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Note by the Director of BDT

DIGITAL DIVIDES IN THE AMERICAS: MEASUREMENT OF ACCESS TO INFORMATION AND COMMUNICATION TECHNOLOGY

The so-called 'Digital Divide' refers to the gap in access to Information and Communication Technology (ICT). This report attempts to measure the status of ICT access in the Americas region with a particular focus on the developing countries of Latin America and the Caribbean (LAC). Access to ICT is generally defined as the availability of communication hardware and software in order to participate in the global information society. This would include items such as telephone lines, personal computers, mobile phones and Internet connections. One difficulty is that so few telecom policy and regulatory agencies in the region collect or publicly disseminate *relevant* indicators about ICT access in their countries. This is surprising considering that the topic of ICT access is at the top of the agenda in most nations.

Fixed telephone lines

The availability of a fixed telephone line is one of the most important measures of ICT access. A telephone line not only allows voice communications, but also with a modem, can be used to access the Internet.[1] While there are other ways to access the Internet such as leased lines, cable modems

[1] "The obligations set out in the Voice Telephony Directive comprise the provision of voice telephony service via a fixed connection which will also **allow a fax and a modem to operate**…By including network access within the scope of universal service, users are given the possibility of accessing not only the defined voice telephony service but all services that can be provided over today's telecommunications networks (i.e. every citizen will be able to access inter-active and **on-line information services including the Internet**, provided they have a computer and a subscription with an Internet service provider…" . European Commission. Universal Service for Telecommunications in the Perspective of a Fully Liberalized Environment. March 1996. http://europa.eu.int/ISPO/infosoc/telecompolicy/en/d8.htm

or mobile telephones, at this point in time they are not as available or affordable as fixed telephone lines.[2]

The traditional measure of fixed telephone penetration has been *teledensity*, or the number of fixed telephone lines per 100 inhabitants. While this is a standard measure that is widely available and lends itself to easy comparisons within and across countries, it is not as analytically useful as other indicators. Teledensity does not truly convey the extent of access across the citizens of a country.[3] A better indicator is the one used to measure *universal telephone service*. This is the number of households in a country with a telephone.

Table 1: Households with a telephone, 2000

Country	Households			Source	Web page
	Total (000s)	With a telephone (%)	Residential main lines per 100		
Brazil	42 851 [99]	37.6 [99]	41.6 [99]	IBGE: National Household Sample Survey	www.ibge.gov.br/english/estatistica/populacao/trabalhoerendimento/pnad99/planotabular/tabbr7_5a.shtm
Canada	11'553 (99)	98.2 [99]	> 100 (99)	Statistics Canada	www.statcan.ca/english/Pgdb/People/Families/famil09b.htm
Costa Rica	935	54.3	58.7 [99]	INEC: Census 2000	www.inec.go.cr
Mexico	21'513	36.2	42.0	INEGI: Census 2000	www.inegi.gob.mx/difusion/espanol/poblacion/definitivos/nal/tabulados/00vi15.pdf
Peru	5'460	24.31	24.1 [99]	INEI :ENAHO 2000	www.inei.gob.pe
USA	106'500	94.1	> 100	FCC: Telephone Penetration Report	www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/pntris00.pdf

Source: ITU adapted from sources shown.

Though the measurement of progress to universal telephone service is a crucial policy indicator, it is surprising how few countries collect household telephone penetration in a systematic manner. Normally this should be done as part of annual household surveys conducted by national statistical

[2] There are exceptions for instance Japan, where 65 per cent of subscribers use a mobile phone to access the Internet. Ministry of Public Management, Home Affairs, Posts and Telecommunications. "Number of Internet Connection Users [July 2001]." http://www.joho.soumu.go.jp/eng/Statistics/number_users2001july.html Another exception is Korea where 24 per cent of Internet subscribers are utilizing high speed connections such as ADSL or cable modem. See Korea Network Information Center. "Status of Subscribers per ISP." July 2001. http://stat.nic.or.kr/isp_stat/2001/07.html

[3] For more on the limitations of teledensity see ITU. *World Telecommunication Development Report 1998*: Universal Access. Geneva. www.itu.int/ti

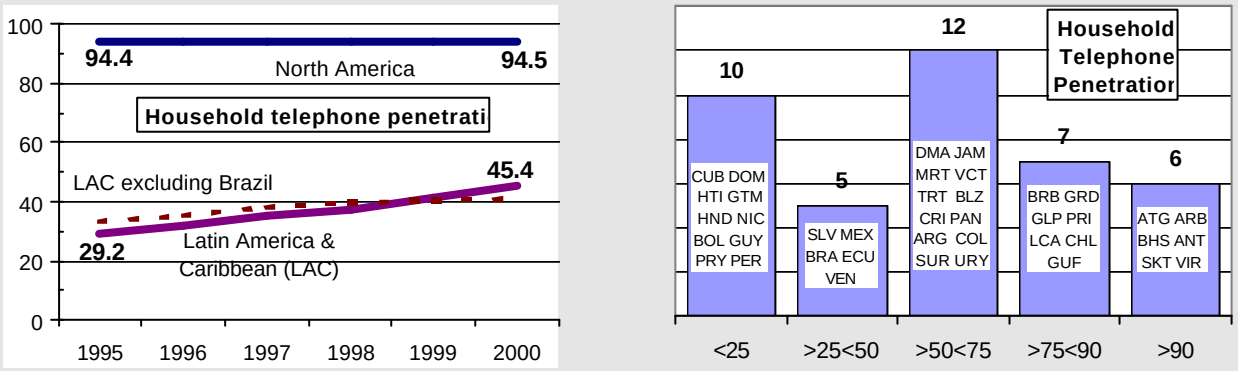
agencies. Of all countries in the hemisphere, only one, the United States, has produced regular reports on trends in household telephone penetration.[4] Some statistical agencies in the region have collected data on household telephones as part of recent census exercises or are now including it in household surveys (See Table 1).

In the meantime, a proxy for household telephone penetration can be calculated by dividing the *number of residential telephone lines by the number of households*. This is not a perfect measure since homes can have more than one line. Also it does not reflect the increasing proportion of mobile phones. Furthermore some operators or countries do not publish statistics on the number (or per cent) of residential telephone lines. Nevertheless sufficient data exists or can be reasonably estimated to gauge general trends.

Overall the number of residential telephone lines per 100 households in LAC stood at 45.4 in December 2000. The region has made progress over the last five years, with the rate increasing 16 per cent. However this rate is misleading because of the impact of Brazil. Without Brazil, the rate drops to 41 and is only rising about one per cent a year. The overall rate is still relatively low especially compared to North America where over 90 per cent of homes have a telephone (see Figure 1, left chart). Moreover, only six LAC economies had achieved a reasonable level of universal service (over 90 per cent household penetration, see Figure 1, right chart). And these six, all in the Caribbean, account for only 0.2 per cent of the LAC population. An additional seven economies have a household telephone penetration of between 75 and 90 per cent. They also are all in the Caribbean except for Chile and French Guiana. Twelve countries have a household telephone penetration of between 50 and 75 per cent. These include the remaining Caribbean economies (except for Cuba, the Dominican Republic and Haiti) as well as Costa Rica, Argentina, Panama, Uruguay and Colombia. In fifteen countries, less than half the homes have a fixed telephone and can therefore be considered to be underserved.

Figure 1: Home phones

Household telephone penetration in North America and Latin America and the Caribbean (LAC) and number of countries by household telephone penetration, LAC, 2000.



Source: ITU.

Mobile

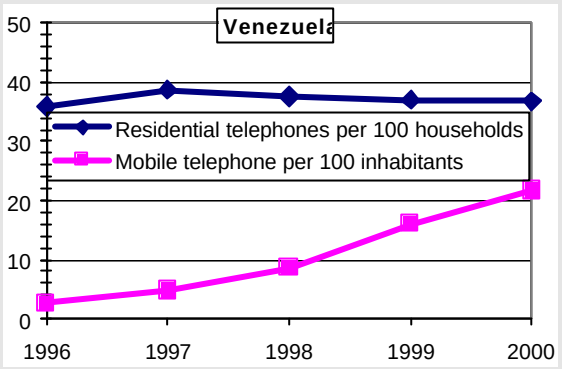
One notable trend is that some countries in the region have a household telephone penetration that has become 'stuck' or is even declining. The reason is that mobile phones are substituting for fixed

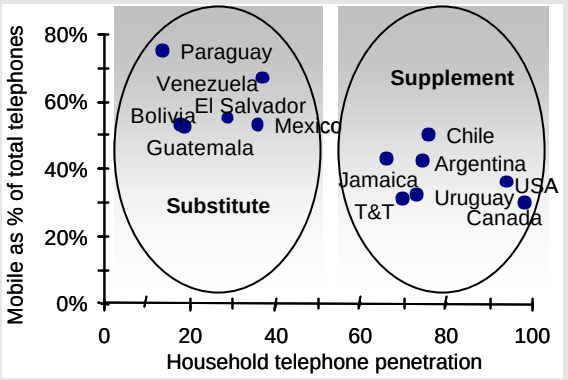
[4] FCC. *Telephone penetration by income by State.* July 2001. http://www.fcc.gov/Bureaus/Common_Carrier/Reports/FCC-State_Link/IAD/pntris00.pdf

ones. For example home fixed telephone penetration in Venezuela has hardly budged over the last five years whereas mobile penetration has skyrocketed (see Figure 2, left chart). Indeed mobile is increasingly used as a *substitute* in the region, particularly in those countries where home fixed line penetration is low (see Figure 2, right chart).

Figure 2: Mobile substitution

Residential telephone lines per 100 households, mobile subscribers per 100 inhabitants, Venezuela, 1996-2000 and Mobile telephone subscribers as a per cent of total telephone subscribers compared to household fixed line telephone penetration, selected countries, Americas region



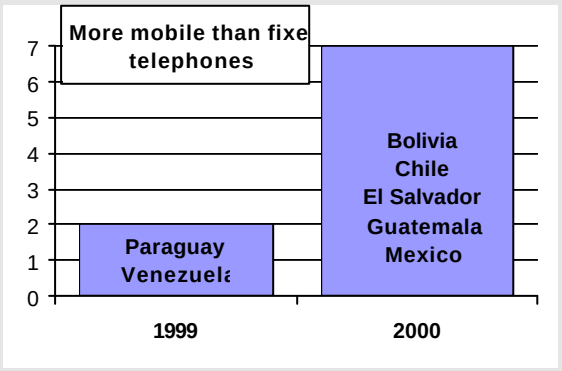


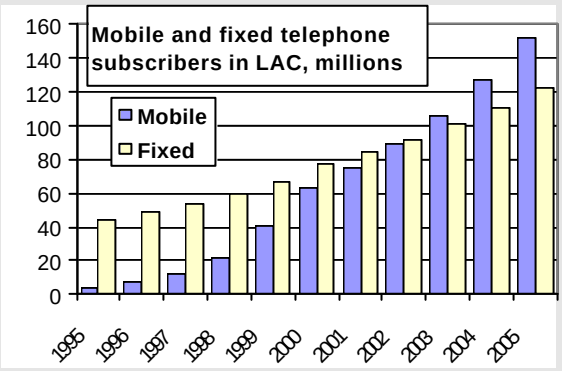
Source: ITU.

Many users in the region are choosing mobile over fixed because the barriers to entry are lower. Mobile start-up costs are typically less since there is no installation charge and registration is increasingly free. Thus the only initial cost is the handset. Most growth in mobile is coming from the pre-paid segment. For example, LAC's largest mobile operator, Telcel of Mexico, reported that over 90 per cent of its 11.7 million subscribers were pre-paid in March 2001, up from 40 per cent in December 1996. As more users opt for mobile over fixed, the number of countries with more mobile than fixed telephone subscribers is increasing. At the end of the year 2000, there were seven countries in LAC where this transition had taken place (see Figure 3, left chart). It is forecast that by 2003, there will be more mobile than fixed telephone subscribers in the LAC region (see Figure 3, right chart).

Figure 3: Mobile transition

Countries where there are more mobile than fixed telephone subscribers, and fixed and mobile subscribers and density, 1998-2004





Source: ITU.

Universal access

In countries with low levels of home telephone penetration, a more appropriate short-term measure is *universal access*, or the percentage of the population within '*easy*' reach of a telephone.[5] The problem here is that 'easy' is a fuzzy concept and few countries have come up with an acceptable definition. For some this might be measured as the number of localities with a telephone, but even here, a locality could be big and inhabitants physically far away from the telephone. Another issue is whether to measure access in terms of distance or time from a telephone. In any case, few, if any countries measure this.

Mobile telephony has introduced a new element into the concept of universal access. Because it is wireless, anyone within the signal range can theoretically receive the signal if they have a mobile phone. This is referred to as *population coverage*, a term often confused by many telecom policy and regulatory analysts who mistake it for mobile penetration. This is a key concept since if everyone is covered by a mobile phone signal, then universal access is 100 per cent—the barrier is no longer technical or lack of infrastructure but economic. An example from Brazil helps illustrate

Box 1: Mobile Coverage + Prepaid = Universal Access

Mobile telephony injects new ways of thinking about universal access to telecommunications. Unlike fixed telephony that requires users to have access to a physical communication wire, anybody within reach of a mobile signal could theoretically use the service if they have a subscription and mobile handset. Thus universal access is becoming less of technical limitation and more of a financial one. The availability of low denomination pre-paid cards for mobile helps reduce financial barriers by welcoming users who would not normally qualify for a subscription-based service. More and more mobile operators are beginning to subsidize mobile handsets, even for prepaid users, once again lowering barriers to entry.

In Brazil, the mobile market has taken off since the introduction of competition. Operators are scrambling to increase mobile coverage to distinguish themselves from competitors as well as to meet coverage requirements mandated by the telecom regulator. Tele Celular Sur (TCS) is one of the cellular operators created from the break-up of the TeleBras system. It operates in the states of Parana, Santa Catarina and Rio Grande o Sul in the south of Brazil. Its region covers around 296'000 kilometres, around 3.5 per cent of the Brazilian land area. The population is 14.7 million, around 9.2 per cent of the Brazil total, with an average per capita income of R$ 6'352. TCS had 1'416'000 subscribers at the end of 2000 for a penetration of 13 per cent. Although it covers less than half the geographic area of the region, some 11.5 million people (78 per cent) can receive the TCS mobile signal (up from 8.2 million in 1997). Prepaid users have been expanding rapidly since its launch in 1999 and now account for just under half of TCS clients.

Population: Subscribers: % prepaid: Density: Coverage:	14.7 million 1.42 million 46% 13 per 100 78%
Per capita income: Mobile Handset: As % of per capita income: Recharge card: As % of per capita income:	R$6'578 R$299 4.71% R$20 0.31%

[5] Another reason to measure access rather than penetration is that not everyone may want to use ICT. So from a policy viewpoint it is more relevant to measure access rather than penetration. "There will always be segments of any society that will not want to avail themselves of technology…". See NITC (Malaysia). "Access and Equity: Benchmarking for Progress." INFOSOC Malaysia 2000. http://www.nitc.org.my/resources/AccessEquity.pdf

the concept (see Box 1).

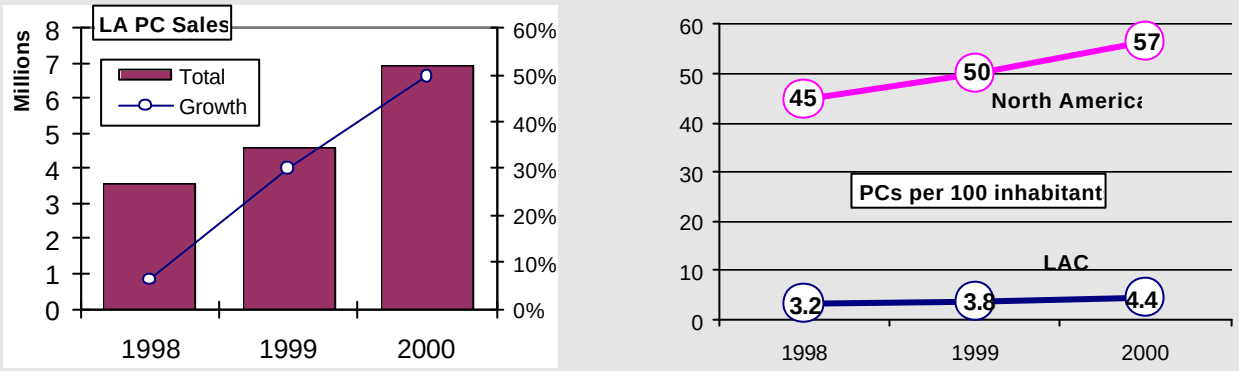
PC penetration

The personal computer (PC) remains the most common device for interfacing with the Internet. Like teledensity, most measurements of PC access revolve around population penetration and thus suffer from the same limitations. Like universal telephone penetration, a more useful measure might be household PC penetration. However only around half a dozen countries in the region keep track of this statistic (see Figure 5, left chart). Indeed few regulators maintain any kind of PC statistics. The ITU has been tracking estimates of PCs in countries, basing the calculation on the number of PCs sold. This data is not available for smaller economies.

Sales of PCs in Latin America have been rising. Almost seven million PCs were sold in that region in 2000, an increase of 50 per cent over the previous year. That is a reflection of growing Internet demand, particularly by households.[6] PC penetration in Latin America has grown at around 17 per cent a year since 1998 so that by the end of 2000, it stood at 4.44 per 100 hundred inhabitants. However this growth has not been sufficient to close the gap with North America where penetration is 13 times more, down slightly from 14 in 1998.

Figure 4: PC trends

Sales of PCs in Latin America (LA) and PCs per 100 inhabitants in Latin and North America



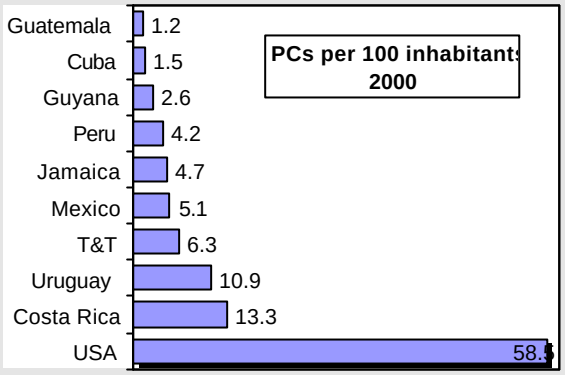
Source: Left chart, ITU adapted from Gartner Group. Right chart: ITU.

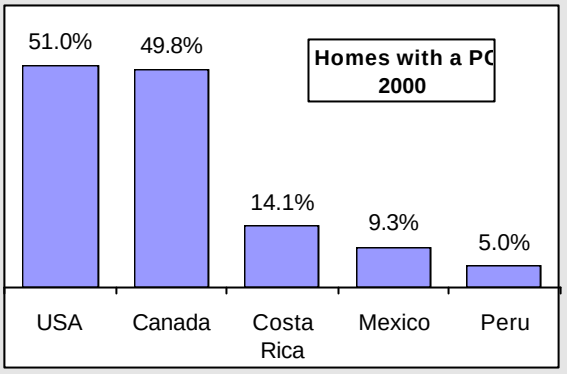
Among individual countries, there are large differences in PC penetration. There is a huge gap between the USA and the next range of countries. There are some countries, primarily in Central America and the Caribbean, where PC penetration is hovering around one per 100 inhabitants. The gap is also evident in household PC penetration. Over half of North American homes have a PC at home. The corresponding figure for countries that report his figure is far less, usually less than ten

[6] "Gartner Dataquest Says Home PC Sales Drive Latin America PC Shipment Growth of 50 Percent in 2000." Press Release. 31 January 2001. http://www4.gartner.com/5_about/press_room/pr20010131c.html

per cent. This explains why many users in the region access the Internet from work, school or Internet cafes.[7]

Figure 5: PC penetration





Source: ITU.

Internet access

The number of subscribers or users is typically used to measure Internet access. These terms are often interchanged making analysis difficult. A *subscriber* is a person (or organization) which has an account with an Internet Service Provider (ISP) whereas a *user* is somebody who access the Internet. While the number of subscribers is a more accurate measure, very few telecom agencies collect this information.[8] Also, the number of subscribers does not capture the full extent of Internet activity particularly in countries where many utilize the Internet from work, school or Internet cafes. Thus Internet users may be a more useful indicator. However there are a number of problems with users. What exactly is a user? Somebody who uses the Internet daily, weekly, monthly? Somebody who only uses email? In any case, unless methodological surveys are made, it is difficult to estimate the number of users (see Box 2). Most estimates are based on multiplying the number of subscribers by some factor.

At the end of 2000, it is estimated that there were some 17.8 million Internet users in the Latin America and Caribbean region with an average penetration of 3.4 users per 100 inhabitants, up from just over one per cent of the population in 1998. Growth has averaged about 60 per cent a year since 1998. The share of LAC Internet users in the total of the hemisphere has increased from less than 10

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[7] "Goosey noted that out-of-home access is a particularly important location for Internet use among adults in Latin America. Nearly nine million people – or 51% of the Internet population in Brazil, Mexico and Argentina – use the Internet away from home. In contrast, the proportion of adults who use the Internet from a location other than their home PC in Europe/Middle East/Africa is 33% and in Asia/Pacific is 23%." See "NIELSEN//NETRATINGS REPORTS THAT 459 MILLION PEOPLE HAVE INTERNET ACCESS WORLDWIDE." Press Release. August 27, 2001. http://www.nielsen-netratings.com/press_releases/PDF/pr_010827.pdf

[8] One exception is the Subsecretaria de Telecomunicaciones (SUBTEL) in Chile which publishes the number of dial-up and leased line subscribers in the country as well as the volume of Internet traffic. See INFORME DE ESTADÍSTICAS BÁSICAS DEL SECTOR DE LAS TELECOMUNICACIONES EN CHILE Informe Nº2 Abril 2001 http://www.subtel.cl/estadisticas/estadisticas2001.htm

per cent in 1998 to over 14 per cent today. Nevertheless, Internet penetration is North America is ten times that of Latin America and the Caribbean.

Box 2: Counting Internet users

In some of the larger countries in the region such as Argentina, Brazil or Mexico, surveys are carried out by international market research firms to estimate the number of Internet users.[1] This improves comparability by applying a standard methodology. It also enhances analysis since the surveys typically include other measures such as time spent per session (see Table). In the United States, the average user spends more than two hours a month online than Latin counterparts, mostly due to the lack of telephone metering in the United States. Unfortunately, these surveys are not available for most of the countries in the region, leading to very unreliable estimates of Internet use.

Table x: Internet use in selected countries
June 2000

	Argentina	Brazil	Mexico	US
Time spent per month	07:21:47	08:10:48	07:37:26	10:19:06
Active Internet universe (penetration)	1'872'249 (5.1%)	6'038'867 (3.5%)	1670201 (1.7%)	102'077'288 (37.1%)
Current Internet universe estimate (penetration)	3'882'526 (10.5%)	11'937'559 (7.0%)	3'419'075 (3.5%)	165'180'807 (60.0%)

Source: ITU adapted from Nielsen // NetRatings

Conclusions

While LAC is making progress in expanding access to communication networks, the rate is not fast enough to provide most citizens with home access in the short-run. Furthermore, while countries in the region are just trying to catch up in basic telephone access, in more developed countries the focus is now on broadband access, a subject not covered here. Mobile telephone growth has been rapid and is increasingly a substitute for the conventional fixed line. However most existing mobile phone networks in the region are not yet ideally suited for accessing the Internet. Also few policy or regulatory officials have considered the implications of providing Internet access from wireless networks.

One shortcoming in the region is the lack of useful data for policy analysis of ICT access. Far better measures of access are needed than are currently collected by telecom policy and regulatory officials. This includes ICT home penetration statistics as well as disaggregated national level detail. Here, telecom officials should work with national statistical agencies. Examples are certainly there in the countries that do collect this type of data.[9] With better and more detailed data, policy measures can be specifically targeted at those without access, enhancing their effectiveness.

In terms of targets to achieve by 2005, the region should shoot for a universal service rate (household telephone penetration) of 75 per cent, a mobile population coverage rate of 99 per cent and an Internet access rate (those with easy access to the Internet regardless of whether they use it or not) of over 50 per cent.

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[9] An excellent reference is produced by Peru's national statistical agency. See INEI. Indicadores de Tecnologías de Información y Comunicaciones en los Hogares - ENAHO 2000 – II. July 2001. Available at : http://www.inei.gob.pe/biblioinei/MuestraCat.asp?varCodigo=10