77	0.2	500	9.6	...	0.2
109	Ukraine	31	2.0	125	3.1	...	2.9
110	Vanuatu	65	11.3	65	11.3	0.22	12.2
	Lower Middle Income	**84**	**4.4**	**121**	**7.4**	**0.05**	**3.7**

6. Telephone tariffs

		Residential		Business		Local call (US$)	Subscription as % of GDP per capita
		Connection (US$)	Monthly subs. (US$)	Connection (US$)	Monthly subs. (US$)		
		2002	2002	1997-02	2002	2002	2002
111	Argentina	49	4.3	49	8.9	0.03	0.5
112	Belize	50	10.0	50	25.0	0.15	3.7
113	Botswana	36	2.5	36	3.0	0.02	1.0
114	Chile	36	9.2	36	9.2	0.10	2.5
115	Costa Rica	46	4.6	46	5.6	0.03	1.4
116	Croatia	64	7.6	64	8.9	0.09	1.8
117	Czech Republic	107	9.1	107	12.2	0.13	1.6
118	Dominica	56	7.4	56	20.4	0.10	2.7
119	Estonia	50	5.9	50	6.1	0.09	1.5
120	Gabon	78	13.6	78	13.6	0.22	4.5
121	Grenada	85	8.1	85	...	0.09	2.2
122	Hungary	131	11.9	291	16.1	0.13	2.2
123	Latvia	97	4.8	97	9.7	0.11	1.6
124	Lebanon	*133*	*8.0*	*133*	*13.3*	*0.07*	*1.9*
125	Libya	...	...	...	...	...	...
126	Lithuania	68	6.3	68	7.6	0.14	1.9
127	Malaysia	13	5.8	13	11.8	0.03	1.8
128	Mauritius	33	2.5	67	7.0	0.04	0.8
129	Mexico	*121*	*16.8*	*375*	*21.2*	*0.16*	*3.2*
130	Oman	26	7.9	26	7.9	0.07	1.2
131	Panama	38	...	...	...	...	...
132	Poland	*73*	*8.6*	*73*	*8.6*	...	*2.2*
133	Saudi Arabia	80	8.0	80	8.0	0.04	1.2
134	Seychelles	*51*	*8.5*	*51*	*8.5*	*0.14*	*1.4*
135	Slovak Republic	*25*	*5.1*	*25*	*5.1*	*0.12*	*1.6*
136	St. Kitts and Nevis	...	...	...	...	...	...
137	St. Lucia	46	8.1	46	14.8	0.09	2.3
138	Trinidad & Tobago	*11*	*4.7*	*22*	*28.1*	*0.04*	*0.8*
139	Uruguay	*85*	*8.2*	*132*	*18.7*	*0.17*	*1.6*
140	Venezuela	52	5.5	57	16.9	0.04	1.3
	Upper Middle Income	**62**	**7.5**	**82**	**12.2**	**0.09**	**1.9**

		Residential		Business		Local call (US$)	Subscription as % of GDP per capita
		Connection (US$)	Monthly subs. (US$)	Connection (US$)	Monthly subs. (US$)		
		2002	2002	1997-02	2002	2002	2002
141	Antigua & Barbuda	*69*	*11.1*	*119*	*22.2*	*0.06*	*1.5*
142	Australia	114	11.9	114	18.5	0.12	0.7
143	Austria	87	13.6	87	19.8	0.19	0.6
144	Bahamas	40	...	...	...	...	...
145	Bahrain	53	3.1	53	5.7	0.06	0.3
146	Barbados	*49*	*14.0*	*49*	*42.4*	-	*1.8*
147	Belgium	62	15.3	62	15.3	0.14	0.8
148	Brunei Darussalam	*28*	*9.5*	*28*	*14.0*	-	*0.9*
149	Canada	*35*	*12.5*	*64*	*25.8*	...	*0.7*
150	Cyprus	56	9.3	56	9.3	0.03	0.8
151	Denmark	*114*	*12.6*	*114*	*12.6*	*0.08*	*0.5*
152	Finland	101	11.1	101	11.1	0.13	0.5
153	France	44	11.8	44	14.3	0.12	0.6
154	French Polynesia	95	19.0	95	19.0	0.30	1.4
155	Germany	42	11.2	42	11.2	0.09	0.6
156	Greece	28	9.4	28	9.4	0.07	0.9
157	Hong Kong, China	61	14.1	61	16.5	-	0.7
158	Iceland	86	13.2	86	13.2	0.09	0.6
159	Ireland	123	21.2	123	21.2	0.14	0.8
160	Israel	*79*	*8.9*	*79*	*8.9*	*0.02*	*0.6*
161	Italy	*110*	*11.4*	*110*	*15.5*	*0.11*	*0.7*
162	Japan	*599*	*14.4*	*599*	*21.4*	*0.07*	*0.5*
163	Korea (Rep.)	48	4.2	48	4.2	0.03	0.5
164	Kuwait	117	8.3	250	19.4	-	0.7
165	Luxembourg	*191*	*16.4*	*191*	*16.4*	*0.80*	*0.4*
166	Macao, China	50	8.3	50	24.9	-	0.7
167	Malta	47	4.7	93	10.1	0.12	0.6
168	Netherlands	*48*	*16.7*	*79*	*16.7*	*0.13*	*0.8*
169	New Caledonia	*112*	*12.0*	*112*	*14.2*	*0.27*	*1.0*
170	New Zealand	29	17.6	39	27.8	-	1.4
171	Norway	95	19.9	95	19.9	0.15	0.6
172	Portugal	68	11.2	68	11.2	0.11	1.1
173	Qatar	55	9.1	55	32.0	-	0.4
174	Singapore	17	4.7	17	7.0	0.02	0.3
175	Slovenia	74	8.1	74	8.1	0.07	0.9
176	Spain	90	11.0	90	11.0	...	0.8
177	Sweden	...	...	...	...	...	...
178	Switzerland	-	16.2	-	16.2	0.15	0.5
179	Taiwan, China	86	2.0	86	8.5	0.05	0.2
180	United Arab Emirates	54	4.1	54	4.1	-	0.2
181	United Kingdom	112	14.2	174	24.1	0.18	0.6
182	United States	42	23.4	72	43.6	-	0.8
	High income	**83**	**11.8**	**94**	**16.7**	**0.10**	**0.7**
	World	**71**	**6.2**	**91**	**9.4**	**0.08**	**5.2**
	Africa	**51**	**4.1**	**63**	**4.9**	**0.10**	**11.7**
	Americas	**88**	**7.6**	**115**	**15.7**	**0.07**	**3.1**
	Asia	**79**	**4.4**	**106**	**7.8**	**0.03**	**3.8**
	Europe	**76**	**8.8**	**96**	**10.5**	**0.12**	**1.2**
	Oceania	**57**	**9.0**	**68**	**12.7**	**0.11**	**4.0**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

7. Mobile cellular subscribers

		Cellular mobile subscribers			Prepaid	Population	As % of total
		Total (000s) 2002	per 100 inhabitants 2002	CAGR (%) 1997-2002	subscribers (%) 2002	coverage (%) 2002	telephone subscribers 2002
1	Angola	130	0.93	79.1	...	...	60.5
2	Azerbaijan	870	10.69	85.1	*81.2*	*94.0*	48.5
3	Bangladesh	1'075	0.81	110.5	*38.5*	50.0	61.2
4	Benin	219	3.22	119.5	...	*23.0*	77.7
5	Bhutan	-	-	-	-	-	-
6	Burkina Faso	90	0.75	126.7	60.1	60.0	58.3
7	Burundi	52	0.74	142.6	...	...	70.2
8	Cambodia	380	2.76	62.5	95.0	87.0	91.5
9	Cameroon	676	4.27	176.2	...	55.0	85.9
10	Central African Rep.	13	0.32	55.9	...	...	58.3
11	Chad	34	0.43	-	...	...	74.3
12	Comoros	-	-	-	-	-	-
13	Congo	222	6.72	-	...	...	91.0
14	Côte d'Ivoire	1'027	6.23	95.5	93.7	46.6	75.3
15	D.R. Congo	560	1.06	129.0	...	...	98.2
16	Equatorial Guinea	32	6.34	154.5	...	...	78.4
17	Eritrea	-	-	-	-	-	-
18	Ethiopia	50	0.07	-	...	...	12.5
19	Gambia	100	7.29	84.1	*98.4*	70.0	72.3
20	Georgia	504	10.21	75.8	...	*79.0*	43.7
21	Ghana	449	2.07	83.1	...	...	62.1
22	Guinea	91	1.18	99.6	74.9	...	77.7
23	Guinea-Bissau	-	-	-	-	-	-
24	Haiti	140	1.69	-	...	...	51.9
25	India	12'688	1.22	70.5	83.4	...	23.4
26	Indonesia	11'700	5.52	66.4	*65.0*	*89.0*	60.2
27	Kenya	1'325	4.15	187.3	*93.2*	...	80.2
28	Kyrgyzstan	53	1.04	-	...	...	11.9
29	Lao P.D.R.	55	1.00	62.2	...	...	47.1
30	Lesotho	92	4.25	92.3	...	...	76.3
31	Madagascar	163	1.02	108.9	...	100.0	73.3
32	Malawi	86	0.82	65.2	86.8	70.0	54.1
33	Mali	53	0.50	79.3	...	*15.4*	48.2
34	Mauritania	247	9.22	-	...	...	88.7
35	Moldova	338	7.69	173.8	76.6	77.0	32.4
36	Mongolia	216	8.89	155.1	96.5	64.0	62.8
37	Mozambique	255	1.40	152.1	89.8	...	75.3
38	Myanmar	48	0.10	41.4	...	...	12.3
39	Nepal	22	0.09	-	...	...	6.3
40	Nicaragua	203	3.78	93.1	85.9	...	54.2
41	Niger	17	0.14	179.3	-	...	42.6
42	Nigeria	1'608	1.34	154.7	...	38.0	69.6
43	Pakistan	1'239	0.85	55.8	...	...	25.3
44	Papua New Guinea	15	0.27	31.2	...	...	19.0
45	Rwanda	111	1.36	-	*93.0*	50.0	82.7
46	S. Tomé & Principe	2	1.31	-	84.6	...	24.1
47	Senegal	553	5.49	140.1	95.0	...	71.1
48	Sierra Leone	66	1.34	-	...	...	73.4
49	Solomon Islands	1	0.22	8.7	-	*35.0*	13.1
50	Sudan	191	0.59	118.9	...	*60.0*	22.1
51	Tajikistan	13	0.21	110.4	...	...	5.3
52	Tanzania	670	1.95	101.4	...	...	80.6
53	Togo	170	3.49	124.3	98.8	90.0	76.9
54	Uganda	393	1.59	139.4	...	55.0	87.7
55	Uzbekistan	187	0.74	61.1	...	75.0	10.0
56	Viet Nam	1'902	2.34	64.0	*68.1*	...	32.6
57	Yemen	411	2.11	101.9	...	...	43.1
58	Zambia	139	1.30	98.2	...	*50.5*	61.3
59	Zimbabwe	353	3.03	128.0	*65.1*	...	55.1
	Low Income	**42'298**	**1.75**	**76.5**	**79.9**	**63.6**	**38.3**

		Cellular mobile subscribers			Prepaid	Population	As % of total
		Total (000s) 2002	per 100 inhabitants 2002	CAGR (%) 1997-2002	subscribers (%) 2002	coverage (%) 2002	telephone subscribers 2002
60	Albania	851	27.63	203.6	98.2	90.0	79.5
61	Algeria	400	1.28	87.2	...	*60.0*	17.3
62	Armenia	72	1.89	70.5	55.8	*38.0*	11.7
63	Belarus	463	4.67	124.2	...	87.0	13.5
64	Bolivia	873	10.46	49.1	*86.5*	...	60.7
65	Bosnia	749	19.63	142.1	66.6	90.0	45.3
66	Brazil	34'881	20.06	50.3	*59.0*	...	47.3
67	Bulgaria	2'598	33.30	106.0	46.5	91.5	47.5
68	Cape Verde	43	9.78	363.9	*97.7*	*90.0*	38.0
69	China	206'620	16.09	73.3	22.8	...	49.1
70	Colombia	4'597	10.62	29.4	...	...	37.2
71	Cuba	18	0.16	42.9	...	*50.0*	*1.5*
72	Djibouti	15	2.29	136.4	100.0	75.0	59.7
73	Dominican Rep.	1'701	20.66	64.4	80.2	88.0	65.2
74	Ecuador	1'561	12.06	65.3	81.5	88.0	52.3
75	Egypt	4'495	6.68	133.1	82.4	*96.0*	37.7
76	El Salvador	889	13.76	85.8	...	*85.0*	57.1
77	Fiji	90	10.97	76.8	91.0	*49.5*	48.0
78	Guatemala	1'577	13.15	89.7	...	*68.0*	65.1
79	Guyana	87	9.93	128.5	...	...	52.0
80	Honduras	327	4.87	86.6	79.4	...	50.3
81	Iran (I.R.)	2'187	3.35	55.7	0.2	...	15.2
82	Jamaica	1'400	53.48	84.2	...	*80.0*	75.9
83	Jordan	1'220	22.89	93.4	82.7	*99.5*	64.4
84	Kazakhstan	1'027	6.43	146.9	...	*94.0*	33.0
85	Maldives	42	14.91	100.6	70.7	54.0	59.4
86	Marshall Islands	1	0.98	3.4	-	...	11.2
87	Morocco	6'199	20.91	142.1	90.0	95.0	84.6
88	Namibia	150	8.00	64.4	...	*90.0*	55.3
89	Palestine	320	9.26	51.6	...	95.0	51.5
90	Paraguay	1'667	28.83	81.7	*80.0*	...	85.9
91	Peru	2'307	8.62	40.5	76.2	...	56.6
92	Philippines	15'201	19.13	62.4	85.5	*70.0*	82.1
93	Romania	5'111	23.57	91.0	61.2	98.0	54.8
94	Russia	17'609	12.01	105.1	...	...	33.2
95	Samoa	3	1.50	28.7	...	...	20.8
96	Serbia and Montenegro	2'750	25.66	99.5	96.4	91.5	52.5
97	South Africa	13'814	30.39	49.7	75.4	95.1	74.0
98	Sri Lanka	932	4.92	52.0	*47.4*	...	51.3
99	St. Vincent	10	8.53	95.9	...	...	26.8
100	Suriname	108	22.52	116.9	97.8	35.0	57.9
101	Swaziland	63	6.10	-	*94.5*	80.0	64.2
102	Syria	400	2.35	-	-	*50.0*	16.0
103	TFYR Macedonia	365	17.70	96.8	*85.1*	*90.0*	39.5
104	Thailand	16'117	26.04	48.9	79.0	...	71.3
105	Tonga	3	3.38	94.7	100.0	95.0	23.0
106	Tunisia	504	5.15	131.0	*76.2*	...	30.5
107	Turkey	23'374	34.75	70.8	*58.8*	88.2	55.3
108	Turkmenistan	8	0.17	26.7	...	...	2.1
109	Ukraine	4'200	8.38	136.1	...	75.0	27.9
110	Vanuatu	5	2.42	88.3	...	20.0	42.6
	Lower Middle Income	**380'000**	**15.88**	**67.6**	**40.7**	**82.3**	**49.1**

7. Mobile cellular subscribers

		Cellular mobile subscribers			Prepaid	Population	As % of total
		Total (000s) 2002	per 100 inhabitants 2002	CAGR (%) 1997-2002	subscribers (%) 2002	coverage (%) 2002	telephone subscribers 2002
111	Argentina	6'500	17.76	32.6	...	...	44.8
112	Belize	52	20.45	82.7	73.5	...	62.3
113	Botswana	415	24.13	-	...	99.0	73.5
114	Chile	6'446	42.83	73.5	77.8	100.0	65.0
115	Costa Rica	460	11.10	48.2	...	...	30.7
116	Croatia	2'340	53.50	81.0	82.4	98.0	56.2
117	Czech Republic	8'610	84.88	74.9	78.2	99.0	70.1
118	Dominica	9	12.00	75.9	...	...	28.3
119	Estonia	881	65.02	43.6	29.5	99.0	65.0
120	Gabon	279	21.50	96.6	...	*45.0*	89.7
121	Grenada	8	7.13	50.6	-	*65.0*	18.4
122	Hungary	6'863	67.60	57.6	78.4	*95.8*	65.2
123	Latvia	917	39.38	64.1	*1.7*	96.9	56.7
124	Lebanon	775	22.70	15.7	...	...	53.3
125	Libya	70	1.26	47.6	...	...	*7.0*
126	Lithuania	1'646	47.53	58.3	34.3	*100.0*	63.7
127	Malaysia	9'241	37.68	35.8	67.9	*95.0*	66.4
128	Mauritius	350	28.91	52.4	79.1	99.8	51.7
129	Mexico	25'928	25.45	71.6	92.3	89.9	63.4
130	Oman	465	17.15	50.7	52.4	...	67.1
131	Panama	570	18.95	98.4	89.0	*77.0*	60.8
132	Poland	14'000	36.26	76.7	*32.2*	*95.0*	*46.7*
133	Saudi Arabia	5'008	21.72	72.1	43.1	*92.0*	60.2
134	Seychelles	45	55.35	81.9	*52.5*	90.0	67.3
135	Slovak Republic	2'923	54.36	71.0	*71.5*	*98.0*	67.0
136	St. Kitts and Nevis	5	10.64	89.4	...	...	17.5
137	St. Lucia	14	8.95	55.0	...	...	21.9
138	Trinidad & Tobago	362	27.81	84.0	*84.5*	...	52.7
139	Uruguay	652	19.26	45.7	...	100.0	40.8
140	Venezuela	6'464	25.64	43.2	91.6	...	69.5
	Upper Middle Income	**102'297**	**30.94**	**57.4**	**74.6**	**93.0**	**59.7**

		Cellular mobile subscribers			*Prepaid*	*Population*	*As % of total*
		Total (000s) 2002	*per 100 inhabitants 2002*	*CAGR (%) 1997-2002*	*subscribers (%) 2002*	*coverage (%) 2002*	*telephone subscribers 2002*
141	Antigua & Barbuda	38	48.98	93.7	...	85.0	50.1
142	Australia	12'579	63.98	22.4	31.8	97.0	54.3
143	Austria	6'415	78.62	40.8	51.4	98.0	61.7
144	Bahamas	122	39.03	81.7	*17.1*	95.0	49.0
145	Bahrain	389	58.33	46.0	78.2	100.0	68.9
146	Barbados	*53*	19.80	*60.5*	*45.6*	*95.0*	*29.2*
147	Belgium	8'136	78.56	52.9	67.7	99.0	61.4
148	Brunei Darussalam	*137*	40.06	*32.1*	...	...	*60.8*
149	Canada	11'849	37.72	22.7	*11.9*	*95.0*	37.2
150	Cyprus	418	58.44	35.4	35.2	100.0	45.9
151	Denmark	4'478	83.32	25.4	31.6	...	54.7
152	Finland	4'517	86.74	15.9	...	99.0	62.4
153	France	38'585	64.70	46.0	44.3	*99.0*	53.2
154	French Polynesia	90	36.66	75.4	...	*70.0*	63.2
155	Germany	60'043	72.75	48.6	52.2	99.0	52.8
156	Greece	9'314	84.54	58.3	65.1	99.6	63.2
157	Hong Kong, China	6'396	94.25	23.5	34.4	100.0	62.5
158	Iceland	261	90.60	31.9	*35.3*	*99.0*	58.1
159	Ireland	3'000	76.32	40.7	*69.1*	99.0	60.3
160	Israel	6'334	95.45	30.5	23.7	97.0	67.1
161	Italy	53'003	93.87	35.2	*89.3*	*99.6*	66.1
162	Japan	81'118	63.65	16.2	...	99.0	53.3
163	Korea (Rep.)	32'342	67.95	36.3	...	99.0	58.2
164	Kuwait	1'227	51.90	42.3	...	100.0	71.8
165	Luxembourg	473	106.05	47.7	55.0	*98.0*	57.1
166	Macao, China	276	62.53	40.4	37.5	100.0	61.1
167	Malta	277	69.91	73.3	93.5	99.0	57.2
168	Netherlands	12'060	74.47	47.7	*65.6*	*99.5*	54.7
169	New Caledonia	80	35.71	72.8	72.5	95.0	60.6
170	New Zealand	2'449	62.17	34.0	67.9	*97.0*	58.1
171	Norway	3'840	84.36	18.0	*43.8*	*97.0*	53.5
172	Portugal	8'529	82.52	41.4	78.4	99.0	66.2
173	Qatar	267	43.80	43.8	51.1	95.0	60.2
174	Singapore	3'313	79.56	31.3	27.0	*100.0*	63.2
175	Slovenia	1'667	83.53	77.9	54.1	99.0	62.3
176	Spain	33'531	82.42	50.5	62.3	99.0	61.9
177	Sweden	7'949	88.89	20.2	54.5	*99.0*	54.7
178	Switzerland	5'747	78.93	40.6	40.3	99.0	51.5
179	Taiwan, China	23'905	106.15	74.2	22.8	100.0	64.6
180	United Arab Emirates	2'428	69.61	51.0	...	100.0	68.9
181	United Kingdom	49'677	84.07	41.2	68.0	99.0	58.7
182	United States	140'767	48.81	20.5	*10.0*	95.0	43.0
	High Income	**638'079**	**66.39**	**29.9**	**44.5**	**97.7**	**53.1**
	World	**1'162'675**	**19.07**	**40.2**	**46.7**	**84.0**	**51.5**
	Africa	**37'080**	**4.59**	**74.9**	**81.4**	**64.1**	**62.4**
	Americas	**252'642**	**29.90**	**28.7**	**33.5**	**91.8**	**46.3**
	Asia	**449'130**	**12.42**	**43.3**	**34.2**	**82.2**	**50.9**
	Europe	**408'508**	**51.26**	**46.3**	**62.7**	**95.0**	**55.1**
	Oceania	**15'315**	**48.87**	**24.3**	**38.2**	**93.5**	**54.7**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

8. Prepaid cellular tariffs, US$
October 2003

		Connection charge 2003	*Per minute local call*		*Cost of local SMS 2003*
			Peak 2003	*Off-peak 2003*	
1	Angola	...	...	...	...
2	Azerbaijan	...	...	...	...
3	Bangladesh	...	0.10	0.10	...
4	Benin	35.87	0.34	0.29	...
5	Bhutan	*	*	*	*
6	Burkina Faso	43.62	0.29	0.29	0.11
7	Burundi	10.74	0.31	0.26	0.03
8	Cambodia	...	0.08	0.04	0.03
9	Cameroon	28.69	0.36	0.29	0.10
10	Central African Rep.	...	...	...	...
11	Chad	...	...	...	...
12	Comoros	...	0.19	0.19	0.14
13	Congo	...	...	...	...
14	Côte d'Ivoire	35.87	0.65	0.65	0.07
15	D.R. Congo	...	...	...	...
16	Equatorial Guinea	...	...	...	...
17	Eritrea	*	*	*	*
18	Ethiopia	*53.45*	*0.08*	*0.04*	...
19	Gambia	...	...	...	...
20	Georgia	6.82	0.13	0.13	0.03
21	Ghana	34.04	0.32	0.24	0.08
22	Guinea	37.45	0.20	0.15	0.05
23	Guinea-Bissau	*	*	*	*
24	Haiti	...	...	...	...
25	India	3.76	0.05	0.05	0.02
26	Indonesia	...	0.16	0.13	...
27	Kenya	12.57	0.20	0.20	0.06
28	Kyrgyzstan	9.37	0.19	0.14	...
29	Lao P.D.R.	10.00	0.07	0.07	...
30	Lesotho	...	...	...	...
31	Madagascar	-	0.20	0.20	0.09
32	Malawi	...	*0.29*	*0.22*	*0.11*
33	Mali	...	...	...	...
34	Mauritania	...	...	...	...
35	Moldova	*12.53*	*0.21*	*0.21*	*0.06*
36	Mongolia	*13.51*	*0.32*	*0.32*	*0.03*
37	Mozambique	...	...	...	...
38	Myanmar	...	...	...	...
39	Nepal	12.84	0.06	0.06	0.01
40	Nicaragua	...	0.54	0.54	-
41	Niger	...	...	...	...
42	Nigeria	49.76	0.41	0.33	0.12
43	Pakistan	16.73	0.10	0.10	0.03
44	Papua New Guinea	6.41	0.41	0.15	...
45	Rwanda	...	0.27	0.21	0.10
46	S. Tomé & Principe	*55.02*	*0.26*	*0.26*	*0.24*
47	Senegal	21.81	0.32	0.17	0.09
48	Sierra Leone	...	...	...	...
49	Solomon Islands	50.50	0.44	0.44	...
50	Sudan	22.95	0.10	0.10	0.02
51	Tajikistan	...	...	...	...
52	Tanzania	...	0.25	0.25	0.05
53	Togo	*28.55*	*0.24*	*0.24*	-
54	Uganda	13.91	0.19	0.16	0.06
55	Uzbekistan	...	...	...	...
56	Viet Nam	9.82	0.22	0.15	...
57	Yemen	...	...	...	...
58	Zambia	*14.78*	*0.30*	*0.26*	*0.05*
59	Zimbabwe	53.21	0.10	0.09	0.02
	Low Income	**24.30**	**0.24**	**0.21**	**0.06**

8. Prepaid cellular tariffs, US$
October 2003

		Connection charge 2003	*Per minute local call*		*Cost of local SMS 2003*
			Peak 2003	*Off-peak 2003*	
60	Albania	*21.40*	*0.50*	*0.43*	*0.19*
61	Algeria	62.74	0.25	0.25	0.06
62	Armenia	*6.40*	*0.10*	*0.07*	*0.02*
63	Belarus	-	0.06	0.04	0.06
64	Bolivia	...	0.14	0.14	0.06
65	Bosnia	23.56	0.19	0.17	0.04
66	Brazil	...	0.57	0.28	...
67	Bulgaria	*14.37*	*0.56*	*0.56*	*0.09*
68	Cape Verde	34.50	0.30	0.21	0.13
69	China	-	0.07	0.07	0.02
70	Colombia	...	...	...	...
71	Cuba	120.00	0.48	0.40	0.16
72	Djibouti	5.63	0.17	0.11	...
73	Dominican Rep.	5.37	0.21	0.21	0.05
74	Ecuador	10.00	0.64	0.64	0.13
75	Egypt	87.78	0.33	0.33	0.11
76	El Salvador	...	0.30	0.25	0.09
77	Fiji	41.56	0.90	0.18	0.09
78	Guatemala	...	0.12	0.12	0.06
79	Guyana	...	...	...	...
80	Honduras	*10.11*	*0.50*	*0.50*	-
81	Iran (I.R.)	...	...	...	...
82	Jamaica	23.75	0.21	0.17	0.06
83	Jordan	15.49	0.25	0.20	0.42
84	Kazakhstan	3.86	0.21	0.21	0.06
85	Maldives	39.06	0.27	0.27	0.08
86	Marshall Islands	...	...	...	...
87	Morocco	22.69	0.27	0.18	0.09
88	Namibia	8.06	0.21	0.10	0.07
89	Palestine	...	*0.17*	*0.17*	*0.04*
90	Paraguay	...	0.30	0.05	0.02
91	Peru	...	0.28	0.28	0.14
92	Philippines	3.29	0.15	0.08	0.02
93	Romania	-	*0.35*	*0.15*	*0.10*
94	Russia	...	0.38	0.30	0.06
95	Samoa	8.58	0.24	0.07	0.06
96	Serbia and Montenegro	*10.22*	*0.19*	*0.08*	*0.04*
97	South Africa	14.14	0.27	0.15	0.08
98	Sri Lanka	10.98	0.11	0.08	0.02
99	St. Vincent	...	...	...	...
100	Suriname	*18.75*	*0.19*	*0.19*	*0.05*
101	Swaziland	4.74	0.25	0.25	0.08
102	Syria	97.09	0.19	0.19	0.10
103	TFYR Macedonia	30.77	0.56	0.25	0.08
104	Thailand	9.31	0.12	0.12	0.07
105	Tonga	...	0.18	0.15	...
106	Tunisia	84.51	0.16	0.12	...
107	Turkey	...	*0.49*	*0.49*	*0.10*
108	Turkmenistan	...	...	...	...
109	Ukraine	20.00	0.40	0.14	0.06
110	Vanuatu	35.92	0.29	0.29	0.14
	Lower Middle Income	**25.85**	**0.29**	**0.22**	**0.08**

8. Prepaid cellular tariffs, US$
October 2003

		Connection charge 2003	*Per minute local call*		*Cost of local SMS 2003*
			Peak 2003	*Off-peak 2003*	
111	Argentina	...	0.11	0.11	0.04
112	Belize	...	*0.43*	*0.30*	*0.13*
113	Botswana	21.33	0.32	0.07	0.03
114	Chile	...	0.39	0.39	0.07
115	Costa Rica	...	...	...	...
116	Croatia	*25.41*	*0.16*	...	*0.05*
117	Czech Republic	*106.75*	*0.21*	*0.08*	*0.10*
118	Dominica	...	0.69	0.69	...
119	Estonia	1.63	0.26	0.14	0.10
120	Gabon	...	0.27	0.13	...
121	Grenada	...	...	...	...
122	Hungary	-	0.33	0.12	0.10
123	Latvia	4.68	0.44	0.44	0.08
124	Lebanon	8.00	0.56	0.56	0.28
125	Libya	...	...	...	...
126	Lithuania	...	0.07	0.07	0.04
127	Malaysia	33.68	0.14	0.10	0.04
128	Mauritius	15.25	0.04	0.04	0.02
129	Mexico	...	...	...	...
130	Oman	78.95	1.84	1.84	0.03
131	Panama	...	...	...	...
132	Poland	...	...	...	...
133	Saudi Arabia	53.33	0.32	0.32	0.13
134	Seychelles	8.94	0.73	0.73	0.09
135	Slovak Republic	...	...	...	...
136	St. Kitts and Nevis	...	...	...	...
137	St. Lucia	...	0.28	0.24	0.09
138	Trinidad & Tobago	...	0.48	0.32	0.04
139	Uruguay	...	...	...	...
140	Venezuela	...	0.54	0.25	...
	Upper Middle Income	**29.83**	**0.41**	**0.35**	**0.08**

8. Prepaid cellular tariffs, US$
October 2003

		Connection charge 2003	Per minute local call		Cost of local SMS 2003
			Peak 2003	Off-peak 2003	
141	Antigua & Barbuda	...	0.33	0.33	...
142	Australia	-	0.53	0.53	0.14
143	Austria	-	0.67	0.29	0.21
144	Bahamas	...	...	...	...
145	Bahrain	52.63	0.13	0.11	0.09
146	Barbados	...	...	...	...
147	Belgium	9.43	0.38	0.24	0.14
148	Brunei Darussalam	22.35	0.22	0.11	0.06
149	Canada	...	0.21	0.21	0.10
150	Cyprus	*53.72*	*0.15*	*0.15*	*0.03*
151	Denmark	...	...	...	...
152	Finland	*47.17*	*0.25*	*0.25*	*0.18*
153	France	18.87	0.42	0.42	0.14
154	French Polynesia	22.47	0.88	0.88	0.44
155	Germany	37.22	0.46	0.27	0.18
156	Greece	*14.15*	*0.38*	*0.38*	*0.10*
157	Hong Kong, China	...	0.04	0.04	0.04
158	Iceland	...	...	...	...
159	Ireland	...	0.47	0.14	0.12
160	Israel	...	...	...	...
161	Italy	18.87	0.06	0.06	...
162	Japan	...	...	...	...
163	Korea (Rep.)	...	...	...	...
164	Kuwait	66.67	1.33	1.33	0.67
165	Luxembourg	-	0.11	0.07	0.11
166	Macao, China	-	0.17	0.11	0.06
167	Malta	...	0.47	0.28	0.05
168	Netherlands	...	...	...	...
169	New Caledonia	...	...	...	...
170	New Zealand	16.20	0.41	0.41	0.09
171	Norway	...	...	...	...
172	Portugal	-	*0.15*	*0.12*	*0.10*
173	Qatar	82.42	0.20	0.20	0.08
174	Singapore	...	0.16	0.16	0.06
175	Slovenia	-	0.08	0.08	0.08
176	Spain	11.32	0.31	0.31	0.14
177	Sweden	9.75	0.57	0.50	0.15
178	Switzerland	25.64	0.58	0.58	0.16
179	Taiwan, China	5.76	0.17	0.10	0.07
180	United Arab Emirates	20.44	0.08	0.06	0.08
181	United Kingdom	...	0.30	0.15	0.18
182	United States	-	0.35	0.10	0.10
	High Income	**21.40**	**0.35**	**0.28**	**0.14**
	World	**24.77**	**0.31**	**0.25**	**0.09**
	Africa	**28.83**	**0.25**	**0.21**	**0.07**
	Americas	**26.85**	**0.36**	**0.29**	**0.07**
	Asia	**23.88**	**0.24**	**0.22**	**0.09**
	Europe	**18.48**	**0.33**	**0.24**	**0.10**
	Oceania	**22.71**	**0.48**	**0.35**	**0.16**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

* No network.

9. ISDN and ADSL

		ISDN subscribers (000s) 2002	*B-channel equivalents (000s) 2002*	*B-channel per 1'000 inhabitants 2002*	*B-channel as % of main lines 2002*	*ADSL subscribers*	
						Total (000s) 2002	*As % of subscriber lines 2002*
1	Angola	-	-	-	-	-	-
2	Azerbaijan	0.4	3.3	0.41	0.36	-	-
3	Bangladesh	-	-	-	-	-	-
4	Benin	-	-	-	-	-	-
5	Bhutan	-	-	-	-	-	-
6	Burkina Faso	-	-	-	-	-	-
7	Burundi	-	-	-	-	-	-
8	Cambodia	-	-	-	-	-	-
9	Cameroon	-	-	-	-	-	-
10	Central African Rep.	-	-	-	-	-	-
11	Chad	-	-	-	-	-	-
12	Comoros	-	-	-	-	-	-
13	Congo	-	-	-	-	-	-
14	Côte d'Ivoire	2.2	14.6	0.89	4.34	-	-
15	D.R. Congo	-	-	-	-	-	-
16	Equatorial Guinea	-	-	-	-	-	-
17	Eritrea	-	-	-	-	-	-
18	Ethiopia	-	-	-	-	-	-
19	Gambia	-	0.1	0.06	0.21	-	-
20	Georgia	-	-	-	-	0.2	0.03
21	Ghana	*0.2*	*0.5*	*0.03*	*0.22*	-	-
22	Guinea	-	-	-	-	-	-
23	Guinea-Bissau	-	-	-	-	-	-
24	Haiti	-	-	-	-	-	-
25	India	*29.2*	*58.5*	*0.06*	*0.15*	38.0	0.09
26	Indonesia	*4.3*	*9.0*	*0.04*	*0.12*	31.3	0.40
27	Kenya	-	-	-	-	-	-
28	Kyrgyzstan	-	-	-	-	-	-
29	Lao P.D.R.	-	-	-	-	-	-
30	Lesotho	-	-	-	-	-	-
31	Madagascar	*0.3*	*2.0*	*0.13*	*3.42*	-	-
32	Malawi	-	-	-	-	-	-
33	Mali	-	-	-	-	-	-
34	Mauritania	-	-	-	-	-	-
35	Moldova	0.9	12.3	2.80	1.74	-	0.01
36	Mongolia	-	0.1	0.02	0.05	0.1	0.05
37	Mozambique	0.5	1.9	0.11	2.29	-	-
38	Myanmar	0.2	0.4	0.01	0.11	-	-
39	Nepal	-	-	-	-	-	-
40	Nicaragua	-	-	-	-	-	-
41	Niger	-	-	-	-	-	-
42	Nigeria	*0.1*	*0.3*	-	*0.05*	-	-
43	Pakistan	-	-	-	-	-	-
44	Papua New Guinea	-	-	-	-	-	-
45	Rwanda	*0.3*	*0.5*	*0.06*	*2.33*	-	-
46	S. Tomé & Principe	0.1	0.3	1.85	4.49	-	-
47	Senegal	*1.7*	*7.9*	*0.80*	*3.32*	1.2	0.53
48	Sierra Leone	-	-	-	-	-	-
49	Solomon Islands	-	-	-	-	0.1	1.64
50	Sudan	*0.3*	*0.5*	*0.02*	*0.11*	-	-
51	Tajikistan	-	-	-	-	-	-
52	Tanzania	-	-	-	-	0.0	0.02
53	Togo	0.2	0.4	0.07	0.70	-	-
54	Uganda	*0.1*	*0.1*	-	*0.18*	-	-
55	Uzbekistan	-	-	-	-	-	-
56	Viet Nam	-	-	-	-	-	-
57	Yemen	0.3	0.6	0.03	0.10	-	-
58	Zambia	-	-	-	-	-	-
59	Zimbabwe	*0.2*	*0.5*	*0.04*	*0.19*	-	-
	Low Income	**41.5**	**113.6**	**0.05**	**0.18**	**70.9**	**0.10**

		ISDN subscribers (000s) 2002	*B-channel equivalents (000s) 2002*	*B-channel per 1'000 inhabitants 2002*	*B-channel as % of main lines 2002*	*ADSL subscribers*	
						Total (000s) 2002	*As % of subscriber lines 2002*
60	Albania	0.2	0.3	0.10	0.14	-	-
61	Algeria	-	-	-	-	-	-
62	Armenia	0.6	1.6	0.42	0.29	-	-
63	Belarus	1.0	8.2	0.83	0.28	-	-
64	Bolivia	-	-	-	-	-	-
65	Bosnia	6.0	...	...	...	-	-
66	Brazil	-	-	-	-	600.0	1.55
67	Bulgaria	10.3	43.7	5.60	1.52	-	-
68	Cape Verde	*0.6*	*1.8*	*4.10*	*2.87*	-	-
69	China	1'177.9	...	...	...	2'220.0	1.04
70	Colombia	*88.7*	...	...	...	2.0	0.03
71	Cuba	-	-	-	-	-	-
72	Djibouti	*0.2*	*0.9*	*1.42*	*9.19*	-	-
73	Dominican Rep.	0.3	0.7	0.08	0.07	-	-
74	Ecuador	*0.1*	*0.2*	*0.02*	*0.02*	...	...
75	Egypt	11.1	...	...	...	...	...
76	El Salvador	*0.9*	*2.0*	*0.31*	*0.31*	-	-
77	Fiji	-	-	*0.05*	*0.04*	-	-
78	Guatemala	*2.7*	*9.2*	*0.79*	*1.22*	-	-
79	Guyana	-	-	-	-	-	-
80	Honduras	-	-	-	-	-	-
81	Iran (I.R.)	0.1	0.1	-	-	16.1	0.13
82	Jamaica	...	...	...	...	...	...
83	Jordan	2.3	14.2	2.66	2.10	1.9	0.28
84	Kazakhstan	-	-	-	-	-	-
85	Maldives	-	-	-	-	0.2	0.66
86	Marshall Islands	-	-	-	-	-	-
87	Morocco	11.8	39.8	1.34	3.53	-	-
88	Namibia	*2.2*	*4.5*	*2.44*	*3.80*	-	-
89	Palestine	0.7	1.6	0.46	0.53	-	-
90	Paraguay	-	-	-	-	-	-
91	Peru	29.9	...	...	...	34.4	1.68
92	Philippines	*1.0*	*2.5*	*0.03*	*0.08*	21.0	0.63
93	Romania	10.7	54.1	2.49	1.28	2.8	0.07
94	Russia	*63.6*	...	...	...	-	-
95	Samoa	-	*0.0*	*0.02*	*0.04*	-	-
96	Serbia and Montenegro	8.2	29.1	2.71	1.17	-	-
97	South Africa	*24.1*	*467.5*	*10.29*	*9.65*	2.7	0.06
98	Sri Lanka	*1.3*	*3.5*	*0.19*	*0.43*	-	-
99	St. Vincent	-	*0.2*	*2.03*	*0.92*	0.8	2.86
100	Suriname	0.1	0.1	0.22	0.14	-	0.02
101	Swaziland	0.3	0.8	0.75	2.21	-	-
102	Syria	*1.0*	*2.0*	*0.12*	*0.11*	-	-
103	TFYR Macedonia	*4.1*	...	...	...	-	-
104	Thailand	12.2	45.5	0.74	0.70	15.0	0.23
105	Tonga	-	-	-	-	-	0.10
106	Tunisia	*0.6*	*1.8*	*0.19*	*0.17*	-	-
107	Turkey	12.6	193.0	2.87	1.02	3.0	0.02
108	Turkmenistan	-	*0.0*	*0.01*	*0.01*	-	-
109	Ukraine	-	-	-	-	-	-
110	Vanuatu	-	-	-	-	-	-
	Lower Middle Income	**1'487.2**	**929.0**	**0.41**	**0.29**	**2'919.8**	**0.76**

9. ISDN and ADSL

		ISDN subscribers (000s) 2002	*B-channel equivalents (000s) 2002*	*B-channel per 1'000 inhabitants 2002*	*B-channel as % of main lines 2002*	*ADSL subscribers*	
						Total (000s) 2002	*As % of subscriber lines 2002*
111	Argentina	...	...	...	...	64.4	0.80
112	Belize	-	-	-	-	-	-
113	Botswana	-	-	-	-	-	-
114	Chile	7.7	...	...	...	73.5	2.12
115	Costa Rica	2.1	17.2	4.16	1.66	0.4	0.03
116	Croatia	78.3	198.7	45.44	10.89	12.0	0.70
117	Czech Republic	145.6	432.4	42.63	11.76	-	-
118	Dominica	-	-	-	-	0.2	0.67
119	Estonia	41.3	108.2	79.88	22.79	33.0	6.95
120	Gabon	-	-	-	-	-	-
121	Grenada	-	-	-	-	0.6	1.68
122	Hungary	200.5	557.3	54.89	15.20	44.0	1.33
123	Latvia	8.1	29.7	12.73	4.23	10.0	1.43
124	Lebanon	-	-	-	-	-	-
125	Libya	-	-	-	-	-	-
126	Lithuania	10.7	34.3	9.91	3.67	10.6	1.16
127	Malaysia	71.2	142.4	5.81	3.05	19.0	0.40
128	Mauritius	2.6	12.0	9.94	3.68	0.3	0.09
129	Mexico	*14.8*	*60.8*	*0.61*	*0.49*	66.6	0.44
130	Oman	0.6	1.2	0.44	0.53	-	-
131	Panama	...	...	...	...	-	-
132	Poland	*102.1*	...	...	...	14.6	...
133	Saudi Arabia	-	-	-	-	2.3	0.07
134	Seychelles	*0.2*	*0.3*	*4.15*	*1.63*	0.1	0.55
135	Slovak Republic	*31.0*	*106.5*	*19.80*	*6.84*	-	-
136	St. Kitts and Nevis	-	-	-	-	0.5	2.13
137	St. Lucia	...	...	...	...	-	-
138	Trinidad & Tobago	*0.2*	*0.3*	*0.26*	*0.11*	0.2	0.05
139	Uruguay	*1.9*	*4.0*	*1.19*	*0.42*	...	...
140	Venezuela	-	-	-	-	46.9	1.65
	Upper Middle Income	**718.9**	**1'705.4**	**6.28**	**3.34**	**399.0**	**0.76**

		ISDN subscribers (000s) 2002	*B-channel equivalents (000s) 2002*	*B-channel per 1'000 inhabitants 2002*	*B-channel as % of main lines 2002*	*ADSL subscribers Total (000s) 2002*	*ADSL subscribers As % of subscriber lines 2002*
141	Antigua & Barbuda	*0.3*	*1.1*	*13.56*	*2.82*	-	-
142	Australia	114.4	1'268.0	64.49	11.97	108.1	1.06
143	Austria	425.1	1'117.9	137.01	28.03	151.6	4.60
144	Bahamas	-	-	-	-	7.5	5.96
145	Bahrain	1.7	...	...	...	5.0	2.84
146	Barbados	*0.5*	*0.9*	*3.41*	*0.71*	-	-
147	Belgium	443.7	1'179.1	113.86	23.03	518.9	11.82
148	Brunei Darussalam	-	-	-	-	-	-
149	Canada	95.9	801.9	25.53	4.02	1'726.4	8.97
150	Cyprus	19.0	64.5	90.24	13.12	5.9	1.32
151	Denmark	394.4	1'003.3	186.69	27.11	307.1	9.98
152	Finland	217.0	711.4	136.63	26.10	220.0	9.12
153	France	1'900.0	4'900.0	82.16	14.44	1'277.0	4.12
154	French Polynesia	2.8	7.1	29.03	13.58	-	-
155	Germany	10'508.8	24'433.6	296.03	45.48	3'160.0	7.94
156	Greece	355.8	881.0	79.96	16.28	-	-
157	Hong Kong, China	11.8	79.9	11.78	2.09	590.0	15.36
158	Iceland	*18.0*	*51.2*	*178.49*	*26.88*	24.3	16.27
159	Ireland	49.6	375.0	95.40	18.99	2.7	0.16
160	Israel	*56.8*	*272.6*	*41.89*	*8.99*	120.0	4.16
161	Italy	2'400.0	5'756.0	101.94	21.21	850.0	3.57
162	Japan	9'598.0	20'435.0	160.36	28.72	7'023.0	11.56
163	Korea (Rep.)	*134.8*	*245.4*	*5.24*	*1.08*	6'386.6	27.59
164	Kuwait	-	-	-	-	*10.5*	*2.18*
165	Luxembourg	*58.5*	*148.6*	*333.19*	*41.81*	1.2	0.47
166	Macao, China	0.2	0.6	1.41	0.35	17.0	9.65
167	Malta	1.2	28.2	71.13	13.59	11.5	5.55
168	Netherlands	1'536.0	3'688.0	227.72	36.87	370.0	4.71
169	New Caledonia	*1.6*	*6.7*	*30.76*	*13.30*	0.7	...
170	New Zealand	...	...	...	...	39.0	2.19
171	Norway	810.9	1'872.2	411.27	56.00	145.4	6.33
172	Portugal	278.5	860.8	83.29	19.77	52.0	1.41
173	Qatar	1.4	15.1	24.71	8.54	0.1	0.05
174	Singapore	24.4	204.7	49.16	10.62	162.0	9.27
175	Slovenia	99.5	232.1	116.27	22.97	16.7	1.91
176	Spain	1'027.6	2'954.6	72.62	14.35	*960.1*	*5.87*
177	Sweden	273.0	1'017.2	113.74	15.46	241.0	3.96
178	Switzerland	915.0	2'256.0	309.84	41.63	195.2	4.79
179	Taiwan, China	34.1	233.1	10.35	1.78	1'832.7	14.21
180	United Arab Emirates	23.7	47.5	13.61	4.34	16.2	1.48
181	United Kingdom	949.0	422.0	7.14	1.21	854.0	2.70
182	United States	1'655.9	10'406.6	36.09	5.59	*6'471.7*	*3.45*
	High Income	**34'439.1**	**87'978.9**	**91.65**	**15.65**	**33'881.1**	**6.57**
	World	**36'686.6**	**90'726.9**	**15.46**	**9.10**	**37'270.9**	**3.66**
	Africa	**59.8**	**558.9**	**0.71**	**2.68**	**4.3**	**0.03**
	Americas	**1'901.9**	**11'305.3**	**14.52**	**4.09**	**9'096.0**	**3.13**
	Asia	**11'190.2**	**21'820.3**	**6.03**	**5.54**	**18'528.1**	**4.39**
	Europe	**23'415.8**	**55'760.5**	**85.75**	**19.00**	**9'494.6**	**3.38**
	Oceania	**118.9**	**1'281.9**	**41.61**	**10.08**	**147.9**	**1.22**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

10. International telephone traffic

		Outgoing international telephone traffic					International telephone circuits (000s)
		Total M Minutes 2002	As % of bothway 2002	CAGR (%) 1997-2002	Minutes per inhab. 2002	Minutes per subscriber 2002	
1	Angola	34.3	34.9	9.4	2.5	403.5	*0.6*
2	Azerbaijan	32.5	28.9	-5.3	4.0	35.2	1.3
3	Bangladesh	*43.6*	*15.6*	*-1.9*	*0.3*	*77.1*	*2.8*
4	Benin	*17.5*	*35.7*	*18.1*	*2.7*	*294.5*	*0.3*
5	Bhutan	*6.2*	...	*42.6*	*9.2*	*353.2*	*0.1*
6	Burkina Faso	19.7	39.8	20.3	1.7	307.0	1.2
7	Burundi	2.8	...	2.7	0.4	126.8	...
8	Cambodia	9.9	22.8	3.8	0.7	278.4	*0.5*
9	Cameroon	*22.1*	...	*-3.1*	*1.4*	*208.4*	*9.5*
10	Central African Rep.	4.2	...	5.4	1.1	466.1	...
11	Chad	*3.9*	...	*8.8*	*0.5*	*363.0*	...
12	Comoros	3.8	20.5	25.6	5.0	373.0	0.1
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	68.5	36.6	11.3	4.2	203.8	*1.9*
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	*4.3*	...	*22.7*	*9.1*	*623.2*	...
17	Eritrea	4.5	15.1	17.0	1.1	124.7	0.2
18	Ethiopia	12.9	27.3	3.8	0.2	36.4	0.6
19	Gambia	13.5	...	20.3	9.8	352.0	4.9
20	Georgia	*61.6*	*39.4*	*12.4*	*12.4*	*108.2*	...
21	Ghana	58.3	27.6	21.6	2.7	212.6	...
22	Guinea	*18.7*	*60.5*	*34.3*	*2.5*	*733.6*	0.7
23	Guinea-Bissau	*3.0*	*24.8*	*0.9*	*2.5*	*270.8*	...
24	Haiti	*14.2*	...	*7.6*	*1.8*	*202.9*	...
25	India	660.0	21.3	9.4	0.6	15.9	*22.8*
26	Indonesia	289.4	40.3	-	1.4	37.3	*9.6*
27	Kenya	*24.4*	*28.4*	*-4.2*	*0.8*	*74.8*	*1.0*
28	Kyrgyzstan	18.3	29.1	-9.0	3.6	46.4	0.2
29	Lao P.D.R.	*7.2*	*25.1*	*2.9*	*1.3*	*137.8*	*0.3*
30	Lesotho	1.8	50.4	-43.7	0.8	64.3	*0.4*
31	Madagascar	6.6	26.2	-2.8	0.4	111.2	0.4
32	Malawi	*23.5*	*55.8*	*23.9*	*2.3*	*434.7*	0.5
33	Mali	*15.3*	*20.2*	*8.1*	*1.5*	*300.1*	*0.3*
34	Mauritania	*9.8*	...	*15.7*	*3.7*	*394.3*	*0.6*
35	Moldova	52.9	28.9	-1.4	12.0	74.8	*0.4*
36	Mongolia	4.7	...	10.8	1.9	36.8	0.2
37	Mozambique	23.0	...	7.0	1.3	274.1	...
38	Myanmar	9.1	11.3	-10.8	0.2	26.6	1.8
39	Nepal	33.3	36.0	13.9	1.4	101.6	1.1
40	Nicaragua	18.6	18.5	-11.4	3.5	108.5	*1.4*
41	Niger	*6.3*	...	*4.5*	*0.6*	*292.0*	*0.1*
42	Nigeria	86.9	...	10.6	0.7	123.8	...
43	Pakistan	128.3	7.7	10.8	0.9	35.1	*9.3*
44	Papua New Guinea	*24.9*	...	*1.6*	*4.7*	*401.6*	...
45	Rwanda	*5.3*	...	*11.2*	*0.7*	*245.3*	*0.2*
46	S. Tomé & Principe	1.2	23.8	7.2	8.1	194.9	0.1
47	Senegal	*69.6*	*30.7*	*25.9*	*7.1*	*293.6*	*3.6*
48	Sierra Leone	*7.6*	...	*17.6*	*1.6*	*336.1*	...
49	Solomon Islands	*5.9*	...	*14.0*	*13.7*	*799.5*	...
50	Sudan	*36.1*	*15.6*	*24.6*	*1.1*	*79.7*	*2.3*
51	Tajikistan	10.0	20.2	-5.9	1.6	42.1	0.4
52	Tanzania	11.8	22.9	3.0	0.3	72.9	*0.5*
53	Togo	17.9	23.6	16.3	3.7	349.4	0.9
54	Uganda	*7.0*	*35.6*	*2.5*	*0.3*	*124.7*	...
55	Uzbekistan	60.8	...	-0.7	2.4	36.2	*11.1*
56	Viet Nam	67.2	10.0	4.1	0.8	17.1	5.8
57	Yemen	43.9	19.0	11.5	2.3	81.0	*1.6*
58	Zambia	15.6	...	3.8	1.5	177.9	0.5
59	Zimbabwe	*78.4*	...	*11.9*	*6.8*	*309.0*	...
	Low Income	**2'342.8**	**21.2**	**5.9**	**1.0**	**34.6**	**102.0**

		Outgoing international telephone traffic					International telephone circuits (000s) 2002
		Total M Minutes 2002	As % of bothway 2002	CAGR (%) 1997-2002	Minutes per inhab. 2002	Minutes per subscriber 2002	
60	Albania	62.0	13.4	8.7	20.1	281.8	9.0
61	Algeria	*209.2*	...	*20.3*	*6.8*	*111.3*	*4.9*
62	Armenia	36.2	38.3	-5.8	9.5	66.7	1.2
63	Belarus	240.6	48.9	10.1	24.3	81.1	5.5
64	Bolivia	39.1	...	6.1	4.7	69.3	...
65	Bosnia	*89.8*	...	*7.9*	*23.7*	*106.1*	*3.6*
66	Brazil	806.0	...	11.1	4.6	20.8	...
67	Bulgaria	136.9	39.6	12.2	17.6	47.7	5.1
68	Cape Verde	*8.4*	*18.7*	*12.0*	*19.2*	*134.7*	*0.5*
69	China	*1'253.2*	*22.7*	*-6.4*	*1.0*	*6.9*	*76.9*
70	Colombia	*295.3*	...	*17.7*	*6.9*	*40.1*	...
71	Cuba	*37.3*	*12.6*	*7.6*	*3.3*	*65.0*	*3.0*
72	Djibouti	5.7	...	4.1	8.7	563.0	*0.3*
73	Dominican Rep.	222.6	...	9.4	27.0	244.9	...
74	Ecuador	*63.7*	*10.0*	*5.3*	*4.9*	*47.7*	*4.1*
75	Egypt	268.2	20.5	17.6	4.0	36.1	11.8
76	El Salvador	*157.7*	*16.4*	*46.4*	*24.6*	*242.6*	...
77	Fiji	*19.7*	...	*3.5*	*24.2*	*213.6*	*1.0*
78	Guatemala	145.9	15.1	24.6	12.2	172.5	...
79	Guyana	18.9	...	-4.8	21.4	234.3	*0.8*
80	Honduras	*43.0*	*14.9*	*0.7*	*6.9*	*144.0*	*2.3*
81	Iran (I.R.)	259.7	59.7	10.1	4.0	21.3	16.3
82	Jamaica	137.9	22.9	18.7	52.7	310.2	...
83	Jordan	198.4	45.7	16.6	37.2	294.1	*4.1*
84	Kazakhstan	131.6	33.6	2.8	8.2	63.2	...
85	Maldives	7.0	40.6	9.9	25.0	244.9	0.2
86	Marshall Islands	0.7	23.0	-11.5	12.0	155.3	-
87	Morocco	*269.5*	...	*15.9*	*9.2*	*226.2*	*12.0*
88	Namibia	60.6	53.8	4.9	32.3	499.1	...
89	Palestine	39.7	40.9	12.2	11.5	131.6	...
90	Paraguay	28.4	28.5	-1.2	4.9	103.9	...
91	Peru	144.7	11.7	10.8	5.4	82.0	...
92	Philippines	171.0	6.1	-7.3	2.2	51.6	*15.3*
93	Romania	212.0	19.8	13.8	9.8	50.3	9.4
94	Russia	1'219.2	54.8	5.0	8.3	34.3	*21.0*
95	Samoa	*13.7*	*51.6*	*17.9*	*77.0*	*1'421.5*	...
96	Serbia and Montenegro	305.8	32.0	7.4	28.5	122.7	11.3
97	South Africa	567.2	41.1	9.0	12.5	117.1	...
98	Sri Lanka	*48.1*	*16.3*	*9.4*	*2.6*	*58.0*	*3.6*
99	St. Vincent	10.5	19.3	1.9	89.7	384.3	*0.6*
100	Suriname	26.4	39.0	42.8	55.0	336.1	0.7
101	Swaziland	23.0	55.8	2.5	22.3	656.8	*0.9*
102	Syria	*163.3*	*33.1*	*16.0*	*9.8*	*89.9*	*10.0*
103	TFYR Macedonia	64.7	25.2	4.8	31.3	115.5	*3.1*
104	Thailand	335.2	50.6	3.4	5.4	51.6	8.2
105	Tonga	*3.1*	...	*27.2*	*31.0*	*284.3*	0.1
106	Tunisia	*173.9*	*33.2*	*15.4*	*18.0*	*164.3*	*4.8*
107	Turkey	649.8	35.8	3.0	9.7	34.4	20.8
108	Turkmenistan	24.1	...	15.9	5.0	64.4	...
109	Ukraine	393.3	54.6	-4.2	7.8	36.3	4.9
110	Vanuatu	*2.8*	...	*1.6*	*14.3*	*416.4*	...
	Lower Middle Income	**9'844.8**	**27.8**	**5.3**	**4.1**	**27.4**	**277.6**

10. International telephone traffic

		Outgoing international telephone traffic					International telephone circuits (000s) 2002
		Total M Minutes 2002	As % of bothway 2002	CAGR (%) 1997-2002	Minutes per inhab. 2002	Minutes per subscriber 2002	
111	Argentina	426.7	...	14.6	11.7	53.3	...
112	Belize	11.6	27.6	10.1	45.7	369.1	0.5
113	Botswana	63.7	58.2	11.5	37.0	424.7	...
114	Chile	273.6	37.5	2.7	18.2	78.9	...
115	Costa Rica	129.4	44.9	14.1	31.2	124.7	...
116	Croatia	360.8	46.2	7.0	82.5	197.7	9.8
117	Czech Republic	392.3	36.6	5.1	38.7	106.7	19.1
118	Dominica	*9.8*	...	*4.6*	*126.0*	*421.5*	...
119	Estonia	103.2	...	9.2	76.2	217.3	*42.8*
120	Gabon	27.4	...	8.3	21.1	854.2	...
121	Grenada	28.8	43.6	24.1	271.7	858.6	*0.6*
122	Hungary	240.2	39.4	-3.5	23.7	65.5	...
123	Latvia	45.4	27.9	-1.9	19.5	64.8	2.6
124	Lebanon	*93.0*	...	*11.6*	*27.8*	*148.6*	...
125	Libya	*45.2*	...	*1.3*	*8.1*	*68.5*	...
126	Lithuania	33.9	...	-8.8	9.8	36.2	...
127	Malaysia	*680.0*	*45.6*	*9.7*	*28.5*	*144.4*	*40.3*
128	Mauritius	37.1	36.9	8.5	30.7	113.4	1.1
129	Mexico	1'996.9	25.5	10.5	19.6	133.6	...
130	Oman	165.8	...	17.4	61.2	728.6	...
131	Panama	*45.3*	*27.4*	*2.4*	*15.6*	*120.3*	*4.7*
132	Poland	*833.7*	*40.8*	*12.0*	*21.6*	*73.1*	...
133	Saudi Arabia	1'916.3	70.2	23.8	83.1	577.6	34.4
134	Seychelles	*8.2*	...	*20.8*	*100.1*	*392.8*	...
135	Slovak Republic	194.0	...	4.0	36.1	134.5	*0.1*
136	St. Kitts and Nevis	11.3	34.0	0.3	240.4	480.9	...
137	St. Lucia	15.6	27.6	4.9	97.5	305.2	...
138	Trinidad & Tobago	*67.9*	*31.6*	*2.2*	*52.2*	*217.8*	*2.6*
139	Uruguay	*83.1*	...	*3.8*	*24.7*	*87.3*	*1.8*
140	Venezuela	*281.0*	...	*15.3*	*11.4*	*103.9*	...
	Upper Middle Income	**8'621.1**	**38.6**	**10.6**	**26.2**	**130.3**	**160.4**

		Outgoing international telephone traffic					International telephone circuits (000s)
		Total M Minutes 2002	As % of bothway 2002	CAGR (%) 1997-2002	Minutes per inhab. 2002	Minutes per subscriber 2002	
141	Antigua & Barbuda	15.5	30.4	2.1	198.7	407.4	...
142	Australia	*2'250.0*	*54.2*	*14.7*	*116.1*	*214.6*	...
143	Austria	1'246.0	60.3	3.1	152.7	312.4	...
144	Bahamas	*67.3*	*37.6*	*1.8*	*219.2*	*545.8*	...
145	Bahrain	199.4	52.4	13.3	299.0	1'136.5	4.9
146	Barbados	*80.6*	*60.2*	*25.0*	*300.3*	*624.7*	...
147	Belgium	1'805.8	...	6.1	174.4	352.7	...
148	Brunei Darussalam	*25.5*	...	*-5.7*	*74.6*	*288.3*	...
149	Canada	8.2	...	-71.4	0.3	0.4	...
150	Cyprus	255.8	61.0	10.6	357.7	520.0	5.3
151	Denmark	792.3	...	8.9	147.4	214.1	...
152	Finland	469.4	...	4.0	90.1	172.2	...
153	France	4'703.0	38.4	8.7	78.9	138.6	...
154	French Polynesia	*18.3*	...	*18.6*	*77.4*	*347.7*	*0.5*
155	Germany	10'186.0	...	16.2	123.4	189.6	...
156	Greece	857.4	46.5	7.5	77.8	158.4	*14.9*
157	Hong Kong, China	3'981.1	69.5	18.3	586.7	1'038.9	...
158	Iceland	*37.1*	*45.7*	*-0.4*	*129.4*	*194.9*	-
159	Ireland	1'395.0	...	15.0	354.9	706.3	...
160	Israel	1'193.7	59.5	21.1	179.9	385.1	...
161	Italy	*4'610.0*	*45.9*	*20.2*	*79.5*	*168.5*	*197.0*
162	Japan	2'638.5	...	8.3	20.7	37.1	...
163	Korea (Rep.)	1'041.8	52.9	2.9	21.9	44.8	84.8
164	Kuwait	189.8	...	3.5	80.3	393.9	4.5
165	Luxembourg	*462.6*	*61.3*	*12.7*	*1'052.5*	*1'334.1*	*7.3*
166	Macao, China	152.0	57.4	5.0	344.2	863.1	4.2
167	Malta	43.6	38.6	4.9	110.2	210.6	1.3
168	Netherlands	*2'600.0*	...	*14.1*	*161.4*	*259.9*	...
169	New Caledonia	*19.1*	...	*16.3*	*86.9*	*375.7*	*0.5*
170	New Zealand	965.0	...	19.0	245.0	546.7	...
171	Norway	551.0	44.2	2.8	121.0	164.8	...
172	Portugal	541.0	...	6.6	52.3	124.2	...
173	Qatar	233.5	63.4	18.3	382.9	1'323.0	12.2
174	Singapore	1'965.0	...	11.1	471.9	1'019.6	...
175	Slovenia	106.7	...	-1.2	53.4	105.6	*4.4*
176	Spain	*3'673.0*	*51.4*	*23.8*	*90.9*	*209.5*	...
177	Sweden	*1'266.0*	...	*7.6*	*142.6*	*188.2*	...
178	Switzerland	*2'590.0*	...	*7.3*	*357.5*	*481.1*	*55.0*
179	Taiwan, China	2'153.9	56.8	22.2	95.6	164.4	46.1
180	United Arab Emirates	1'894.2	...	20.7	543.1	1'732.0	82.6
181	United Kingdom	9'000.0	...	10.5	152.3	257.9	...
182	United States	40'337.2	73.9	12.3	139.9	216.6	*464.2*
	High Income	**106'621.3**	**62.2**	**10.6**	**110.8**	**190.5**	**989.7**
	World	**127'430.1**	**51.4**	**10.0**	**21.0**	**121.0**	**1'529.7**
	Africa	**2'507.5**	**31.9**	**10.6**	**3.4**	**114.1**	**67.7**
	Americas	**46'099.9**	**63.0**	**8.7**	**54.7**	**157.5**	**487.3**
	Asia	**22'677.0**	**41.9**	**11.4**	**6.2**	**56.8**	**518.8**
	Europe	**52'822.5**	**44.1**	**10.4**	**66.2**	**161.7**	**453.9**
	Oceania	**3'323.2**	**54.2**	**13.3**	**107.7**	**264.9**	**2.1**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

11. Telecommunication staff

		Total telecommunication staff				Mobile staff	
		Total (000s) 2002	CAGR (%) 1997-2002	% female 2002	Subscribers per employee 2002	Total (000s) 2002	Subscribers per employee 2002
1	Angola	2.2	0.8	27.7	96	...	...
2	Azerbaijan	8.1	-7.6	41.1	220	...	...
3	Bangladesh	*19.8*	*0.7*	...	*55*	...	...
4	Benin	*1.2*	*-1.1*	*12.8*	*150*	...	...
5	Bhutan	0.4	-3.7	11.0	49	-	-
6	Burkina Faso	1.3	0.3	13.3	122	*0.04*	*1'125*
7	Burundi	*0.7*	*4.4*	...	*69*	...	...
8	Cambodia	0.6	-5.2	31.9	720	...	...
9	Cameroon	2.2	4.1	...	354	...	...
10	Central African Rep.	0.4	-	15.0	54	...	...
11	Chad	*0.7*	*18.0*	...	*50*	...	...
12	Comoros	*0.1*	*-3.6*	...	*73*	-	-
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	3.7	0.7	28.7	368	1.24	826
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	*0.2*	*16.1*	...	*110*	...	...
17	Eritrea	0.6	0.4	46.6	56	-	-
18	Ethiopia	7.6	6.2	33.3	53	...	...
19	Gambia	1.1	4.5	24.3	124	...	...
20	Georgia	16.5	12.5	...	70	...	...
21	Ghana	4.8	6.3	19.3	150	*0.10*	*1'957*
22	Guinea	0.8	-1.4	32.8	150	0.05	1'681
23	Guinea-Bissau	*0.2*	*0.6*	...	*46*	-	-
24	Haiti	*4.5*	*12.6*	...	*38*	...	...
25	India	*416.6*	*-0.5*	...	*108*	...	...
26	Indonesia	*39.8*	*-0.3*	...	*345*	...	...
27	Kenya	*19.3*	*8.9*	*27.9*	*48*	...	...
28	Kyrgyzstan	*7.7*	*3.6*	*53.0*	*54*	...	...
29	Lao P.D.R.	1.4	5.1	29.3	85	*0.08*	*379*
30	Lesotho	0.4	-10.7	38.4	336	...	...
31	Madagascar	2.4	-3.6	22.7	93	0.68	240
32	Malawi	*3.2*	*-9.3*	*9.8*	*35*	*0.45*	*124*
33	Mali	*1.4*	*0.1*	*22.4*	*71*	...	...
34	Mauritania	*0.7*	*16.4*	*28.8*	*48*	...	...
35	Moldova	7.5	-0.7	38.0	140	0.38	888
36	Mongolia	4.2	-3.4	54.4	82	0.33	655
37	Mozambique	2.1	-0.6	30.0	158	0.37	685
38	Myanmar	7.9	1.2	43.1	49	...	...
39	Nepal	4.7	2.5	9.7	75	...	...
40	Nicaragua	2.1	-7.7	42.7	179	0.05	3'976
41	Niger	*1.3*	*-1.3*	...	*18*	...	...
42	Nigeria	12.1	-1.0	17.5	192	*0.21*	*1'914*
43	Pakistan	*55.8*	*1.4*	...	*73*	...	...
44	Papua New Guinea	*1.8*	...	*19.0*	*41*	...	...
45	Rwanda	*0.4*	*8.8*	*23.0*	*247*	...	...
46	S. Tomé & Principe	0.1	-6.6	21.1	87	-	-
47	Senegal	*1.6*	*3.7*	*23.5*	*346*	*0.12*	*2'624*
48	Sierra Leone	*1.2*	*5.8*	...	*42*	...	...
49	Solomon Islands	*0.2*	*-14.1*	*14.6*	*55*	...	...
50	Sudan	*3.0*	*5.2*	*17.9*	*184*	...	...
51	Tajikistan	5.0	0.3	37.0	50	...	...
52	Tanzania	3.5	-5.7	30.4	237	...	...
53	Togo	0.9	0.9	18.3	248	0.12	1'417
54	Uganda	*2.4*	*14.4*	...	*138*	...	...
55	Uzbekistan	*24.3*	*-5.0*	...	*74*	...	...
56	Viet Nam	80.0	-2.1	...	73	...	...
57	Yemen	5.4	8.4	7.1	176	...	...
58	Zambia	*3.1*	*-1.8*	*23.3*	*68*	...	...
59	Zimbabwe	*4.0*	*-10.8*	...	*144*	...	...
	Low Income	**805.2**	**-0.2**	**29.4**	**113**	**4.22**	**826**

		Total telecommunication staff				*Mobile staff*	
		Total (000s) 2002	*CAGR (%) 1997-2002*	*% female 2002*	*Subscribers per employee 2002*	*Total (000s) 2002*	*Subscribers per employee 2002*
60	Albania	3.4	-6.0	40.5	319	0.50	1'716
61	Algeria	*17.9*	*-1.2*	…	*111*	…	…
62	Armenia	5.9	-7.7	45.1	104	…	…
63	Belarus	26.5	0.6	44.9	130	1.02	454
64	Bolivia	*3.0*	*-9.2*	…	*432*	…	…
65	Bosnia	7.0	37.3	5.4	238	…	…
66	Brazil	*93.5*	*1.7*	…	*708*	*19.55*	*1'471*
67	Bulgaria	27.5	0.7	51.1	199	2.98	873
68	Cape Verde	0.5	2.8	67.0	241	…	…
69	China	*685.0*	*21.0*	…	*222*	…	…
70	Colombia	*32.2*	*6.0*	…	*330*	…	…
71	Cuba	*16.7*	*1.8*	*50.6*	*35*	…	…
72	Djibouti	*0.6*	*4.2*	…	*23*	…	…
73	Dominican Rep.	*16.2*	*57.8*	-	*99*	…	…
74	Ecuador	*4.9*	*-3.9*	*23.8*	*451*	…	…
75	Egypt	53.1	0.4	21.7	225	…	…
76	El Salvador	*3.9*	*-8.0*	…	*391*	…	…
77	Fiji	*1.2*	*3.2*	…	*139*	…	…
78	Guatemala	*3.2*	*-11.4*	…	*594*	…	…
79	Guyana	*0.6*	*-2.8*	…	*241*	…	…
80	Honduras	5.2	1.7	28.8	126	…	…
81	Iran (I.R.)	47.3	-0.2	6.3	304	0.60	3'645
82	Jamaica	*2.6*	*-9.7*	…	*437*	…	…
83	Jordan	6.2	3.5	19.7	303	1.17	1'044
84	Kazakhstan	32.2	-6.1	…	97	…	…
85	Maldives	0.5	5.4	27.0	136	…	…
86	Marshall Islands	0.1	-0.7	50.0	45	*0.01*	*98*
87	Morocco	*16.2*	*3.3*	…	*368*	…	…
88	Namibia	1.5	-2.1	…	181	…	…
89	Palestine	1.6	13.6	…	388	0.50	640
90	Paraguay	*11.7*	*17.3*	…	*123*	*0.74*	*1'546*
91	Peru	*5.4*	*-1.8*	…	*657*	…	…
92	Philippines	12.1	-5.0	…	1'526	…	…
93	Romania	36.9	-6.7	45.2	252	4.07	1'257
94	Russia	*427.7*	*-1.5*	…	*83*	…	…
95	Samoa	*0.2*	*-7.3*	…	*66*	…	…
96	Serbia and Montenegro	14.0	0.7	34.4	374	0.44	6'251
97	South Africa	41.6	-6.1	22.3	449	*8.16*	*1'322*
98	Sri Lanka	*11.4*	*2.4*	*20.0*	*131*	*1.12*	*594*
99	St. Vincent	*0.2*	*-4.4*	*20.0*	*165*	…	…
100	Suriname	1.0	-2.6	28.2	182	0.01	7'740
101	Swaziland	*0.5*	*1.3*	…	*183*	…	…
102	Syria	*21.7*	*3.8*	*27.0*	*93*	*0.12*	*1'667*
103	TFYR Macedonia	*3.8*	*2.5*	*32.9*	*202*	…	…
104	Thailand	29.3	-3.6	…	771	…	…
105	Tonga	0.3	2.1	37.4	50	0.01	373
106	Tunisia	*7.4*	*4.4*	*30.1*	*196*	…	…
107	Turkey	63.6	-2.8	15.3	665	…	…
108	Turkmenistan	*7.5*	*-0.9*	…	*53*	…	…
109	Ukraine	125.8	-0.8	…	120	…	…
110	Vanuatu	*0.2*	*0.1*	…	*40*	…	…
	Lower Middle Income	**1'938.5**	**1.8**	**25.9**	**243**	**40.99**	**1'395**

11. Telecommunication staff

		Total telecommunication staff				Mobile staff	
		Total (000s) 2002	CAGR (%) 1997-2002	% female 2002	Subscribers per employee 2002	Total (000s) 2002	Subscribers per employee 2002
111	Argentina	*24.0*	*1.0*	...	*627*	...	...
112	Belize	0.4	5.4	...	202	...	...
113	Botswana	*1.7*	*0.3*	*28.0*	*266*	...	...
114	Chile	19.4	4.5	...	511	4.47	1'443
115	Costa Rica	4.9	2.0	22.6	307	0.32	1'423
116	Croatia	10.7	0.6	70.1	389	1.90	1'232
117	Czech Republic	24.0	-2.5	36.7	512	6.35	1'355
118	Dominica	*0.2*	...	...	*132*	...	...
119	Estonia	3.5	-1.4	...	387	0.60	1'468
120	Gabon	*1.2*	*10.5*	...	*256*	...	...
121	Grenada	*0.2*	*-6.6*	*34.1*	*185*	...	...
122	Hungary	20.8	-0.9	...	507	4.11	1'669
123	Latvia	3.9	-6.1	41.0	415	...	...
124	Lebanon	*5.7*	*6.8*	...	*210*	...	...
125	Libya	*14.0*	*2.5*	...	*46*	...	...
126	Lithuania	*5.3*	*-14.4*	...	*409*	...	...
127	Malaysia	*21.2*	*-6.2*	...	*574*	...	...
128	Mauritius	1.8	0.1	20.4	374	...	...
129	Mexico	*99.3*	*11.9*	...	*358*	*14.24*	*1'528*
130	Oman	2.2	0.6	...	319	...	...
131	Panama	*5.5*	*14.2*	...	*153*	...	...
132	Poland	*69.0*	*-1.8*	...	*256*	...	...
133	Saudi Arabia	21.3	1.4	-	390	...	...
134	Seychelles	*0.4*	*2.5*	*33.2*	*162*	...	...
135	Slovak Republic	*14.7*	*-1.0*	*35.3*	*253*	*1.80*	*1'192*
136	St. Kitts and Nevis	*0.1*	*-6.5*	...	*167*	...	...
137	St. Lucia	...	...	...	...	...	...
138	Trinidad & Tobago	*3.1*	*3.2*	...	*182*	...	...
139	Uruguay	*5.7*	*-0.5*	...	*260*	...	...
140	Venezuela	14.8	2.1	...	630	...	...
	Upper Middle Income	**399.0**	**1.4**	**30.3**	**382**	**33.80**	**1'465**

		Total telecommunication staff				*Mobile staff*	
		Total (000s) 2002	*CAGR (%) 1997-2002*	*% female 2002*	*Subscribers per employee 2002*	*Total (000s) 2002*	*Subscribers per employee 2002*
141	Antigua & Barbuda	*0.2*	...	...	*338*	...	...
142	Australia	*77.0*	*-2.9*	37.7	*281*	...	...
143	Austria	*17.6*	*-0.1*	...	*600*	...	...
144	Bahamas	*1.1*	*-15.8*	...	*165*	...	...
145	Bahrain	1.9	-1.7	...	300	...	...
146	Barbados	*1.0*	*0.7*	*43.4*	*176*	*0.08*	*656*
147	Belgium	25.9	0.8	...	511	4.91	1'657
148	Brunei Darussalam	...	...	...	...	...	...
149	Canada	84.3	-1.7	...	377	12.50	948
150	Cyprus	2.4	0.3	24.3	376	0.10	4'058
151	Denmark	*22.4*	*6.9*	...	*349*	...	...
152	Finland	22.0	4.1	...	329	...	...
153	France	146.2	-2.3	...	496	...	...
154	French Polynesia	*0.9*	*1.6*	...	*129*	...	...
155	Germany	231.5	1.1	...	491	25.20	2'383
156	Greece	*18.5*	*-5.0*	18.3	*732*	5.64	1'652
157	Hong Kong, China	17.8	-13.5	...	576	...	...
158	Iceland	*1.3*	*8.8*	*40.6*	*336*	...	...
159	Ireland	14.9	6.3	...	334	3.00	1'000
160	Israel	*12.2*	*9.9*	...	*733*	...	...
161	Italy	*75.8*	*-7.0*	...	*915*	...	...
162	Japan	*149.5*	*-5.0*	...	*991*	...	...
163	Korea (Rep.)	53.3	-6.2	...	1'044	7.54	4'287
164	Kuwait	7.3	-2.8	36.4	234	...	...
165	Luxembourg	*1.5*	*15.8*	...	*508*	...	...
166	Macao, China	1.1	1.4	*37.3*	425	...	...
167	Malta	1.8	-	...	275	0.44	631
168	Netherlands	*58.5*	*20.1*	21.3	*353*	...	...
169	New Caledonia	*0.3*	*3.2*	...	*367*	...	...
170	New Zealand	*5.6*	*-8.9*	...	*732*	...	...
171	Norway	15.1	-6.6	...	476	...	...
172	Portugal	18.1	-2.7	...	710	*4.11*	*1'942*
173	Qatar	1.8	1.5	*14.4*	248	...	...
174	Singapore	*8.8*	*1.5*	...	*561*	...	...
175	Slovenia	4.5	7.1	31.3	601	...	...
176	Spain	*64.2*	*0.1*	19.3	*735*	...	...
177	Sweden	21.6	-6.8	45.0	672	...	...
178	Switzerland	23.5	1.2	...	475	...	...
179	Taiwan, China	38.1	2.0	33.5	971	8.02	2'980
180	United Arab Emirates	9.5	7.6	14.4	369	...	...
181	United Kingdom	236.0	6.3	24.2	358	...	...
182	United States	1'093.7	2.0	...	299	192.41	732
	High Income	**2'588.7**	**0.6**	**26.8**	**453**	**263.96**	**1'129**
	World	**5'731.4**	**0.9**	**27.0**	**329**	**342.97**	**1'190**
	Africa	**249.2**	**-0.4**	**23.5**	**219**	**11.55**	**1'168**
	Americas	**1'564.8**	**2.2**	**26.6**	**337**	**244.38**	**866**
	Asia	**1'910.8**	**1.3**	**22.6**	**308**	**19.49**	**3'135**
	Europe	**1'918.8**	**-**	**28.4**	**360**	**67.54**	**1'808**
	Oceania	**87.8**	**-2.2**	**37.2**	**299**	**0.01**	**275**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

12. Telecommunication revenue

		Telecommunication revenue					
		Total (M US$) 2002	*% mobile 2002*	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*Per employee (US$) 2002*	*As a % of GDP 2002*
1	Angola	*113.8*	*27.4*	*8.7*	*1'191*	*53'906*	*1.3*
2	Azerbaijan	85.8	1.8	10.5	48	10'542	2.2
3	Bangladesh	*334.9*	*30.2*	*2.6*	*309*	*16'903*	*0.7*
4	Benin	*61.9*	*33.0*	*9.4*	*336*	*50'312*	*2.6*
5	Bhutan	*10.6*	-	*15.7*	*604*	*28'064*	...
6	Burkina Faso	63.3	...	5.3	410	49'965	2.4
7	Burundi	*14.7*	*43.6*	*2.1*	*291*	*20'083*	*2.2*
8	Cambodia	*21.8*	...	*1.7*	*135*	*32'541*	*0.6*
9	Cameroon	*68.6*	...	*4.7*	*682*	*30'997*	...
10	Central African Rep.	10.8	2.7	2.7	498	26'901	1.1
11	Chad	*21.3*	...	*2.9*	*2'199*	*53'325*	...
12	Comoros	*8.6*	-	*11.9*	*971*	*71'203*	*3.9*
13	Congo	...	...	...	...	...	...
14	Côte d'Ivoire	398.7	49.7	24.2	292	107'698	3.4
15	D.R. Congo	...	...	...	...	...	...
16	Equatorial Guinea	*18.8*	...	*40.1*	*860*	*94'129*	*1.1*
17	Eritrea	16.4	-	4.1	458	25'647	...
18	Ethiopia	104.4	13.0	1.6	258	13'778	1.7
19	Gambia	*26.6*	...	*19.9*	*296*	*27'740*	*6.1*
20	Georgia	135.0	60.2	27.4	117	8'182	4.1
21	Ghana	126.1	9.8	5.8	174	26'083	2.9
22	Guinea	*28.5*	*65.1*	*3.8*	*352*	*35'402*	*1.0*
23	Guinea-Bissau	...	...	...	...	...	...
24	Haiti	...	...	...	...	...	...
25	India	*7'644.8*	*17.5*	*7.4*	*170*	*18'348*	*1.6*
26	Indonesia	*2'167.1*	*35.5*	*10.4*	*158*	*54'422*	*1.5*
27	Kenya	*483.4*	*40.1*	*15.4*	*522*	*25'000*	*4.2*
28	Kyrgyzstan	43.2	22.2	8.5	97	...	2.7
29	Lao P.D.R.	27.0	...	4.9	231	19'600	1.5
30	Lesotho	11.9	19.2	5.5	98	33'035	1.7
31	Madagascar	96.0	46.2	6.0	432	40'230	2.2
32	Malawi	*33.8*	*53.6*	*3.3*	*308*	*10'641*	*2.1*
33	Mali	*59.2*	...	*5.7*	*614*	*43'399*	*2.0*
34	Mauritania	*25.2*	...	*9.9*	*736*	*35'043*	*2.8*
35	Moldova	96.1	30.1	21.8	92	12'856	6.5
36	Mongolia	56.7	0.0	23.3	165	13'469	5.4
37	Mozambique	128.4	36.2	7.0	379	60'100	3.3
38	Myanmar	11.1	30.9	0.2	28	1'396	0.2
39	Nepal	84.2	6.0	3.6	241	17'958	1.5
40	Nicaragua	101.4	1.3	18.9	271	48'588	4.0
41	Niger	*18.4*	*3.2*	*1.6*	*772*	*13'732*	*1.1*
42	Nigeria	*355.4*	...	*3.1*	*674*	*30'670*	*0.7*
43	Pakistan	1'442.0	22.3	9.9	295	...	2.3
44	Papua New Guinea	*79.2*	*5.3*	*15.4*	*1'078*	*44'218*	*2.0*
45	Rwanda	*20.1*	...	*2.5*	*232*	*57'402*	*1.2*
46	S. Tomé & Principe	6.9	0.01	45.7	839	72'607	13.8
47	Senegal	*202.0*	*15.3*	*20.6*	*375*	*129'716*	*4.4*
48	Sierra Leone	...	...	...	...	...	...
49	Solomon Islands	*12.1*	...	*28.0*	*1'447*	*80'082*	*4.6*
50	Sudan	*164.8*	...	*5.2*	*296*	*54'565*	*1.3*
51	Tajikistan	7.6	...	1.2	30	1'521	0.6
52	Tanzania	*218.5*	*39.2*	*6.5*	*380*	*61'176*	*2.4*
53	Togo	42.1	...	8.6	190	47'329	2.9
54	Uganda	275.0	...	11.1	613	...	4.6
55	Uzbekistan	*195.6*	*54.6*	*7.8*	*109*	*8'059*	*1.7*
56	Viet Nam	1'400.2	...	17.2	240	17'502	4.0
57	Yemen	144.2	...	7.4	151	26'658	1.4
58	Zambia	*69.2*	*2.0*	*6.5*	*335*	*22'620*	*2.2*
59	Zimbabwe	*207.2*	*60.5*	*18.0*	*356*	*51'183*	*2.8*
	Low Income	**17'600.6**	**24.4**	**7.6**	**198**	**21'624**	**1.8**

		Telecommunication revenue					
		Total (M US$) 2002	*% mobile 2002*	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*Per employee (US$) 2002*	*As a % of GDP 2002*
60	Albania	250.6	60.4	81.4	234	74'596	6.1
61	Algeria	*361.7*	*...*	*11.7*	*183*	*20'205*	*0.7*
62	Armenia	82.1	25.2	21.6	133	13'884	3.5
63	Belarus	214.8	0.2	21.7	63	8'112	1.5
64	Bolivia	*389.3*	*11.8*	*47.0*	*298*	*128'894*	*4.9*
65	Bosnia	*208.9*	*30.2*	*55.0*	*162*	*30'727*	*4.5*
66	Brazil	*20'428.0*	*32.0*	*118.9*	*309*	*218'495*	*4.0*
67	Bulgaria	910.7	43.8	116.7	167	33'137	5.9
68	Cape Verde	*41.6*	*19.3*	*95.3*	*444*	*89'327*	*7.7*
69	China	50'993.8	48.8	39.7	121	...	4.1
70	Colombia	3'875.8	16.3	89.5	314	...	4.8
71	Cuba	*787.0*	*...*	*70.0*	*1'350*	*47'126*	*4.6*
72	Djibouti	*22.5*	*...*	*34.9*	*1'740*	*40'408*	*3.9*
73	Dominican Rep.	*...*	*...*	*...*	*...*	*...*	*...*
74	Ecuador	*448.2*	*...*	*34.8*	*204*	*92'127*	*3.3*
75	Egypt	2'486.1	44.5	36.9	208	46'812	2.9
76	El Salvador	*586.6*	*...*	*91.7*	*389*	*152'010*	*4.3*
77	Fiji	*88.2*	*26.4*	*108.4*	*509*	*70'810*	*5.2*
78	Guatemala	*448.5*	*...*	*38.4*	*236*	*139'929*	*2.2*
79	Guyana	*80.1*	*...*	*92.0*	*516*	*124'150*	*11.2*
80	Honduras	390.1	...	58.2	601	75'501	5.9
81	Iran (I.R.)	1'270.1	18.7	19.4	88	26'838	0.3
82	Jamaica	*524.8*	*...*	*201.9*	*462*	*201'909*	*6.5*
83	Jordan	760.6	48.5	142.7	402	121'846	8.6
84	Kazakhstan	601.9	50.9	37.7	194	18'695	2.5
85	Maldives	65.2	43.1	232.2	925	125'692	10.5
86	Marshall Islands	6.7	...	117.7	1'351	60'545	6.7
87	Morocco	1'651.5	38.7	55.7	225	...	4.9
88	Namibia	85.0	...	45.4	313	56'578	2.7
89	Palestine	*103.2*	*...*	*31.3*	*174*	*62'141*	*...*
90	Paraguay	*308.6*	*...*	*54.7*	*214*	*26'303*	*4.5*
91	Peru	*1'394.7*	*27.3*	*53.5*	*391*	*256'899*	*2.6*
92	Philippines	2'728.9	48.9	34.3	147	224'949	3.5
93	Romania	1'727.3	39.4	79.7	185	46'767	3.8
94	Russia	*6'955.8*	*...*	*47.4*	*170*	*...*	*2.2*
95	Samoa	*10.1*	*...*	*56.3*	*826*	*54'365*	*3.9*
96	Serbia and Montenegro	*357.6*	*...*	*33.5*	*81*	*25'461*	*...*
97	South Africa	5'338.8	57.0	117.5	286	128'368	5.1
98	Sri Lanka	334.5	...	17.7	184	...	2.0
99	St. Vincent	*28.8*	*...*	*254.2*	*1'057*	*174'721*	*8.4*
100	Suriname	55.8	38.1	116.0	298	54'233	6.2
101	Swaziland	*26.4*	*69.4*	*25.9*	*304*	*55'676*	*2.1*
102	Syria	*432.6*	*12.3*	*26.0*	*214*	*19'946*	*2.3*
103	TFYR Macedonia	*218.4*	*...*	*106.9*	*287*	*57'844*	*...*
104	Thailand	4'140.5	50.6	66.9	183	141'224	3.3
105	Tonga	*4.3*	*...*	*43.9*	*467*	*16'598*	*...*
106	Tunisia	*476.1*	*25.4*	*49.2*	*329*	*64'341*	*2.4*
107	Turkey	*5'196.0*	*2.7*	*78.4*	*135*	*74'292*	*3.6*
108	Turkmenistan	*56.2*	*0.5*	*11.6*	*142*	*7'481*	*1.3*
109	Ukraine	*1'559.4*	*...*	*31.0*	*121*	*12'357*	*4.1*
110	Vanuatu	*12.2*	*...*	*62.2*	*1'721*	*68'366*	*5.6*
	Lower Middle Income	**119'526.7**	**40.9**	**50.2**	**161**	**73'658**	**3.4**

12. Telecommunication revenue

		Telecommunication revenue					
		Total (M US$) 2002	*% mobile 2002*	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*Per employee (US$) 2002*	*As a % of GDP 2002*
111	Argentina	*7'547.0*	*34.5*	*208.3*	*500*	*313'922*	*2.8*
112	Belize	56.0	19.6	221.3	674	135'922	7.0
113	Botswana	*176.5*	*41.3*	*105.0*	*385*	*102'402*	*3.6*
114	Chile	2'420.9	...	160.9	244	124'849	3.6
115	Costa Rica	364.3	38.2	87.9	243	74'711	2.2
116	Croatia	1'239.5	44.0	283.4	298	115'843	5.5
117	Czech Republic	3'269.7	50.5	322.3	266	136'169	4.7
118	Dominica	*13.4*	...	*175.0*	*605*	*79'706*	...
119	Estonia	418.7	56.6	309.0	309	119'618	6.5
120	Gabon	*108.0*	...	*88.1*	*679*	*101'694*	*2.1*
121	Grenada	...	...	...	...	...	...
122	Hungary	3'719.7	35.0	366.4	353	178'969	5.6
123	Latvia	237.1	...	101.8	147	60'732	2.8
124	Lebanon	*596.9*	...	*184.5*	*498*	*104'716*	...
125	Libya	...	...	...	...	...	...
126	Lithuania	441.8	48.6	127.6	171	...	3.2
127	Malaysia	*4'465.3*	*47.5*	*186.8*	*366*	*210'259*	*5.1*
128	Mauritius	163.3	...	134.9	241	90'163	3.4
129	Mexico	16'938.4	...	166.3	414	...	2.7
130	Oman	509.2	46.3	187.8	735	234'551	2.5
131	Panama	*437.0*	*8.7*	*153.9*	*521*	*79'455*	*4.4*
132	Poland	*7'068.9*	*24.2*	*182.9*	*400*	*102'428*	*4.5*
133	Saudi Arabia	6'279.2	55.0	272.3	754	294'122	3.3
134	Seychelles	*40.1*	...	*494.3*	*891*	*108'391*	*6.7*
135	Slovak Republic	*939.7*	*37.7*	*174.7*	*254*	*64'130*	*4.6*
136	St. Kitts and Nevis	*27.6*	...	*619.7*	*1'331*	*164'524*	...
137	St. Lucia	...	...	...	...	...	...
138	Trinidad & Tobago	*298.9*	*24.6*	*229.9*	*526*	*95'549*	*3.3*
139	Uruguay	*714.1*	*28.0*	*212.5*	*486*	*126'018*	*3.8*
140	Venezuela	2'934.2	...	116.4	315	198'675	2.3
	Upper Middle Income	**61'425.4**	**39.4**	**190.0**	**390**	**157'243**	**3.3**

		Telecommunication revenue					
		Total (M US$) 2002	*% mobile 2002*	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*Per employee (US$) 2002*	*As a % of GDP 2002*
141	Antigua & Barbuda	...	...	...	...	...	...
142	Australia	*13'382.4*	*24.0*	*690.3*	*619*	*173'797*	*3.7*
143	Austria	5'245.3	56.0	642.9	504	...	2.6
144	Bahamas	...	...	...	...	...	...
145	Bahrain	488.9	38.8	733.2	866	260'214	6.4
146	Barbados	*177.8*	*16.3*	*662.6*	*976*	*172'273*	*7.0*
147	Belgium	6'877.9	44.5	664.2	519	265'280	2.8
148	Brunei Darussalam	...	...	...	...	...	...
149	Canada	21'014.6	...	669.0	661	249'328	2.9
150	Cyprus	347.4	...	485.8	382	143'735	3.4
151	Denmark	*4'216.6*	*24.5*	*787.4*	*539*	*188'232*	*2.6*
152	Finland	4'728.3	45.2	908.1	653	214'884	3.6
153	France	32'023.6	34.4	537.0	442	219'040	2.2
154	French Polynesia	*135.9*	*32.0*	*574.8*	*1'134*	*146'648*	*3.5*
155	Germany	58'207.5	38.3	705.2	512	251'436	2.9
156	Greece	*4'847.3*	*42.0*	*457.5*	*357*	*261'382*	*4.1*
157	Hong Kong, China	*6'626.5*	*32.8*	*985.4*	*685*	*254'456*	*4.0*
158	Iceland	*173.5*	*35.3*	*604.7*	*396*	*132'979*	*2.3*
159	Ireland	3'245.3	...	825.6	652	217'804	2.7
160	Israel	3'689.9	65.1	556.1	391	...	3.6
161	Italy	*35'241.1*	*43.1*	*607.4*	*448*	...	*3.2*
162	Japan	*117'970.9*	*58.4*	*926.8*	*796*	*789'103*	*2.8*
163	Korea (Rep.)	21'737.2	49.7	456.7	391	408'003	4.6
164	Kuwait	856.7	64.2	362.4	501	117'448	2.4
165	Luxembourg	*343.8*	*27.3*	*782.1*	*455*	*231'170*	*1.7*
166	Macao, China	230.6	45.3	522.3	510	216'559	3.4
167	Malta	*113.3*	*45.1*	*289.1*	*253*	*57'530*	*3.1*
168	Netherlands	*13'138.4*	*31.8*	*815.8*	*588*	...	*3.4*
169	New Caledonia	*76.8*	*29.7*	*350.3*	*648*	*237'819*	*2.5*
170	New Zealand	1'988.4	...	504.8	472	...	3.4
171	Norway	*5'134.8*	*25.4*	*1'135.0*	*726*	*231'152*	*3.1*
172	Portugal	6'467.9	37.1	625.8	502	356'556	5.3
173	Qatar	449.7	33.8	737.3	1'014	251'524	2.6
174	Singapore	3'348.6	34.7	804.2	639	...	3.8
175	Slovenia	677.5	43.6	339.4	253	152'112	3.1
176	Spain	29'796.7	39.1	732.4	551	...	4.6
177	Sweden	7'824.3	...	874.9	539	361'903	3.3
178	Switzerland	9'596.1	28.1	1'317.9	859	408'346	3.6
179	Taiwan, China	9'591.3	55.7	425.9	259	251'727	3.4
180	United Arab Emirates	2'180.9	49.9	625.3	619	228'633	3.1
181	United Kingdom	72'835.8	25.4	1'232.7	861	308'626	4.7
182	United States	294'000.0	27.3	1'019.5	899	268'812	2.8
	High Income	**799'029.8**	**36.3**	**831.5**	**671**	**299'356**	**3.1**
	World	**997'582.6**	**36.8**	**167.1**	**458**	**199'105**	**3.1**
	Africa	**14'478.0**	**46.7**	**19.9**	**278**	**58'606**	**3.0**
	Americas	**376'792.0**	**27.6**	**457.3**	**708**	**252'264**	**2.9**
	Asia	**254'403.1**	**51.9**	**70.8**	**296**	**170'917**	**3.0**
	Europe	**336'113.2**	**34.4**	**421.6**	**475**	**191'093**	**3.4**
	Oceania	**15'796.2**	**24.0**	**514.7**	**599**	**168'040**	**3.7**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

13. Telecommunication investment

		Telecommunication investment				
		Total (M US$) 2002	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*As a % of revenue 2002*	*As % of GFCF 2002*
1	Angola	...	...	...	...	...
2	Azerbaijan	28.7	3.5	16.0	33.4	...
3	Bangladesh	*70.0*	*0.5*	*64.5*	*20.9*	*0.7*
4	Benin	*26.4*	*4.0*	*143.4*	*42.7*	*5.8*
5	Bhutan	2.8	4.0	140.8	...	...
6	Burkina Faso	24.0	2.0	155.7	38.0	3.3
7	Burundi	*30.0*	*4.4*	*592.8*	...	...
8	Cambodia	...	...	...	...	...
9	Cameroon	...	...	...	...	...
10	Central African Rep.	...	...	...	...	...
11	Chad	...	...	...	...	...
12	Comoros	...	...	...	...	...
13	Congo	...	...	...	...	...
14	Côte d'Ivoire	137.7	8.3	101.0	34.5	11.3
15	D.R. Congo	...	...	...	...	...
16	Equatorial Guinea	...	...	...	...	...
17	Eritrea	0.9	0.2	25.4	5.5	...
18	Ethiopia	29.1	0.4	71.9	27.8	...
19	Gambia	*6.6*	*5.0*	*73.5*	*24.9*	...
20	Georgia	...	...	...	...	...
21	Ghana	59.4	2.7	82.1	47.1	...
22	Guinea	*0.8*	*0.1*	*10.1*	*2.9*	...
23	Guinea-Bissau	...	...	...	...	...
24	Haiti	...	...	...	...	...
25	India	*3'511.5*	*3.4*	*78.1*	*45.9*	*3.3*
26	Indonesia	*1'703.3*	*8.1*	*124.0*	*78.6*	*5.6*
27	Kenya	*50.6*	*1.6*	*54.6*	*10.5*	*3.2*
28	Kyrgyzstan	5.5	1.1	12.3	12.8	2.0
29	Lao P.D.R.	10.9	2.0	93.4	40.5	...
30	Lesotho	7.1	3.3	58.7	59.7	3.3
31	Madagascar	*11.2*	*0.7*	*94.6*	*14.0*	*1.8*
32	Malawi	...	...	...	...	...
33	Mali	*17.7*	*1.7*	*183.9*	*30.0*	*3.0*
34	Mauritania	*4.1*	*1.6*	*247.8*	*14.3*	...
35	Moldova	72.0	16.4	68.9	75.0	...
36	Mongolia	5.2	2.1	15.0	9.1	...
37	Mozambique	59.2	3.2	174.9	46.1	13.8
38	Myanmar	2.4	0.0	6.2	21.7	...
39	Nepal	*20.9*	*0.9*	*66.1*	*28.5*	*2.0*
40	Nicaragua	40.6	7.6	108.5	40.1	4.5
41	Niger	...	...	...	...	...
42	Nigeria	*132.2*	*1.2*	*250.9*	*37.2*	...
43	Pakistan	169.2	1.2	34.6	11.7	2.2
44	Papua New Guinea	*65.4*	*12.7*	*891.2*	*82.6*	...
45	Rwanda	*16.8*	*2.3*	*709.0*	*93.1*	*5.0*
46	S. Tomé & Principe	4.1	27.4	504.1	60.1	...
47	Senegal	108.6	10.8	139.6	...	10.4
48	Sierra Leone	...	...	...	...	...
49	Solomon Islands	*22.0*	*52.3*	*2'489.1*	...	...
50	Sudan	*108.1*	*3.4*	*194.2*	*65.6*	...
51	Tajikistan	0.2	0.0	0.7	2.2	...
52	Tanzania	*9.4*	*0.3*	*16.4*	*4.3*	*0.6*
53	Togo	30.0	6.2	135.6	71.2	11.5
54	Uganda	*55.2*	*2.5*	*485.9*	*63.4*	*4.7*
55	Uzbekistan	*40.8*	*1.6*	*22.8*	*20.8*	...
56	Viet Nam	*322.7*	*4.1*	*132.6*	*50.1*	*4.4*
57	Yemen	73.7	3.8	77.3	51.1	...
58	Zambia	*4.8*	*0.5*	*23.4*	*7.0*	...
59	Zimbabwe	*117.9*	*10.4*	*211.2*	*66.6*	*11.5*
	Low Income	**7'219.8**	**3.3**	**86.7**	**44.4**	**3.7**

		Telecommunication investment				
		Total (M US$) 2002	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*As a % of revenue 2002*	*As % of GFCF 2002*
60	Albania	32.2	10.4	30.0	12.8	...
61	Algeria	*96.5*	*3.1*	*48.7*	*26.7*	...
62	Armenia	22.7	6.0	37.0	27.7	5.0
63	Belarus	62.4	6.3	18.2	29.1	2.1
64	Bolivia	*161.8*	*19.6*	*124.0*	*41.6*	*14.4*
65	Bosnia	*64.0*	*16.9*	*49.6*	*30.6*	...
66	Brazil	5'205.5	29.9	70.6	...	6.1
67	Bulgaria	407.3	52.2	74.5	44.7	14.5
68	Cape Verde	14.9	33.9	131.4	...	...
69	China	25'040.0	19.5	59.5	49.1	...
70	Colombia	*1'530.2*	*35.8*	*143.9*	*44.1*	*13.2*
71	Cuba	*143.7*	*12.8*	*246.5*	*18.3*	...
72	Djibouti	*2.1*	*3.4*	*216.4*	*10.5*	*3.0*
73	Dominican Rep.	*288.1*	*33.2*	*129.5*	...	*5.9*
74	Ecuador	*44.5*	*3.6*	*29.4*	*9.8*	*2.2*
75	Egypt	665.8	9.9	55.8	26.8	4.4
76	El Salvador	*163.1*	*25.5*	*108.2*	*27.8*	*7.2*
77	Fiji	*15.3*	*18.9*	*108.3*	*17.5*	*9.4*
78	Guatemala	...	...	...	...	...
79	Guyana	*14.4*	*16.7*	*132.8*	*20.2*	...
80	Honduras	53.0	7.9	81.6	13.6	3.6
81	Iran (I.R.)	1'825.1	27.9	126.9	...	...
82	Jamaica	*137.4*	*52.8*	*121.0*	*26.2*	*5.8*
83	Jordan	193.0	36.2	101.9	25.4	...
84	Kazakhstan	87.5	5.5	28.1	14.5	1.6
85	Maldives	8.0	28.4	113.0	12.2	...
86	Marshall Islands	...	...	...	...	...
87	Morocco	644.3	21.7	87.9	39.0	...
88	Namibia	9.0	4.8	33.1	10.6	...
89	Palestine	*33.5*	*10.2*	*56.7*	*32.5*	...
90	Paraguay	*81.5*	*14.5*	*56.7*	*26.4*	*6.3*
91	Peru	*174.5*	*6.7*	*48.9*	*12.5*	*1.8*
92	Philippines	696.7	8.8	37.6	25.5	4.7
93	Romania	301.7	13.9	32.4	17.5	3.1
94	Russia	1'014.9	6.9	19.1	...	1.6
95	Samoa	*1.3*	*7.6*	*121.6*	*13.3*	...
96	Serbia and Montenegro	212.1	19.8	40.4	...	...
97	South Africa	712.0	15.7	38.2	13.3	4.5
98	Sri Lanka	35.0	1.8	19.3	10.5	1.0
99	St. Vincent	*4.4*	*38.6*	*160.5*	*15.2*	*5.0*
100	Suriname	32.8	68.1	175.2	58.7	...
101	Swaziland	*12.9*	*13.2*	*284.8*	*44.6*	*2.6*
102	Syria	*175.2*	*10.6*	*86.9*	*40.5*	...
103	TFYR Macedonia	*47.3*	*23.5*	*91.0*	*26.7*	*7.7*
104	Thailand	1'513.0	24.4	66.9	36.5	5.2
105	Tonga	...	...	...	...	...
106	Tunisia	*212.8*	*22.0*	*147.0*	*44.7*	*4.1*
107	Turkey	198.2	2.9	4.7	...	0.6
108	Turkmenistan	7.3	1.5	19.0	...	...
109	Ukraine	466.2	9.3	31.0	...	5.5
110	Vanuatu	...	...	...	...	...
	Lower Middle Income	**42'865.2**	**18.0**	**56.1**	**40.6**	**4.3**

13. Telecommunication investment

		Telecommunication investment				
		Total (M US$) 2002	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*As a % of revenue 2002*	*As % of GFCF 2002*
111	Argentina	*869.0*	*24.0*	*57.6*	*11.5*	*2.3*
112	Belize	30.0	118.6	361.3	53.6	...
113	Botswana	*24.8*	*14.8*	*54.2*	*14.1*	*2.1*
114	Chile	588.8	39.1	59.4	24.3	4.2
115	Costa Rica	249.1	60.1	166.3	68.4	...
116	Croatia	181.8	41.6	43.6	14.7	3.3
117	Czech Republic	810.7	79.9	66.0	24.8	4.4
118	Dominica	...	...	...	...	...
119	Estonia	*72.8*	*50.9*	*62.9*	*21.5*	*4.9*
120	Gabon	*45.1*	*36.8*	*283.9*	*41.8*	...
121	Grenada	...	...	...	...	...
122	Hungary	686.2	67.6	65.2	18.4	4.7
123	Latvia	91.9	39.5	56.8	38.8	4.2
124	Lebanon	...	...	...	...	...
125	Libya	...	...	...	...	...
126	Lithuania	*92.0*	*25.0*	*42.4*	*34.8*	*3.8*
127	Malaysia	*1'180.3*	*49.4*	*96.8*	*26.4*	*5.4*
128	Mauritius	58.8	48.6	86.8	36.0	5.8
129	Mexico	3'178.9	31.2	77.8	18.8	2.6
130	Oman	127.4	47.0	183.9	25.0	...
131	Panama	...	...	...	...	...
132	Poland	*1'368.5*	*35.4*	*77.3*	*19.4*	*3.5*
133	Saudi Arabia	1'541.3	66.8	185.1	24.5	4.4
134	Seychelles	*4.1*	*50.8*	*91.6*	*10.3*	...
135	Slovak Republic	*125.5*	*23.3*	*33.9*	*13.4*	*2.0*
136	St. Kitts and Nevis	...	...	...	...	...
137	St. Lucia	...	...	...	...	...
138	Trinidad & Tobago	*110.1*	*84.7*	*193.9*	*36.8*	...
139	Uruguay	*104.7*	*31.4*	*78.1*	*13.5*	*4.0*
140	Venezuela	673.9	26.7	72.4	23.0	...
	Upper Middle Income	**12'215.9**	**38.5**	**79.1**	**20.3**	**3.4**

		Telecommunication investment				
		Total (M US$) 2002	*Per inhabitant (US$) 2002*	*Per telephone subscriber (US$) 2002*	*As a % of revenue 2002*	*As % of GFCF 2002*
141	Antigua & Barbuda	...	...	...	...	...
142	Australia	*4'663.2*	*240.5*	*215.7*	*34.8*	*6.0*
143	Austria	*1'562.2*	*191.9*	*148.2*	*32.7*	*3.6*
144	Bahamas	...	...	...	...	...
145	Bahrain	83.9	125.8	148.7	17.2	9.0
146	Barbados	*26.8*	*100.0*	*147.3*	*15.1*	...
147	Belgium	753.8	72.8	56.9	11.0	1.5
148	Brunei Darussalam	...	...	...	...	...
149	Canada	3'629.3	115.5	114.1	17.3	2.5
150	Cyprus	99.2	138.7	109.0	28.5	5.2
151	Denmark	*1'279.6*	*238.9*	*163.5*	*30.3*	*3.7*
152	Finland	730.2	140.2	100.8	15.4	2.9
153	France	5'471.7	91.8	75.5	17.1	1.9
154	French Polynesia	...	...	...	...	...
155	Germany	6'632.1	80.4	58.3	11.4	1.8
156	Greece	1'232.1	111.8	83.7	...	4.0
157	Hong Kong, China	*1'186.7*	*176.5*	*122.7*	*17.9*	*2.7*
158	Iceland	*37.3*	*129.8*	*84.9*	*21.5*	*2.2*
159	Ireland	*376.3*	*99.4*	*87.6*	*14.3*	*1.7*
160	Israel	*442.8*	*68.0*	*49.6*	*10.9*	*2.1*
161	Italy	*7'289.3*	*125.6*	*92.7*	*20.7*	*3.4*
162	Japan	15'774.8	123.8	103.6	...	...
163	Korea (Rep.)	6'506.6	136.7	117.0	29.9	5.1
164	Kuwait	*42.0*	*19.9*	*55.6*	*11.0*	*0.9*
165	Luxembourg	*72.3*	*164.5*	*95.7*	*21.0*	*1.7*
166	Macao, China	40.5	91.7	89.5	17.5	5.8
167	Malta	*31.1*	*79.4*	*69.6*	*27.5*	*3.7*
168	Netherlands	*2'633.0*	*163.5*	*117.8*	*20.0*	*3.1*
169	New Caledonia	*37.6*	*175.3*	*372.6*	*43.5*	...
170	New Zealand	263.0	66.8	62.4	13.2	2.3
171	Norway	2'588.8	568.7	360.4	...	...
172	Portugal	1'975.5	191.1	153.3	30.5	6.3
173	Qatar	71.2	116.7	160.5	15.8	...
174	Singapore	433.0	104.0	82.6	12.9	1.9
175	Slovenia	149.6	75.0	55.9	22.1	3.0
176	Spain	5'241.7	128.8	96.8	17.6	3.2
177	Sweden	*1'481.7*	*166.3*	*106.6*	*20.0*	*4.0*
178	Switzerland	1'633.5	224.3	146.3	17.0	...
179	Taiwan, China	2'625.8	116.6	71.0	27.4	5.5
180	United Arab Emirates	311.7	89.4	88.5	14.3	1.9
181	United Kingdom	13'432.8	227.3	158.8	18.4	5.3
182	United States	*29'620.0*	*104.0*	*92.7*	...	...
	High Income	**120'462.6**	**125.9**	**101.6**	**19.0**	**3.2**
	World	**182'763.5**	**31.1**	**83.5**	**23.2**	**3.4**
	Africa	**3'555.3**	**5.4**	**69.2**	**24.8**	**4.7**
	Americas	**47'156.1**	**57.8**	**89.1**	**19.7**	**3.7**
	Asia	**65'972.5**	**18.5**	**77.0**	**36.2**	**7.4**
	Europe	**61'011.8**	**76.4**	**84.1**	**17.8**	**3.0**
	Oceania	**5'067.9**	**168.5**	**193.7**	**32.3**	**5.5**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

14. Equipment trade

		Telecom equipment exports			Telecom equipment imports			Trade balance
		(M US$)		CAGR (%)	(M US$)		CAGR (%)	(M US$)
		1997	2002	1997-02	1997	2002	1997-02	2002
1	Angola	...	...	...	...	...	...	...
2	Azerbaijan	...	-	...	...	39	...	-39
3	Bangladesh	...	...	...	59	*163*	*28.9*	...
4	Benin	...	-	...	...	*6*	...	*-6*
5	Bhutan	...	...	...	...	...	...	...
6	Burkina Faso	...	*1*	...	...	*8*	...	*-7*
7	Burundi	...	...	...	...	*2*	...	...
8	Cambodia	...	...	...	...	...	...	...
9	Cameroon	...	-	...	...	20	...	-20
10	Central African Rep.	...	...	...	...	...	...	...
11	Chad	...	...	...	...	...	...	...
12	Comoros	...	...	...	...	*0*	...	...
13	Congo	...	...	...	...	...	...	...
14	Côte d'Ivoire	...	2	...	...	28	...	-27
15	D.R. Congo	...	...	...	...	...	...	...
16	Equatorial Guinea	...	...	...	...	...	...	...
17	Eritrea	...	...	...	...	...	...	...
18	Ethiopia	...	...	...	...	22	...	...
19	Gambia	...	...	...	5	...	...	...
20	Georgia	...	*1*	...	...	*19*	...	*-18*
21	Ghana	...	-	...	...	*26*	...	*-26*
22	Guinea	...	-	...	63	*3*	*-53.6*	*-3*
23	Guinea-Bissau	...	...	...	...	...	...	...
24	Haiti	...	...	...	...	...	...	...
25	India	46	50	1.7	243	1'615	46.0	-1'565
26	Indonesia	200	137	-7.2	1'397	346	-24.3	-209
27	Kenya	...	2	...	20	109	40.3	-107
28	Kyrgyzstan	...	2	...	...	...	...	...
29	Lao P.D.R.	...	...	...	...	...	...	...
30	Lesotho	...	...	...	...	*2*	...	...
31	Madagascar	...	...	...	11	...	...	...
32	Malawi	...	-	...	8	*14*	*13.8*	*-14*
33	Mali	...	...	...	6	...	...	...
34	Mauritania	...	...	...	...	...	...	...
35	Moldova	...	-	...	...	23	...	-23
36	Mongolia	...	-	...	...	*11*	...	*-10*
37	Mozambique	...	...	...	...	...	...	...
38	Myanmar	...	...	...	...	...	...	...
39	Nepal	...	...	...	...	*15*	...	...
40	Nicaragua	...	1	...	32	39	3.9	-38
41	Niger	...	-	...	3	*2*	*-5.9*	*-2*
42	Nigeria	...	...	...	148	*57*	*-27.2*	...
43	Pakistan	...	-	...	57	153	21.8	*-76*
44	Papua New Guinea	...	...	...	...	*3*	...	...
45	Rwanda	...	...	...	...	5	...	...
46	S. Tomé & Principe	...	...	...	...	...	...	...
47	Senegal	...	1	...	8	25	24.0	-24
48	Sierra Leone	...	...	...	...	...	...	...
49	Solomon Islands	...	...	...	...	...	...	...
50	Sudan	...	-	...	20	47	18.7	-47
51	Tajikistan	...	...	...	...	...	...	...
52	Tanzania	...	-	...	21	*68*	*34.5*	*-68*
53	Togo	...	-	...	8	8	0.6	-8
54	Uganda	...	2	...	...	29	...	-27
55	Uzbekistan	...	...	...	...	...	...	...
56	Viet Nam	...	...	...	...	...	...	...
57	Yemen	...	...	...	...	...	...	...
58	Zambia	...	-	...	...	18	...	-18
59	Zimbabwe	2	1	-7.6	69	30	-15.3	-29
	Low Income	**248**	**202**	**-5.3**	**2'179**	**2'957**	**4.4**	**-2'409**

		Telecom equipment exports			Telecom equipment imports			Trade balance
		(M US$)		CAGR (%)	(M US$)		CAGR (%)	(M US$)
		1997	2002	1997-02	1997	2002	1997-02	2002
60	Albania	...	1	...	9	27	23.8	-26
61	Algeria	...	...	...	86	*118*	*11.2*	...
62	Armenia	...	...	...	18	16	-2.9	...
63	Belarus	...	6	...	...	92	...	-85
64	Bolivia	...	*8*	...	166	*54*	*-24.5*	*-46*
65	Bosnia	...	...	...	...	...	...	...
66	Brazil	192	*1'258*	*59.9*	1'829	518	-22.3	*-636*
67	Bulgaria	...	*4*	...	48	*91*	*24.1*	*-87*
68	Cape Verde	...	...	...	5	*3*	*-11.3*	...
69	China	2'178	10'042	35.8	2'234	6'370	23.3	3'673
70	Colombia	-	5	79.0	835	504	-9.6	-498
71	Cuba	...	-	...	...	*64*	...	*-63*
72	Djibouti	...	...	...	...	...	...	...
73	Dominican Rep.	...	...	...	...	...	...	...
74	Ecuador	-	1	34.2	174	181	0.8	-180
75	Egypt	...	*1*	...	145	186	5.2	*-237*
76	El Salvador	...	3	...	27	59	17.1	-56
77	Fiji	...	...	...	...	...	...	...
78	Guatemala	-	2	42.8	72	202	22.9	-200
79	Guyana	...	...	...	...	...	...	...
80	Honduras	1	1	2.2	21	32	8.1	-31
81	Iran (I.R.)	...	3	...	401	289	-6.3	-286
82	Jamaica	...	...	...	51	*64*	*8.2*	...
83	Jordan	...	-	...	36	80	17.3	*-125*
84	Kazakhstan	...	*1*	...	...	*101*	...	*-100*
85	Maldives	...	...	...	...	...	...	...
86	Marshall Islands	...	...	...	...	...	...	...
87	Morocco	...	*2*	...	50	*297*	*56.4*	*-295*
88	Namibia	...	*1*	...	...	*25*	...	*-24*
89	Palestine	...	...	...	...	...	...	...
90	Paraguay	...	-	...	66	33	-13.0	*-42*
91	Peru	1	3	31.7	340	191	-10.9	-188
92	Philippines	857	497	-10.3	1'343	797	-9.9	-300
93	Romania	3	218	137.7	229	371	10.2	-153
94	Russia	52	45	-3.0	1'306	1'217	-1.4	-1'173
95	Samoa	...	...	...	...	...	...	...
96	Serbia and Montenegro	5	...	...	59	*33*	*-17.7*	...
97	South Africa	94	140	8.4	1'143	1'167	0.4	-1'026
98	Sri Lanka	...	-	...	...	52	...	-51
99	St. Vincent	...	...	...	2	5	26.1	...
100	Suriname	...	...	...	6	*11*	*22.0*	...
101	Swaziland	...	-	...	...	*8*	...	*-8*
102	Syria	...	...	...	...	...	...	...
103	TFYR Macedonia	1	-	*-22.9*	18	*29*	*12.3*	*-29*
104	Thailand	756	*935*	*5.5*	1'101	*1'893*	*14.5*	*-957*
105	Tonga	...	...	...	...	...	...	...
106	Tunisia	...	*4*	...	43	*99*	*23.2*	*-96*
107	Turkey	54	63	3.2	711	654	-1.7	-591
108	Turkmenistan	...	...	...	...	*8*	...	...
109	Ukraine	...	17	...	...	...	...	...
110	Vanuatu	...	...	...	...	...	...	...
	Lower Middle Income	**4'193**	**13'263**	**25.8**	**12'575**	**15'940**	**4.4**	**-3'898**

14. Equipment trade

		Telecom equipment exports			Telecom equipment imports			Trade balance
		(M US$)		CAGR (%)	(M US$)		CAGR (%)	(M US$)
		1997	2002	1997-02	1997	2002	1997-02	2002
111	Argentina	34	*38*	*2.2*	1'094	*606*	*-13.7*	*-569*
112	Belize	...	...	...	3	6	15.4	...
113	Botswana	...	*1*	...	...	*88*	...	*-86*
114	Chile	4	*8*	*21.2*	457	469	0.5	*-493*
115	Costa Rica	114	20	-29.6	74	100	6.0	-80
116	Croatia	...	75	...	154	187	3.9	-111
117	Czech Republic	41	501	64.6	482	590	4.1	-89
118	Dominica	...	...	...	2	4	7.1	...
119	Estonia	78	255	26.9	91	131	7.5	124
120	Gabon	...	...	...	...	...	...	...
121	Grenada	...	-	...	2	6	23.2	*-4*
122	Hungary	39	2'904	136.7	333	993	24.4	1'912
123	Latvia	7	8	1.6	56	88	9.4	-80
124	Lebanon	...	*4*	...	...	*49*	...	*-46*
125	Libya	...	...	...	...	...	...	...
126	Lithuania	11	*19*	*13.7*	110	*102*	*-2.0*	*-83*
127	Malaysia	1'578	*3'991*	*26.1*	1'050	*1'273*	*4.9*	*2'718*
128	Mauritius	...	10	...	21	25	3.5	-15
129	Mexico	2'184	6'902	25.9	1'761	2'632	8.4	4'270
130	Oman	4	4	3.1	65	63	-0.9	-58
131	Panama	...	...	...	50	100	14.8	...
132	Poland	...	146	...	845	1'209	7.4	-1'063
133	Saudi Arabia	...	-	...	...	*569*	...	*-569*
134	Seychelles	...	...	...	...	2	...	...
135	Slovak Republic	60	29	-13.7	254	224	-2.5	-195
136	St. Kitts and Nevis	...	...	...	3	*2*	*-17.7*	...
137	St. Lucia	...	-	...	3	19	46.7	-19
138	Trinidad & Tobago	...	*10*	...	22	*67*	*31.4*	*-57*
139	Uruguay	-	-	21.1	92	19	-26.9	-19
140	Venezuela	3	*3*	*1.3*	336	*483*	*9.5*	*-480*
	Upper Middle Income	**4'157**	**14'929**	**28.7**	**7'362**	**10'102**	**5.0**	**4'909**

		Telecom equipment exports			*Telecom equipment imports*			*Trade balance*
		(M US$)		*CAGR (%)*	*(M US$)*		*CAGR (%)*	*(M US$)*
		1997	*2002*	*1997-02*	*1997*	*2002*	*1997-02*	*2002*
141	Antigua & Barbuda	...	...	...	...	...	...	...
142	Australia	486	261	-11.7	1'388	1'721	4.4	-1'461
143	Austria	461	863	13.4	586	1'318	17.6	-454
144	Bahamas	...	-	...	22	*48*	*21.1*	*-48*
145	Bahrain	...	-	...	...	*50*	...	*-50*
146	Barbados	...	-	...	15	27	12.2	-27
147	Belgium	1'047	*2'555*	*25.0*	1'167	*2'205*	*17.2*	*350*
148	Brunei Darussalam	2	...	...	28	...	...	...
149	Canada	3'834	3'685	-0.8	2'842	3'606	4.9	78
150	Cyprus	...	...	...	41	59	7.5	...
151	Denmark	807	2'284	23.1	822	2'123	20.9	161
152	Finland	4'046	7'166	12.1	456	702	9.0	6'463
153	France	4'212	6'533	9.2	2'769	3'922	7.2	2'611
154	French Polynesia	...	-	...	...	15	...	-14
155	Germany	8'569	11'948	6.9	4'132	7'385	12.3	4'563
156	Greece	95	*215*	*22.7*	452	*686*	*11.0*	*-471*
157	Hong Kong, China	330	39	-34.9	7'553	8'313	1.9	-8'274
158	Iceland	...	-	...	33	34	0.9	-34
159	Ireland	1'168	2'132	12.8	559	1'525	22.2	607
160	Israel	1'931	2'284	3.4	628	736	3.2	1'548
161	Italy	2'017	2'170	1.5	3'137	3'906	4.5	-1'735
162	Japan	6'053	4'146	-7.3	3'361	3'146	-1.3	1'000
163	Korea (Rep.)	1'991	10'772	40.2	1'420	1'485	0.9	9'288
164	Kuwait	...	...	...	...	...	...	...
165	Luxembourg	...	*739*	...	...	*756*	...	*-17*
166	Macao, China	...	...	...	26	117	34.9	...
167	Malta	...	...	...	16	*25*	*12.0*	...
168	Netherlands	1'362	1'876	6.6	1'716	3'151	12.9	-1'274
169	New Caledonia	...	...	...	...	*11*	...	...
170	New Zealand	103	69	-7.8	331	252	-5.3	-184
171	Norway	466	352	-5.5	674	625	-1.5	-273
172	Portugal	35	62	11.9	464	684	8.1	-622
173	Qatar	...	...	...	...	68	...	...
174	Singapore	2'293	2'839	4.4	2'031	2'710	5.9	129
175	Slovenia	84	119	7.2	107	145	6.2	-25
176	Spain	944	1'028	1.7	1'741	2'669	8.9	-1'641
177	Sweden	6'710	4'158	-9.1	1'273	1'296	0.4	2'862
178	Switzerland	586	453	-5.0	1'117	1'113	-0.1	-660
179	Taiwan, China	1'825	...	...	1'049	...	...	...
180	United Arab Emirates	...	...	...	...	...	...	...
181	United Kingdom	5'109	15'220	24.4	5'138	7'943	9.1	7'277
182	United States	14'035	10'611	-5.4	12'771	29'292	18.1	-18'681
	High Income	**70'602**	**94'579**	**6.4**	**59'867**	**93'867**	**9.6**	**992**
	World	**79'200**	**122'973**	**9.5**	**81'983**	**122'866**	**8.3**	**-406**
	Africa	**96**	**166**	**8.2**	**1'884**	**2'548**	**3.9**	**-2'223**
	Americas	**20'402**	**21'244**	**1.0**	**23'173**	**39'442**	**11.2**	**-19'420**
	Asia	**20'043**	**30'818**	**14.2**	**24'103**	**30'544**	**5.1**	**693**
	Europe	**38'070**	**60'426**	**10.3**	**31'105**	**48'329**	**8.8**	**12'213**
	Oceania	**589**	**329**	**-11.0**	**1'719**	**2'003**	**2.8**	**-1'659**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

15. Information technology

		Internet				PCs	
		Hosts Total 2002	*Hosts per 100 inhab. 2002*	*Users (000s) 2002*	*Users per 100 inhab. 2002*	*Total (000s) 2002*	*Per 100 inhab. 2002*
1	Angola	7	-	41	0.29	27	0.19
2	Azerbaijan	1'139	0.01	300	3.69	...	...
3	Bangladesh	2	-	204	0.15	450	0.34
4	Benin	574	0.01	50	0.74	15	0.22
5	Bhutan	1'242	0.18	10	1.45	10	1.45
6	Burkina Faso	409	-	25	0.21	19	0.16
7	Burundi	3	-	8	0.12	5	0.07
8	Cambodia	1'391	0.01	30	0.22	27	0.20
9	Cameroon	439	-	60	0.38	90	0.57
10	Central African Rep.	6	-	5	0.13	8	0.20
11	Chad	11	-	15	0.19	13	0.17
12	Comoros	12	-	3	0.42	4	0.55
13	Congo	36	-	5	0.15	13	0.39
14	Côte d'Ivoire	4'397	0.03	90	0.55	154	0.93
15	D.R. Congo	134	-	50	0.09	...	...
16	Equatorial Guinea	3	-	2	0.36	4	0.69
17	Eritrea	859	0.02	9	0.23	10	0.25
18	Ethiopia	41	-	50	0.07	100	0.15
19	Gambia	568	0.04	25	1.82	19	1.38
20	Georgia	3'032	0.06	74	1.49	156	3.16
21	Ghana	313	-	170	0.78	82	0.38
22	Guinea	251	-	35	0.46	42	0.55
23	Guinea-Bissau	20	-	5	0.40	...	...
24	Haiti	-	-	80	0.96	...	...
25	India	78'595	0.01	16'580	1.59	7'500	0.72
26	Indonesia	61'279	0.03	8'000	3.77	2'519	1.19
27	Kenya	2'963	0.01	400	1.25	204	0.64
28	Kyrgyzstan	5'930	0.12	152	2.98	65	1.27
29	Lao P.D.R.	281	0.01	15	0.27	18	0.33
30	Lesotho	45	-	21	0.97	...	...
31	Madagascar	509	-	55	0.35	70	0.44
32	Malawi	17	-	27	0.26	14	0.13
33	Mali	158	-	25	0.24	15	0.14
34	Mauritania	79	-	10	0.37	29	1.08
35	Moldova	2'189	0.05	150	3.41	77	1.75
36	Mongolia	127	0.01	50	2.06	69	2.84
37	Mozambique	1'925	0.01	*30*	*0.17*	82	0.45
38	Myanmar	2	-	25	0.05	250	0.51
39	Nepal	1'206	0.01	80	0.34	85	0.37
40	Nicaragua	3'370	0.06	90	1.68	150	2.79
41	Niger	119	-	15	0.13	7	0.06
42	Nigeria	1'030	-	420	0.35	853	0.71
43	Pakistan	12'707	0.01	1'500	1.03	*600*	*0.42*
44	Papua New Guinea	517	0.01	75	1.37	321	5.87
45	Rwanda	1'233	0.02	25	0.31	...	...
46	S. Tomé & Principe	1'069	0.71	11	7.28	...	...
47	Senegal	761	0.01	105	1.04	200	1.98
48	Sierra Leone	277	0.01	8	0.16	...	...
49	Solomon Islands	470	0.11	2	0.50	18	4.05
50	Sudan	-	-	84	0.26	200	0.61
51	Tajikistan	302	-	4	0.05	...	...
52	Tanzania	1'731	0.01	80	0.23	144	0.42
53	Togo	80	-	200	4.10	150	3.08
54	Uganda	2'242	0.01	100	0.40	82	0.33
55	Uzbekistan	281	-	275	1.09	...	...
56	Viet Nam	529	-	1'500	1.85	800	0.98
57	Yemen	113	-	100	0.51	145	0.74
58	Zambia	1'621	0.02	52	0.49	80	0.75
59	Zimbabwe	2'382	0.02	500	4.30	600	5.16
	Low Income	**201'028**	**0.01**	**32'112**	**1.33**	**16'594**	**0.72**

		Internet				PCs	
		Hosts Total 2002	*Hosts per 100 inhab. 2002*	*Users (000s) 2002*	*Users per 100 inhab. 2002*	*Total (000s) 2002*	*Per 100 inhab. 2002*
60	Albania	172	0.01	12	0.39	36	1.17
61	Algeria	821	-	500	1.60	242	0.77
62	Armenia	2'850	0.07	60	1.58	60	1.58
63	Belarus	4'025	0.04	809	8.16	...	...
64	Bolivia	1'413	0.02	270	3.24	190	2.28
65	Bosnia	5'702	0.15	100	2.62	...	...
66	Brazil	2'237'527	1.29	14'300	8.22	13'000	7.48
67	Bulgaria	32'986	0.42	630	8.08	405	5.19
68	Cape Verde	48	0.01	16	3.64	35	7.97
69	China	156'531	0.01	59'100	4.60	35'500	2.76
70	Colombia	55'626	0.13	2'000	4.62	2'133	4.93
71	Cuba	1'133	0.01	*120*	*1.07*	359	3.18
72	Djibouti	498	0.08	5	0.69	10	1.52
73	Dominican Rep.	45'508	0.55	300	3.64	...	...
74	Ecuador	2'648	0.02	538	4.16	403	3.11
75	Egypt	3'061	-	1'900	2.82	1'120	1.66
76	El Salvador	269	-	300	4.65	163	2.52
77	Fiji	785	0.10	50	6.10	40	4.88
78	Guatemala	9'789	0.08	400	3.33	173	1.44
79	Guyana	63	0.01	125	14.22	24	2.73
80	Honduras	160	-	169	2.52	91	1.36
81	Iran (I.R.)	3'491	0.01	3'168	4.85	4'900	7.50
82	Jamaica	1'276	0.05	600	22.92	141	5.39
83	Jordan	4'116	0.08	307	5.77	200	3.75
84	Kazakhstan	16'562	0.10	250	1.57	...	...
85	Maldives	-	-	15	5.34	20	7.12
86	Marshall Islands	5	0.01	1	2.21	3	5.30
87	Morocco	2'680	0.01	700	2.36	700	2.36
88	Namibia	3'709	0.20	50	2.67	133	7.09
89	Palestine	...	...	105	3.04	125	3.62
90	Paraguay	4'351	0.08	100	1.73	200	3.46
91	Peru	19'447	0.07	2'500	9.35	1'149	4.30
92	Philippines	38'440	0.05	3'500	4.40	2'200	2.77
93	Romania	40'971	0.19	1'800	8.30	1'500	6.92
94	Russia	409'229	0.28	6'000	4.09	13'000	8.87
95	Samoa	5'705	3.16	4	2.22	1	0.67
96	Serbia and Montenegro	16'972	0.16	640	5.97	290	2.71
97	South Africa	198'853	0.44	3'100	6.82	3'300	7.26
98	Sri Lanka	2'335	0.01	200	1.06	250	1.32
99	St. Vincent	-	-	7	5.98	14	11.97
100	Suriname	24	-	20	4.16	*20*	*4.55*
101	Swaziland	1'329	0.13	20	1.94	25	2.42
102	Syria	11	-	220	1.29	330	1.94
103	TFYR Macedonia	3'167	0.15	100	4.84	...	...
104	Thailand	100'132	0.16	4'800	7.76	2'461	3.98
105	Tonga	19'485	19.64	3	2.92	2	2.02
106	Tunisia	341	-	506	5.17	300	3.07
107	Turkey	154'585	0.23	4'900	7.28	3'000	4.46
108	Turkmenistan	2'020	0.04	*8*	*0.17*	...	...
109	Ukraine	71'691	0.14	900	1.80	951	1.90
110	Vanuatu	551	0.27	7	3.46	3	1.48
	Lower Middle Income	**3'683'093**	**0.15**	**116'234**	**4.86**	**89'202**	**3.80**

15. Information technology

		Internet				PCs	
		Hosts Total 2002	*Hosts per 100 inhab. 2002*	*Users (000s) 2002*	*Users per 100 inhab. 2002*	*Total (000s) 2002*	*Per 100 inhab. 2002*
111	Argentina	495'920	1.35	4'100	11.20	3'000	8.20
112	Belize	1'498	0.59	30	11.86	35	13.83
113	Botswana	1'617	0.09	*50*	*2.97*	70	4.07
114	Chile	135'155	0.90	3'575	23.75	1'796	11.93
115	Costa Rica	7'725	0.19	800	19.31	817	19.72
116	Croatia	29'644	0.68	789	18.04	760	17.38
117	Czech Republic	226'429	2.23	2'600	25.63	1'800	17.74
118	Dominica	464	0.59	13	16.03	7	8.97
119	Estonia	63'364	4.68	444	32.77	285	21.03
120	Gabon	79	0.01	25	1.92	25	1.92
121	Grenada	14	0.01	15	14.15	14	13.21
122	Hungary	194'503	1.92	1'600	15.76	1'100	10.84
123	Latvia	35'492	1.52	310	13.31	400	17.17
124	Lebanon	7'199	0.21	400	11.71	275	8.05
125	Libya	83	-	125	2.25	130	2.34
126	Lithuania	54'605	1.58	500	14.44	380	10.97
127	Malaysia	86'285	0.35	7'841	31.97	3'600	14.68
128	Mauritius	3'462	0.29	120	9.91	141	11.65
129	Mexico	1'107'795	1.09	10'033	9.85	8'353	8.20
130	Oman	676	0.02	180	6.64	95	3.50
131	Panama	7'393	0.25	*120*	*4.14*	115	3.83
132	Poland	657'495	1.70	8'880	23.00	4'079	10.56
133	Saudi Arabia	14'788	0.06	1'419	6.15	3'003	13.02
134	Seychelles	266	0.33	12	14.52	13	16.08
135	Slovak Republic	85'998	1.60	863	16.04	970	18.04
136	St. Kitts and Nevis	2	-	10	21.28	9	19.15
137	St. Lucia	29	0.02	*13*	*8.24*	24	15.00
138	Trinidad & Tobago	7'209	0.55	138	10.60	104	7.95
139	Uruguay	78'660	2.32	*400*	*11.90*	*370*	*11.01*
140	Venezuela	24'138	0.10	1'274	5.06	1'536	6.09
	Upper Middle Income	**3'327'987**	**1.01**	**46'678**	**14.13**	**33'305**	**10.08**

		Internet				PCs	
		Hosts Total 2002	*Hosts per 100 inhab. 2002*	*Users (000s) 2002*	*Users per 100 inhab. 2002*	*Total (000s) 2002*	*Per 100 inhab. 2002*
141	Antigua & Barbuda	622	0.80	10	12.82	...	...
142	Australia	2'564'339	13.04	9'472	48.17	11'111	56.51
143	Austria	367'933	4.51	3'340	40.94	3'013	36.93
144	Bahamas	32	0.01	60	19.23	...	...
145	Bahrain	1'339	0.20	165	24.75	107	16.04
146	Barbados	160	0.06	30	11.15	28	10.41
147	Belgium	336'604	3.25	3'400	32.83	2'500	24.14
148	Brunei Darussalam	8'668	2.46	*35*	*10.23*	27	7.67
149	Canada	2'993'982	9.53	16'110	51.28	15'300	48.70
150	Cyprus	2'692	0.38	210	29.37	193	26.99
151	Denmark	836'631	15.57	2'756	51.28	3'100	57.68
152	Finland	1'220'062	23.43	2'650	50.89	2'300	44.17
153	France	1'388'681	2.33	18'716	31.38	20'700	34.71
154	French Polynesia	3'661	1.49	35	14.26	70	28.51
155	Germany	2'594'323	3.14	34'000	41.19	35'600	43.13
156	Greece	160'829	1.46	1'705	15.47	900	8.17
157	Hong Kong, China	398'151	5.87	2'919	43.01	2'864	42.20
158	Iceland	68'261	23.70	187	64.79	130	45.14
159	Ireland	136'487	3.47	1'065	27.09	1'654	42.08
160	Israel	146'791	2.21	2'000	30.14	1'610	24.26
161	Italy	672'638	1.19	19'900	35.24	13'025	23.07
162	Japan	9'260'117	7.27	57'200	44.89	48'700	38.22
163	Korea (Rep.)	407'318	0.86	26'270	55.19	26'458	55.58
164	Kuwait	3'261	0.14	250	10.58	285	12.06
165	Luxembourg	17'260	3.87	165	37.00	265	59.42
166	Macao, China	150	0.03	115	26.04	92	20.83
167	Malta	7'355	1.86	83	20.93	101	25.51
168	Netherlands	3'137'203	19.37	8'200	50.63	7'557	46.66
169	New Caledonia	5'915	2.64	30	13.39	...	...
170	New Zealand	432'957	10.99	1'908	48.44	1'630	41.38
171	Norway	255'742	5.62	2'288	50.26	2'405	52.83
172	Portugal	164'711	1.59	2'000	19.35	1'394	13.49
173	Qatar	171	0.03	70	11.48	110	18.03
174	Singapore	338'349	8.13	2'100	50.44	2'590	62.20
175	Slovenia	35'791	1.79	750	37.58	600	30.06
176	Spain	589'979	1.45	6'359	15.63	7'972	19.60
177	Sweden	849'174	9.50	5'125	57.31	5'556	62.13
178	Switzerland	560'902	7.70	2'556	35.10	5'160	70.87
179	Taiwan, China	2'170'233	9.64	8'590	38.14	8'887	39.46
180	United Arab Emirates	52'332	1.50	1'176	33.70	450	12.90
181	United Kingdom	2'865'930	4.85	25'000	42.31	23'972	40.57
182	United States	115'311'958	39.99	159'000	55.14	190'000	65.89
	High Income	**150'369'694**	**15.64**	**427'999**	**44.53**	**448'416**	**46.68**
	World	**157'581'802**	**2.59**	**623'023**	**10.22**	**587'518**	**9.91**
	Africa	**243'171**	**0.03**	**9'945**	**1.23**	**9'579**	**1.30**
	Americas	**122'555'360**	**14.50**	**217'649**	**25.76**	**239'717**	**28.95**
	Asia	**13'390'474**	**0.37**	**211'361**	**5.85**	**157'893**	**4.45**
	Europe	**18'358'407**	**2.30**	**172'481**	**21.64**	**167'130**	**21.40**
	Oceania	**3'034'390**	**9.68**	**11'587**	**36.98**	**13'199**	**42.42**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

16. Internet tariff
20 hours per month, August 2003

		ISP charge				Telephone	Total Internet price	
		Monthly fee US$	Hours included	Excess time charge US$	Total ISP charge US$	usage charge US$	20 hours of use US$	As % of GNI per capita
1	Angola	20.00	*	-	20.00	58.81	78.81	143.3
2	Azerbaijan	-	-	11.11	11.11	97.19	108.29	183.0
3	Bangladesh	-	-	8.29	8.29	11.75	20.04	66.8
4	Benin	8.52	*	-	8.52	37.88	46.40	146.5
5	Bhutan	29.83	30	-	29.83	43.20	73.03	148.5
6	Burkina Faso	14.39	10	10.33	24.72	20.66	45.38	247.5
7	Burundi	50.00	20	-	50.00	30.94	80.94	971.3
8	Cambodia	30.00	13	15.40	45.40	11.96	57.36	245.8
9	Cameroon	-	-	28.69	28.69	22.96	51.65	110.7
10	Central African Rep.	14.35	-	103.30	117.65	57.39	175.04	807.9
11	Chad	-	*	-	-	68.87	68.87	375.6
12	Comoros	9.56	-	57.39	66.95	-	66.95	206.0
13	Congo	121.22	*	-	121.22	-	121.22	207.8
14	Côte d'Ivoire	51.65	*	-	51.65	15.50	67.15	132.1
15	D.R. Congo	14.00	20	-	14.00	60.00	74.00	986.7
16	Equatorial Guinea	103.30	*	-	103.30	-	103.30	177.1
17	Eritrea	15.33	15	-	15.33	11.46	26.79	200.9
18	Ethiopia	2.68	-	15.40	18.09	9.33	27.42	329.1
19	Gambia	11.04	*	-	11.04	16.06	27.11	116.2
20	Georgia	13.33	8	4.68	18.01	8.18	26.19	48.4
21	Ghana	33.75	*	-	33.75	10.08	43.83	194.8
22	Guinea	22.78	15	10.12	32.90	30.37	63.26	185.2
23	Guinea-Bissau	105.00	30	-	105.00	0.09	105.09	840.7
24	Haiti	130.00	*	-	130.00	-	130.00	354.5
25	India	2.16	10	-	2.16	6.58	8.74	21.9
26	Indonesia	10.74	25	-	10.74	11.52	22.26	37.6
27	Kenya	12.70	*	-	12.70	33.02	45.71	152.4
28	Kyrgyzstan	5.00	-	10.00	15.00	-	15.00	62.1
29	Lao P.D.R.	18.00	15	8.50	26.50	5.37	31.87	123.4
30	Lesotho	8.06	*	-	8.06	35.29	43.36	110.7
31	Madagascar	45.37	20	-	45.37	21.96	67.33	336.7
32	Malawi	32.00	*	-	32.00	30.00	62.00	465.0
33	Mali	28.69	25	-	28.69	29.27	57.96	289.8
34	Mauritania	16.56	-	22.08	38.64	-	38.64	113.1
35	Moldova	11.05	*	-	11.05	7.96	19.01	49.6
36	Mongolia	11.71	20	-	11.71	6.12	17.83	48.6
37	Mozambique	20.00	*	-	20.00	30.79	50.79	290.2
38	Myanmar	20.00	20	-	20.00	22.50	42.50	180.9
39	Nepal	7.70	-	-	7.70	5.78	13.48	70.3
40	Nicaragua	30.00	*	-	30.00	21.05	51.05	138.6
41	Niger	-	-	64.56	64.56	32.28	96.85	683.6
42	Nigeria	42.69	*	-	42.69	42.79	85.48	353.7
43	Pakistan	0.84	-	6.70	7.54	8.08	15.61	45.7
44	Papua New Guinea	10.26	-	8.21	18.46	1.54	20.00	45.3
45	Rwanda	31.49	*	-	31.49	35.27	66.76	348.3
46	S. Tomé & Principe	-	-	40.00	40.00	49.51	89.51	370.4
47	Senegal	40.63	*	-	40.63	-	40.63	103.7
48	Sierra Leone	-	-	-	-	12.01	12.01	102.9
49	Solomon Islands	34.07	10	29.81	63.89	27.26	91.15	191.9
50	Sudan	1.14	-	22.79	23.93	136.72	160.65	550.8
51	Tajikistan	50.00	20	-	50.00	4.35	54.35	362.3
52	Tanzania	69.00	*	-	69.00	48.00	117.00	501.4
53	Togo	10.04	*	-	10.04	20.32	30.36	134.9
54	Uganda	30.00	30	-	30.00	66.76	96.76	464.4
55	Uzbekistan	-	-	18.58	18.58	1.61	20.19	53.8
56	Viet Nam	1.78	-	8.64	10.42	9.42	19.85	55.4
57	Yemen	-	-	25.62	25.62	5.12	30.75	75.3
58	Zambia	19.00	100	-	19.00	13.64	32.64	118.7
59	Zimbabwe	7.91	*	-	7.91	15.41	23.32	58.3
	Low Income	**24.23**		**8.99**	**33.21**	**24.07**	**57.28**	**246.4**

16. Internet tariff
20 hours per month, August 2003

		ISP charge				Telephone usage charge	Total Internet price	
		Monthly fee US$	Hours included	Excess time charge US$	Total ISP charge US$	US$	20 hours of use US$	As % of GNI per capita
60	Albania	20.00	30	-	20.00	8.56	28.56	24.8
61	Algeria	11.30	30	-	11.30	6.53	17.82	12.4
62	Armenia	42.00	*	-	42.00	2.79	44.79	68.0
63	Belarus	1.10	-	8.48	9.58	3.21	12.79	11.3
64	Bolivia	13.95	80	-	13.95	8.37	22.32	29.8
65	Bosnia	2.40	15	0.71	3.12	4.18	7.30	6.9
66	Brazil	13.83	-	-	13.83	14.16	27.99	11.8
67	Bulgaria	5.29	20	-	5.29	7.16	12.45	8.3
68	Cape Verde	17.06	20	-	17.06	13.46	30.51	28.4
69	China	-	-	7.25	7.25	2.90	10.14	13.0
70	Colombia	10.78	*	-	10.78	7.82	18.61	12.2
71	Cuba	30.00	15	15.00	45.00	12.78	57.78	32.2
72	Djibouti	36.12	*	-	36.12	78.78	114.90	153.2
73	Dominican Rep.	33.05	*	-	33.05	-	33.05	17.1
74	Ecuador	15.00	25	-	15.00	16.80	31.80	26.3
75	Egypt	-	*	-	-	5.47	5.47	4.5
76	El Salvador	20.00	20	-	20.00	28.11	48.11	27.8
77	Fiji	19.38	15	11.26	30.64	1.10	31.74	17.6
78	Guatemala	-	*	-	-	31.24	31.24	21.4
79	Guyana	19.93	30	-	19.93	0.94	20.87	29.8
80	Honduras	15.00	*	-	15.00	25.56	40.56	52.9
81	Iran (I.R.)	3.62	*	-	3.62	2.32	5.94	4.2
82	Jamaica	26.50	15	7.75	34.25	9.29	43.54	18.5
83	Jordan	9.44	20	-	9.44	16.90	26.34	18.0
84	Kazakhstan	30.73	29	-	30.73	3.76	34.49	27.4
85	Maldives	25.78	15	12.89	38.67	23.44	62.11	35.7
86	Marshall Islands	15.00	15	5.00	20.00	-	20.00	10.2
87	Morocco	25.32	*	-	25.32	-	25.32	25.5
88	Namibia	9.49	*	-	9.49	23.91	33.40	22.5
89	Palestine	18.99	*	-	18.99	6.46	25.44	32.8
90	Paraguay	25.00	*	-	25.00	11.34	36.34	37.3
91	Peru	10.00	*	-	10.00	22.84	32.84	19.2
92	Philippines	10.66	15	6.40	17.05	-	17.05	20.1
93	Romania	6.00	17	2.10	8.10	18.29	26.39	17.1
94	Russia	10.00	20	-	10.00	-	10.00	5.6
95	Samoa	29.95	30	-	29.95	13.02	42.97	36.3
96	Serbia and Montenegro	10.33	20	-	10.33	2.85	13.18	11.3
97	South Africa	7.50	*	-	7.50	25.83	33.33	15.4
98	Sri Lanka	5.23	30	-	5.23	9.83	15.05	21.5
99	St. Vincent	22.22	20	-	22.22	-	22.22	9.5
100	Suriname	15.00	*	-	15.00	15.21	30.21	18.5
101	Swaziland	8.69	-	-	8.69	11.95	20.64	21.0
102	Syria	44.52	20	-	44.52	10.69	55.21	58.6
103	TFYR Macedonia	12.43	-	-	12.43	6.43	18.87	13.3
104	Thailand	-	-	5.59	5.59	1.40	6.98	4.2
105	Tonga	18.18	*	-	18.18	27.27	45.45	38.7
106	Tunisia	2.93	*	-	2.93	14.37	17.30	10.4
107	Turkey	6.30	*	-	6.30	13.53	19.83	9.5
108	Turkmenistan	20.00	-	-	20.00	0.22	20.22	20.2
109	Ukraine	3.19	-	6.75	9.94	6.75	16.70	26.0
110	Vanuatu	46.70	20	-	46.70	-	46.70	51.9
	Lower Middle Income	**15.80**		**1.75**	**17.55**	**11.33**	**28.88**	**24.9**

16. Internet tariff
20 hours per month, August 2003

		ISP charge				Telephone usage charge US$	Total Internet price	
		Monthly fee US$	Hours included	Excess time charge US$	Total ISP charge US$		20 hours of use US$	As % of GNI per capita
111	Argentina	6.37	*	-	6.37	6.90	13.27	3.9
112	Belize	12.00	-	45.00	57.00	-	57.00	23.1
113	Botswana	11.85	*	-	11.85	15.17	27.01	10.9
114	Chile	21.81	*	-	21.81	-	21.81	6.1
115	Costa Rica	15.00	*	-	15.00	10.84	25.84	7.6
116	Croatia	-	*	-	-	17.15	17.15	4.4
117	Czech Republic	-	-	20.83	20.83	-	20.83	4.5
118	Dominica	16.67	20	-	16.67	-	16.67	6.3
119	Estonia	13.55	20	-	13.55	-	13.55	3.9
120	Gabon	35.87	*	-	35.87	86.08	121.95	46.9
121	Grenada	22.22	20	-	22.22	-	22.22	7.6
122	Hungary	6.01	15	4.19	10.20	-	10.20	2.3
123	Latvia	-	*	-	-	58.06	58.06	20.0
124	Lebanon	15.00	*	-	15.00	21.89	36.89	11.1
125	Libya	-	-	15.75	15.75	3.15	18.90	3.8
126	Lithuania	-	*	-	-	34.06	34.06	11.2
127	Malaysia	0.53	-	3.16	3.68	4.74	8.42	2.9
128	Mauritius	15.02	20	-	15.02	-	15.02	4.7
129	Mexico	19.57	*	-	19.57	3.06	22.63	4.6
130	Oman	5.26	-	9.47	14.74	8.84	23.58	3.8
131	Panama	-	-	-	-	36.00	36.00	10.7
132	Poland	15.69	30	-	15.69	-	15.69	4.1
133	Saudi Arabia	2.67	-	16.00	18.67	16.00	34.67	4.9
134	Seychelles	31.93	30	-	31.93	59.85	91.79	16.9
135	Slovak Republic	4.83	*	-	4.83	15.88	20.71	6.3
136	St. Kitts and Nevis	22.22	20	-	22.22	-	22.22	4.2
137	St. Lucia	22.22	20	-	22.22	-	22.22	6.9
138	Trinidad & Tobago	12.70	20	-	12.70	0.74	13.43	2.5
139	Uruguay	12.73	*	-	12.73	13.73	26.46	7.3
140	Venezuela	19.47	*	-	19.47	-	19.47	5.7
	Upper Middle Income	**12.04**		**3.81**	**15.85**	**13.74**	**29.59**	**8.6**

16. Internet tariff
20 hours per month, August 2003

		ISP charge				Telephone	Total Internet price	
		Monthly fee US$	*Hours included*	*Excess time charge US$*	*Total ISP charge US$*	*usage charge US$*	*20 hours of use US$*	*As % of GNI per capita*
141	Antigua & Barbuda	22.22	20	-	22.22	-	22.22	2.8
142	Australia	15.73	*	-	15.73	2.39	18.13	1.1
143	Austria	32.92	*	-	32.92	-	32.92	1.7
144	Bahamas	25.00	*	-	25.00	-	25.00	2.0
145	Bahrain	39.47	*	-	39.47	-	39.47	4.1
146	Barbados	25.88	40	-	25.88	-	25.88	3.2
147	Belgium	28.65	*	-	28.65	-	28.65	1.5
148	Brunei Darussalam	16.39	24	-	16.39	-	16.39	1.4
149	Canada	12.71	100	-	12.71	-	12.71	0.7
150	Cyprus	10.66	*	-	10.66	6.56	17.21	1.7
151	Denmark	17.62	20	-	17.62	-	17.62	0.7
152	Finland	8.30	*	-	8.30	14.23	22.53	1.2
153	France	14.15	20	-	14.15	-	14.15	0.8
154	French Polynesia	69.29	20	-	69.29	-	69.29	4.8
155	Germany	14.10	30	-	14.10	-	14.10	0.7
156	Greece	37.64	*	-	37.64	-	37.64	3.9
157	Hong Kong, China	3.85	20	-	3.85	-	3.85	0.2
158	Iceland	-	*	-	-	22.13	22.13	0.9
159	Ireland	28.29	150	-	28.29	-	28.29	1.4
160	Israel	-	-	8.86	8.86	20.89	29.75	2.1
161	Italy	-	*	-	-	16.51	16.51	1.0
162	Japan	21.12	*	-	21.12	-	21.12	0.8
163	Korea (Rep.)	3.12	*	-	3.12	6.63	9.74	1.2
164	Kuwait	16.67	10	8.00	24.67	-	24.67	2.0
165	Luxembourg	29.29	*	-	29.29	-	29.29	0.9
166	Macao, China	12.20	25	-	12.20	-	12.20	1.0
167	Malta	18.02	*	-	18.02	-	18.02	2.3
168	Netherlands	2.78	*	-	2.78	21.32	24.10	1.2
169	New Caledonia	36.52	*	-	36.52	43.82	80.34	6.4
170	New Zealand	12.94	*	-	12.94	-	12.94	1.1
171	Norway	26.32	*	-	26.32	-	26.32	0.8
172	Portugal	-	*	-	-	20.58	20.58	2.3
173	Qatar	5.49	-	16.48	21.98	-	21.98	0.9
174	Singapore	11.04	*	-	11.04	-	11.04	0.6
175	Slovenia	4.91	-	7.14	12.05	13.39	25.44	3.1
176	Spain	20.66	*	-	20.66	-	20.66	1.7
177	Sweden	0.21	*	-	0.21	22.18	22.38	1.1
178	Switzerland	-	*	-	-	22.44	22.44	0.7
179	Taiwan, China	1.46	*	-	1.46	6.48	7.93	0.7
180	United Arab Emirates	5.45	-	7.63	13.08	-	13.08	0.8
181	United Kingdom	23.87	*	-	23.87	-	23.87	1.1
182	United States	14.95	*	-	14.95	-	14.95	0.5
	High Income	**16.43**		**1.15**	**17.57**	**5.70**	**23.27**	**1.7**
	World	**18.06**		**4.30**	**22.35**	**14.56**	**36.91**	**88.7**
	Africa	**24.04**		**7.66**	**31.69**	**28.39**	**60.09**	**241.3**
	Americas	**20.97**		**1.94**	**22.91**	**8.48**	**31.39**	**27.5**
	Asia	**12.71**		**4.87**	**17.58**	**9.44**	**27.02**	**48.7**
	Europe	**11.16**		**1.26**	**12.42**	**9.09**	**21.50**	**6.8**
	Oceania	**27.15**		**5.43**	**32.58**	**7.26**	**39.84**	**39.9**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

* Unlimited access.

17. Internet

		Internet subscribers (000s) 2002	*Broadband*			*International bandwidth*	
			Total (000s) 2002	*As % of total subscribers 2002*	*CAGR (%) 2001-2002*	*Total (Mbps) 2002*	*Bits per inhabitant 2002*
1	Angola	...	-	-	-	7.0	0.5
2	Azerbaijan	*12.0*	-	-	-	2.1	0.3
3	Bangladesh	68.0	-	-	-	*40.0*	*0.3*
4	Benin	4.7	-	-	-	2.1	0.3
5	Bhutan	1.6	-	-	-	2.0	2.9
6	Burkina Faso	8.0	-	-	-	8.0	0.7
7	Burundi	1.4	-	-	-	4.0	0.6
8	Cambodia	6.7	0.1	0.7	...	12.0	0.9
9	Cameroon	5.5	-	-	-	9.0	0.6
10	Central African Rep.	1.3	-	-	-	0.5	0.1
11	Chad	1.8	-	-	-	0.5	0.1
12	Comoros	0.9	-	-	-	0.3	0.3
13	Congo	0.6	-	-	-	0.1	0.0
14	Côte d'Ivoire	15.2	-	-	-	11.0	0.7
15	D.R. Congo	6.0	-	-	-	10.2	0.2
16	Equatorial Guinea	0.9	-	-	-	1.0	2.0
17	Eritrea	2.4	-	-	-	2.0	0.5
18	Ethiopia	8.5	-	-	-	10.0	0.1
19	Gambia	*4.0*	-	-	-	2.0	1.5
20	Georgia	3.7	0.9	25.2	...	...	...
21	Ghana	*20.1*	-	-	-	12.0	0.6
22	Guinea	10.0	-	-	-	2.0	0.3
23	Guinea-Bissau	0.2	-	-	-	*0.1*	*0.1*
24	Haiti	30.0	-	-	-	...	...
25	India	3'640.0	82.4	2.3	164.8	1'670.3	1.6
26	Indonesia	*600.0*	31.3	*2.5*	208.7	573.0	2.7
27	Kenya	*45.0*	-	-	-	*56.0*	*1.8*
28	Kyrgyzstan	4.6	-	-	-	15.0	2.9
29	Lao P.D.R.	2.6	-	-	-	*1.7*	*0.3*
30	Lesotho	1.7	-	-	-	1.0	0.5
31	Madagascar	18.0	-	-	-	6.0	0.4
32	Malawi	13.5	-	-	-	*2.0*	*0.2*
33	Mali	15.0	-	-	-	6.0	0.6
34	Mauritania	*1.0*	-	-	-	9.5	3.5
35	Moldova	13.8	0.4	3.0	...	34.0	7.7
36	Mongolia	10.5	0.1	0.9	183.7	17.0	7.0
37	Mozambique	*6.1*	-	-	-	*4.5*	*0.3*
38	Myanmar	8.4	1.0	11.7	...	4.8	0.1
39	Nepal	20.0	-	-	-	*10.0*	*0.4*
40	Nicaragua	21.0	2.3	11.0	144.6	32.0	6.0
41	Niger	2.4	-	-	-	0.5	0.0
42	Nigeria	53.2	-	-	-	72.0	0.6
43	Pakistan	*200.0*	-	-	-	410.0	2.8
44	Papua New Guinea	*27.0*	-	-	-	6.0	1.1
45	Rwanda	2.3	-	-	-	10.3	1.3
46	S. Tomé & Principe	0.8	-	-	-	2.0	13.2
47	Senegal	9.6	-	-	-	79.0	7.8
48	Sierra Leone	*0.8*	-	-	-	0.5	0.1
49	Solomon Islands	1.0	-	-	-	0.5	1.2
50	Sudan	30.0	-	-	-	10.0	0.3
51	Tajikistan	0.3	-	-	-	1.8	0.3
52	Tanzania	20.0	0.0	0.1	...	16.0	0.5
53	Togo	12.0	-	-	-	12.0	2.5
54	Uganda	6.5	-	-	-	9.5	0.4
55	Uzbekistan	*7.0*	-	-	-	*0.9*	-
56	Viet Nam	350.0	1.1	0.3	...	143.0	1.8
57	Yemen	15.0	-	-	-	*6.0*	*0.3*
58	Zambia	11.6	0.0	0.4	154.8	5.1	0.5
59	Zimbabwe	40.0	-	-	-	11.0	0.9
	Low Income	**5'423.9**	**119.6**	**1.9**	**174.2**	**3'376.8**	**1.4**

		Internet subscribers (000s) 2002	*Broadband*			*International bandwidth*	
			Total (000s) 2002	*As % of total subscribers 2002*	*CAGR (%) 2001-2002*	*Total (Mbps) 2002*	*Bits per inhabitant 2002*
60	Albania	10.0	-	-	-	12.0	3.9
61	Algeria	*60.0*	-	-	-	156.3	5.0
62	Armenia	*20.0*	0.0	...	...	8.0	2.1
63	Belarus	18.1	0.0	0.1	...	79.0	8.0
64	Bolivia	49.0	-	-	-	*18.0*	*2.2*
65	Bosnia	87.0	0.2	0.2	...	*25.0*	*6.6*
66	Brazil	7'900.0	731.0	9.3	220.8	9'340.5	53.7
67	Bulgaria	8.5	-	-	-	79.0	10.1
68	Cape Verde	3.9	-	-	-	3.0	6.8
69	China	49'700.0	2'260.0	4.5	665.7	9'380.0	7.3
70	Colombia	520.0	34.9	6.7	252.3	*5'600.0*	*130.8*
71	Cuba	...	-	-	-	*52.0*	*4.6*
72	Djibouti	1.6	-	-	-	2.0	3.1
73	Dominican Rep.	82.5	-	-	-	*51.8*	*6.0*
74	Ecuador	100.7	...	...	...	*75.2*	*5.8*
75	Egypt	...	0.9	...	...	735.0	10.9
76	El Salvador	94.9	-	-	-	*43.4*	*6.8*
77	Fiji	7.6	-	-	-	8.0	9.8
78	Guatemala	...	-	-	-	874.0	72.9
79	Guyana	*20.0*	-	-	-	...	...
80	Honduras	75.0	-	-	-	*10.0*	*1.6*
81	Iran (I.R.)	816.2	16.2	2.0	2'446.4	550.0	8.4
82	Jamaica	95.0	...	...	...	*73.2*	*28.2*
83	Jordan	62.2	1.9	3.1	475.0	90.0	16.9
84	Kazakhstan	...	-	-	-	48.0	3.0
85	Maldives	1.1	0.2	17.8	...	9.0	32.0
86	Marshall Islands	0.7	-	-	-	1.5	27.3
87	Morocco	55.0	2.0	3.6	...	310.0	10.5
88	Namibia	*15.0*	-	-	-	8.5	4.5
89	Palestine	25.0	-	-	-	20.0	5.8
90	Paraguay	25.0	0.5	2.0	166.7	100.0	17.3
91	Peru	*175.0*	34.4	*4.1*	475.3	1'220.0	45.6
92	Philippines	800.0	21.0	2.6	210.0	890.5	11.2
93	Romania	...	15.8	...	263.3	1'947.0	89.8
94	Russia	1'890.5	11.0	0.6	...	8'967.3	61.2
95	Samoa	1.3	-	-	-	2.0	11.1
96	Serbia and Montenegro	26.8	-	-	-	*10.0*	*0.9*
97	South Africa	*937.5*	2.7	-	...	564.5	12.4
98	Sri Lanka	70.1	-	-	-	90.0	4.8
99	St. Vincent	6.0	1.1	18.2	1'340.7	*4.0*	*35.3*
100	Suriname	5.5	0.1	1.7	...	12.0	24.9
101	Swaziland	10.0	-	-	-	1.0	1.0
102	Syria	73.0	-	-	-	16.0	0.9
103	TFYR Macedonia	*30.0*	-	-	-	50.0	24.2
104	Thailand	*1'500.0*	15.0	*0.1*	929.9	1'010.6	16.3
105	Tonga	1.9	0.0	0.6	...	2.0	20.2
106	Tunisia	77.0	-	-	-	*41.5*	*4.3*
107	Turkey	4'300.0	21.2	0.5	194.3	1'132.0	16.8
108	Turkmenistan	*2.2*	-	-	-	*0.3*	*0.1*
109	Ukraine	...	-	-	-	314.1	6.3
110	Vanuatu	1.5	-	-	-	2.0	9.9
	Lower Middle Income	**69'762.2**	**3'170.1**	**4.5**	**437.0**	**44'039.3**	**18.4**

17. Internet

		Internet subscribers (000s) 2002	Broadband Total (000s) 2002	Broadband As % of total subscribers 2002	Broadband CAGR (%) 2001-2002	International bandwidth Total (Mbps) 2002	International bandwidth Bits per inhabitant 2002
111	Argentina	1'430.0	115.0	8.0	135.3	5'476.2	149.6
112	Belize	5.2	-	-	-	46.0	181.8
113	Botswana	*15.0*	-	-	-	26.0	15.1
114	Chile	757.8	188.5	24.9	314.2	1'981.0	131.6
115	Costa Rica	96.4	0.4	0.4	...	*275.0*	*66.9*
116	Croatia	538.0	12.0	2.2	...	180.0	41.2
117	Czech Republic	1'644.4	15.3	0.9	246.8	22'206.0	2'189.1
118	Dominica	4.5	0.3	7.2	182.9	*5.0*	*64.3*
119	Estonia	121.0	45.7	37.8	264.8	555.0	409.6
120	Gabon	6.7	-	-	-	45.0	34.6
121	Grenada	3.9	0.6	14.6	...	*4.0*	*42.4*
122	Hungary	445.9	111.5	25.0	557.3	10'642.0	1'048.3
123	Latvia	37.7	10.0	26.5	309.1	423.0	181.6
124	Lebanon	130.0	35.0	26.9	...	60.0	17.6
125	Libya	...	-	-	-	6.0	1.1
126	Lithuania	99.5	20.0	20.1	824.1	328.0	94.7
127	Malaysia	2'633.0	19.3	0.7	482.6	1'320.5	53.8
128	Mauritius	50.3	0.3	0.6	...	34.0	28.1
129	Mexico	2'044.0	177.0	8.7	354.0	5'825.0	57.2
130	Oman	48.2	-	-	-	38.0	14.0
131	Panama	*43.0*	-	-	-	621.5	206.7
132	Poland	*930.0*	14.6	-	121.7	6'316.0	163.6
133	Saudi Arabia	550.0	2.3	0.4	228.7	297.0	12.9
134	Seychelles	2.9	0.1	4.1	...	6.0	74.2
135	Slovak Republic	134.0	-	-	-	8'153.0	1'516.0
136	St. Kitts and Nevis	4.6	0.5	10.9	...	2.0	42.2
137	St. Lucia	...	-	-	-	*15.0*	*95.1*
138	Trinidad & Tobago	37.0	0.2	0.5	...	*96.0*	*73.8*
139	Uruguay	...	*1.4*	...	-	436.2	128.9
140	Venezuela	337.0	114.3	33.9	357.4	690.0	27.4
	Upper Middle Income	**12'150.0**	**884.1**	**7.1**	**283.4**	**66'108.4**	**200.0**

		Internet subscribers (000s) 2002	*Broadband*			*International bandwidth*	
			Total (000s) 2002	*As % of total subscribers 2002*	*CAGR (%) 2001-2002*	*Total (Mbps) 2002*	*Bits per inhabitant 2002*
141	Antigua & Barbuda	...	-	-	-	28.0	359.0
142	Australia	4'600.0	258.1	5.6	210.2	10'497.9	533.9
143	Austria	1'200.0	539.5	45.0	168.3	36'076.0	4'421.6
144	Bahamas	19.0	19.5	102.9	...	145.0	464.7
145	Bahrain	52.9	5.0	9.4	423.5	195.0	292.4
146	Barbados	...	-	-	-	...	...
147	Belgium	1'694.4	869.0	51.3	189.4	84'024.1	8'113.7
148	Brunei Darussalam	*23.0*	-	-	-	*60.0*	*175.4*
149	Canada	*5'624.0*	3'515.0	*50.4*	123.9	89'273.0	2'841.8
150	Cyprus	79.0	5.9	7.4	235.2	169.0	236.3
151	Denmark	2'441.0	440.5	18.0	197.3	109'204.0	20'319.8
152	Finland	1'212.1	273.5	22.6	526.0	16'587.0	3'185.5
153	France	8'985.9	1'683.0	18.7	279.8	200'000.0	3'353.6
154	French Polynesia	11.0	-	-	-	*7.5*	*32.1*
155	Germany	24'500.0	3'205.0	13.1	152.6	260'667.8	3'158.2
156	Greece	515.0	-	-	-	2'446.2	222.0
157	Hong Kong, China	2'372.7	1'039.0	43.8	145.0	12'668.1	1'866.8
158	Iceland	*50.0*	24.3	*20.8*	232.8	68.0	236.1
159	Ireland	1'108.0	10.6	1.0	...	13'501.0	3'434.5
160	Israel	*956.0*	135.0	*4.2*	337.5	1'418.0	213.7
161	Italy	*5'800.0*	850.0	*2.0*	217.9	67'627.8	1'197.7
162	Japan	29'562.5	9'092.0	30.8	237.1	30'285.6	237.7
163	Korea (Rep.)	10'784.7	10'405.5	96.5	133.3	17'207.0	361.5
164	Kuwait	...	10.5	...	...	...	...
165	Luxembourg	*42.2*	5.7	*2.9*	468.9	1'469.0	3'293.7
166	Macao, China	47.0	17.0	36.1	173.2	216.0	489.1
167	Malta	66.3	17.7	26.7	193.1	155.0	391.4
168	Netherlands	4'500.0	1'069.0	23.8	229.3	167'232.0	10'326.2
169	New Caledonia	15.0	0.7	4.7	530.3	*8.0*	*36.5*
170	New Zealand	700.0	43.5	6.2	251.9	2'303.0	584.7
171	Norway	1'403.2	205.3	14.6	231.9	22'696.1	4'985.7
172	Portugal	5'165.1	259.5	5.0	269.4	4'019.0	388.9
173	Qatar	19.5	0.2	1.2	...	155.0	254.1
174	Singapore	2'020.8	270.0	13.4	178.8	5'898.2	1'416.6
175	Slovenia	*280.0*	56.7	*2.0*	1'031.5	1'077.0	539.6
176	Spain	3'924.5	1'247.5	31.8	290.1	46'554.0	1'144.3
177	Sweden	3'187.0	716.1	22.5	200.9	94'896.0	10'611.2
178	Switzerland	2'275.0	455.2	20.0	325.2	65'827.3	9'040.6
179	Taiwan, China	7'442.0	2'100.0	28.2	185.3	14'790.5	656.7
180	United Arab Emirates	290.5	16.6	5.7	214.5	1'085.0	311.1
181	United Kingdom	13'100.0	1'821.0	13.9	363.5	319'663.3	5'410.0
182	United States	*70'000.0*	19'881.5	*18.3*	155.4	381'692.5	1'323.6
	High Income	**216'069.3**	**60'564.1**	**24.0**	**169.4**	**2'081'892.8**	**2'172.0**
	World	**303'405.4**	**64'737.9**	**18.5**	**175.6**	**2'195'417.3**	**361.5**
	Africa	**1'615.9**	**6.1**	**0.2**	**154.8**	**2'333.6**	**2.9**
	Americas	**89'605.9**	**24'818.4**	**19.1**	**153.0**	**504'117.5**	**603.9**
	Asia	**114'952.8**	**25'578.5**	**22.1**	**180.8**	**100'715.8**	**27.9**
	Europe	**91'863.9**	**14'032.6**	**14.4**	**221.1**	**1'575'412.0**	**1'977.2**
	Oceania	**5'367.0**	**302.3**	**5.7**	**215.6**	**12'838.5**	**409.9**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

18. Broadcasting

		Radio			Television		
		Households (000s) 2002	As % of total households 2002	Population coverage 2002	Households (000s) 2002	As % of total households 2002	Population coverage 2002
1	Angola	450	16.7	85	650	24.1	35
2	Azerbaijan	1'800	103.4	100	2'500	143.6	100
3	Bangladesh	7'994	31.1	98	7'850	30.6	92
4	Benin	700	66.0	85	70	6.6	80
5	Bhutan	92	23.5	90	12	3.1	7
6	Burkina Faso	1'500	85.3	95	600	34.1	70
7	Burundi	575	41.1	99	190	13.6	86
8	Cambodia	949	43.1	74	533	24.2	60
9	Cameroon	1'244	45.0	100	1'100	39.8	70
10	Central African Rep.	177	27.4	...	18	2.8	...
11	Chad	1'230	78.1	95	14	0.9	13
12	Comoros	50	34.5	100	3	1.7	...
13	Congo	200	33.3	...	35	5.8	...
14	Côte d'Ivoire	1'500	76.6	100	910	46.5	100
15	D.R. Congo	1'000	15.4	...	90	1.4	...
16	Equatorial Guinea	...	...	...	...	...	...
17	Eritrea	600	75.8	100	150	18.9	85
18	Ethiopia	2'000	16.0	81	250	2.0	13
19	Gambia	107	62.6	100	19	11.1	100
20	Georgia	1'000	81.6	95	928	75.8	96
21	Ghana	1'700	39.4	100	920	21.3	95
22	Guinea	820	73.0	80	355	30.9	70
23	Guinea-Bissau	210	120.0	75	40	22.9	...
24	Haiti	840	51.6	80	421	25.9	50
25	India	67'415	35.5	99	60'650	31.9	89
26	Indonesia	40'000	74.1	...	30'000	55.6	88
27	Kenya	5'894	86.7	95	698	10.3	65
28	Kyrgyzstan	500	45.1	98	930	83.9	98
29	Lao P.D.R.	421	52.0	65	260	29.9	40
30	Lesotho	120	27.8	80	70	16.2	10
31	Madagascar	1'100	38.5	...	365	11.5	...
32	Malawi	1'205	49.9	80	35	1.4	70
33	Mali	1'500	85.4	95	250	14.2	90
34	Mauritania	485	102.0	100	225	47.3	44
35	Moldova	936	69.5	100	...	...	99
36	Mongolia	...	...	98	161	29.0	95
37	Mozambique	2'275	55.0	90	240	5.6	...
38	Myanmar	232	2.2	80	320	3.1	70
39	Nepal	1'800	43.1	80	550	13.2	32
40	Nicaragua	690	78.4	...	560	59.8	...
41	Niger	720	41.2	85	90	5.1	70
42	Nigeria	13'000	54.4	...	11'000	46.0	...
43	Pakistan	7'300	34.8	97	8'250	39.3	89
44	Papua New Guinea	...	...	...	90	8.1	...
45	Rwanda	800	36.2	...	55	2.5	60
46	S. Tomé & Principe	15	53.8	98	10	35.7	70
47	Senegal	848	75.3	100	684	60.8	90
48	Sierra Leone	400	53.5	100	50	6.7	...
49	Solomon Islands	...	...	80	3	4.3	...
50	Sudan	7'000	130.5	100	4'486	83.7	93
51	Tajikistan	...	...	79	886	79.5	85
52	Tanzania	2'400	35.4	90	1'400	20.7	65
53	Togo	700	86.2	100	416	51.2	100
54	Uganda	4'021	76.5	100	442	8.4	...
55	Uzbekistan	2'700	61.1	99	4'000	90.5	99
56	Viet Nam	8'500	53.5	90	13'021	79.6	...
57	Yemen	1'500	60.3	...	1'000	40.2	...
58	Zambia	1'200	58.3	70	450	21.9	42
59	Zimbabwe	1'600	61.2	90	580	22.2	60
	Low Income	**204'014**	**45.2**	**96**	**159'883**	**35.2**	**83**

		Radio			Television		
		Households (000s) 2002	*As % of total households 2002*	*Population coverage 2002*	*Households (000s) 2002*	*As % of total households 2002*	*Population coverage 2002*
60	Albania	600	82.3	95	655	89.9	95
61	Algeria	*3'500*	*70.0*	*95*	4'466	88.1	*95*
62	Armenia	350	41.6	100	762	90.6	98
63	Belarus	1'549	48.2	100	*2'836*	*88.0*	99
64	Bolivia	*1'573*	*84.8*	...	*880*	*46.1*	...
65	Bosnia	...	...	100	950	87.2	100
66	Brazil	41'795	87.9	*88*	42'779	89.9	*89*
67	Bulgaria	...	...	100	*2'284*	*78.8*	94
68	Cape Verde	*62*	*65.7*	*84*	*38*	*40.0*	*78*
69	China	...	...	93	310'000	89.2	95
70	Colombia	10'947	123.9	98	8'130	92.0	92
71	Cuba	...	...	100	...	...	98
72	Djibouti	*55*	*56.7*	*80*	*39*	*39.7*	*75*
73	Dominican Rep.	*2'100*	*71.2*	100	*2'266*	*76.8*	100
74	Ecuador	2'894	100.6	100	2'554	88.8	95
75	Egypt	10'000	69.1	95	12'407	85.7	...
76	El Salvador	...	...	100	*1'240*	*84.5*	...
77	Fiji	*145*	*108.7*	*97*	*86*	*62.9*	*46*
78	Guatemala	*1'960*	*79.5*	100	*1'050*	*40.4*	100
79	Guyana	...	...	*85*	...	...	*80*
80	Honduras	*1'104*	*74.2*	90	720	47.4	90
81	Iran (I.R.)	12'000	83.0	98	11'070	76.6	97
82	Jamaica	...	...	90	*469*	*65.0*	85
83	Jordan	*660*	*82.9*	...	858	93.4	...
84	Kazakhstan	*1'566*	*41.4*	*73*	*3'473*	*91.8*	*97*
85	Maldives	...	...	100	29	67.7	...
86	Marshall Islands	...	...	...	...	...	...
87	Morocco	*4'658*	*87.0*	95	4'100	76.1	88
88	Namibia	*310*	*89.1*	98	*132*	*37.9*	48
89	Palestine	385	82.6	95	440	94.4	75
90	Paraguay	...	...	*94*	*945*	*69.1*	*80*
91	Peru	4'506	...	100	4'736	...	77
92	Philippines	13'300	83.3	86	12'200	76.4	60
93	Romania	*3'010*	*40.7*	90	*6'400*	*86.6*	99
94	Russia	...	...	93	50'975	98.0	99
95	Samoa	*20*	*85.9*	100	*23*	*96.6*	98
96	Serbia and Montenegro	...	...	*90*	2'341	91.8	*90*
97	South Africa	8'433	82.7	95	6'783	66.5	91
98	Sri Lanka	3'000	63.3	100	1'500	31.6	*92*
99	St. Vincent	...	...	100	...	...	95
100	Suriname	*67*	*78.5*	...	*59*	*65.6*	...
101	Swaziland	95	57.9	...	30	18.3	85
102	Syria	...	...	...	2'825	80.1	...
103	TFYR Macedonia	...	...	...	460	...	...
104	Thailand	*12'178*	*77.8*	99	*15'400*	*97.9*	96
105	Tonga	...	...	100	...	...	70
106	Tunisia	*1'570*	*76.4*	100	*1'816*	*88.4*	100
107	Turkey	*6'760*	*48.6*	99	16'072	108.4	98
108	Turkmenistan	*410*	*45.8*	100	*840*	*93.8*	100
109	Ukraine	...	...	86	17'141	97.3	95
110	Vanuatu	...	...	...	*2*	*5.6*	...
	Lower Middle Income	**151'561**	**80.2**	**93**	**555'261**	**89.4**	**84**

18. Broadcasting

		Radio			Television		
		Households (000s) 2002	As % of total households 2002	Population coverage 2002	Households (000s) 2002	As % of total households 2002	Population coverage 2002
111	Argentina	8'000	81.2	...	9'800	97.0	...
112	Belize	40	79.8	100	19	35.2	...
113	Botswana	325	80.3	85	62	15.3	30
114	Chile	4'108	99.2	99	3'934	95.0	99
115	Costa Rica	900	99.7	98	800	84.2	95
116	Croatia	1'510	93.6	99	1'520	93.6	99
117	Czech Republic	3'117	81.4	99	3'940	102.9	100
118	Dominica	20	86.8	100	18	76.0	90
119	Estonia	550	97.1	100	520	91.8	100
120	Gabon	145	72.6	80	100	50.1	70
121	Grenada	30	93.8	100	30	93.8	...
122	Hungary	3'500	92.8	91	3'599	96.0	97
123	Latvia	794	79.5	100	790	79.1	99
124	Lebanon	700	98.2	95	660	92.6	95
125	Libya	700	86.4	100	750	90.4	100
126	Lithuania	1'300	98.1	90	1'312	96.7	98
127	Malaysia	3'784	77.0	...	4'602	88.9	...
128	Mauritius	260	84.4	100	276	89.6	98
129	Mexico	19'142	81.5	98	23'093	93.6	97
130	Oman	300	78.3	97	300	78.3	94
131	Panama	594	83.1	81	554	77.4	58
132	Poland	12'501	95.2	95	12'125	92.3	99
133	Saudi Arabia	3'000	97.4	...	3'205	96.5	...
134	Seychelles	19	95.6	98	18	91.4	98
135	Slovak Republic	1'520	90.4	99	1'681	100.0	96
136	St. Kitts and Nevis	14	90.1	...	11	70.8	...
137	St. Lucia	44	92.6	100	38	79.0	100
138	Trinidad & Tobago	340	98.0	100	296	85.3	89
139	Uruguay	950	95.0	100	930	93.0	100
140	Venezuela	5'035	98.0	98	4'300	82.9	97
	Upper Middle Income	**73'242**	**87.7**	**95**	**79'282**	**92.6**	**88**

		Radio			Television		
		Households (000s) 2002	*As % of total households 2002*	*Population coverage 2002*	*Households (000s) 2002*	*As % of total households 2002*	*Population coverage 2002*
141	Antigua & Barbuda	*18*	*90.0*	*...*	*20*	*90.7*	*...*
142	Australia	*7'120*	*96.3*	100	7'100	94.8	100
143	Austria	2'898	86.8	100	3'250	97.4	100
144	Bahamas	*80*	*113.5*	100	*76*	*107.8*	*...*
145	Bahrain	*100*	*99.3*	100	104	96.2	100
146	Barbados	*95*	*99.0*	100	*80*	*82.5*	*100*
147	Belgium	*3'024*	*70.7*	100	4'290	99.3	100
148	Brunei Darussalam	*...*	*...*	100	*59*	*98.3*	*...*
149	Canada	*11'200*	*99.5*	*99*	*11'802*	*99.2*	*99*
150	Cyprus	*225*	*98.5*	100	*222*	*97.2*	*98*
151	Denmark	*2'275*	*93.1*	100	*2'379*	*96.9*	*100*
152	Finland	2'275	95.9	100	2'163	91.2	100
153	France	*...*	*...*	*...*	23'411	95.0	*...*
154	French Polynesia	*42*	*80.5*	*...*	50	92.0	*...*
155	Germany	*33'334*	*88.2*	100	36'350	93.9	100
156	Greece	*...*	*...*	*...*	*3'510*	*97.5*	*...*
157	Hong Kong, China	*...*	*...*	*...*	2'148	99.6	*...*
158	Iceland	*99*	*97.0*	100	101	96.8	*98*
159	Ireland	1'262	95.0	100	1'287	96.9	100
160	Israel	*...*	*...*	*95*	*1'666*	*92.6*	*95*
161	Italy	*...*	*...*	*...*	*20'900*	*97.3*	*...*
162	Japan	*46'000*	*99.1*	100	48'000	99.8	100
163	Korea (Rep.)	*...*	*...*	*100*	13'674	92.1	*98*
164	Kuwait	*450*	*114.8*	100	450	95.4	100
165	Luxembourg	*170*	*98.9*	100	*160*	*93.1*	*100*
166	Macao, China	*100*	*67.6*	100	125	80.1	100
167	Malta	*...*	*...*	99	123	93.2	99
168	Netherlands	7'000	99.4	100	7'000	99.4	100
169	New Caledonia	46	80.0	*95*	*44*	*78.4*	*95*
170	New Zealand	*...*	*...*	100	*1'330*	*97.8*	*100*
171	Norway	*1'950*	*99.4*	100	1'980	100.0	100
172	Portugal	*3'094*	*88.2*	100	*3'561*	*99.8*	95
173	Qatar	*...*	*...*	100	*75*	*85.8*	*100*
174	Singapore	*920*	*98.4*	100	987	98.6	100
175	Slovenia	627	91.5	98	620	90.5	96
176	Spain	*12'937*	*95.5*	100	*13'400*	*98.9*	100
177	Sweden	4'000	92.6	100	4'057	93.9	100
178	Switzerland	*2'741*	*91.2*	99	3'030	99.8	99
179	Taiwan, China	5'400	78.0	98	6'655	96.1	96
180	United Arab Emirates	*430*	*89.6*	100	500	93.6	100
181	United Kingdom	*19'200*	*78.7*	*99*	*23'800*	*97.5*	99
182	United States	*104'425*	*99.0*	*99*	106'642	97.8	*99*
	High Income	**273'538**	**94.2**	**99**	**357'181**	**97.1**	**98**
	World	**702'355**	**69.3**	**95**	**1'151'607**	**75.3**	**86**
	Africa	**89'478**	**59.2**	**93**	**57'975**	**38.2**	**69**
	Americas	**223'512**	**95.8**	**96**	**229'250**	**94.4**	**94**
	Asia	**247'235**	**54.0**	**95**	**574'458**	**69.0**	**91**
	Europe	**134'757**	**82.2**	**96**	**281'196**	**96.7**	**99**
	Oceania	**7'373**	**96.3**	**100**	**8'728**	**84.5**	**98**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

19. Multichannel TV

		Cable TV subscribers		*Home satellite antennas*		*Cable modem subscribers*	
		Total (000s) 2002	*As % of TV households 2002*	*Total (000s) 2002*	*As % of TV households 2002*	*Total (000s) 2002*	*As % of cable TV subscribers 2002*
1	Angola	*12.1*	*1.9*	*7.2*	*1.2*	-	-
2	Azerbaijan	4.8	0.2	241.0	9.6	-	-
3	Bangladesh	3'600.0	45.9	0.2	-	-	-
4	Benin	...	...	...	...	-	-
5	Bhutan	11.2	93.5	...	...	-	-
6	Burkina Faso	-	-	500.0	83.3	-	-
7	Burundi	-	-	0.6	0.3	-	-
8	Cambodia	...	...	...	...	-	-
9	Cameroon	...	...	...	...	-	-
10	Central African Rep.	...	...	...	...	-	-
11	Chad	...	...	1.0	...	-	-
12	Comoros	...	...	...	...	-	-
13	Congo	...	...	...	...	-	-
14	Côte d'Ivoire	-	-	...	...	-	-
15	D.R. Congo	...	...	...	...	-	-
16	Equatorial Guinea	...	...	...	...	-	-
17	Eritrea	-	-	4.0	2.6	-	-
18	Ethiopia	-	-	*1.9*	*0.9*	-	-
19	Gambia	...	...	...	...	-	-
20	Georgia	61.2	6.6	0.5	0.1	0.7	1.2
21	Ghana	*6.0*	*0.7*	...	...	-	-
22	Guinea	-	-	*3.1*	*0.9*	-	-
23	Guinea-Bissau	...	...	*0.6*	...	-	-
24	Haiti	*40.0*	...	*1.2*	...	-	-
25	India	*40'000.0*	*66.0*	...	...	36.4	0.1
26	Indonesia	*70.0*	*0.2*	*4'000.0*	*13.8*	*5.0*	*7.1*
27	Kenya	*15.0*	*2.1*	...	...	-	-
28	Kyrgyzstan	15.8	...	...	...	-	-
29	Lao P.D.R.	-	-	*5.0*	*1.9*	-	-
30	Lesotho	...	...	...	...	-	-
31	Madagascar	...	...	...	...	-	-
32	Malawi	-	-	*10.1*	*28.9*	-	-
33	Mali	...	...	1.3	...	-	-
34	Mauritania	...	...	*2.7*	...	-	-
35	Moldova	58.6	...	*1.2*	...	0.3	0.6
36	Mongolia	45.0	27.9	4.3	2.7	-	-
37	Mozambique	...	...	...	...	-	-
38	Myanmar	...	...	59.7	...	-	-
39	Nepal	*65.0*	*56.5*	...	...	-	-
40	Nicaragua	*55.0*	*10.4*	...	...	2.3	...
41	Niger	...	...	*2.2*	...	-	-
42	Nigeria	*59.0*	*0.5*	...	...	-	-
43	Pakistan	*25.0*	*0.2*	...	...	-	-
44	Papua New Guinea	*22.0*	*24.4*	...	...	-	-
45	Rwanda	...	...	...	...	-	-
46	S. Tomé & Principe	...	...	0.1	...	-	-
47	Senegal	*0.5*	*0.1*	*2.0*	*0.3*	-	-
48	Sierra Leone	...	...	*1.3*	...	-	-
49	Solomon Islands	...	...	*0.8*	...	-	-
50	Sudan	-	-	86.1	1.9	-	-
51	Tajikistan	0.5	0.1	...	...	-	-
52	Tanzania	*8.0*	*0.6*	...	...	-	-
53	Togo	...	...	1.5	...	-	-
54	Uganda	*6.0*	*2.6*	-	-	-	-
55	Uzbekistan	93.1	...	*25.0*	...	-	-
56	Viet Nam	...	...	...	...	-	-
57	Yemen	...	...	...	...	-	-
58	Zambia	*13.0*	*2.9*	*11.1*	*2.5*	-	-
59	Zimbabwe	*24.0*	*4.4*	*32.0*	*5.8*	-	-
	Low Income	**44'310.9**	**31.0**	**5'007.4**	**9.8**	**44.8**	**0.1**

		Cable TV subscribers		*Home satellite antennas*		*Cable modem subscribers*	
		Total (000s) 2002	*As % of TV households 2002*	*Total (000s) 2002*	*As % of TV households 2002*	*Total (000s) 2002*	*As % of cable TV subscribers 2002*
60	Albania	7.0	1.1	*240.2*	*36.7*	-	-
61	Algeria	-	-	4'119.0	92.2	-	-
62	Armenia	*4.6*	...	...	...	...	...
63	Belarus	765.3	27.0	*60.0*	*2.1*	-	-
64	Bolivia	*80.0*	*9.1*	...	...	-	-
65	Bosnia	74.0	7.8	285.0	30.0	-	-
66	Brazil	*2'368.0*	*5.7*	*1'243.5*	*3.0*	131.0	5.5
67	Bulgaria	729.4	31.9	*184.6*	*8.1*	-	-
68	Cape Verde	...	...	...	...	-	-
69	China	96'380.0	31.1	...	...	*3.2*	-
70	Colombia	*577.1*	*7.3*	*78.7*	*1.0*	18.4	...
71	Cuba	...	...	...	...	-	-
72	Djibouti	...	...	*5.1*	...	-	-
73	Dominican Rep.	...	...	...	...	-	-
74	Ecuador	437.6	17.1	18.0	0.7	...	...
75	Egypt	-	-	891.0	7.2	-	-
76	El Salvador	*312.0*	*25.6*	*35.0*	*2.9*	-	-
77	Fiji	...	...	*0.1*	...	-	-
78	Guatemala	...	...	...	...	-	-
79	Guyana	...	...	*0.8*	...	-	-
80	Honduras	144.4	20.1	...	...	-	-
81	Iran (I.R.)	...	...	...	...	-	-
82	Jamaica	...	...	...	...	...	...
83	Jordan	*1.4*	*0.2*	328.0	40.1	-	-
84	Kazakhstan	106.1	...	...	...	-	-
85	Maldives	...	...	*3.5*	...	-	-
86	Marshall Islands	...	...	...	...	-	-
87	Morocco	-	-	816.0	20.9	-	-
88	Namibia	30.0	22.7	20.0	15.2	-	-
89	Palestine	-	-	310.0	86.1	-	-
90	Paraguay	*120.0*	*12.7*	...	...	0.5	0.4
91	Peru	443.0	9.4	...	...	*5.4*	*1.2*
92	Philippines	2'940.0	24.1	*25.0*	*0.2*	-	-
93	Romania	3'300.0	51.6	*320.0*	*5.0*	13.0	0.4
94	Russia	6'396.4	12.5	1'624.0	3.2	-	-
95	Samoa	0.3	1.4	0.0	0.1	-	-
96	Serbia and Montenegro	...	...	...	...	-	-
97	South Africa	-	-	502.0	7.4	-	-
98	Sri Lanka	*6.5*	*0.7*	*0.2*	*0.0*	-	-
99	St. Vincent	...	...	...	...	0.3	...
100	Suriname	3.0	5.1	0.6	0.9	...	...
101	Swaziland	...	...	5.0	...	-	-
102	Syria	-	-	1'265.0	44.8	-	-
103	TFYR Macedonia	...	...	...	...	-	-
104	Thailand	800.0	5.2	330.9	2.1	*0.9*	*0.6*
105	Tonga	...	...	...	...	-	-
106	Tunisia	...	...	*1'552.0*	...	-	-
107	Turkey	954.6	5.9	*2'095.5*	*13.0*	18.2	1.9
108	Turkmenistan	...	...	...	...	-	-
109	Ukraine	1'936.0	11.3	141.0	0.8	-	-
110	Vanuatu	...	...	...	...	-	-
	Lower Middle Income	**118'916.8**	**22.5**	**16'499.6**	**7.9**	**190.9**	**0.2**

19. Multichannel TV

		Cable TV subscribers		*Home satellite antennas*		*Cable modem subscribers*	
		Total (000s) 2002	*As % of TV households 2002*	*Total (000s) 2002*	*As % of TV households 2002*	*Total (000s) 2002*	*As % of cable TV subscribers 2002*
111	Argentina	*5'900.0*	*60.2*	*300.0*	*3.1*	*46.0*	*0.8*
112	Belize	...	...	...	...	-	-
113	Botswana	...	...	*13.0*	...	-	-
114	Chile	864.0	22.0	126.2	3.2	93.5	10.8
115	Costa Rica	*75.0*	*10.0*	*3.0*	*0.4*	-	-
116	Croatia	35.4	...	*470.0*	...	-	-
117	Czech Republic	*965.0*	*28.7*	470.0	14.0	15.3	1.6
118	Dominica	...	...	...	...	0.2	...
119	Estonia	145.0	27.9	90.0	17.3	12.7	8.8
120	Gabon	15.0	...	1.0	...	-	-
121	Grenada	...	...	...	...	-	-
122	Hungary	1'727.1	...	*826.9*	...	31.2	1.8
123	Latvia	308.0	39.0	110.0	13.9	-	-
124	Lebanon	*100.0*	*15.2*	*300.0*	*45.5*	35.0	35.0
125	Libya	...	...	587.0	...	-	-
126	Lithuania	260.0	19.8	19.0	1.4	...	...
127	Malaysia	-	-	945.5	21.9	-	-
128	Mauritius	...	...	13.0	...	-	-
129	Mexico	2'480.0	10.7	980.0	4.2	*20.0*	*0.8*
130	Oman	-	-	...	...	-	-
131	Panama	...	...	...	...	-	-
132	Poland	3'529.4	29.1	*2'500.0*	*20.6*	*10.0*	*0.3*
133	Saudi Arabia	6.0	0.2	*2'060.9*	*64.3*	-	-
134	Seychelles	...	...	-	...	-	-
135	Slovak Republic	684.5	40.7	*620.0*	*36.9*	-	-
136	St. Kitts and Nevis	...	...	...	...	-	-
137	St. Lucia	...	...	...	...	-	-
138	Trinidad & Tobago	...	...	...	...	-	-
139	Uruguay	*420.0*	*42.9*	...	...	...	...
140	Venezuela	915.9	21.3	...	...	67.4	7.4
	Upper Middle Income	**18'430.3**	**23.4**	**10'435.4**	**12.8**	**331.2**	**1.9**

		Cable TV subscribers		*Home satellite antennas*		*Cable modem subscribers*	
		Total (000s) 2002	*As % of TV households 2002*	*Total (000s) 2002*	*As % of TV households 2002*	*Total (000s) 2002*	*As % of cable TV subscribers 2002*
141	Antigua & Barbuda	...	...	...	...	-	-
142	Australia	1'500.0	21.1	*575.0*	*8.1*	140.9	9.4
143	Austria	1'076.8	33.1	1'560.0	48.0	255.0	23.7
144	Bahamas	...	...	...	...	12.0	...
145	Bahrain	*7.7*	*7.5*	*65.8*	*64.3*	-	-
146	Barbados	-	-	*0.7*	*0.9*	-	-
147	Belgium	3'880.3	90.5	290.0	6.8	353.5	9.1
148	Brunei Darussalam	*24.0*	*40.7*	...	...	-	-
149	Canada	*7'868.3*	*66.7*	*1'609.2*	*13.6*	*1'624.5*	*20.6*
150	Cyprus	-	-	...	...	-	-
151	Denmark	*1'078.5*	*45.3*	*800.0*	*33.6*	154.8	14.4
152	Finland	1'040.0	48.1	*361.0*	*16.7*	54.0	5.2
153	France	3'430.2	14.7	*2'789.6*	*11.9*	239.9	7.0
154	French Polynesia	*8.6*	*17.7*	*8.6*	*17.7*	-	-
155	Germany	20'630.0	56.8	13'650.0	37.6	45.0	0.2
156	Greece	-	-	*70.0*	*2.0*	-	-
157	Hong Kong, China	615.1	28.6	1.9	0.1	225.0	36.6
158	Iceland	35.4	35.1	5.9	5.9	-	-
159	Ireland	562.0	43.7	286.0	22.2	2.3	0.4
160	Israel	1'221.0	73.3	113.0	6.8	15.0	1.2
161	Italy	*80.0*	*0.4*	*2'550.0*	*12.2*	-	-
162	Japan	23'332.2	48.6	11'577.1	24.1	2'069.0	8.9
163	Korea (Rep.)	*6'177.7*	*45.5*	...	...	3'701.7	59.9
164	Kuwait	...	...	*650.0*	...	-	-
165	Luxembourg	*138.0*	*86.2*	*33.0*	*20.6*	0.1	0.1
166	Macao, China	5.6	4.4	0.3	0.2	-	-
167	Malta	95.1	77.3	15.1	12.3	6.2	6.5
168	Netherlands	6'500.0	92.9	500.0	7.1	800.0	12.3
169	New Caledonia	...	...	...	...	-	-
170	New Zealand	*27.3*	*2.1*	*300.3*	*22.6*	4.5	16.5
171	Norway	840.1	42.4	510.0	25.8	52.3	6.2
172	Portugal	1'262.0	35.4	*425.0*	*11.9*	207.5	16.4
173	Qatar	*34.4*	*45.8*	...	...	-	-
174	Singapore	352.0	35.7	-	-	108.0	30.7
175	Slovenia	320.0	51.6	270.0	43.5	40.0	12.5
176	Spain	811.4	5.9	1'995.7	14.5	342.6	42.2
177	Sweden	2'200.0	54.2	1'090.0	26.9	*115.5*	*5.8*
178	Switzerland	2'739.0	90.4	850.0	28.1	260.0	9.5
179	Taiwan, China	4'642.0	69.8	30.0	0.5	247.7	5.3
180	United Arab Emirates	...	...	...	...	-	-
181	United Kingdom	3'380.0	14.2	6'849.0	28.8	960.0	28.4
182	United States	73'525.2	68.9	*17'890.5*	*16.8*	11'369.1	15.5
	High Income	**169'439.6**	**47.5**	**67'722.7**	**19.7**	**23'406.0**	**13.8**
	World	**351'097.6**	**31.8**	**99'665.2**	**14.6**	**23'972.9**	**7.0**
	Africa	**188.6**	**0.3**	**9'192.7**	**21.7**	**-**	**-**
	Americas	**96'628.5**	**43.4**	**22'287.3**	**10.7**	**13'390.5**	**14.1**
	Asia	**180'747.9**	**33.3**	**22'342.7**	**15.7**	**6'447.6**	**3.7**
	Europe	**71'974.4**	**25.7**	**44'957.7**	**16.0**	**3'989.4**	**5.6**
	Oceania	**1'558.2**	**18.1**	**884.8**	**10.3**	**145.4**	**9.4**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

20. Projections

		Main telephone lines			Cellular subscribers		
		Total (000s)	per 100 inhabitants		Total (000s)	per 100 inhabitants	
		2005	2002	2005	2005	2002	2005
1	Angola	114	0.61	0.75	195	0.93	1.28
2	Azerbaijan	1'144	11.35	13.29	1'023	10.69	11.88
3	Bangladesh	1'185	0.51	0.85	2'367	0.81	1.70
4	Benin	84	0.92	1.12	391	3.22	5.21
5	Bhutan	32	2.84	4.31	...	...	...
6	Burkina Faso	85	0.54	0.66	189	0.75	1.47
7	Burundi	26	0.32	0.35	89	0.74	1.21
8	Cambodia	44	0.26	0.29	656	2.76	4.41
9	Cameroon	140	0.70	0.82	1'596	4.27	9.38
10	Central African Rep.	8	0.23	0.19	...	0.32	0.36
11	Chad	15	0.15	0.17	53	0.43	0.62
12	Comoros	19	1.35	2.18	...	...	...
13	Congo	22	0.67	0.61	326	6.72	9.05
14	Côte d'Ivoire	484	2.04	2.49	1'434	6.23	7.38
15	D.R. Congo	10	0.02	0.02	2'993	1.06	5.53
16	Equatorial Guinea	15	1.74	2.57	73	6.34	12.36
17	Eritrea	46	0.90	1.01	...	...	...
18	Ethiopia	667	0.53	0.91	95	0.07	0.13
19	Gambia	47	2.80	3.20	187	7.29	12.59
20	Georgia	933	13.14	19.40	851	10.21	17.70
21	Ghana	341	1.27	1.42	1'156	2.07	4.80
22	Guinea	29	0.34	0.36	149	1.18	1.88
23	Guinea-Bissau	11	0.89	0.85	...	...	...
24	Haiti	312	1.57	3.66	214	1.69	2.51
25	India	59'770	3.98	5.50	26'295	1.22	2.42
26	Indonesia	9'723	3.65	4.40	21'537	5.52	9.74
27	Kenya	338	1.03	1.00	3'187	4.15	9.40
28	Kyrgyzstan	425	7.75	7.81	110	1.04	2.02
29	Lao P.D.R.	115	1.12	1.93	107	1.00	1.78
30	Lesotho	42	1.32	1.91	149	4.25	6.83
31	Madagascar	67	0.37	0.39	178	1.02	1.04
32	Malawi	151	0.70	1.43	133	0.82	1.25
33	Mali	98	0.53	0.87	60	0.50	0.54
34	Mauritania	68	1.18	2.33	605	9.22	20.90
35	Moldova	942	16.07	21.26	507	7.69	11.43
36	Mongolia	146	5.27	5.79	237	8.89	9.42
37	Mozambique	81	0.46	0.40	430	1.40	2.14
38	Myanmar	485	0.70	0.95	109	0.10	0.21
39	Nepal	446	1.41	1.81	27	0.09	0.11
40	Nicaragua	183	3.20	3.13	263	3.78	4.49
41	Niger	27	0.19	0.20	369	0.14	2.74
42	Nigeria	1'179	0.58	0.91	9'756	1.34	7.50
43	Pakistan	4'787	2.50	3.05	1'886	0.85	1.20
44	Papua New Guinea	63	1.17	1.05	21	0.27	0.35
45	Rwanda	35	0.28	0.40	192	1.36	2.16
46	S. Tomé & Principe	10	4.13	6.37	2.958	1.31	1.92
47	Senegal	256	2.23	2.33	1'046	5.49	9.54
48	Sierra Leone	34	0.48	0.67	185	1.34	3.63
49	Solomon Islands	5	1.49	1.09	1	0.22	0.21
50	Sudan	1'538	2.06	4.42	362	0.59	1.04
51	Tajikistan	269	3.73	3.98	314	0.21	4.65
52	Tanzania	145	0.47	0.39	1'053	1.95	2.82
53	Togo	67	1.05	1.27	312	3.49	5.93
54	Uganda	46	0.22	0.17	556	1.59	2.02
55	Uzbekistan	1'721	6.65	6.55	271	0.74	1.03
56	Viet Nam	7'547	4.84	9.05	2'886	2.34	3.46
57	Yemen	1'060	2.78	4.97	1'317	2.11	6.17
58	Zambia	95	0.82	0.83	158	1.30	1.39
59	Zimbabwe	357	2.47	2.97	376	3.03	3.13
	Low Income	**98'133.3**	**2.83**	**3.85**	**89'051**	**1.75**	**3.50**

		Main telephone lines			*Cellular subscribers*		
		Total (000s)	*per 100 inhabitants*		*Total (000s)*	*per 100 inhabitants*	
		2005	*2002*	*2005*	*2005*	*2002*	*2005*
60	Albania	380	7.14	12.44	1'995	27.63	65.22
61	Algeria	2'151	6.10	6.58	2'406	1.28	7.36
62	Armenia	557	14.28	14.67	246	1.89	6.46
63	Belarus	3'322	29.94	33.91	2'061	4.67	21.04
64	Bolivia	654	6.76	7.66	966	10.46	11.31
65	Bosnia	1'124	23.67	29.08	1'277	19.63	33.03
66	Brazil	54'559	22.32	30.28	41'748	20.06	23.17
67	Bulgaria	2'848	36.77	38.98	4'406	33.30	60.30
68	Cape Verde	102	15.99	22.94	58	9.78	12.99
69	China	386'260	16.69	30.45	356'073	16.09	28.07
70	Colombia	8'713	17.94	19.45	6'409	10.62	14.31
71	Cuba	732	5.09	6.43	40	0.16	0.35
72	Djibouti	11	1.54	1.56	135	2.29	19.46
73	Dominican Rep.	932	11.04	11.99	2'249	20.66	28.95
74	Ecuador	1'793	11.02	13.38	2'917	12.06	21.78
75	Egypt	11'719	11.04	15.94	7'269	6.68	9.89
76	El Salvador	737	10.34	10.93	1'013	13.76	15.03
77	Fiji	117	11.90	14.03	99	10.97	11.86
78	Guatemala	1'183	7.05	9.11	2'145	13.15	16.53
79	Guyana	103	9.15	11.31	100	9.93	11.02
80	Honduras	362	4.81	4.89	444	4.87	6.00
81	Iran (I.R.)	17'794	18.66	26.16	2'279	3.35	3.35
82	Jamaica	360	16.97	13.45	2'254	53.48	84.27
83	Jordan	777	12.66	13.40	1'701	22.89	29.35
84	Kazakhstan	2'517	13.04	16.14	1'853	6.43	11.88
85	Maldives	36	10.20	12.20	101	14.91	33.98
86	Marshall Islands	5	7.74	7.97	1	0.98	0.98
87	Morocco	793	3.80	2.55	7'944	20.91	25.54
88	Namibia	140	6.48	6.93	224	8.00	11.06
89	Palestine	352	8.73	9.31	392	9.26	10.38
90	Paraguay	259	4.73	4.16	2'399	28.83	38.45
91	Peru	1'842	6.60	6.47	3'430	8.62	12.05
92	Philippines	3'724	4.17	4.42	18'740	19.13	22.27
93	Romania	4'738	19.44	23.00	6'706	23.57	32.55
94	Russia	41'345	24.22	28.31	44'005	12.01	30.13
95	Samoa	14	5.69	7.29	3	1.50	1.56
96	Serbia and Montenegro	2'629	23.26	24.25	3'745	25.66	34.54
97	South Africa	4'673	10.66	9.69	17'445	30.39	36.16
98	Sri Lanka	1'090	4.66	5.54	1'287	4.92	6.53
99	St. Vincent	31	23.35	25.61	13	8.53	10.71
100	Suriname	84	16.35	14.96	133	22.52	23.70
101	Swaziland	40	3.40	3.73	71	6.10	6.67
102	Syria	2'945	12.32	16.00	844	2.35	4.59
103	TFYR Macedonia	650	27.13	30.56	603	17.70	28.35
104	Thailand	8'147	10.50	12.76	37'026	26.04	57.98
105	Tonga	14	11.29	13.88	35	3.38	34.95
106	Tunisia	1'513	11.74	14.95	644	5.15	6.36
107	Turkey	19'722	28.12	28.03	27'542	34.75	39.15
108	Turkmenistan	389	7.71	7.06	8	0.17	0.15
109	Ukraine	11'489	21.61	23.13	8'234	8.38	16.58
110	Vanuatu	7	3.27	3.00	50	2.42	22.75
	Lower Middle Income	**606'477.2**	**16.48**	**25.12**	**623'766**	**15.88**	**25.83**

20. Projections

		Main telephone lines			Cellular subscribers		
		Total (000s)	per 100 inhabitants		Total (000s)	per 100 inhabitants	
		2005	2002	2005	2005	2002	2005
111	Argentina	8'185	21.88	21.68	7'403	17.76	19.61
112	Belize	26	12.37	9.37	67	20.45	24.67
113	Botswana	174	8.72	9.44	538	24.13	29.20
114	Chile	3'729	23.04	25.18	7'773	42.83	52.48
115	Costa Rica	1'288	25.05	29.76	675	11.10	15.59
116	Croatia	1'993	41.72	47.11	3'081	53.50	72.84
117	Czech Republic	3'400	36.23	34.16	10'523	84.88	105.73
118	Dominica	25	30.39	31.91	11	12.00	14.13
119	Estonia	411	35.06	33.23	1'178	65.02	95.14
120	Gabon	24	2.47	1.74	300	21.50	21.75
121	Grenada	37	31.65	32.04	9	7.13	7.58
122	Hungary	3'477	36.12	33.51	9'378	67.60	90.38
123	Latvia	654	30.11	29.81	1'268	39.38	57.80
124	Lebanon	869	19.88	24.32	819	22.70	22.94
125	Libya	752	11.88	13.72	97	1.26	1.77
126	Lithuania	655	27.03	20.83	2'676	47.53	85.13
127	Malaysia	4'724	19.04	17.80	11'263	37.68	42.44
128	Mauritius	411	27.03	33.28	444	28.91	35.88
129	Mexico	19'928	14.67	18.70	30'488	25.45	28.62
130	Oman	236	8.39	7.90	660	17.15	22.07
131	Panama	290	12.20	8.85	673	18.95	20.56
132	Poland	12'117	29.53	31.43	19'394	36.26	50.30
133	Saudi Arabia	3'927	14.39	15.45	10'431	21.72	41.03
134	Seychelles	27	26.91	33.06	54	55.35	66.95
135	Slovak Republic	1'130	26.82	21.15	3'934	54.36	73.63
136	St. Kitts and Nevis	26	50.00	52.21	13	10.64	26.67
137	St. Lucia	55	31.95	32.60	144	8.95	85.84
138	Trinidad & Tobago	338	24.98	25.75	507	27.81	38.61
139	Uruguay	973	27.96	28.14	806	19.26	23.31
140	Venezuela	3'371	11.27	12.56	7'579	25.64	28.24
	Upper Middle Income	**73'251.8**	**20.06**	**21.38**	**132'188**	**30.94**	**38.58**

		Main telephone lines			*Cellular subscribers*		
		Total (000s)	*per 100 inhabitants*		*Total (000s)*	*per 100 inhabitants*	
		2005	*2002*	*2005*	*2005*	*2002*	*2005*
141	Antigua & Barbuda	38	48.78	47.08	58	48.98	72.84
142	Australia	10'960	53.86	53.61	14'057	63.98	68.75
143	Austria	3'978	48.88	48.41	6'811	78.62	82.89
144	Bahamas	147	40.56	45.63	259	39.03	80.08
145	Bahrain	182	26.31	25.39	496	58.33	69.08
146	Barbados	148	49.44	54.57	103	19.74	37.82
147	Belgium	4'860	49.44	46.30	8'547	78.56	81.43
148	Brunei Darussalam	106	25.57	27.69	196	38.92	51.01
149	Canada	19'398	63.55	59.92	12'813	37.72	39.58
150	Cyprus	581	68.80	75.23	549	58.44	70.98
151	Denmark	3'544	68.86	65.13	5'007	83.32	92.01
152	Finland	2'551	52.35	48.55	4'846	86.74	92.24
153	France	33'841	56.89	55.69	41'135	64.70	67.69
154	French Polynesia	51	21.38	19.16	119	36.66	44.85
155	Germany	59'433	65.09	71.65	63'651	72.75	76.73
156	Greece	5'063	49.13	43.15	10'756	84.54	91.66
157	Hong Kong, China	3'695	56.47	53.00	7'012	94.25	100.58
158	Iceland	182	65.28	61.01	273	90.60	91.32
159	Ireland	2'211	50.24	54.58	3'091	76.32	76.32
160	Israel	3'299	46.72	46.85	6'832	95.45	97.03
161	Italy	27'126	48.07	49.11	54'607	93.87	98.86
162	Japan	66'613	55.83	51.96	87'221	63.65	68.03
163	Korea (Rep.)	25'397	48.86	50.66	35'646	67.95	71.11
164	Kuwait	505	20.38	19.04	1'698	51.90	64.01
165	Luxembourg	395	79.68	86.43	540	106.05	118.09
166	Macao, China	175	39.88	39.42	389	62.53	87.51
167	Malta	212	52.34	52.32	316	69.91	78.05
168	Netherlands	10'179	61.77	61.65	12'425	74.47	75.25
169	New Caledonia	54	23.21	22.41	93	35.71	38.94
170	New Zealand	1'670	44.81	39.79	2'631	62.17	62.68
171	Norway	3'406	73.44	73.62	3'913	84.36	84.57
172	Portugal	4'417	42.13	40.81	9'054	82.52	83.66
173	Qatar	204	28.94	32.53	398	43.80	63.34
174	Singapore	1'899	46.29	43.22	3'632	79.56	82.68
175	Slovenia	1'473	50.61	73.49	1'869	83.53	93.24
176	Spain	27'213	50.62	65.51	37'491	82.42	90.26
177	Sweden	6'362	73.57	70.40	8'717	88.89	96.46
178	Switzerland	5'706	74.42	77.20	6'206	78.93	83.97
179	Taiwan, China	13'816	58.17	60.36	26'161	106.15	114.28
180	United Arab Emirates	1'214	31.35	30.94	3'045	69.61	77.62
181	United Kingdom	34'409	59.06	59.24	52'923	84.07	91.11
182	United States	185'084	64.58	61.88	152'946	48.81	51.13
	High Income	**571'797.4**	**58.54**	**58.24**	**688'530**	**66.39**	**70.13**
	World	**1'349'659.7**	**17.90**	**21.47**	**1'533'535**	**19.07**	**24.40**
	Africa	**29'326.3**	**2.77**	**3.37**	**65'682**	**4.59**	**7.55**
	Americas	**315'925.3**	**34.73**	**35.99**	**289'063**	**29.90**	**32.93**
	Asia	**641'281.6**	**11.99**	**17.31**	**676'438**	**12.42**	**18.25**
	Europe	**350'167.2**	**41.34**	**43.81**	**485'239**	**51.26**	**60.71**
	Oceania	**12'959.2**	**40.40**	**39.23**	**17'109**	**48.87**	**51.79**

Note: For data comparability and coverage, see the technical notes.
Figures in italics are estimates or refer to years other than those specified.
Source: ITU.

TECHNICAL NOTES

General methodology

The compound annual growth rate (CAGR) is computed by the formula:

$$[(P_v / P_0)^{(1/n)}]-1$$

where P_v = Present value
P_0 = Beginning value
n = Number of periods

The result is multiplied by 100 to obtain a percentage.

United States dollar figures are reached by applying the average annual exchange rate (from the International Monetary Fund, IMF) to the figure reported in national currency. For countries where the IMF rate is unavailable or where the exchange rate typically applied to foreign exchange transactions differs markedly from the official IMF rate, a World Bank conversion rate is used. For the few countries where neither the IMF nor World Bank rates are available, a United Nations end-of-period rate was used.

Group figures are either *totals* or weighted *averages* depending on the indicator. For example, for main telephone lines, the total number of *main telephone lines* for each grouping is shown, while for *main lines per 100 inhabitants* the weighted average is shown. Group figures are shown in bold in the tables. In cases of significant missing data, group totals are not shown. Group growth rates generally refer to countries for which data is available for both years.

1. Basic indicators

The data for *Population* are mid-year estimates from national statistical offices or the United Nations (UN). Population *Density* is based on land area data from the UN; the land area does not include any overseas dependencies but does include inland waters. The data for *Gross Domestic Product* (GDP) are generally from the IMF. They are current price data in national currency converted to United States dollars by the method identified above. *Total telephone subscribers* refer to the sum of main telephone lines and cellular mobile subscribers (see below for definitions). *Total telephone subscribers per 100 inhabitants* is calculated by dividing the total telephone subscribers by the population and multiplying by 100. *Effective teledensity* is the higher value of either main telephone lines per 100 inhabitants or cellular subscribers per 100 inhabitants.

2. Main telephone lines

This table shows the number of *Main telephone lines* and *Main telephone lines per 100 inhabitants* for the years indicated and corresponding annual growth rates. *Main telephone lines* refer to telephone lines connecting a customer's equipment (e.g., telephone set, facsimile machine) to the Public Switched Telephone Network (PSTN) and which have a dedicated port on a telephone exchange. Note that for most countries, main lines also include public payphones. Many countries also include ISDN channels in main lines (see 9. ISDN). *Main telephone lines per 100 inhabitants* is calculated by dividing the number of main lines by the population and multiplying by 100. *Subscriber lines* is calculated by subtracting the number of ISDN channels from main telephone lines and adding ISDN subscribers.

3. Waiting list

The table shows the total number of applications for a connection to a main telephone line that have had to be held over owing to a lack of technical availability. It should be noted that the waiting list refers to applications received; it does not include figures for those who desire a telephone line but have not submitted an application. *Total demand* is obtained by adding main lines in operation and the waiting list. *Satisfied demand* is obtained by dividing the number of main lines by the total demand for main telephone lines (sum of the unmet applications and operating main telephone lines). *Waiting time* shows the approximate number of years applicants must wait for a telephone line. It is calculated by dividing the number of applicants on the waiting list by the average number of main lines added per year over the past three years.

4. Local telephone network

Capacity used is obtained by dividing the number of main lines in service by the total number of main lines that could be connected to local public switching exchanges. The *Automatic* per cent is calculated by dividing the number of main lines connected to automatic exchanges by the total number of main lines. The *Digital* per cent is calculated by dividing the number of main lines connected to digital exchanges by the total number of main lines. The percentage of *Residential* lines refers to the number of main lines serving households (i.e. lines that are not used for professional purposes or as public telephone stations) divided by the total number of main lines. *Faults per*

100 main lines per year refer to the number of reported faults per 100 main telephone lines for the year indicated. It is calculated by the total number of reported faults for the year divided by the number of telephone main lines and multiplied by 100. Some countries report this on a monthly basis, so an annual estimate is made by multiplying by 12. The definition of a fault varies among countries: some operators define faults as including malfunctioning customer equipment while others include only technical faults.

5. Teleaccessibility

Total residential main lines refer to the number of main lines used by households. *Per 100 households* is obtained by dividing the number of residential main lines by the number of households and multiplying by 100. *Percentage of households with a telephone* is based on surveys carried out by national statistical offices. Note that it generally includes main telephone lines and where countries report a combined figure, would also include households with a mobile subscription. *Payphones* refers to the total number of all types of public telephones including coin— and card—operated ones. Some countries include public phones installed in private places. No distinction is made between operational and non-operational payphones. *Per 1'000 inhabitants* is obtained by dividing the number of public payphones by the population and multiplying by 1'000. *As % of main lines* is obtained by dividing the number of public telephones by the number of main lines.

6. Telephone tariffs

The table shows the costs associated with local residential and business telephone service. *Connection* refers to connection charges for basic telephone service. *Monthly subscription* refers to the recurring fixed charge for subscribing to the PSTN. This indicator is not always comparable since some countries include a number of free local calls in the subscription. When subscription charges are reported annually or bi-monthly, they are converted to their corresponding monthly amount. *Local call* refers to the cost of a 3-minute call within the same exchange area using the subscriber's equipment (i.e., not from a public telephone). This is the amount the subscriber must pay for a 3-minute call and not the average price for each 3-minutes. Any taxes involved in these three charges are included to improve comparability. The *Subscription as a % of GDP per capita* shows cost of an annual residential telephone subscription as a percentage of Gross Domestic Product per capita.

7. Mobile cellular subscribers

Cellular mobile telephone subscribers refer to users of portable telephones subscribing to an automatic public mobile telephone service using cellular technology that provides access to the PSTN. *Per 100 inhabitants* is obtained by dividing the number of cellular subscribers by the population and multiplying by 100. *% digital* is the number of mobile cellular subscribers who use a digital cellular service (e.g. GSM, CDMA, DAMPS, PCS, PHS) by the total number of cellular subscribers. *Prepaid subscribers* refers to the total number of mobile cellular subscribers using prepaid cards. *Population coverage* measures the percentage of inhabitants that are within range of a mobile cellular signal whether or not they are subscribers. This is calculated by dividing the number of inhabitants within range of a mobile cellular signal by the total population. *As a % of total telephone subscribers* is obtained by dividing the number of cellular subscribers by the total number of telephone subscribers (sum of the main telephone lines and the cellular subscribers.

8. Prepaid cellular tariffs

Connection charge refers to the initial, one-time charge for a new subscription. *Per minute local call* refers to the price of a one-minute peak and off-peak rate local call from a mobile cellular telephone. When there are different rates, the price of a call to the same mobile network is used. *Cost of local SMS* is the price of sending a national Short Message Service (SMS) message from a mobile handset.

9. ISDN and ADSL

ISDN subscribers refers to the number of subscribers to Integrated Services Digital Networks. It includes both basic rate and primary rate interface subscribers. *B-channel equivalents* converts the number of ISDN subscriber lines into their equivalent voice channels. The number of basic rate subscribers is multiplied by two and the number of primary rate subscribers is multiplied by 23 or 30 depending on the standard implemented. *B-channels per 1'000 inhabitants* is the number of B-channel equivalents divided by the population and multiplied by 1'000. *B-channels as % of main lines* is the number of B-channel equivalents divided by the number of main telephone lines.

10. International telephone traffic

Outgoing telephone traffic refers to total telephone traffic measured in minutes that originated in the specified country with a destination outside the country. *As % of bothway* refers to outgoing traffic divided by total traffic (incoming and outgoing).

Minutes per inhabitant is obtained by dividing outgoing international minutes by the number of inhabitants in the country. *Minutes per subscriber* is obtained by dividing outgoing international minutes by the number of main lines. *International telephone circuits* refers to the number of links (voice channel equivalents) with other countries for establishing telephone communications.

11. Telecommunication staff

Telecommunication staff refers to the total number of staff (part-time staff converted to full-time equivalents) employed by telecommunication enterprises providing public telecommunication services. In some cases where posts and telecommunication organisations are combined, no breakdown of telecommunication staff is available. Note that the figure would generally not include sub-contract staff. *% female* refers to the number of full time telecommunication staff that are female divided by the total number of employees. *Subscribers per employee* is computed by dividing total telephone subscribers by the number of employees. Caution should be used in interpreting this figure as some countries may subcontract a proportion of work, in which case the number of main lines per employee would be overstated. *Mobile staff* refers to the total number of staff employed by mobile cellular network operators. This refers to mobile operators building infrastructure and not staff employed by resellers. *Mobile subscribers per employee* is calculated by dividing total mobile cellular subscribers by the number of mobile staff.

12. Telecommunication revenue

This table shows the revenues (turnover) received from providing telecommunication services in each country. United States dollar values are obtained by the method described earlier. Data may not be strictly comparable due to a number of factors. First, it is assumed that the data relate to revenues of all operators providing service in the country. This is not unequivocally known and may be impossible to determine since there may be no legal requirement for all operators to provide financial information, or operators may be part of a parent company that only provides consolidated accounts. The data does not always include revenues from cellular mobile telephone, radio paging or data services in some developing nations if these services are not provided by the main fixed-link operator. Second, the operators may have subsidiaries with financial activities unrelated to telecommunication services that may be included. Third, in the case of countries where posts and telecommunications are combined, a perfect allocation of revenues is not always possible. Fourth, there are definition and accounting differences among countries.

Total telecommunication revenue consists of all telecommunication revenues earned during the financial year under review. *% mobile revenue* is the share of mobile communication revenue. *Per inhabitant* shows current revenues divided by the number of inhabitants in the country. *Per telephone subscriber* is obtained by dividing revenues by total telephone subscribers (fixed plus mobile). *Per employee* is obtained by dividing revenues by employees. For some countries, no breakdown between postal and telecommunication staff is available and the figure may thus be unrealistically low. *As a % of GDP* shows telecommunication revenues divided by national Gross Domestic Product.

13. Telecommunication investment

Investment refers to the annual expenditure associated with acquiring ownership of property and plant used for telecommunication services and includes land and buildings. *Total telecom investment* shows total current investments for the year indicated; the United States dollar figure is arrived at by the method described above. *Per inhabitant* is obtained by dividing the annual investment by the population. *Per main line* is obtained by dividing investment by main lines. *As a % of revenue* is obtained by dividing annual investment by telecommunication revenues. *As a % of GFCF* shows telecommunications investment divided by Gross Fixed Capital Formation (GFCF). For some countries where GFCF is not available, Gross Domestic Investment is used. This is similar to GFCF except that it does not include changes in inventories which tend to comprise a small proportion of GFCF.

14. Equipment trade

This table shows *telecommunication equipment imports* and *exports*. The data come from the United Nations in United States dollar values. They correspond to the Standard Industrial Trade Classification (SITC, Revision 2 or latest) categories 764.1 Line telephony / telegraphy, 764.3 Transmission apparatus, 764.81 Radio-telephony / telegraphy receivers and 764.91 Parts and accessories. *Balance* shows exports minus imports for the latest year available.

15. Information technology

Internet hosts refer to the number of computers directly connected to the worldwide Internet network. Note that Internet host computers are identified by a two-digit country code or a three-digit code generally

reflecting the nature of the organization using the Internet computer. The number of hosts is assigned to economies based on the country code although this does not necessarily indicate that the host is actually physically located in the economy. In addition, all other hosts for which there are no country code identification are assigned to the United States. Therefore the number of Internet hosts shown for each country can only be considered an approximation. Data on Internet host computers are from Internet Software Consortium and RIPE (Réseaux IP Européens). Internet *Users* is based on nationally reported data. In some cases, surveys have been carried out that give a more precise figure for the number of Internet users. However surveys differ across countries in the age and frequency of use they cover. The reported figure for Internet users—which may refer to only users above a certain age—is divided by the total population to obtain *users per 100 inhabitants*. Countries that do not have surveys generally base their estimates on derivations from reported Internet Service Provider subscriber counts, calculated by multiplying the number of subscribers by a multiplier. *PCs* shows the estimated number of Personal Computers (PCs), both in absolute numbers and in terms of PCs per 100 inhabitants. The figures for PCs come from the annual questionnaire supplemented by other sources.

16. Internet tariff

The table shows the costs associated with 20 hours dial-up use per month. If broadband prices are cheaper, these are used instead. Data are generally those of the largest Internet Service Provider (ISP) and incumbent telephone company as they list the prices. *ISP charge* refers to the Internet monthly subscription plus extra charges once free hours have been used up. *Telephone charge* refers to the amount payable to the telephone company for local telephone charges while logged on. This includes usage charges but does not include the telephone line rental. *Total Internet price* refers to the sum of telephone usage charges and ISP charges. *As % of GNI per capita* shows cost of 20 hours use per month as a percentage of Gross National Income.

17. Internet

Internet subscribers refers to the number of dial-up, leased line and broadband Internet subscribers. *Broadband subscribers* refer to the sum of DSL, cable modem and other broadband subscribers. Although there exist various definitions of *broadband*, it may be defined as sufficient bandwidth to permit combined provision of voice, data and video. Speed should be greater than 128 kbps in at least one direction. *As % of total subscribers* is calculated by dividing the total number of broadband subscribers by the total number of Internet subscribers. *International bandwidth* refers to the amount of international Internet bandwidth measured in Mega Bits Per Second (Mbps). Data for Internet bandwidth come from ITU's annual questionnaire supplemented with data from TeleGeography. *Bits per inhabitant* is calculated by dividing the international Internet bandwidth by the population.

18. Broadcasting

Radio households represent the number of households that have a radio receiver. (See the discussion under television households regarding licenses that would also be applicable to radio). *As % of total households* is calculated by dividing the number of radio households by total households. Radio *population coverage* refers to the percentage of the population that could receive terrestrial-based radio programming transmissions from where they live. *Television households* is the number of households that have television receivers. Note that for some countries, the number of licenses (i.e. system where television sets must be registered) is used as a proxy for television households. Since households may not register, the number of licenses may understate the true number especially if there is widespread avoidance of the licensing system. *Coverage* refers to the percentage of the population that can receive a terrestrial broadcast signal.

19. Multichannel TV

Cable TV subscribers are those who subscribe to a multi-channel television service delivered by a fixed-link connection, usually coaxial or fibre optic cable. However, some countries also report subscribers using wireless technology. In addition, some countries also report the number of households cabled to community antenna systems re-broadcasting free-to-air channels because of poor reception. *As % of TV households* is calculated by dividing the number of cable TV subscribers by the number of TV households. *Home satellite antennas* shows the number of households with access to a multi-channel television service delivered by satellite. This figure includes both Direct-to-the-home (DTH) service and Satellite Master Antenna Television (SMATV) which serves several households in the same building. SMATV serving households in different buildings is counted as cable TV. *Cable modem Internet subscribers* refer to Internet subscribers via a cable TV network. *As % of cable TV subscribers* is calculated by dividing the number of cable modem Internet subscribers by the total cable TV subscribers and multiplying by 100.

20. Projections

Main telephone lines, total and per 100 inhabitants, and *cellular subscribers, total and per 100 inhabitants,* show the current figures for these items and the estimated figure for the year 2005. The estimated number of lines in the year 2005 is a projection based on historical growth rates over the last three years. The estimated number of mobile cellular subscribers for the year 2005 is generally derived from the 2002 growth rate. The 2002 growth rate is halved each year to arrive at the forecast for 2005. In some cases values have been adjusted (e.g. 2002 growth rate exceptionally high, additional suppliers to enter market, etc.).

Box 1: Other economies

Population, main telephone lines, cellular subscribers, Internet users, total telephone subscribers and Internet users per 100 inhabitants for economies not shown in the main tables, ranked in ascending order of population, 2002

	Population	*Main telephone lines*		*Mobile cellular subscribers*		*Internet users*	
	(000s)	*Total (000s)*	*per 100 inhabitants*	*Total (000s)*	*per 100 inhabitants*	*Total (000s)*	*per 100 inhabitants*
Ascension	1.3	*0.6*	*49.0*	-	-	*0.5*	*38.2*
Niue	1.7	1.1	61.8	*0.4*	*22.4*	0.9	52.9
Tokelau	2.0	*0.3*	*15.0*	-	-	...	...
Falkland (Malvinas) Is.	2.4	2.4	98.5	-	-	1.9	77.7
Montserrat	4.0	*2.8*	*70.3*	*0.5*	*12.2*	...	...
St. Helena	6.0	2.2	35.9	-	-	0.5	8.3
St. Pierre & Miquelon	6.6	*4.8*	*72.7*	...	...	...	...
Tuvalu	10.0	*0.7*	*6.5*	-	-	1.3	12.5
Anguilla	11.6	*6.2*	*53.6*	*1.8*	*15.3*	*3.0*	*26.0*
Nauru	11.6	*1.9*	*16.0*	*1.5*	*13.0*	*0.3*	*2.6*
Wallis and Futuna	14.6	*1.9*	*13.0*	-	-	*0.9*	*6.2*
Turks & Caicos Is.	18.0	*5.7*	*34.3*	...	...	...	...
Cook Islands	18.0	6.2	34.3	1.5	8.3	3.6	20.0
British Virgin Islands	22.0	11.7	53.2	8.0	36.4	4.0	18.2
San Marino	27.0	20.6	76.3	16.8	62.1	14.3	53.1
Gibraltar	28.0	*24.5*	*89.2*	*9.8*	*35.6*	*6.2*	*22.5*
Monaco	32.4	33.7	104.0	19.3	59.6	16.0	49.4
Liechtenstein	34.2	19.9	58.3	11.4	33.3	20.0	58.5
Cayman Islands	47.0	*38.0*	*84.9*	*17.0*	*38.0*	...	...
Faroe Islands	47.7	23.0	48.2	30.7	64.4	25.0	52.4
Northern Marianas	50.0	*21.0*	*39.6*	*3.0*	*5.7*	...	...
American Samoa	59.6	*14.7*	*25.2*	...	...	...	...
Bermuda	65.0	56.0	86.2	30.0	46.2	*30.0*	*46.4*
Andorra	82.0	*35.0*	*43.8*	*23.5*	*30.2*	*7.0*	*9.0*
Kiribati	87.6	4.5	5.1	0.5	0.6	2.0	2.3
Virgin Islands (US)	110.0	*69.4*	*63.5*	*41.0*	*37.5*	30.0	27.3
Aruba	110.0	*37.1*	*35.0*	*53.0*	*50.0*	*24.0*	*22.6*
Micronesia	117.9	*10.1*	*8.7*	1.8	1.5	6.0	5.1
Mayotte	148.0	*10.0*	*7.0*	21.7	14.7	...	...
Guam	160.0	*80.0*	*50.9*	*32.6*	*20.7*	50.0	31.3
French Guiana	177.0	*51.0*	*26.8*	138.2	78.1	*3.2*	*1.7*
Neth. Antilles	220.0	*81.0*	*37.2*	...	...	...	...
Martinique	405.0	*172.0*	*43.0*	319.9	79.0	*40.0*	*10.0*
Guadeloupe	464.0	*210.0*	*45.7*	323.5	69.7	*20.0*	*4.3*
Réunion	743.5	*300.0*	*41.0*	489.8	65.9	*150.0*	*20.5*
Timor-Leste	750.0	...	...	...	...	...	...
Liberia	3'237.5	*6.8*	*0.2*	*2.0*	*0.1*	*1.0*	*0.0*
Puerto Rico	3'858.5	*1'329.5*	*34.6*	*1'211.1*	*31.6*	*600.0*	*15.6*
Somalia	10'162.0	100.0	1.0	35.0	0.3	89.0	0.9
Afghanistan	23'294.0	33.1	0.1	12.0	0.1	1.0	0.0
Iraq	24'242.0	675.0	2.8	20.0	0.1	25.0	0.1

Note: Figures in italics are estimates or refer to earlier years.
Source: ITU World Telecommunication Indicators database.