Part III. US Team : 14. IT Policies and Issues: US and the Americas

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IT Policies and Issues: US and the Americas

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1. INTRODUCTION

Indicators for Internet infrastructure and online users worldwide have shown phenomenal growth in every aspect of the new telecommunications technology since the introduction of the World Wide Web in the early 1990s. During the last decade, the number of people who have access to the Internet has increased from a virtually negligible number to a range of 300-500 million, depending on various surveys. NUA's estimate put the figure at 513 million in August, 2001 (NUA [2001]). 426 million were online in July, 2001 according to Nielsen/NetRatings; of these, 236 million people were active online users during the month of July, 2001 (Nielsen/NetRatings [2001]). At the same time, the number of Internet hosts that provide contents and services has increased from just over a million in 1993 to 110 million in January 2001 (ISC [2001]).

Despite such extraordinary successes, adequate and effective access to the Internet continues to be limited to a few countries and, within each country, to those who are in middle to upper income brackets. A critical measure of Internet diffusion is the share of the US among the Internet users. In 2000, about half of Internet users were located in the US and Canada, slightly down from 57 percent in 1999, according to CommerceNet. Worldwide, top-ten countries accounted for 85 percent of the total Internet population in 2001 (see Table 14.1).

Table 14.1: Internet Population and Penetration Rate, July 2001

	Internet Population	Penetration Rate (%)	Internet User during July	Average # of Sessions	Hours Online
US	165,180,807	58.1	102,077,288	20	10:19:06
Japan	46,659,923	36.8	20,061,849	19	9:27:04
Germany	27,914,911	33.9	15,144,455	17	7:49:23
Korea	26,590,004	54.3	16,835,227	26	19:20:17
UK	23,870,341	39.8	13,098,235	13	6:22:21
Italy	18,697,197	32.3	8,321,314	12	5:48:17
Canada	14,445,047	46.5	8,754,653	19	9:08:10
Brazil	11,937,559	6.9	6,038,867	13	8:10:48
Taiwan	11,602,523	51.3	5,021,109	13	8:04:21
France	11,107,974	18.8	5,468,447	15	6:58:58
Australia	9,674,157	49.8	5,640,427	13	7:41:43
Netherlands	8,671,316	54.4	4,526,370	15	6:44:11
Spain	7,384,966	18.6	3,934,630	11	7:00:14
Sweden	5,543,193	61.8	3,048,001	12	5:29:16
Hong Kong	3,935,769	56.5	1,804,016	19	12:12:19
Argentina	3,882,526	10.0	1,872,249	13	7:21:47
Belgium	3,663,437	35.6	1,579,445	12	6:22:27
Mexico	3,419,075	3.4	1,670,201	10	7:37:26
Switzerland	3,415,278	47.2	1,811,677	13	5:31:32
Austria	2,995,651	36.9	1,326,513	13	6:16:39
Denmark	2,930,032	53.7	1,617,277	12	5:13:55
Norway	2,452,772	54.4	1,389,599	11	4:37:47
Singapore	2,103,331	51.2	955,824	15	8:48:06
Finland	1,977,637	38.1	1,096,792	10	4:10:11
Israel	1,939,084	29.7	976,261	14	7:15:36
New Zealand	1,747,203	44.6	1,015,577	15	6:59:51
South Africa	1,499,186	3.4	611,467	10	4:20:43
Ireland	1,250,404	32.9	560,842	9	3:56:15
Total	426,491,303		236,258,612	18	9:36:12

Source: Nielsen/NetRatings, *Global Internet Index*, 2001. Population figures: Mid-2001 estimates by Population Reference Bureau.

Note: Penetration rate is calculated as (Internet population)/(total population).

The growing disparity in Internet access among countries or socio-economic groups is called 'the digital divide.' A deepening digital divide in the Internet age is a critical policy issue because the Internet as a general purpose technology has become essential not only for communications needs but also in economic, social and political arenas. To promote better Internet access, the US and other countries in the Western hemi-

sphere have implemented significant changes in telecommunications policy, infrastructure management, and e-business promotional strategies. In this and the following two chapters, we evaluate the current status of such policies and their effects on increasing access to the Internet.

In this chapter, we take up the case of the US telecommunications policy and the question of universal access. In the next chapter, we review current phases of Internet usage in Latin America and investigate the connection between Latin American telecommunications policies and the digital divide. Finally in the third chapter, we focus on Mexico and Argentina as a case study to evaluate the effectiveness of telecommunications reforms and discuss success factors.

2. INTERNET INFRASTRUCTURE AND INTERNET ACCESS: A SNAP SHOT

2.1. Internet Access: Penetration Rate

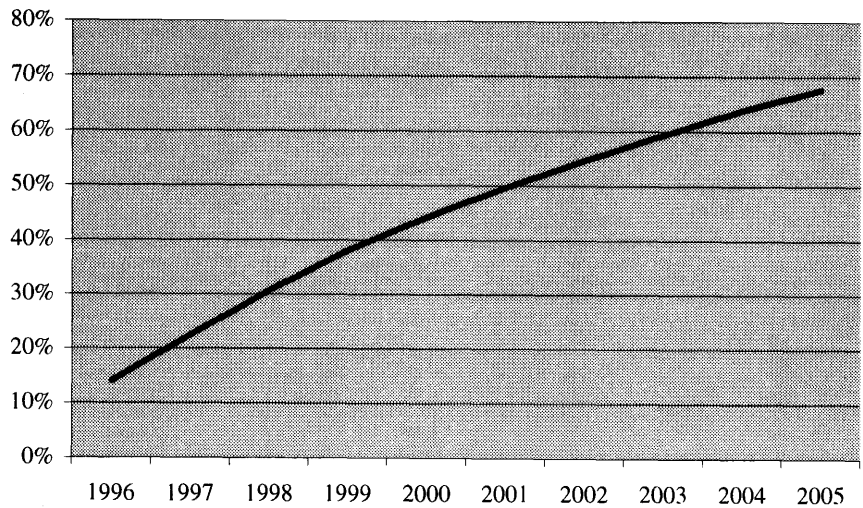
Despite the fact that estimating Internet usage is still an imprecise science, most available data indicate that access to the Internet is distributed unequally across nations, as discussed above. But even among those who are leaders in Internet usage, Internet penetration rates vary widely. The Internet penetration rate is calculated by dividing the total Internet population by a country's total population. Among the 28 countries for which Nielsen Net Ratings provide detailed data, the penetration rate varies from 3.4 percent (South Africa and Mexico) to 61.8 percent (Sweden) (see Table 14.1).

Especially notable is the fact that three Latin American countries included in the survey — Brazil, Argentina and Mexico — have the lowest penetration rates except for South Africa. This is the first indication of their serious problem in terms of expanding Internet opportunities to the majority of their populations.

On the other hand, penetration rates for the leading countries in North America, Europe and Asia-Pacific are surpassing or approaching the 50 percent mark, which is used as an indicator of the maturity of a given technology. When an innovative technology appears, a sequence of innovators (2.5 percent), early adopters (13.5 percent) and early majority (34 percent) adopt the new technology (Rogers [1983]). Early majority adopters are usually risk-averse persons with above average wealth and education, and their adoption signals a general acceptance of the technol-

ogy. Early technologies took a number of years before they reached 50 percent of households: newspapers, 100 years; telephone, 75 years; phonograph, 55 years; automobiles, 90 years; electricity, 50 years. Estimates vary according to sources, but recent technologies have been adopted rather quickly: color TV, 18 years; radio, 10 years; VCR, 10 years; PCs, 20 years. The Internet has grown faster than any other technology, being adopted by more than 50 percent of households in less than 10 years. Figure 14.1 shows the Internet penetration trend in the US.

Figure 14.1: Internet Penetration Rate in the US



Sources: US online users: Jupiter Media Metrix; Population estimates and projections: US Census Bureau.

Low penetration rates for Latin American countries are due to several factors. Foremost is limited access to basic telecommunications infrastructure such as telephone and mobile phones. Recent reforms and efforts to privatize the telecommunications sector are indications that governments in these countries are seriously tackling the issue. Whether they have been as effective as expected will be analyzed in later chapters. Secondly, the low level of income, along with associated problem of uneven income distribution, is another factor that hinders rapid adoption of the Internet. Thirdly, survey data on Internet usage typically focus on household users. However, a significant number of Internet users in Latin America connect to the Internet from various locations. Nielsen

Net Ratings' Global Internet Trends Report for 2nd quarter of 2001 showed that 51 percent of the Internet population in Brazil, Mexico and Argentina accessed the Internet away from home. In comparison, between 23 percent and 33 percent of users in Europe and Asia-Pacific countries log on the Internet away from home. Such away-from-home Internet access — e.g. at Internet café, library or work — highlights the critical nature of such problems as low PC penetration at home and the policies to provide more public access points.

2.2. Basic Infrastructure Availability and Internet Access

During the next five to ten years, most Internet services will be moving toward formats tailored for broadband — and wireless — platforms. In the US, the majority of Internet users depend on 56K modems for connection. However, broadband users — including cable modems, DSL (Digital Subscriber Line), satellite and ISDN connections — have increased rapidly from 1.3 million in September 1999 to 12 million at the end of 2000 (Parks Associates and Nielsen data). Among at-home Internet users, 12 percent reported to have broadband connection in 2000 (Arbitron/Edison Media Research [2001]). Currently, US Internet users are upgrading Internet connection through 56K modem but the most explosive growth is seen in the broadband adoption (Table 14.2).

Table 14.2: Internet Connection Speed Upgrades, US Home Users

	Dec. 1999	Dec. 2000	Unit: % Change
14.4K modem	8.3	5.0	-20.4
28.8/33.6K modem	43.1	23.6	-27.3
56K modem	42.2	59.4	87.3
Broadband	6.4	12.0	147.7

Source: Nielsen/NetRatings.

Broadband Internet access is exceptionally strong in the Asia-Pacific region where there are over 6 million users with high speed access, usually through DSL, according to Gartner Dataquest report. During the first six months in 2001, there were 4.4 million new DSL subscribers worldwide, half of which were in the Asia-Pacific region, according to Point Topic (http://www.point-topic.com), a DSL subscriber analysis firm. Out

of 10 million DSL subscribers in June 2001, the Asia-Pacific region accounted for 4.6 million users. Korea, the leader in DSL lines, had 3.2 million DSL subscribers. A few European countries are also increasingly connecting to the Internet via cable or DSL high speed lines (Table 14.3).

In contrast, broadband Internet access in the US is dominated by cable operators. In June 2001, almost 70 percent of broadband users in the US relied on cable modems (6.5 million cable broadband users vs. 2.9 million DSL subscribers). Cable operators began offering broadband services early, and 66 percent of US households have access to cable, compared to only 45 percent who are serviced by DSL. But telephone companies who offer DSL services are also hampered by the technical limitations of DSL. For example, DSL services work reliably only within 12,000 feet of a terminal of a telephone network. In addition, unlike cable television services that can be bundled with high-speed Internet service, DSL lines do not carry video signals, limiting revenue options. Telephone companies are currently pushing for a complete deregulation regarding long-distance and high-speed Internet services. H.R. 1542 (Tauzin-Dingell) introduced in 2001 addresses several regulatory provisions such as long-distance services, network unbundling and resale requirements (CRS [2001]). Telephone companies argue that such restrictions are limiting their abilities to deploy broadband services more rapidly while the dominant cable players are unregulated. Some versions of the Tauzin-Dingell bill will pass in 2002. Nevertheless, the question

Table 14.3: Broadband Access in Selected European Countries, August 2001

Unit: %

	Broadband Penetration	Type of Broadband			
		Cable	Satellite	ADSL	T1/ Leased Line
Sweden	13.8	3.3	0.0	5.5	5.0
Denmark	13.2	6.6	0.0	6.6	0.0
Germany	7.8	3.6	0.0	4.2	0.0
France	6.4	3.2	0.4	2.8	0.0
Spain	6.2	2.7	0.0	3.5	0.0
Norway	5.1	3.5	0.2	1.4	0.0
UK	2.3	1.7	0.1	0.5	0.0
Italy	0.9	0.5	0.1	0.3	0.0

Source: NetValue, http://www.netvalue.com/.

remains as to whether the sub-par performance of DSL services is primarily due to regulation or non-competitive pricing practices of telephone companies.

Argentina, Brazil and Mexico are far behind in broadband access. Taking into account such factors as PC penetration, availability of cable, competition in the local loop, government policies and others, eMarketer categorized 29 countries into five tiers according to the broadband readiness and potential (Table 14.4). The prospect ranges from very high (tier one) to very low (tier five). Tier four and five countries generally suffer from low PC penetration rates, lack of cable or DSL infrastructure, and an economic condition which is least conducive to broadband growth.

Table 14.4: The Broadband Readiness and Potential, 2001

Tier One	Tier Two	Tier Three	Tier Four	Tier Five
US	Netherland	Taiwan	France	India
Canada	Finland	Austria	Spain	Poland
Korea	Japan	Belgium	Portugal	Brazil
Sweden	Hong Kong	UK	Italy	Mexico
Denmark	Singapore	Switzerland	Argentina	China
Germany	Norway	Australia		Russia

Source: eMarketer (Macklin [2001]).

Access to the Internet is determined by several factors, including the adequacy of basic telecommunications infrastructure, which is a critical reason why many Latin American countries face serious challenges in catching up with other Internet leaders. A comparison of two key variables that determine Internet access is presented in Table 14.5. Japan and Korea are shown here because the average figures for Asia are not representative of those leaders. Low telephone penetration rates for Latin American Internet leaders are notable if governments are to formulate policies to promote IT and Internet within these countries. Without an adequate telephone infrastructure and available PCs, a wider diffusion of the Internet will be difficult. Reforms in the telecommunications industry have focused on upgrading and expanding the basic infrastructure. But whether privatization and competition policies have brought about noticeable impacts or not is still uncertain. In some cases, a rapid increase in Internet usage among a selected few has resulted in a wider digital divide while the majority of the population are disconnected from the digital revolution. Improving basic telecommunications infrastructure

Table 14.5: Basic Infrastructure and Internet Usage, 2000

	Telephones per 100	PCs per 100	Internet users per 10,000
World	16.3	7.7	588
US	70.0	58.5	3,466
Brazil	18.2	4.4	294
Argentina	21.3	5.1	675
Mexico	12.5	5.1	274
Europe	39.3	16.8	1,264
Asia	9.8	2.9	325
Japan	65.3	31.5	3,709
Korea	46.4	19.0	4,025
Africa	2.5	0.9	53

Source: International Telecommunication Union, 2001.

and access remains the number one concern in Latin American IT policy.

In certain senses, low telephone penetration rates may not matter if policies are chosen to bypass or leapfrog technological developments. For example, although the diffusion of DSL broadband networks suffers from inadequate telephone networks, access using cable modem, satellite or wireless can be an alternative. However, except for Argentina, the prospect for cable broadband is also low due to low cable penetration rates (Table 14.6).

Table 14.6: Cable Penetration Rates, 2000

Unit: %

Argentina	57.1
Brazil	7.2
Chile	17.9
Colombia	39.8
Mexico	16.2
Peru	10.1
Puerto Rico	26.0
Uruguay	42.6
Venezuela	10.5
Average	18.6

Source: Deutsche Bank, 2000.

2.3. Public Access to the Internet

American online users accessed the Internet from home (37 percent), work (35 percent) or school (27 percent) in 1999, according to Nielsen Home Technology Report. The remaining 28 percent accessed it from somewhere else. These access sites include someone else's home or public places such as libraries or community technology centers. In Asia and Europe, public access sites are primarily commercial operations such as Internet cafés or cybercafés. Particularly in Asia, commercial access sites have great success in expanding Internet access to the masses. In Korea, there were about 16,000 'PC-bang' (meaning PC-room) by 2000 according to Donga.com analysis. There were 2,000 similar Internet cafés in Taiwan.

These public access sites offer a very inexpensive alternative to owning a PC and subscribing to an ISP. For example, PC-bangs in Korea are open 24 hours and offer DSL-level connectivity, at a price of about US$1.00-$2.00 an hour. The great number of PC-bangs may be an odd phenomenon in Korea, where residential access and broadband availability are already outstripping the level seen in North America or Europe. Most users are young males and primary activities are interactive games and Web surfing. Users are also not limited to those with low incomes or other disadvantaged groups. Rather, PC-bangs are concentrated in the areas near colleges and business offices.

In the US and most other countries, public access sites are established by government grants or community initiatives for the expressed purpose of expanding Internet access to those who will be otherwise excluded. But publicly funded Internet centers may not be as inviting as PC-bangs where users can do whatever or go whenever they wish.

3. TELECOMMUNICATIONS REFORMS AND INTERNET USAGE

The telecommunications industry worldwide has undergone major changes during the last two decades toward a more open and competitive market. Digitization, computers and the Internet, and the convergence in analog, digital, and wireless technologies are the market forces that made reforms imperative in many countries.

In the US, the long struggle among AT&T, the Justice Department and new technology companies ultimately led to the breakup of AT&T

and the Telecommunications Act of 1996 which aimed at reducing federal regulation, creating competition and promoting economic convergence in telephony, cable and computer industries. Internationally, World Trade Organization (WTO) members implemented their agreement on basic telecommunications, opening their markets and allowing competitive services trade (the Fourth Protocol to the General Agreement on Trade in Services (GATS), entered into force in 1998).

Such reform-minded actions stem from the recognition of the fact that telecommunications technologies, computers and software are converging into an essential infrastructure which acts not only as a basic communications medium but also as a platform for international trade — especially in value-added services and digitized products — and economic development. Besides voice and data services through wired and wireless networks, the convergence in various communications markets has affected almost all aspects of economic activities and international trade. Exports in value-added services such as messaging, data transfer, distance learning, remote call centers and other services all depend on open access to competitive telecommunications markets around the world.

However, regulatory reforms do not create market forces that bring about competition unless they are accompanied by efforts by private industries. And markets often fail to safeguard marginal consumers. The increasing digital divide in the US is evidence that the long-held principle of universal access is in jeopardy when it comes to access to the Internet. At the same time, despite reforms and privatization, open and cost-effective telecommunications markets are still not in evidence in many Latin American countries. The success or failure of any reform must be evaluated by increased or decreased levels of access and the cost of access. In this section, we examine the current status of telecommunications reform and policy-making in the US focusing on whether such efforts have increased public access to the Internet. This section will offer a general background for later discussion on the digital divide in the US, policy issues for broadband Internet access, and the relationship between the US and Latin American countries in the IT, Internet and telecommunications industries.

3.1. Brief Overview of US Deregulation Efforts

Invented in 1876, the telephone as the forerunner of telecommunications media exemplifies the difficulty in promoting and managing an essential

infrastructure that tends to be a natural monopoly.

During the formative years of Bell Telephone and later AT&T, its growth was aided by the simple economics of network externality, the economies of scale and scope. These factors favored one giant network firm instead of many smaller providers, which AT&T exploited to acquire competitors. The heavy investment required to build a network also meant that only a monopoly would be able to provide such an essential service without failing in the market. By linking universal service with economics of efficient networking, AT&T was able to amass a vast network of telephone providers.

The history of telecommunications regulation and reform in the US can be summarized as a struggle between the economics of AT&T's natural monopoly and the market forces that favored new technologies and competition. Major reform initiatives were introduced with the development of new technologies which reshaped the telecommunications industry. After divesting Western Union's telegraph service in the 1910s, AT&T and the Justice Department entered into an agreement that maintained a government-sanctioned monopoly. As later economists pointed out, a natural monopolist could 'capture' regulators in such a way that protected the monopolist's interest (Stigler [1971]).

But with the advent of broadcasting through the use of electromagnetic radio spectrum, AT&T asserted itself in the areas of newly developing technologies and markets. The Communications Act of 1934, which created the Federal Communications Commission (FCC) and put in place major regulatory guidelines for broadcasting, telephony, and telecommunications equipment markets, was a direct result of new communications technologies and the increasing concerns among new technology firms and government regulators.

Nevertheless, AT&T retained its monopoly in three key areas of the telecommunications industry: equipment, long-distance service, and local exchange service. From the post-World War II years to the divestiture agreement in 1982, regulatory and antitrust actions against AT&T continued as new technologies and markets developed. In 1956, a federal appeal's court ruled against AT&T and the FCC in the case of a 'terminal equipment' manufacturer, Hush-A-Phone (Wilson [2000]). Hush-A-Phone was a small plastic snap-on device that users could place over the mouthpiece of the telephone to reduce background noise. AT&T petitioned the FCC that the device could potentially lower AT&T's service quality and therefore should not be allowed. This was a strategic move

by AT&T who strived to maintain its end-to-end monopoly in the telephony market. But the court invalidated AT&T and FCC's views, in part establishing consumer's right to use terminal devices. It is noteworthy that the FCC, although being a regulatory agency, essentially shared the same opinion with AT&T.

While Hush-A-Phone was a rudimentary, non-powered device, the case of Carterfone [1968] brought the new radio technology and the question of interconnection to the forefront. Since 1959, Carter Electronics Corporation marketed a two-way radio device that allowed a remote, mobile users to be linked to the telephone network. Carterfone was essentially an analog-to-radio converter that relayed the signal from the telephone headset to a mobile Carterfone unit. In its response, AT&T introduced a rule that prohibited any device that established a 'direct electrical connection' to its network. After two years of public hearings, the FCC ruled against AT&T. However, terminal equipment and interconnected device markets did not emerge from this case. Even though AT&T implemented stricter rules regarding terminal devices and interconnection to stave off further competition, real challenges appeared in long-distance services through new technologies.

Various privately owned point-to-point networks had been authorized by the FCC during the post-war period. But the allocation of new frequencies above 890 MHz for microwave communications and subsequent developments in satellite-based communications and associated services brought final challenges to AT&T's monopoly in local exchange networks and its monopoly over the common carrier telephony service. Microwave Communications Incorporated (MCI) began its 'shared private network' service for long-distance telephony in 1972 ten years after it first petitioned the FCC for such a service. MCI's service consisted of microwave communications between selected cities across the US, while local interconnections were left to the customers. Nevertheless, the question of interconnection between MCI and other long-distance service providers and AT&T's local exchange networks was largely settled in favor of competition by the end of 1970s.

Following the cases of Carterfone, MCI and new technology providers, AT&T agreed (or proposed) to divest itself from equipment and local operating companies in 1982, giving birth to regional Bell operating companies (RBOCs). RBOCs would continue to be local monopolies providing common carrier services for both telecommunications equipment vendors and long-distance service providers. Expect in the local

exchange market, the US telecommunications markets were competitive by the end of 1980s.

3.2. Telecommunications Act of 1996

The Telecommunications Act of 1996 was a major revision to the Communications Act of 1934. While encompassing past developments in the AT&T telephony case, cable television legislations, and new technologies of microwave, the Internet and wireless, the 1996 Act was an affirmation of the new reality evident in the rapidly converging telecommunications sector and computer-based networks. As such, it included provisions dealing with the broadcasting industry (spectrum usage and cross-industry ownership), local access issues in telephone networks, cable franchise regulation, universal access, and obscenity and violence issues. Major economic components of the 1996 Act include:

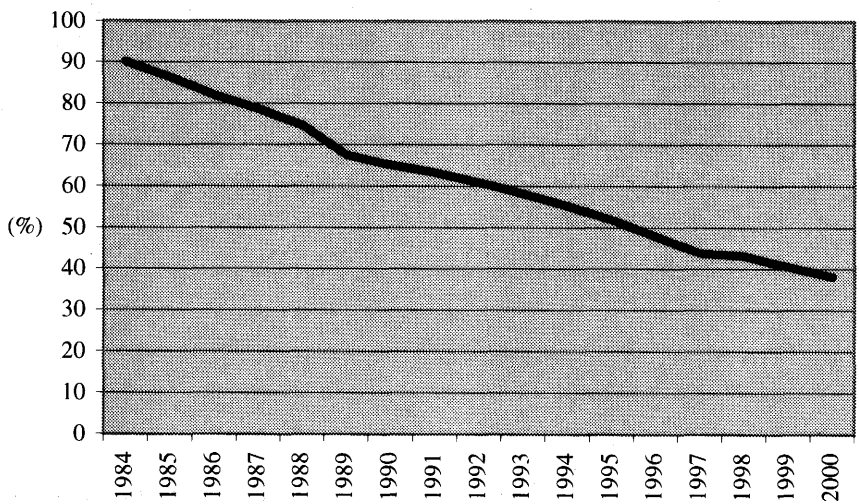
- Relaxation of FCC regulatory intervention;
- More favorable environment for mergers/acquisitions across telecommunications sectors;
- Expanding competition to achieve lowered price and better service;
- Promotion of new technologies and businesses;
- Promotion of the convergence and integration among telephony, cable and computer industries;
- Minimizing state regulatory powers.

These changes have the greatest effect on market structure in the broad categories of industries that fall under the telecommunications industry. These include basic telecommunication services such as voice, packet- or circuit-switched data services, telex and telegraph, FAX and private leased line services. In addition, various types of value added services such as e-mail, voice mail, EDI and online data processing services are affected.

The immediate effect of the Act on the telecommunications industry was that of relaxing market ownership restrictions and lowering entry barriers. Broadcasting companies are no longer restricted in cross ownership; any telecommunications company may enter into any other market; and private sector initiatives on new communications technologies and resulting business ventures are generally promoted.

In terms of Internet access, the 1996 Act is the final step toward opening up the local access market. Since the breakup of AT&T, markets for long-distance and other enhanced services became competitive, where AT&T's share dropped from 90 percent in 1984 to 38 percent by 2000 (see Figure 14.2). At the time of the legislation, AT&T's share was already below 50 percent of the market. The intent of the Act was to encourage the same kind of competition in the local access market that connects end users where local Bell operating companies (LBOCs) maintained a monopoly in the 'final mile.'

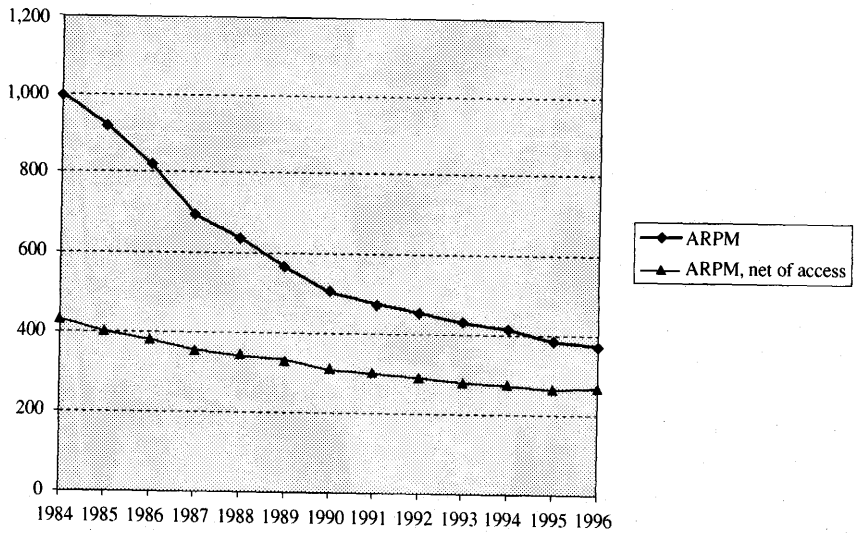
Figure 14.2: AT&T's Share of Total Long-distance Service Revenues



Figures include long distance carriers only, excluding local exchange carriers' long distance revenues.
Source: US FCC, *Trends in Telephone Service*, 2001.

At the same time, increased market competition brought down long-distance charges significantly, continuing the long-term trend that began with AT&T's divestiture in 1983 (Figure 14.3). By 1996, per minute charge had fallen by half from that of 1984. Most significantly for market competition AT&T's access charges for local loop dropped from an average of US$60 to less than US$20.

Figure 14.3: Averege Revenue per Minute for AT&T



Source: Economides, 1998.

4. COMPETITION IN LOCAL LOOP AND BROADBAND SERVICE

Despite the intention of the 1996 Act to make local network more competitive, consumers have not been offered a significant number of choices for local telephone providers. To the contrary, the 1996 Act has resulted in a significant consolidation in the number of local telephone companies, known as Regional Bell Operating Companies (RBOCs), who were spun off from AT&T as a result of its break-up in 1984. Out of the original seven RBOCs (organized from existing 18 regional companies), there are now four entities: SBC Communications (Southwestern Bell, Pacific Bell and Ameritech), Bell South, Qwest Communications International (US West), and Verizon Communications (Bell Atlantic, NYNEX and GTE).

While choices were reduced due to consolidations, the loosening of cross-market entry restriction meant that competitive local exchange carriers could build new networks or lease lines from incumbent carriers. Cable operators and satellite communications enterprises are now free to offer voice service in addition to video, data and other enhanced ser-

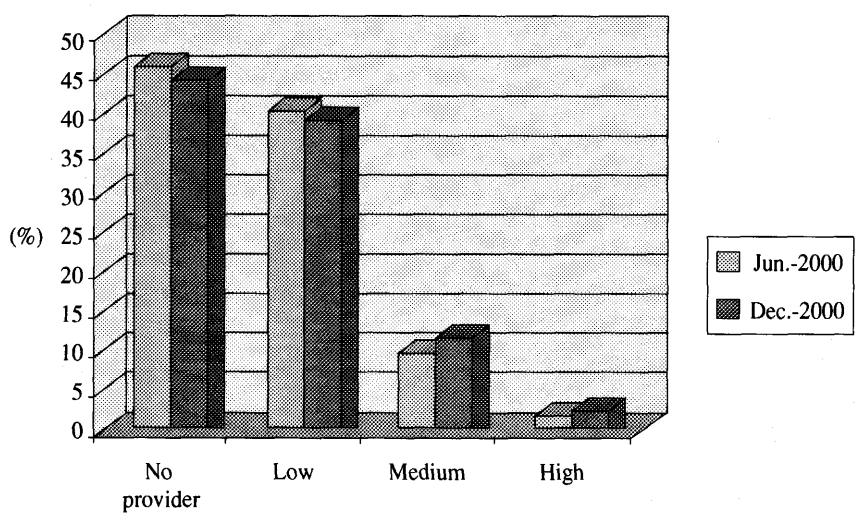
vices. As a result, the latter players face a lower barrier to entry into local network markets. More competition and choices for Internet access are expected at the local level.

4.1. Local Competition

The US Federal Communications Commission now collects data on the level of competition in local exchange markets by Zip codes. According to the latest report, 56 percent of the areas reported at least one competitive local exchange provider or more. 46 percent of the Zip codes still rely on one incumbent provider (Figure 14.4). However, the FCC also reports that 88 percent of US subscribers live in competitive market areas since many of the non-competitive Zip codes are rural areas. Among competitive areas, about 40 percent reported from 1 to 4 competitive local exchange carriers (CLECs), shown as 'low' competition areas in Figure 14.4. Areas with a medium level of competition include those with 5 to 9 CLECs, while high competition areas reported 10 or more competitors. Areas with medium and high levels of competition are growing in number, but still account for less than 16 percent.

Although the number of competitive local exchange carriers is growing rapidly, effects on end users and consumers are not clear. CLECs,

Figure 14.4: Competition in Local Exchange Markets



Source: US FCC, *Local Telephone Competition*, 2001.

instead of building their own network infrastructure that includes the last mile, largely rely on leasing existing lines from incumbent carriers. For example, about 35 percent of their customers were served by CLECs' own last mile or local loop facilities in 2000. The rest were served by leased lines. From an economic efficiency point of view, unnecessary duplication of network infrastructure should be discouraged. However, competitive carriers leasing incumbent's lines are constrained by the incumbent's pricing policy, which will reduce price effects from competition.

Furthermore, new entrants tend to focus on medium and large businesses, institutions and large organizations with voluminous demand. About 60 percent of CLEC lines are targeted on large users while 80 percent of the customers served by incumbents are small businesses and consumers. Thus, the majority of residential consumers are largely ignored by the increasingly competitive market players.

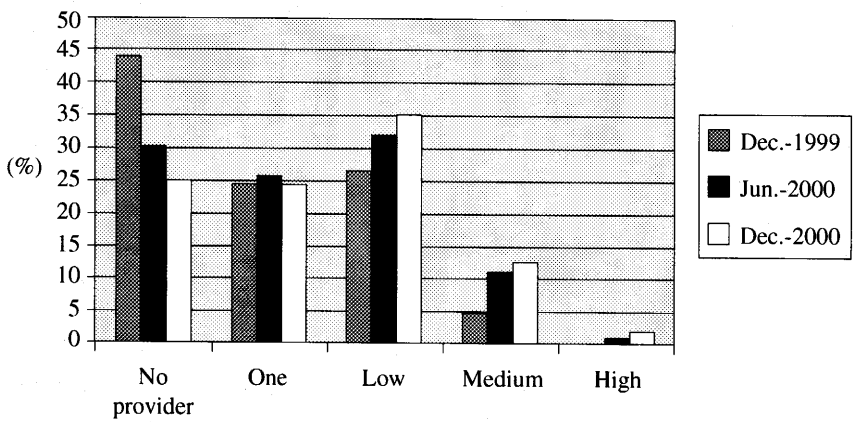
4.2. High-Speed Internet Access

High-speed Internet access in the local exchange market is provided via digital subscriber lines (DSLs), coaxial cable lines, satellite and microwave connections. During the year 2000, broadband services penetrated to 75 percent of the Zip code areas reported by the FCC, growing from 56 percent the year before (Figure 14.5). The largest broadband connection is through coaxial cable (3.6 million lines at the end of 2000). Although DSL subscriber lines are smaller than cable at 2 million in 2000, it is growing three times faster than coaxial cable lines.

Still, a quarter of US Zip code areas have no high-speed Internet access provider and another quarter is served by only one provider. Low competition areas with two to four providers cover the most geographical areas with 35.5 percent. Medium (five to nine providers) and high (ten or more) competition accounts for 15 percent. Although half of the US has no or only one provider, 98 percent of Zip code areas with high population density (i.e. 3,147 persons or more per square mile) report at least one broadband Internet access provider. This implies that the majority of the population are reached by high-speed Internet access.

Nevertheless, the lack of competition in high-speed Internet access providers and their focus on high-density, urban areas is creating unequal access to the Internet in selected areas and population segments. Compared to the top 10 percent of the most populous Zip code areas,

Figure 14.5: Competition in High-speed Internet Access



Source: US FCC, *High-Speed Services for Internet Access,* 2001.

where high-speed Internet access is available at 98 percent, low-density, rural areas lag significantly behind. For example, only 37 percent of the bottom 10 percent of Zip code areas in terms of population density (fewer than 6 per square mile) reported at least one broadband subscriber to the Internet (Table 14.7). Broadband penetration at the bottom 30 percent of the US is low. The majority of sparsely populated regions have

Table 14.7: Broadband Access by Population Density, by Zip Codes, 2000

Deciles	Density	Subscribers*
90-100	More than 3,147	98.2
80-90	947-3,147	96.8
70-80	268-947	95.4
60-70	118-268	91.7
50-60	67-118	85.8
40-50	41-67	76.8
30-40	25-41	66.4
20-30	15-25	54.3
10-20	6-15	44.5
0-10	Fewer than 6	37.2

* percent of Zip codes in decile with at least one high-speed subscriber.
High-speed is defined as over 200 kbps in at least one direction.
Source: US FCC, *High-Speed Services for Internet Access*, 2001.

no high-speed Internet users.

The gap between the rich and the poor is also evident (Table 14.8). In the lowest income areas, only 56 percent of the Zip codes reported at least one subscriber, compared to 96 percent for the highest income areas. In the lowest five deciles, high-speed connection is available for less than 70 percent of the areas. Nevertheless, even in this lowest income decile, 92 percent of the population lived in the Zip code areas where high-speed service was available. In other words, the disparity in high-speed Internet access is more prominent in terms of population density than household income.

5. COSTS OF ACCESS

Innovative and pro-competitive telecommunications policies are designed to attract new entrants into local access markets, which promotes more choices and lower prices for consumers. For consumers, Internet access costs consist of two elements: local access charges (dial-up charges) and fees levied by the Internet access provider (ISP). Broadband access often does not require ISP charges, although some telephone operators may require existing telephone service and cable operators may demand a subscription to basic cable television service.

Table 14.8: Broadband Access by Household Income, 2000

Deciles	Median HH income	Subscribers*
90-100	Over $54K	96.1
80-90	$44K-$54K	90.4
70-80	$39K-$44K	82.4
60-70	$35K-$39K	78.7
50-60	$32K-$34K	74.6
40-50	$30K-$32K	69.8
30-40	$28K-$30K	69.4
20-30	$24K-$28K	67.1
10-20	$22K-$28K	62.6
0-10	Below $22K	56.0

* percent of Zip codes in decile with at least one high-speed subscriber.
High-speed is defined as over 200Kbps in at least one direction.
Source: US FCC, *High-Speed Services for Internet Access, 2001.*

Despite increasing competition in the local telephone service, average monthly charges as well as initial connection charges for new service

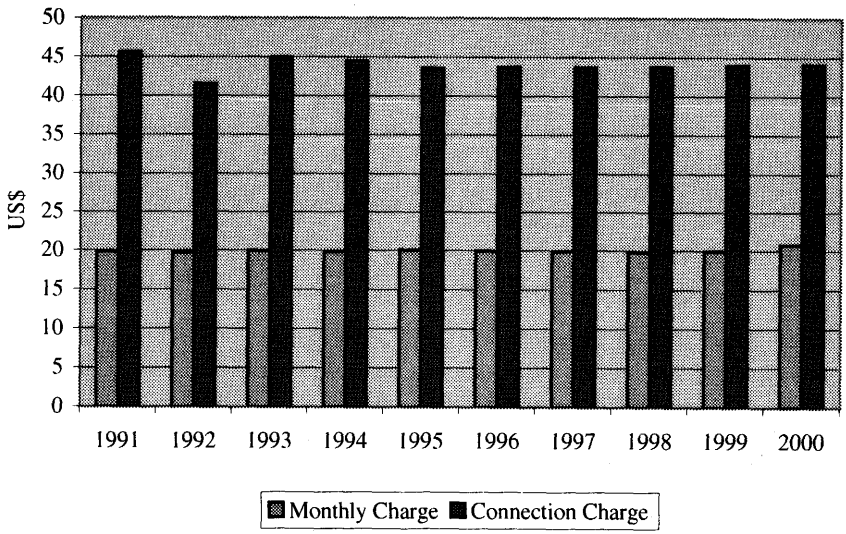
have not shown any significant change over the last ten years (Figure 14.6). In 2000, an average monthly charge for telephone connection was US$20.78. In addition, an average Internet user also pays for ISP. According to the OECD, ISP charges constituted a larger portion of total Internet access charges (i.e. telephone access charges + ISP charges) in 1995. By 1998, increased competition in the ISP market had lowered ISP charges significantly (OECD [2000]). However, local telephone charges did not decrease substantially due to the market's non-competitive nature. In 1998, a survey of OECD countries showed that on average 65 percent (57 percent off-peak) of total Internet access fees were paid to local telephone access providers.

The difference between traditional telephone calls and Internet usage highlight the need to restructure telephone tariff schedules. Based on the average duration of a telephone call during peak and off-peak hours, telephone providers instituted various tariff structures, using measured rates, flat rates and time-of-usage differentiation schemes. Different providers in each country also utilize different tariff schedules, making comparisons difficult. But telephone tariff structures have immense effect on accessibility to the Internet. Measured tariff models result in excessively high Internet access costs while unmeasured, unlimited access charges often reduce users' incentive to disconnect even when idling.

Nevertheless, a general cost comparison is possible by focusing on off-peak Internet access at an average usage of 20 hours per month. A typical dial-up charge for an ISP in 1998 was US$19.85 in the US where most dial-up services are charged a low price for initial hours and a flat rate schedule that varies by usage. Together with charges for local telephone access, a typical dial-up Internet access cost just below US$40, a lower than average figure compared to an OECD average of US$46.62.

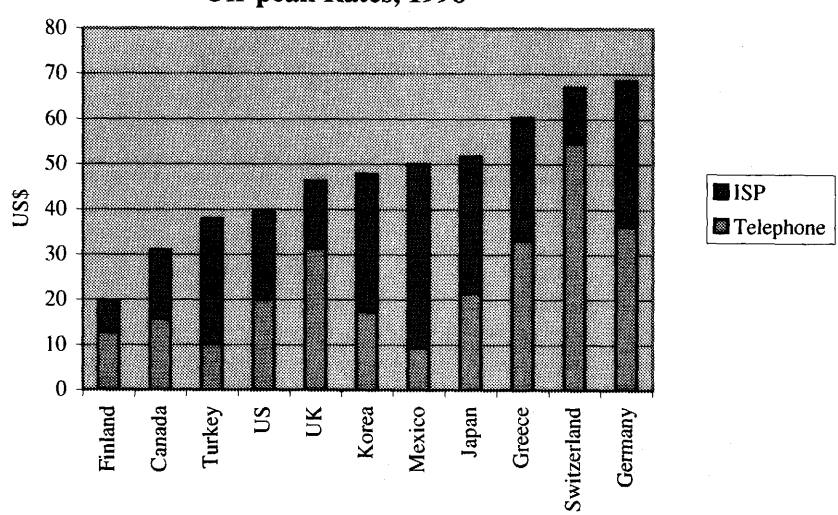
Figure 14.7 shows a comparison of monthly telephone charges and ISP charges in selected countries. In this figure, ISP charges were calculated for 20 hours per month usage except for those using a fixed rate schedule — Finland, Turkey, Korea, Mexico, Greece and Switzerland — where the figure represents a charge for unlimited access. Internet access costs vary widely from Finland at US$19.77 to a high of US$68.44 for Germany. The share of ISP in total cost also varies widely, from the low of 18.6 percent (Mexico) to 81.5 percent (Switzerland). Finland (as well as Denmark and Norway) offers the least expensive Internet access. These countries also use a flat-fee schedule. But Internet access in Switzerland and Greece, despite offering a flat rate plan, is relatively expensive.

Figure 14.6: Average Residential Rates for Local Telephone Service



Data are for urban areas only.
Source: US FCC, *Statistics of Communications Common Carriers*, 2001.

Figure 14.7: Comparison of Total Internet Access Charges, Off-peak Rates, 1998



Based on the largest ISP in each country, for 20 hours online access a month.
In US$ purchasing power parity.
Source: OECD, *Communications Outlook*, 1999.

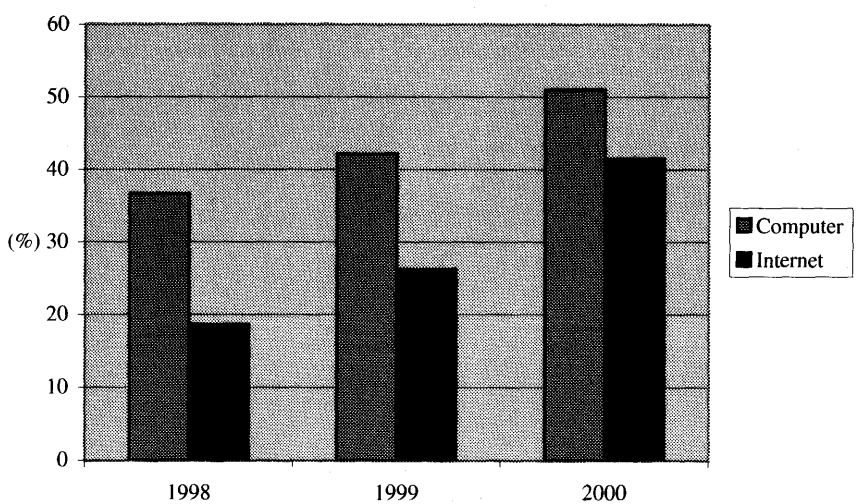
6. THE DIGITAL DIVIDE IN THE US

By the numbers of Internet users and IP hosts, the US is one of the leaders in Internet access and usage. Basic Internet indicators on PC ownership (59 per 100 inhabitants) and Internet usage (3,466 per 10,000 inhabitants) are well over world averages (7.7 and 588, respectively) according to International Telecommunication Union. The rapid diffusion of PCs and Internet continues. In 2000, half of all US households had a computer at home, and 80 percent of them accessed the Internet (Figure 14.8). Despite such strengths, however, the digital divide is apparent among geographical regions, income and education levels and racial groups.

6.1. Persistent Disparities in Income and Education Groups

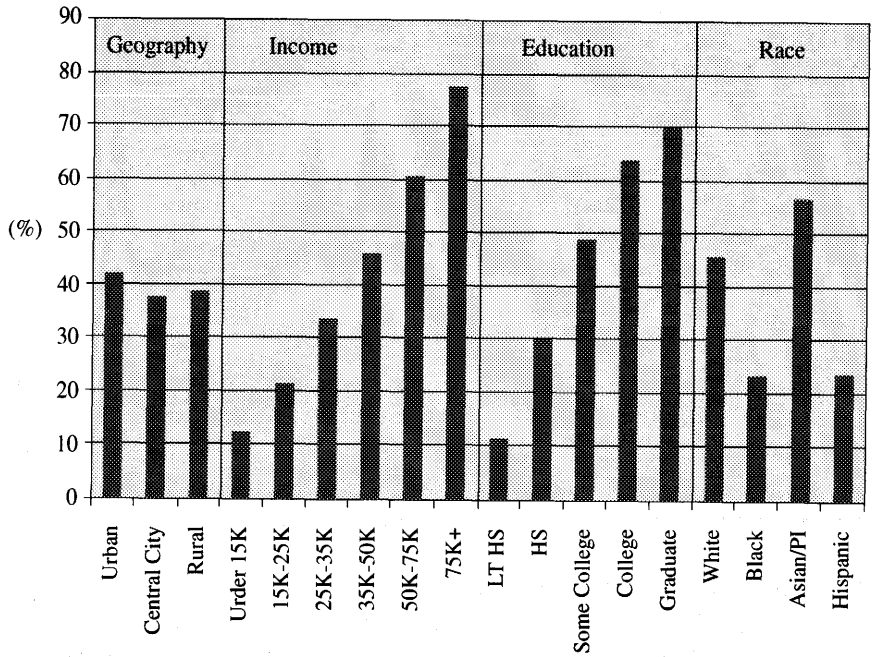
The digital divide exists between rural and urban areas, although the extent is minor compared to other variables (Figure 14.9). Central cities are particularly affected by the disparity. But a more prominent digital divide runs along education and income levels. Households in the highest income group (over US$75,000) are six times more likely to have Internet access than those in the lowest income group (less than

Figure 14.8: US Households with a Computer and Internet Access



Source: US Department of Commerce, *Falling Through the Net*, 2000.

Figure 14.9: Digital Divide in the US, 2000



Source: US Department of Commerce, *Falling Through the Net*, 2000.

US$15,000). The disparity in terms of education levels is as severe. The significant gap between racial groups, and to a minor degree the plight of central city areas, are strongly affected by the fact that minority races (Blacks and Hispanics) tend to dominated low income, low education groups.

6.2. Digital Divide or Digital Inclusion

As PCs and Internet usage penetrate into wider groups of US households, a US Department of Commerce report characterizes the current status of Internet access as a "digital inclusion" rather than a "digital divide." Such a rosy description is based on the fact that lower income groups registered higher rates of growth than higher income groups. For example, households with less than US$15,000 annual income experienced 78 percent growth in Internet access between 1998 and 2000 (from 7.1 percent to 12.7 percent). Those in the US$15,000-$25,000 bracket

registered 94 percent growth while the highest income bracket (over US$75,000) showed only a 29 percent growth rate. Similarly rapid gains in lower education households are noted. Given such accomplishments, the government report devotes a considerable amount of attention to the issue of Internet access by people with physical disabilities.

However, such a positive interpretation of Internet diffusion in the US ignores the consistent fact that only one in eight in the low income group — who are also likely to be in central cities, belong to a minority racial group and have low education — has an Internet access while more than three out of four have the same privilege at the other end of socio-economic spectrum. High growth rates, when starting with a low base percentage, often obscure the level of disparity. At the same time, a survey of a few years may not correctly reflect a long-term trend. High growth rates, if not sustained over a long period of time, may fail to expand the opportunity to the majority of households in the disadvantaged groups.

6.3. US Framework for Universal Service

The initial idea of universal service in the US appeared as a marketing scheme of AT&T during the early 20th century. As AT&T's patent expired in 1908, it faced more competition and a possible nationalization of the telephone network as many other nations had implemented. To fend off competition and government intervention, AT&T launched a sustained series of advertisements, touting its effort to provide universal service that could only be achieved through a single telephone monopoly (Marchand [1999]). Beatty [1999] noted:

> In a series of monthly magazine advertisements in a homey populist style, AT&T defended its goal of monopolizing the phone system as a natural one, the necessary guarantor of "universal service" through a "single system." Other ads followed, depicting heroic telephone linemen fighting blizzards, and comely telephone operators weaving strands of speech through "the magic loom of the Bell System," to quote from the ad's lush copy. One ad plunged so deeply into bathos as to show a widow and her children opening the envelopes containing their AT&T dividend checks. So successful was Vail's ad campaign at changing AT&T's image that after the federal government took control of the phones in the war emergency

> of 1918 there was no talk of making the arrangement permanent. AT&T got its sacrosanct monopoly back as soon as the war was over. Why should the public take over a company already dedicated to public service?

But the idea of universal service is now entrenched in the policies of most governments as well as social and political groups' agendas. While universal service is a political or social goal, economists would argue that interventionist pricing policies often fail to increase social welfare. Given existing costs to extend telephone services to each and everyone, market-determined prices are bound to be higher than the level needed to guarantee universal access. To increase social welfare, economic models favor raising prices to the cost of service, which invariably leaves some consumers without access to the service. But political mechanisms seldom work the same way. Subsidies and monopoly rights are granted to special groups and providers in order to extend the service. AT&T's long monopoly over local exchange markets were first and foremost based on the desire to guarantee universal service.

Universal access to the Internet now has the same level of urgency among policy makers in the age of information. The Telecommunications Act of 1996 specifically stipulated that "access to advanced telecommunications and information services should be provided in all regions of the Nation (Section 254(b)(2))," thereby making Internet access one of its defined goals of universal access. The Act also put a new emphasis on explicitly funded projects to promote universal access in contrast to the previous approach that relied mostly on implicit support through rate balancing and tariffs. Instead of subsidizing rural areas from high-cost urban service prices, equitable and nondiscriminatory contributions are distributed to target programs such as lifeline and link-up programs and to specific groups such as health care providers in rural areas, educational institutions and libraries, and low-income customers. The collected contributions are deposited in the Universal Service Fund, administered by Universal Service Administrative Company (see http://www.universalservice.org).

6.4. Extending Universal Service to Internet Access

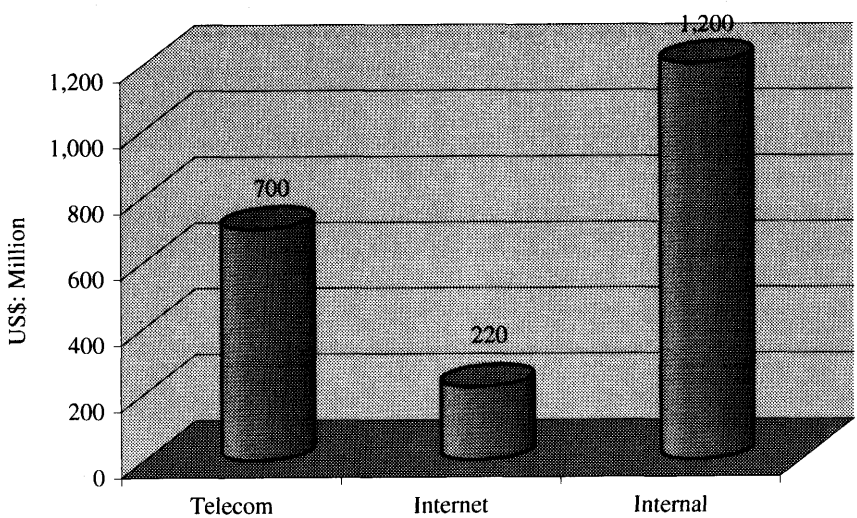
Universal service goals and policies regarding Internet access in the US revolve around the main objective of extending universal service into the

information age, put forward in the National Information Infrastructure (NII) Agenda for Action (NTIA [1993]). The Universal Service Administrative Company focuses on four areas: high cost, low income, rural health care, and school and library projects as mandated by the 1996 Act.

A major funding effort is carried out through the so-called E-rate grants, which provide discounts to public and private schools, libraries and consortia. The majority of E-rate funding involved 70 percent to 90 percent discount levels, and was distributed mainly for internal networking needs (57 percent) with 33 percent on telecommunications services, and 10 percent on Internet access (Figure 14.10). Relatively speaking, grants are primarily used to install and enhance basic telecommunications needs rather than for increasing Internet access. Grantees are located in both rural and urban areas but emphasis has been on low-income urban areas. In its third year (2000-2001), 25 percent of E-rate grants have been given to rural applicants, compared to 62 percent urban and 12 percent of unknown.

A similar information infrastructure support program is run by the Department of Commerce's National Telecommunications and Information Administration (NTIA). Since 1994, NTIA's Technology

Figure 14.10: Types of E-rate Grants, 2000-2001



Source: Universal Service Administrative Company, 2001.

Opportunities Program (TOP) has awarded US$150 million to 456 programs, which were also matched by US$221 million in local funds. The type of funded projects and target institutions are similar to the E-rate program as they aim at extending access to telecommunications and the Internet to underserved and disadvantaged communities (poor, rural and inner city). Major types of organizations receiving funds include educational, public safety, governmental, community and health care organizations.

TOP's main concern is to lower technological barriers to accessing advanced telecommunications technology (i.e. Internet). Out of 42 TOP projects surveyed by NTIA in 2001, 83 percent proposed and implemented an access site where community members could access the Internet (Table 14.9). Other activities included launching resource sites or Web-based information sites, supporting alliances and community networks that enhanced Internet access, and improving network services to extend health care and governmental services.

Access sites and resource centers established by TOP are mostly located in non-profit entities, K-12 schools and school districts, and in colleges. As such, TOP projects strengthened community access points in underserved and disadvantaged areas. But, along with E-rate discount

Table 14.9: Types of Activities in TOP Projects

	Percent of Projects with he Component
Establish access sites	83%
Establish resource centers	67%
Provide information or services via Web	67%
Develop an alliance for better access to technology	62%
Establish a network to provide educational services	57%
Provide Internet services through an established ISP	48%
Establish a network to provide health services	31%
Establish a network to provide government services	26%
Create a network to refurbish or distributed donated	21%
Create a new entity to provide telecommunications services	21%

Source: NTIA, *Evaluation Report, TOP,* 2001.

programs that also support similar educational and community centers, US initiatives for universal service primarily focus on establishing non-residential access points. This is similar to the telephone universal ser-

vice framework which emphasized public telephones in low-income, underserved areas. To the extent that these programs do not improve low PC ownership (due to low income) and high residential access fees that prevent residential Internet access among disadvantaged groups, improvements in the actual number of users may not coincide with increased numbers of community access centers.

7. US AND THE AMERICAS: TELECOMMUNICATIONS CONNECTION

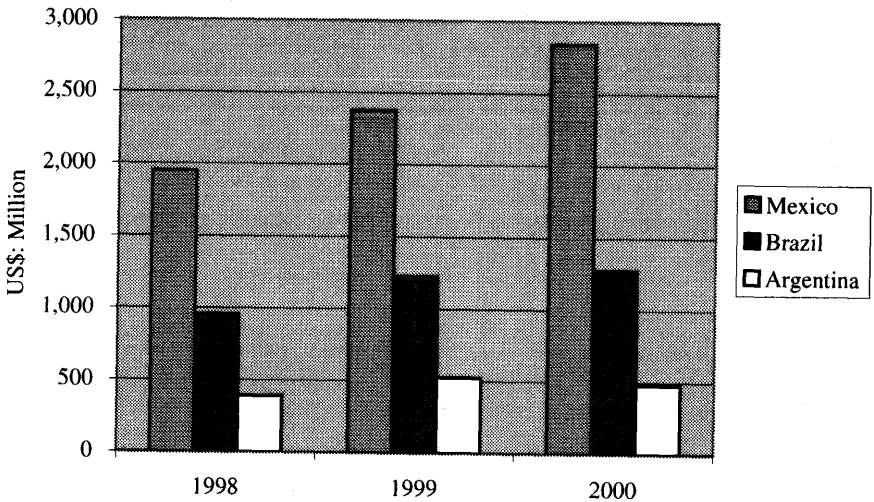
Although we have highlighted the digital divide in the US among various income groups, there is an immense, insurmountable disparity in terms of Internet access and the use of advanced telecommunications network between the US and Latin American countries. More detailed discussion on Latin American countries will be presented in the next chapter. However, computer and information industries in the US are closely connected to their counterparts in Latin American countries. With telecommunications reforms, privatization and opening up domestic markets to foreign ownership and competition, US and European telecommunications players are increasingly active in these countries.

While IT and Internet adoption rates are relatively low in Latin America, telecommunications exports to these countries represent billions of dollars each year, and growing rapidly. Mexico alone imported US$2.8 billion worth of US telecommunications equipment in 2000, a 20 percent increase from 1999 (Figure 14.11).

Top ten markets including Mexico, Brazil and Argentina accounted for US exports of more than US$5 billion in 2000. Mexico alone accounted for 10 percent of total US telecommunications exports in 2000 of US$22 billion (Figure 14.12). With more competitive and open telecommunications markets, US players are expected to invest and compete directly in Latin American countries. In Mexico, the giant Telmex has entered into a US$3.5 billion alliance with Bell Canada International and SBC communications. Telmex also operates Latin Internet portal in partnership with Microsoft. On the Internet, AOL Time Warner (AOL Latin America) and Yahoo (Yahoo Latin America) are significant players while BellSouth and SBC Communications are investing in cellular networks and partnering with local and international companies.

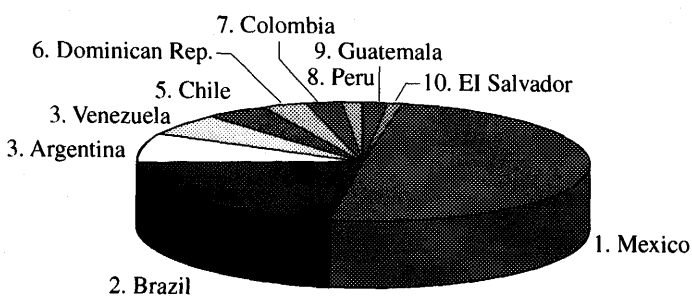
Telecommunications industry, particularly the Internet and e-commerce, in Latin America is seen as an important market for US compa-

Figure 14.11: US Telecommunications Equipment Exports, 1998-2000



Source: US Office of Telecommunications Technologies.

Figure 14.12: Top 10 Latin American Markets for Telecommunications Equipment Exports from the US, 2000



Mexico: US$2.8 billion
Source: US Department of Commerce, 2001.

nies. Although Internet penetration is limited to the top 10 or 20 percent of income groups, the potential is in the liberalized market conditions that present more favorable investment and operational opportunities in those countries. Whether past telecommunications reforms and market privatization efforts will lead to increased Internet access for the majority

of the Latin American population is still a question. But increasingly, US telecommunications corporations and their business models will be impacting the way the Internet is accessed in Latin American countries.

8. CONCLUSIONS

As the Internet expands in other countries, the US's share in key variables of Internet usage is shrinking. Nevertheless, PC and Internet penetration rates and the availability of the Internet in the US are growing steadily. Telecommunications reforms during the 1990s accelerated this trend by recognizing the innovative characteristics of new telecommunications media and evolving market conditions and by formulating policies to further enhance such developments.

Despite such strengths, however, the digital divide still plagues many groups of the US population, mainly those with low income and low education levels. These groups are also predominantly ethnic minorities and more likely reside in urban, inner-city areas or remote rural regions. In particular, inner city neighborhoods have the lowest Internet penetration rates.

Economic or market forces are often inadequate to address their interests. Universal service policies formulated under the Telecommunications Act of 1996 adopted market-based approaches rather than government intervention in rate pricing or access guarantee. The primary tools are equitably collected funds that are distributed as grants or cost sharing measures such as discounts on telephone charges. As we will discuss in Chapter 15, such community-oriented projects are also becoming more prevalent in Latin American countries. While these are in line with the dominant trend in the telecommunications industry and political leadership, i.e. market liberalization and reduction in active government intervention in telephone tariff settlement, their effect on increasing Internet access to the underserved and disadvantaged population will be minimal.

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