The Digital Economy Fact Book

SIXTH EDITION, 2004

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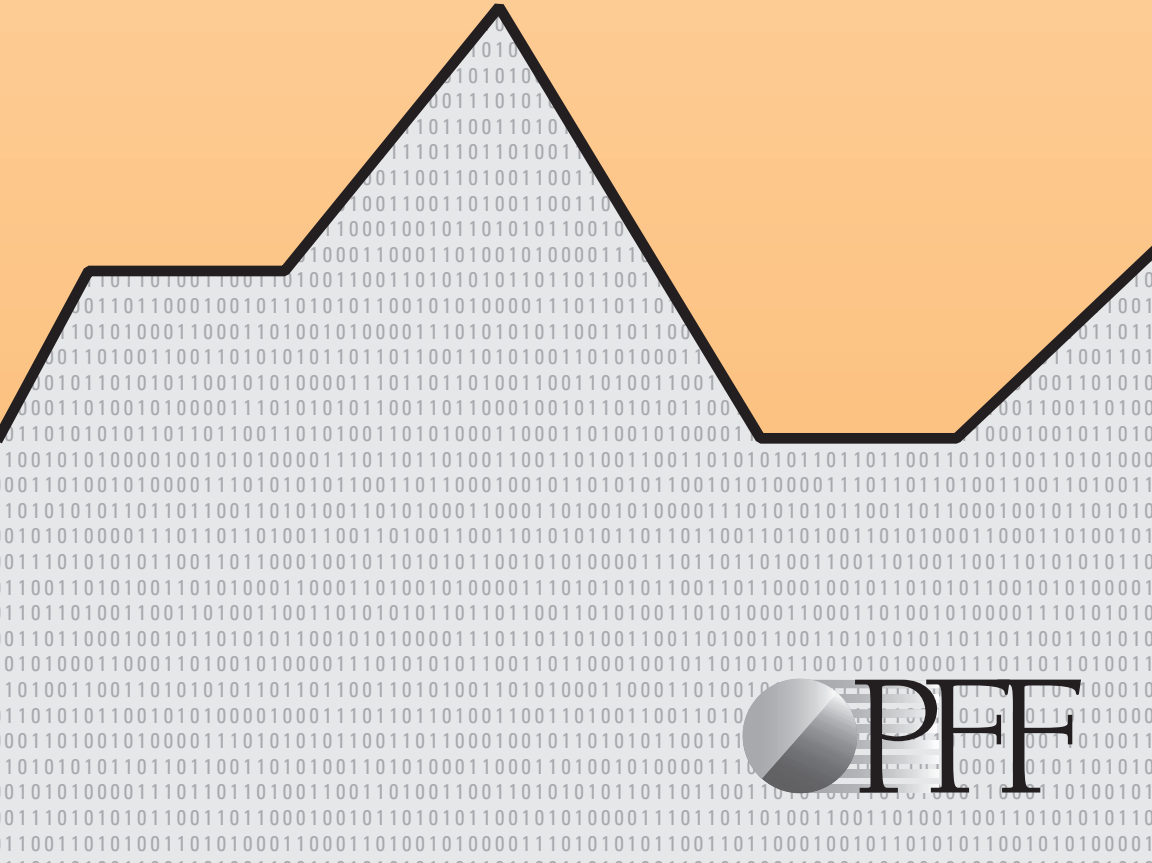

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with
Brooke E. Emmerick
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The Progress & Freedom Foundation is a market-oriented think tank that promotes innovative policies for the digital age. Dedicated to principles of individual liberty, it conducts research on the impact of technological change on the marketplace and the resulting implications for public policy, and disseminates the results of its work through books, studies, seminars, conferences and electronic media of all forms. Established in 1993, the Foundation is a private, non-profit, non-partisan organization supported by tax-deductible donations from corporations, foundations and individuals. It does not engage in lobbying or take positions on legislation. The views expressed here are those of the authors, and do not necessarily represent the views of the Foundation, its Board of Directors, officers or staff.

The Progress & Freedom Foundation
1401 H St. NW, Suite 1075, Washington, D.C. 20005
voice: (202)289-8928 fax: (202)289-6079
email: mail@pff.org Internet: www.pff.org

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Foreward

The Digital Economy Fact Book is a metronome for the digital revolution. It annually marks time, reporting the facts about the progress of the digital economy. This Sixth Edition of the *Fact Book* follows the arc of the digital economy through 2003 and 2004, which saw a modest economic revival of the U.S. economy as a whole. For the digital sector, the IPO returned, venture capital perked up and the communications regulatory regime continued on it tortuous path.

The Progress & Freedom Foundation was founded on the premise that the digital revolution is as important a societal transformation as the industrial revolution before and the agrarian revolution before that. A study of the digital revolution requires an assessment and compilation of the activities that make up that transformation. That is the goal of this volume, and editions of the *Fact Book* that came before and those that will come after.

Austrian Economist Joseph Schumpeter is the patron saint of the digital age, or at least its most prescient commentator (which is not bad for someone writing over a half-century ago). Schumpeter described capitalism as a process of "creative destruction," where reaching for the next product and the next market spurred innovation and dynamism. The *Fact Book* documents this Schumpeterian vision and reality.

This book is put together under the capable stewardship of Tom Lenard and Bill Adkinson. Much of the toil, and credit, goes to Mike Pickford, who labored under reams of data and arcane research reports for months to put this together. Mike got help from another Mike, Mike Waldron. Jane Creel and Brooke Emmerick saw the volume through production. Finally, the many friends and supporters of PFF make this annual marking of the digital economy possible. We are grateful for their ongoing support.

Ray Gifford
President
The Progress & Freedom Foundation
August 2, 2004

Chapter 1
The Growth of the Internet

The digital economy experienced serious setbacks as we entered the third millennium. Starting in late 1999, the bursting of the Internet stock market bubble coupled with a virtual meltdown in the telecom sector brought enormous business and financial difficulties and scandals. Despite these adverse circumstances, however, expansion of Internet use has proceeded without interruption. Consumer and public confidence in the Internet and telecom sectors largely has been restored, fostering renewed growth and expansion.

The Internet is increasingly integrated into the daily routines of households and businesses throughout America and the rest of the world. By all measures, a majority of adult Americans are now online, and increasing numbers have access to broadband connections. Overall, users are employing the Internet for longer periods and pursuing an expanded range of personal and commercial activities.

The forerunner of the modern Internet was created in 1983, essentially for use by defense contractors and scientists. In the early 1990s, the Internet became a suitable medium for use by households and businesses - particularly due to the development of the World Wide Web by Tim Berners-Lee and the "Mosaic" browser by Marc Andreesen (which in 1994 became the basis for Netscape's "Navigator").

The explosive growth in the number of Internet users in the mid-to-late 1990s was fueled initially by "early adopters," generally in the better-educated, higher income segments of the U.S. population. Today, usage is growing for most demographic groups, although some low-income groups still lag behind.

Perhaps even more exciting is the expansion in Internet usage in the rest of the world. While the U.S. now accounts for 27 percent of users worldwide, growth rates in both Europe and Asia exceed those in the U.S. The rapidly growing Asia-Pacific region accounts for 33 percent of all users worldwide. China boasts the second highest number Internet users, with 79.5 million.[1]

Americans using the Internet are also engaging in a wider variety of activities on a more frequent basis. While email and surfing the Internet remain the most common activities, individuals increasingly use the Internet for various commercial and financial pursuits, such as purchasing goods, trading stocks, banking and working from home. The number of users downloading digital video and audio files has also continued to increase. Telecommunications applications on the Internet, such as email, instant messenger and VoIP services, also provide powerful motivations for nearly ubiquitous use of the Internet by teenagers and young adults.

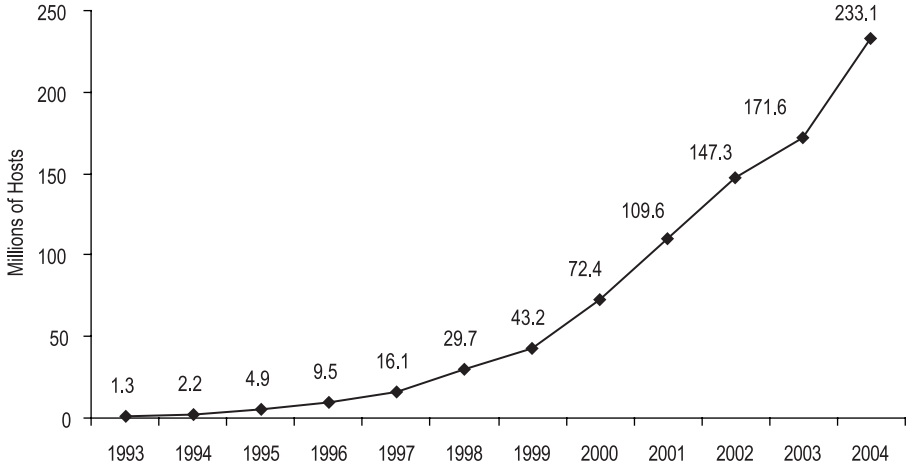
Internet Host Computers

The number of host computers connected to the Internet, a major measure of its size, continues to grow rapidly. The first host computer on the Internet was installed at UCLA in the fall of 1969. When the current TCP/IP standard was adopted in 1983, there were still only about 300 hosts connected to the Internet. By 1993, the figure had grown to two million. Late in 1993, with the release of Mosaic, the first graphical web browser, the number of hosts skyrocketed, increasing by over 10,000 percent over the next decade, from 2.2 million in 1994 to over 233 million today.

Hosts are generally defined as computers that act as servers for one or more top-level domains (TLDs). The last letters in the domain name denote TLDs. Generic TLDs (gTLDs) generally indicate the type of site (such as *.com* for commercial), while country code TLDs (ccTLDs) indicate geographic location (such as *.it* for Italy).

- In the year ending January 2004, the number of hosts on the Internet increased by 36 percent, from 171.6 million to 233.1 million, more than double the 16-percent increase in the number of hosts from January 2002 to January 2003.[2]
- The number of hosts associated with the *.net* gTLD jumped over 60 percent, from 62 million in January 2003 to 101 million in January 2004. After decreasing between 2002 and 2003, hosts connected to the *.com* gTLD posted a 20-percent increase, from 40.6 million in 2003 to 48.7 million in 2004. The hosts associated with *.edu* increased only 1.3 percent, from 7.5 million to 7.6 million.[3]
- As of January 2004, there were a total of 66.2 million hosts associated with ccTLDs. Japan led with 12.9 million, more than twice as many as second place Italy. The remainder of the top ten consists of Western European countries as well as Canada, Brazil, Australia and Taiwan.[4]
- Apache software was installed on almost 70 percent of the active host computers that responded to Netcraft's May 2004 survey. Microsoft products were installed on 23 percent, while Zeus and SunOne had roughly 1 percent each.[5]

Hosts on the Internet*



*Figures as of January of year indicated.

Date	Hosts	Percent Change	Date	Hosts	Percent Change
Aug-81	213		Jan-93	1,313,000	80.6
May-82	235	10.3	Jan-94	2,217,000	68.8
Aug-83	562	139.1	Jan-95	4,852,000	118.9
Oct-84	1,024	82.2	Jan-96	9,472,000	95.2
Oct-85	1,961	91.5	Jan-97	16,146,000	70.5
Nov-86	5,089	159.5	Jan-98	29,670,000	83.8
Dec-87	28,174	453.6	Jan-99	43,230,000	45.7
Oct-88	56,000	98.8	Jan-00	72,398,000	67.5
Oct-89	159,000	182.1	Jan-01	109,574,000	51.3
Oct-90	313,000	98.1	Jan-02	147,344,000	34.5
Jan-91	376,000	20.1	Jan-03	171,638,000	16.5
Jan-92	727,000	93.4	Jan-04	233,101,000	35.8

Source: Internet Software Consortium

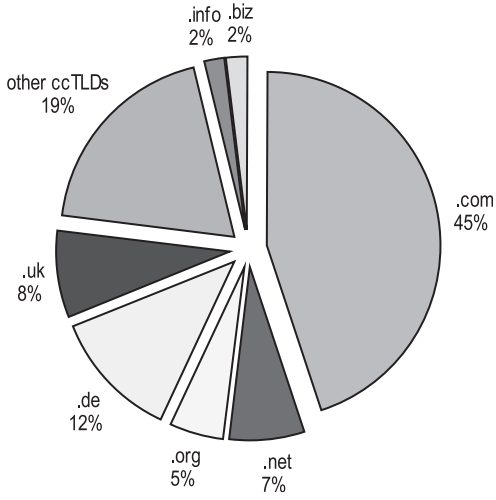
Internet Domain Names

The number of domain names registered on the Internet is another important measure of its size. Under the Internet Domain Name System (DNS), a majority of domain names end in generic top-level domain (gTLD) codes, denoting categories of sites, such as *.com* for commercial sites, *.edu* for education sites, and *.org* for non-profit organization sites. There are also a large number of country code top-level domains (ccTLDs), one for each country, which are an increasingly important source of registrations.

Network Solutions (NSI), was the sole provider of gTLD registrations until November 1999, but now the Internet Corporation for Assigned Names and Numbers (ICANN) has accredited over 220 registrars.[6] NSI was also the sole gTLD registry database operator, but its successor, VeriSign, now holds contracts with ICANN only for the *.com* and *.net* registries.[7]

- After a pause in the growth of gTLD domain names in 2002, slow growth resumed in 2003 and has continued into 2004. From the lowest point of 28.7 million gTLD registrations in June 2002, the number of gTLD registrations increased by 23 percent, to a total of 35.3 million by January 2004, according to Zooknic.[8]
- According to Zooknic, in January 2004 *.com* registrations totaled 26.2 million and *.net* registrations totaled 4.35 million, up 19 percent and 18 percent, respectively, over the previous year.[9]
- ICANN approved seven new gTLDs in November 2000. As of January 2004, two had substantial registrations: *.info* (information) had 1.1 million and *.biz* (business) had over 900,000. The other four, *.pro* (professional), *.coop* (cooperatives), *.areo* (aviation) and *.museum*, have far fewer registrations.[10]
- The top ten ccTLDs account for 71 percent of all ccTLD registrations. There are more than 240 ccTLDs, accounting for 40 percent of all domain name registrations as of March 2004.[11]
- Registrations in ccTLDs are increasing. As shown at the right, VeriSign estimates that ccTLDs accounted for 40 percent of all domain registrations at the end of June 2004. The leading ccTLDs included *.de* (Germany), which accounts for 12 percent of registrations, and *.uk*, which accounts for 8 percent of registrations.[12]
- Certain country codes are being successfully marketed. For example, *.nl* (the Netherlands) has over 600,000 registrations, while *.cc* (Cocos Islands) and *.tv* (Tuvalu) have about a half million registrations each.[13]

Distribution of Domain Names (June 2004)



Source: VeriSign

gTLD Domains (thousands)

Top-Level Domain	Jan-99	Jan-00	Jan-01	Jan-02	Jan-03	Jan-04
Commercial (.com)	3,426	8,006	21,185	22,747	22,148	26,208
Network (.net)	261	1,217	3,999	3,989	3,702	4,349
Non-Profit Organization (.org)	348	780	2,510	2,485	2,442	2,776
Business (.biz)				687	1,014	1,085
Information (.info)				499	829	915
Education (.edu)	4	6	6	7	7	7
Total	4,039	10,009	27,700	30,414	30,142	35,340

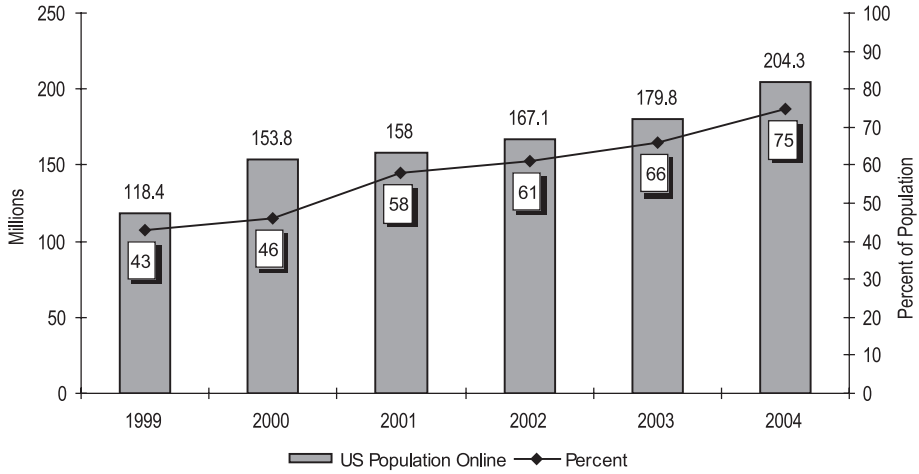
Source: Mathew Zooknic, Zooknic.com Internet Geography Project

The U.S. Online Population

The number of Americans online has continued to grow over the past several years. A March 2004 Nielsen//NetRatings report found that nearly 75 percent of Americans, over 200 million people, have access to the Internet from home.[14] The ways in which people access the Internet are also evolving. In an April 2004 survey, the Pew Internet and American Life Project found that 90 percent of U.S. Internet users go online from the home, while 50 percent go online from work.[15] In a previous survey, Pew also found that 23 percent of U.S. Internet users go online from places other than home or work, such as a school, library or cyber café.[16]

- The U.S. online population has increased by 72.6 percent from 1999 to 2004. From 2003 to 2004, the U.S. online population increased by 13.6 percent to 204.3 million.[17]
- According to an April 2004 survey by Pew, 63 percent of American adults (those over 18) use the Internet.[18]
- Pew reports that high-speed Internet access at home has grown to 24 percent of all adult Americans, an increase of 60 percent since March 2003.[19]
- eMarketer projects that the number of dial-up households in the U.S. will decline by 9.7 percent between 2003 and 2007, while total broadband households will grow by 21.8 percent.[20]
- On an average day, about 72 million American adults go online according to Pew, representing 56 percent of those with Internet access. Among the myriad online activities, the most common is to send or receive email, with almost half of those with access using email daily.[21] Getting news and research are also common online pursuits.
- More than half of online Americans (53 percent) have used the Internet for six years or longer. Those with the most online experience are most likely to use the Internet frequently, to have broadband and to engage in every type of online activity.[22]

U.S. Population Online



Source: Nielsen//NetRatings

Daily Internet Activities

Activity	Percent*
Go online	56
Send email	48
Get news	27
Research for work	19
Research a product or service before making a purchase	15
Look up political news/info	13
Check sports scores and info	11
Send Instant Message	10
Look up phone number or address	7
Get map or driving directions	7
Log on using a wireless device	6
Participate in online auction	3
Read a blog	3
Buy a product	3
Create a blog	1
Trade stocks, bonds or mutual funds	1

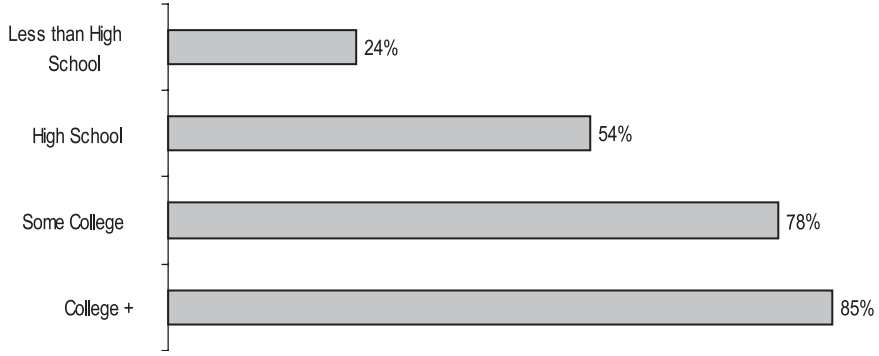
* Percent of all Internet users who engage in the specified activity on a typical day.
Source: Pew Internet & American Life Project

Demographics of U.S. Internet Users

Since the mid-1990s, concern has been expressed about "digital divide" issues – differences in Internet access and usage rates across a number of highly correlated demographic factors, including income, age, ethnic and other demographic groups. Internet usage rates tend to be higher for whites, Asian Americans, affluent and well-educated families, as compared with less-privileged groups. The disparities are shrinking as Internet usage rates are growing considerably among all groups.

- In February 2004, Pew found continuing disparities across racial groups - 64 percent of whites and 63 percent of English-speaking Hispanics accessed the Internet, compared to 46 percent of Blacks.[23]
- As seen on the right, Pew reports that the disparities in Internet usage based on educational attainment are far greater than those based on race.[24]
- The February 2004 Pew survey found that men are slightly more likely than women to go online - 65 percent of men use the Internet, compared to 61 percent of women.[25]
- Pew found that in 2003, urban and suburban areas had substantially identical Internet penetration rates, 67 percent and 66 percent, respectively. In contrast, the penetration rate in rural areas was 52 percent.[26]
- Pew also reports that Internet access is highly correlated with income, with 89 percent of those making $75,000 a year or more having Internet access compared to only 41 percent for those making less than $30,000.[27]
- According to Nielsen//NetRatings, Internet access for affluent Americans, those with a total household income of $150,000 and higher, grew 31 percent between 2003 and 2004, more than for any other income group.[28]
- According to Nielsen//NetRatings, U.S. home Internet penetration rates ranged between 75 percent and 81 percent for all adult age groups between 18 and 55 years old.[29]
- Those households with higher incomes are more likely to not only have Internet access, but are much more likely to have broadband access rather than narrowband access.[30]

Online Penetration by Education

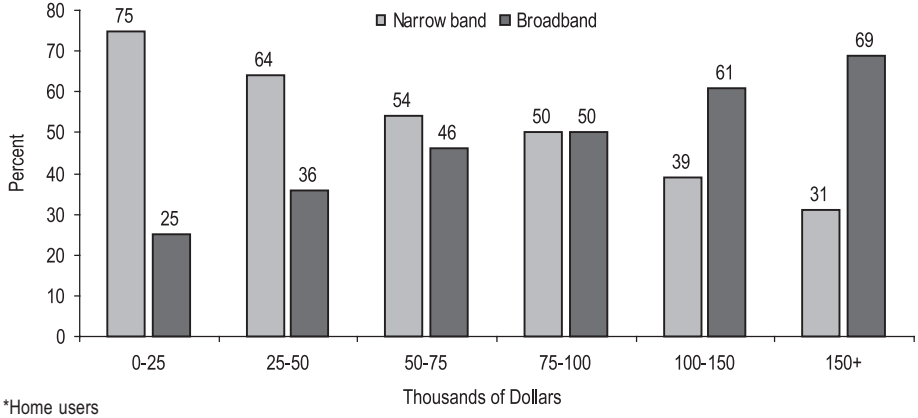


Source: Pew Internet & American Life Project

Online Penetration by Ethnicity

Source: Pew Internet & American Life Project

Narrowband-Broadband Shares by Income*



*Home users

Source: Nielsen//NetRatings

The Worldwide Online Population

The worldwide Internet population is growing even more rapidly than the U.S. online population. As late as 1988, only seven countries were connected to the Internet. According to the 2003 CIA World Factbook, 49 countries have at least one million Internet users.[31] The Computer Industry Almanac projects that the worldwide Internet population will reach 945 million in 2004, and grow to 1.46 billion by the year 2007.[32]

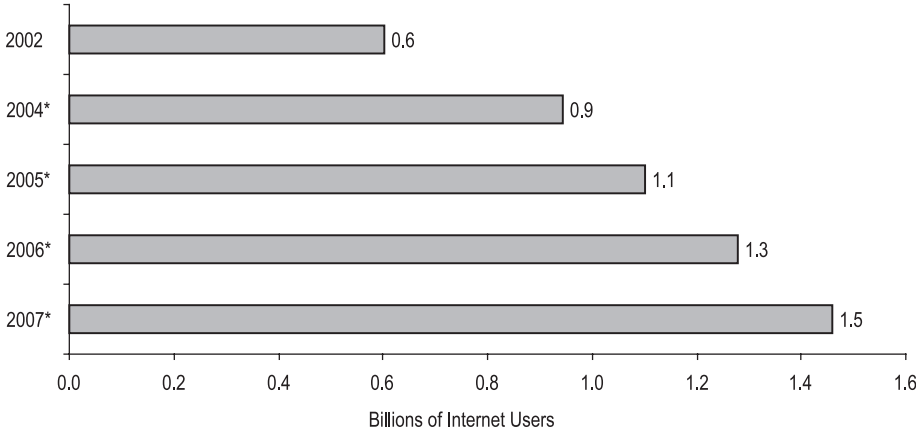
- Nielsen//NetRatings estimates that as of January 2004, the Internet universe consisted of 448 million individuals worldwide, representing a 6.2-percent increase from December 2003. Almost two-thirds of these (294 million) were active users.[33]
- The U.S. currently accounts for 27 percent of worldwide Internet users, but by 2007, IDATE projects that nearly 80 percent of Internet users will live outside the U.S.[34]
- According to the Computer Industry Almanac, the countries with the largest estimated online population after the U.S. (185.9 million) are China (95.8 million), Japan (78 million), Germany (41.9 million), the United Kingdom (34.1 million) and South Korea (32.1 million).[35]
- As shown at right, the countries with the highest Internet penetration rates are Sweden (69 percent), the U.S. (67 percent), South Korea (65 percent), Japan (55 percent) and Germany (52 percent).[36]
- Around the globe, Internet users are spending more time on the Internet. Nielsen/ /NetRatings estimates that global usage from home averaged 25.5 hours per month in January 2004, up 6.6 percent from December 2003. The average length of a session was 51 minutes and the average duration of a page view was 48 seconds.[37]
- The Computer Industry Almanac projects that worldwide Internet users will grow to 1.5 billion by 2007, an increase of two-thirds over 2004.[38]

Internet Penetration by Region

	Internet Users (millions)			Internet Penetration (percent)		
	2002	**2003**	**2007***	**2002**	**2003**	**2007***
Western Europe	148	161	197	35	38	47
France	23	25	31	38	41	51
Germany	39	43	50	47	52	60
Italy	18	20	27	31	35	47
Sweden	6	6	7	63	69	82
United Kingdom	28	29	34	47	49	56
North America	200	214	253	64	68	78
U.S.	179	191	227	64	67	77
Asia-Pacific	180	234	448	5	7	12
Japan	51	69	91	40	55	74
South Korea	29	32	40	60	65	80
Rest of the World	80	98	188	4	5	10
Eastern Europe	25	31	60	8	10	20
Latin America	33	40	83	6	7	15
Africa/Middle East	22	27	45	2	3	4
Total	**608**	**707**	**1,086**	**10**	**11**	**17**

*Projections
Source: IDATE

Worldwide Internet-User Growth



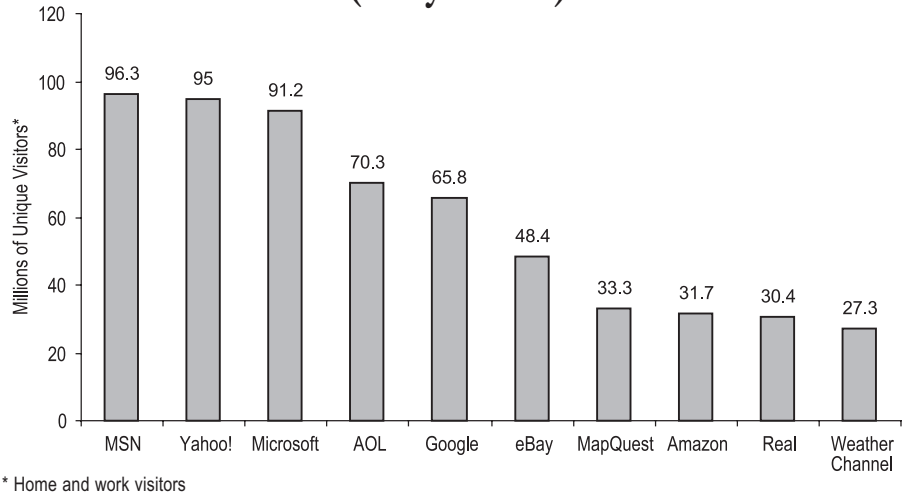
*Projections
Sources: CIA World Factbook (2002), Computer Industry Almanac (2004-2007)

Most Frequently Visited Web Sites

As noted above, both the number of Internet users and the number of sites on the Internet have expanded rapidly. Competition among sites to attract traffic flow has been intense, especially with the bursting of the Internet bubble. The most heavily trafficked web sites are associated with the major Internet Service Providers, such as AOL, MSN, and "portals," such as Yahoo!, Google and Lycos, that provide search engines and gateways to other sites on the Internet. Some very popular sites, like Amazon and eBay, that are destinations in their own right, are also among the most visited.

- There are many approaches to measuring traffic. One can sum total hits on the site or count only unique visitors. Similarly, individuals or households (domestic or worldwide) can be the focus of analysis.
- As shown at the right, Nielsen//NetRatings places MSN first among web site brands in terms of unique visitors from home or work, with 96.3 million for the month of May 2004. Yahoo! and Microsoft followed close behind, with 95 million and 91.2 million unique visitors, respectively,[39] while AOL and Google rounded out the top five.
- First in terms of unique visitors for U.S. parent companies was Microsoft, with 110.2 million unique visitors in May 2004, followed by Time Warner with 98 million and Yahoo! with 97.4 million.[40]
- According to ComScore Media Metrix, in November 2003, Yahoo! had the most unique visitors, supplanting AOL-Time Warner and MSN, who had jockeyed for the top spot. Yahoo! maintained its most-visited status through April 2004, when it had 113 million unique visitors.[41]
- The Weather Channel web site has also grown in popularity, reaching 23.9 million unique visitors in April 2004, compared to only 11.1 million in January 2002.[42]

Most Frequently Visited Web Sites Worldwide (May 2003)



* Home and work visitors

Source: Nielsen//NetRatings

U.S. Sites with Most Unique Visitors (millions)

	January 2000		January 2002		April 2002	
Web Site	**Rank**	**Visitors**	**Rank**	**Visitors**	**Rank**	**Visitors**
Yahoo!	2	44.3	3	74.9	1	113.2
AOL Time Warner	3	42.7	1	86.9	2	111.8
MSN-Microsoft Sites	1	56.4	2	78.8	3	110.1
Google Sites	14	11.6	8	26.9	4	66.0
eBay	n/a	n/a	7	28.8	5	60.1
Amazon Sites	4	31.4	6	30.1	6	39.1
Terra Lycos	10	13.2	4	40.5	7	38.4
About/Primedia	8	15.5	5	34.9	8	38.3
Excite Network					9	29.0
Viacom Sites	22	6.9	15	18.8	10	28.0
Verizon Communications Corp.	n/a	n/a	n/a	n/a	11	22.7
CNET Networks	17	9.5	10	23.3	12	23.5
Weather Channel	18	8.9	27	11.1	13	23.9
Walt Disney Internet Group	6	22.7	12	20.2	14	24.1
Real.com Networks	13	12.4	19	16.3	15	24.0

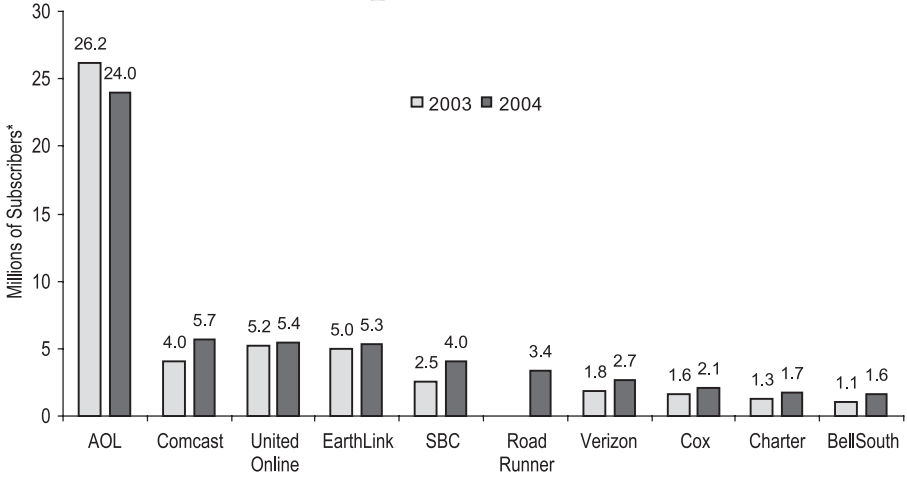
Source: ComScore Media Metrix

Internet Service Providers

Internet Service Providers (ISPs) are the principal gateways to cyberspace for Internet users. For many years, the dominant form of home Internet access has been dial-up service using phone lines and a modem. While this remains the most common access choice, as broadband becomes more affordable many dial-up users are switching over to take advantage of its faster speeds and convenience.

- AOL remains by far the largest ISP in the U.S. with a share of just over 26 percent.[43]
- AOL's subscriber base is shrinking, however, decreasing from 26.2 million in the first quarter of 2003 to 24 million subscribers in the first quarter of 2004.[44]
- ISP-Planet reports that (aside from AOL) all of the top ten ISPs in the U.S. experienced gains in subscribership from the first quarter of 2003 to the first quarter of 2004. The largest gain was by Road Runner, which had 3.4 million subscribers in Q1 2004 but was not even among the top 20 ISPs in Q1 2003.[45]
- For the first quarter of 2004, six of the top 10 U.S. ISPs were cable or phone companies, including Comcast, which had the second largest market share with 6.2 percent.[46]
- As seen at right, AOL remained the largest global ISP, with 33.3 million active subscribers, 9 percent of which were broadband subscribers. South Korea's KT had the most broadband subscribers with 5.6 million, representing over 97 percent of its active subscribers.[47]
- Six of the top 15 global ISPs are based primarily in the U.S.[48]

Top U.S. ISPs



*As of end of Q1 of year indicated
Source: ISP-Planet

Top Global ISPs (millions)

	Country of Origin	Active Subscribers	Broadband Subscribers
AOL	USA	33.3	3.0
T-Online	Germany	12.7	3.2
Wanadoo	France	8.8	1.8
MSN	USA	8.7	
Tiscali	Italy	7.1	0.5
Terra Lycos	Spain	6.0	0.5
Nifty	Japan	5.8	
KT	South Korea	5.8	5.6
United Online	USA	5.2	0.4
Earthlink	USA	5.0	1.0
Comcast/ATT Broadband	USA	4.4	4.4
Freenet	Germany	3.8	0.0
Wind	Italy	3.3	0.1
SBC	USA	2.8	2.8
Telecom Italia	Italy	2.4	0.7

Source: IDATE

Chapter 2
The Hardware Sector

Beginning with Dr. Jack Kilby's invention of the integrated circuit in 1958, the digital economy has been powered by an extraordinary succession of innovations in electronics and computing technologies. Since then, computing performance has followed the path forecast by Intel co-founder Gordon Moore. Moore's law states that the number of transistors applied to a single microchip doubles approximately every 18 months – for practical purposes doubling the computing power of the chip. Harvard economist Dale Jorgensen has described Moore's 1965 prediction as "astonishingly accurate," and emphasized its importance in the resurgence of U.S. productivity growth.

In the future, new technological marvels are likely to propel growth. Many, including the Bush administration, see nanotechnology as the next big thing, promising changes on "the scale of the Internet," and indeed, "to revolutionize the Internet itself."[1] Nanotechnology "is the manipulation of matter at the atomic and molecular levels," and can improve human biology and information systems.[2] Examples include super-fast computers with vast storage capacity and even "memory ports in the brain."[3] Scientists are already developing new transistor chips that could reach one-millionth the size of a grain of sand.[4] Progress is threatened, however, by "growing speculation about potential dangers posed by nanotechnology."[5]

While this new technology may sound far-fetched, consider the recent history of technological advance. In 1971, Intel debuted its first microprocessor with a speed of 108 kilohertz. Now Pentium 4 chips can run at 3.4 gigahertz, or 31,482 times as fast. As a result of these achievements, and a multitude of improvements in storage capacity (hard drives, CDs and DVDs), communications (the Internet, modems, broadband, wireless) and other systems, current bargain-basement systems provide functionality virtually undreamed of when the IBM PC came to market in 1976.

Faster, smaller and cheaper chips have also enormously expanded the possible applications of computing power to improve business productivity and the quality of everyday life. Internet access and interactivity are now being integrated into handheld devices, gaming systems, televisions and wireless phones.

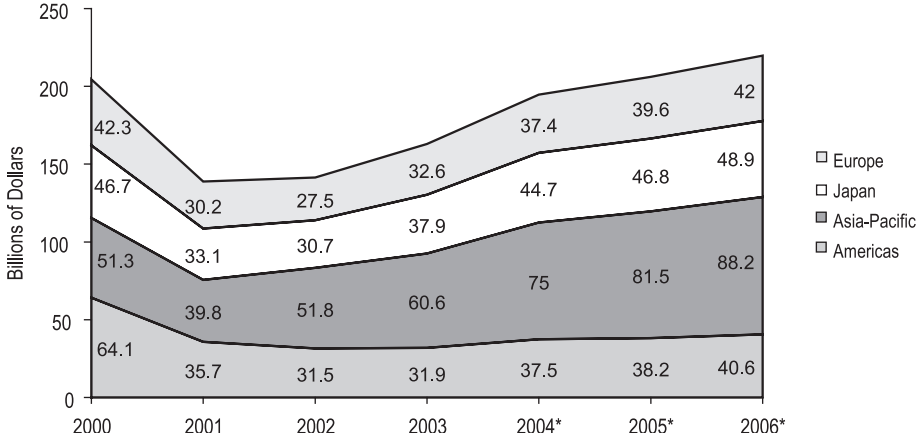
Despite these wonders, the hardware market – especially the semiconductor sector – has experienced considerable volatility and slow sales for many products in recent years. Last year saw an upswing in sales of semiconductors and other products that appears to be ushering in a period of renewed growth in the hardware sector, spurred on by increased consumer and economic confidence, as well as improvements in telecommunications and the widespread adoption of broadband service. Sales of relatively new products, as well as increasing computer penetration in developing countries, will also drive the market in the coming years.

Semiconductor Sales

Semiconductors are thin wafers (or "chips") of silicon imprinted with thousands or even millions of electronic circuits. Semiconductors of all types – microprocessors, memory chips, and other products – are the building blocks for computers and "smart" devices. Today these chips perform many functions in a wide variety of equipment – from automobiles to cell phones to personal digital assistants (PDAs). Semiconductor capabilities have risen, and quality-adjusted prices have fallen in close adherence to the path predicted by Moore's law. The market for semiconductors is subject to great volatility, driven mainly by fluctuations in shipments of personal computers, consumer electronics and, more recently, digital telecommunications equipment.

- As shown at right, the Semiconductor Industry Association (SIA), reports that 2000 saw record semiconductor sales of $64.1 billion in the Americas and $204.4 billion worldwide. Sales peaked in September 2000 and declined precipitously in 2001.[6]
- In 2002, the market began to post gains and by 2003, sales in Europe, Japan and Asia-Pacific increased by 8 percent, 14.5 percent and 52 percent, respectively, over 2001. Sales in the Americas were down 1.1 percent from 2001 to 2003.[7]
- SIA estimates 2003 worldwide sales increased by 15.8 percent over 2002 to $163 billion, and projects that 2004 sales will increase by 19.4 percent to $194.6 billion. The majority of this growth will be seen in the Asia-Pacific market, which by 2006 will account for 40 percent of the worldwide market.[8]
- As reported at right, Gartner Dataquest found that revenues of semiconductor manufacturers worldwide increased by 12 percent in 2003.[9]
- Intel retained its position as leader in both revenue and market share in 2003, posting a 10.4-percent increase in revenue. Even though its market share decreased by two-tenths of a percentage point to 16.0 percent, this remained nearly three times the share of the next leading competitor, Samsung.[10]
- Rensesas Technology, a joint venture between Japanese companies Hitachi and Mitsubishi, was reported by Gartner for the first time in 2003 and claimed the third position, with revenue of $7.5 billion and a market share of 4.3 percent.[11]

Worldwide Semiconductor Market



* Projections
Source: Semiconductor Industry Association

Semiconductor Sales ($ billions)

	Revenue ($ billions)					Share (%)		
Company	**1999**	**2000**	**2001**	**2002**	**2003**	**2001**	**2002**	**2003**
Intel	26.8	30.3	24.9	25.4	28.1	16.3	16.2	16.0
Samsung	7.1	10.6	6.3	8.6	10.3	4.1	5.5	5.9
Renesas Technology		n/a	n/a	n/a	7.5	n/a	n/a	4.3
Toshiba	7.6	10.9	6.8	6.5	7.4	4.4	4.2	4.2
Texas Instruments	7.1	9.2	6.1	6.2	7.4	4.0	4.0	4.2
STMicroelectrics	5.1	7.9	6.4	6.3	7.1	4.2	4.0	4.1
Infineon Technologies		n/a	n/a	5.3	7	n/a	3.4	4.0
NEC	9.2	10.6	5.4	5.7	6.4	3.5	3.6	3.7
Motorola	6.4	7.7	4.8	4.8	4.7	3.2	3.1	2.7
Philips Semiconductors		n/a	n/a	4.4	4.4	n/a	2.8	2.5
Hitachi	5.6	7.3	4.7	4.7	n/a	3.1	3.0	n/a
Worldwide Total	**169.1**	**227**	**153.2**	**156.6**	**175**			

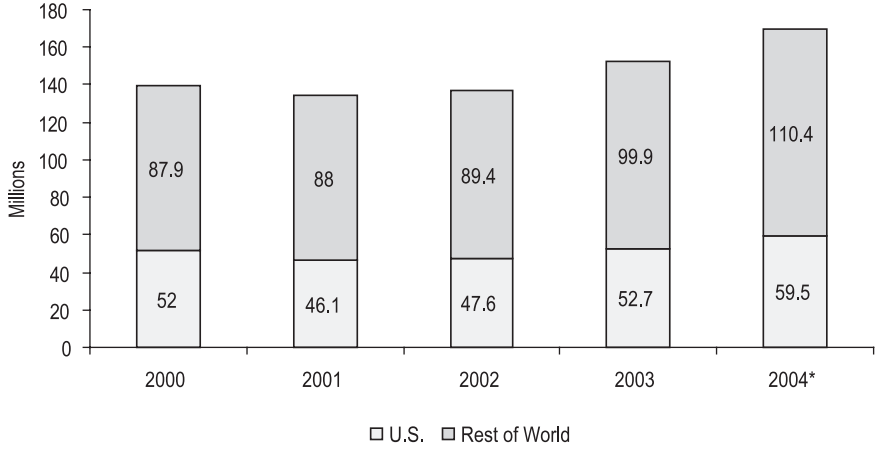
Source: Gartner Dataquest

Personal Computer Sales

In 2000, for the first time, a majority if American households owned at least one PC. But increased penetration was accompanied by slower growth. U.S. PC shipments declined by 11.4 percent between 2000 and 2001, the first drop in 15 years.[12] In 2003, U.S. PC shipments increased 11.2 percent, while worldwide PC shipments increased 11.4 percent.[13]

- In 2003, as in 2002, the commercial segment accounted for almost two-thirds of U.S. and worldwide shipments, with the home segment accounting for the remainder. In 2003, U.S. consumer shipments were 17.3 percent greater than in 2002, and commercial shipments posted a gain of 7.2 percent.[14]
- Worldwide PC shipments will grow an estimated 11.4 percent in 2004. U.S. computer shipments are estimated to grow 12.5 percent in 2004.[15]
- In December 2003, the Computer Industry Almanac projected that worldwide PC sales would grow from 149.3 million in 2003 to 225 million in 2008, a 50.7-percent increase. It also projects a 30.4-percent increase in U.S. PC sales, from 48.3 million in 2003 to 63 million in 2008.[16]
- Dell has expanded its share of U.S. PC shipments substantially over the last four years, from 19.3 percent in 1999 to an industry-leading 27.6 percent in 2003, according to Gartner. Hewlett-Packard/Compaq is second at 18.6 percent. HP/Compaq was the worldwide leader in 2002, with 14.2 percent compared to Dell's 13.2 percent. In 2003, however, Dell led with 15 percent compared to HP's 14.3 percent.[17]
- While Dell held the lead in U.S. and worldwide shipments for the year, in the fourth quarter of 2003 HP led with 7.5 million shipments worldwide to Dell's 7.2 million.[18]
- In 2003, worldwide server systems factory revenues grew 5 percent to $46.1 billion. On a revenue basis, IBM led with a 32 percent revenue share, followed by HP with 27.1 percent, and Sun Microsystems with 11.8 percent.[19]

Personal Computer Shipments



* Projections
Source: twice.com

Personal Computer Shipment by Vendor (millions)

Vendor	U.S.					Worldwide				
	1999	2000	2001	2002	2003	1999	2000	2001	2002	2003
Dell	7.3	9.4	10.8	13.0	15.9	11.5	14.5	17.0	20.1	25.3
Hewlett-Packard*	3.9	5.6	10	9.2	10.7	7.6	10.2	23.7	21.6	24.2
IBM	3.3	2.7	2.9	2.5	2.7	9.3	9.2	8.2	7.9	8.6
Gateway	4.0	4.3	3.2	2.7	2.0	4.7	5.1	n/a	n/a	n/a
Apple	n/a	n/a	1.7	1.7	1.7	n/a	n/a	n/a	n/a	n/a
Fujitsu/Fujitsu Siemens	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5.7	6.4
Toshiba	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.7	4.2	4.9
Compaq*	7.2	7.6	n/a	n/a	n/a	15.9	17.2	n/a	n/a	n/a
Others	23.0	25.4	16.4	22.2	24.6	70.2	82.9	71.5	92.8	99.4
Total	**44.8**	**49.3**	**44.5**	**51.4**	**57.7**	**117.6**	**134.7**	**128.9**	**152.3**	**168.9**

*Hewlett-Packard and Compaq are reported as Hewlett-Packard starting in 2001.

Source: Gartner

Personal Digital Assistants (PDAs)

While personal computers remain the most frequently used devices to access the Internet, a wide variety of web-enabled information appliances (IAs) provide enhanced Internet access for some and a cost-effective option for others. IAs cover a broad range of products, based on computer technology, but designed to perform a more limited range of functions than a PC. U.S. consumers currently purchase more PDAs than any other information appliance, but the rate of growth of PDA purchases is declining.

- PDA shipments in the U.S. fell by 2 percent in 2003, while worldwide shipments fell 5.3 percent in 2003, according to Gartner.[20]
- As seen at right, worldwide PDA shipments are projected to continue to decline slowly, falling from 11.5 million in 2003 to 11.3 million in 2005.[21]
- Palm, historically the industry leader, has seen its share of U.S. PDA shipments drop from 54.8 percent in 2002 to 43.4 percent in 2003, while its shipments decreased by 22.3 percent.[22]
- Similarly, the share of Palm OS-based PDAs fell from 49 percent to 40.7 percent during that period. Windows CE-based PDAs accounted for 40.2 percent of shipments in Q1 2004, up from only 11 percent in 2000.[23]
- Research in Motion (RIM) was the biggest gainer in terms of unit sales from Q1 2003 to Q1 2004, posting a 352-percent gain and improving to a 14.8-percent market share. RIM is the maker of Blackberry, which combines phone and PDA functions.[24]
- According to Gartner, the U.S. continues to account for just over half of all PDA purchases, and is the key segment for overall growth.[25]

U.S. PDA Shipments by Vendor

	2002		2003	
	Shipments	**Share**	**Shipments**	**Share**
PalmOne	3,265,000	54.8%	2,537,300	43.4%
HP	677,828	11.4%	887,500	15.2%
Sony	859,000	14.4%	866,500	14.8%
Research in Motion	75,000	1.3%	435,500	7.5%
Dell	196,000	3.3%	433,000	7.4%
Toshiba	236,989	4.0%	178,361	3.1%
Other	653,536	11.0%	504,530	8.6%
Total	**5,963,353**	**100.0%**	**5,842,691**	**100%**

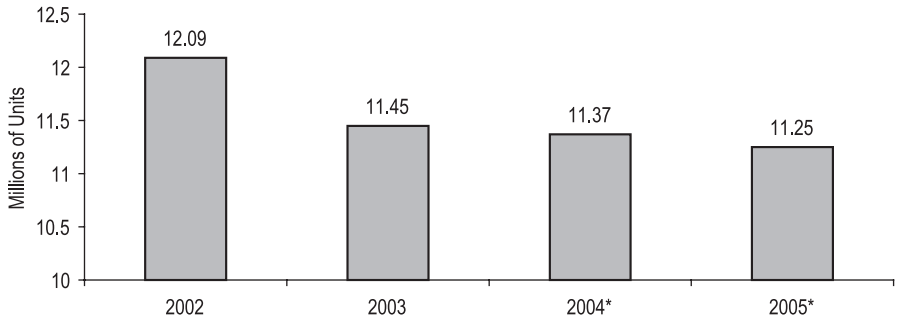
Source: Gartner

Worldwide PDA Sales by Operating System

	Q1 2003		Q1 2004	
	Shipments	**Share**	**Shipments**	**Share**
Palm OS	1,403,418	49.0%	1,113,089	40.7%
Windows CE	1,051,401	36.7%	1,099,931	40.2%
Research in Motion	89,500	3.1%	405,000	14.8%
Linux	52,967	1.8%	52,300	1.9%
Others	268,278	9.4%	64,490	2.4%
Total	**2,865,564**	**100.0%**	**2,734,810**	**100.0%**

Sources: Gartner, eMarketer

PDA Shipments Worldwide



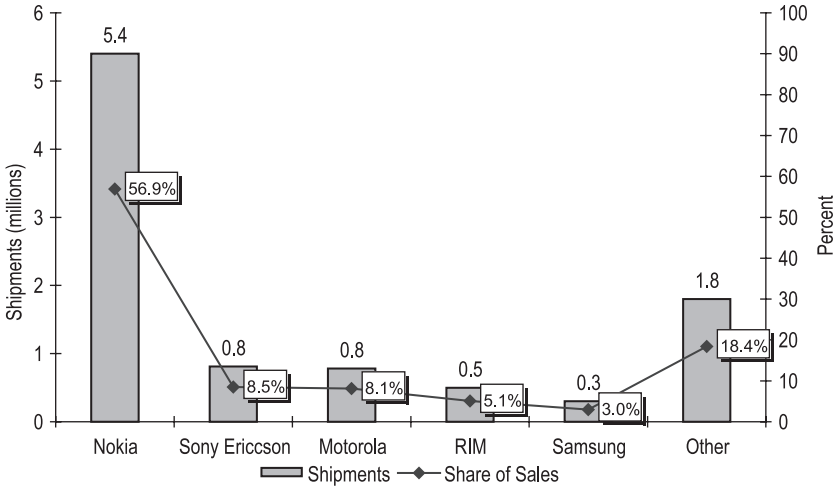
* Projections
Sources: Gartner, eMarketer

Smartphones

Web-enabled cell phones are by far the most popular IAs worldwide. Cell phones have added many PDA-like features and photographic capabilities, and are gaining ground in the U.S., as consumers move towards choosing to carry one device rather than a phone and a PDA. Gartner claims that in 2004, smartphones (voice-centric devices) will outsell PDAs for the first time. Other IAs are also gaining popularity. Set-top boxes can act as a gateway for a wide array of digital video products into the home, across a variety of platforms (Internet, cable, satellite, etc). Residential gateways can be used to integrate different access technologies and provide for home networking. Digital video recorders provide gateway and storage capabilities.

- In the fourth quarter of 2003, the worldwide converged mobile device market grew 182.3 percent year-over-year.[26]
- As seen at the right, the smartphone worldwide market is dominated by Nokia, which held 56.9 percent of smartphone sales in 2003. The next leading competitor was Sony Ericcson with 8.5 percent.[27] Total shipments of converged mobile devices were 9.6 million for 2003.[28]
- The European market for handheld mobile devices grew 62 percent between Q1 2003 and Q1 2004, according to The Register. While the PDA market grew by 33 percent, the smartphone market increased by 83 percent. Smartphones outsold PDAs nearly two-to-one in the first quarter of 2004.[29]
- Mobile phone handset sales worldwide are projected to see substantial growth in 2004, according to eMarketer. Smartphone sales are expected to reach 30 million, representing a year-over-year growth of 111 percent.[30]
- Canalys reports that the Europe, Middle East and Africa (EMEA) markets for smartphones (voice-centric devices) saw an increase of 82.6 percent from the first quarter of 2003 to the first quarter of 2004.[31]

2003 Worldwide Smartphone Sales by Vendor



Source: Windowsfordevices.com

Smartphone Shipments in EMEA by Operating System

	Q1 2004		Q1 2003	
	Shipments	**Share**	**Shipments**	**Share**
Symbian	1,475,720	91.2%	807,270	91.1%
Microsoft	125,400	7.8%	62,170	7.0%
PalmSource	16,750	1.0%	14,100	1.6%
Others			2,440	0.3%
Total	**1,617,870**	**100%**	**885,980**	**100.0%**

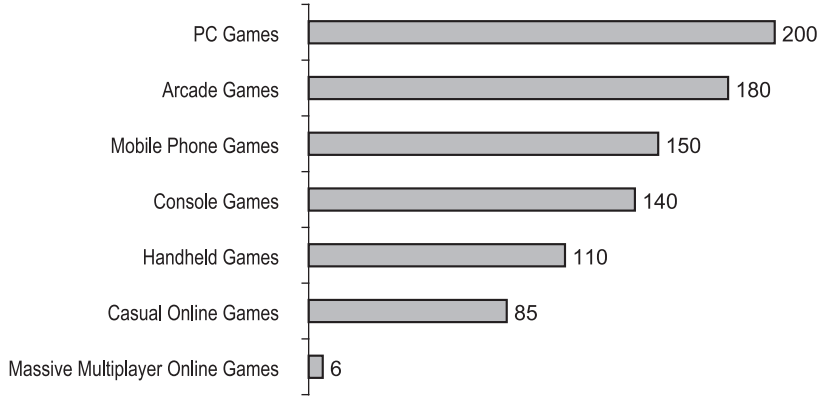
Source: Canalys

Consoles and PC Video Games

Game consoles are evolving into another family of appliances that provide opportunities for interactive entertainment online. Nintendo dominated the market from the mid-1980s until Sony's PlayStation system debuted in 1995 and took the leadership position. Microsoft entered the fray in November 2001 with the launch of the Xbox, while Sony's PlayStation 2 and Nintendo's Game Cube also hit the market, leading to intense competition and dramatic price cuts. Online gaming became increasingly popular in 2002, as console games became more Internet-enabled. Spring 2003 saw a new round of product introductions and price cuts, with increased emphasis on handheld units, online capability and multimedia functionality.

- The Entertainment Software Association (ESA) reports that computer and video game sales in the U.S. reached $7 billion in 2003. Video game sales increased to $5.8 billion from $5.5 billion in 2002, while computer game sales declined from $1.4 billion to $1.2 billion.[32]
- According to NPD, between the first quarter of 2003 and the first quarter of 2004, total U.S. retail sales for the console and portable game industry declined slightly, dropping from $1.9 billion to $1.8 billion. Console sales topped $336 million in Q1 2004 compared to $445 million during the same period last year, while portable game software sales reached $157 million, compared to the previous year's $167 million.[33]
- In 2004, 43 percent of gamers say they play games online, up from 37 percent last year and 31 percent in 2002.[34] NPD reports that the U.S. sales of online-capable console video games exceeded $1 billion in 2003.[35]
- In 2003, unit sales for video games were up 14 percent from 2002 levels, to 186.4 million, while computer game sales were down 14 percent, to 52.9 million units in 2003. Combined unit sales still increased by 7 percent from 2002 to 2003.[36]
- Thirty-four percent of gamers are under the age of 18, while 46 percent are between 18 and 35 years old.
- Electronic Arts, the leading video game maker, is now the fourth largest software company in the world, behind only Microsoft, Oracle and SAP.[37]
- Worldwide gaming revenues, including hardware, software, mobile and online reached $31.4 billion in 2003. Console software, at $16.5 billion, makes up the largest component of the market.[38]
- In 2002, PC games were the most commonly played type of video game worldwide, followed by arcade games and mobile phone games.[39]

Number of Game Players Worldwide by Game Type (millions, 2002)



Source: eMarketer

World Video Game Market (billions of euros)

	2001	2002	2003	2004*	2005*	2006*	2007*
Hardware Video Game	10.8	12	9.2	6.8	4.7	6.2	8.8
Console Software	15.4	15.2	16.2	14.5	12.6	12.1	14.3
PC Software	3.6	3.9	4.3	4.6	4.8	5.1	5.3
Total	**29.7**	**31.1**	**29.6**	**25.9**	**22.1**	**23.4**	**28.3**

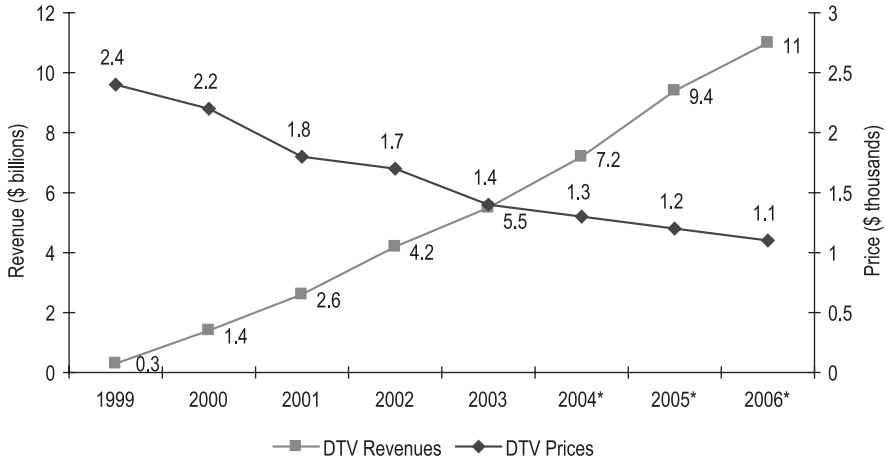
* Projections
Source: IDATE

Digital TV and DVD Players

While digital video is still in the early stages of adoption in the U.S. market, it is beginning to emerge as a significant component in the interactive household's arsenal of equipment. Certain elements have already become common fixtures. Digital video disc (DVD) players are projected to reach 65 percent of households by the end of 2004, only six years after their introduction.

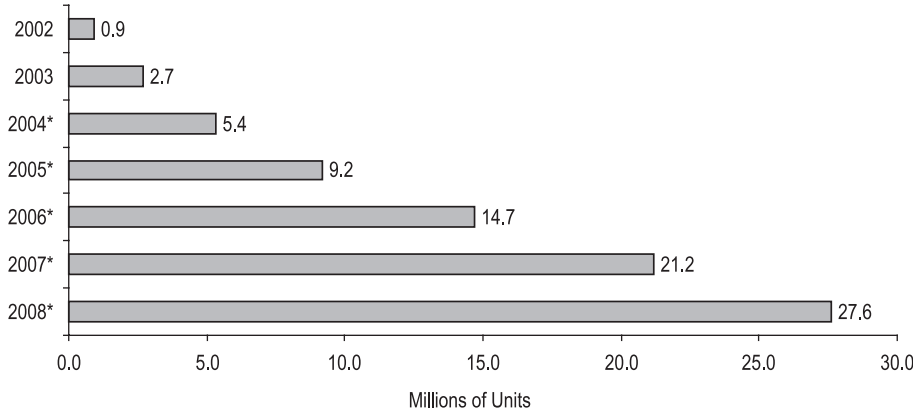
- The Digital Entertainment Group (DEG) estimates that nearly 34 million DVD players were sold to U.S. customers in 2003, approximately a 34-percent increase over last year. In total, more than 90 million DVD players have been sold in the U.S. since launch in 1997, bringing the number of DVD households to nearly 57 million.[40]
- The growth of DVD players' popularity is due in large part to the dramatic fall in the price of both DVD players and DVDs. The average selling price of a home DVD deck in 2003 was $122, 70-percent less than the average price of almost $400 in 1998. DVDs can now be bought for an average of $22 a disk, and many titles are available for as low as $9.99.[41]
- Digital television (DTV) sets are still relatively rare, due in no small part to a paucity of digital programming. In part, this reflects a "chicken and egg" problem, as FCC Chairman Michael Powell has observed, and concerns about the security of digital content. Nevertheless, as seen at the right, as DTV prices fall, revenue from sales is expected to rise.[42]
- According to the NABA, DTV signals are being transmitted in 202 markets that include over 99 percent of U.S. TV households. In addition, 78 percent of the more than 106 million U.S. TV households are in markets with five or more broadcasters airing DTV.[43]
- The Digital Video Recorder (DVR) market will grow at an average annual rate of 59 percent between 2002 and 2008, according to Strategy Analytics. By 2008, there will be a projected 71.5 million DVR users.[44]

DTV Revenue and Price



* Projections
Source: NABA

Worldwide DVR Sales



* Projections
Sources: Strategy Analytics, eMarketer

Chapter 3
The Communications Sector

The convergence of communications and computing – the widespread adoption of digital technology for all forms of information transfer and storage – is transforming the communications sector. Wireless, cable as well as traditional wireline telephone companies now all provide platforms for a variety of voice, video and data services. The latest manifestation of "convergence" is the advent of Voice over Internet Protocol (VoIP) technology, which permits voice service to be offered as simply another application to broadband users.

Hundreds of billions of dollars have been invested in upgrading the communications infrastructure to meet these new demands. Telecommunications investment rose during the late 1990s and peaked in 2000. From 2000 to 2002, following the collapse of the IT sector, telecom investment by local exchange carriers fell by about 30 percent. During this period, the market capitalization of the communications equipment and competitive local exchange carrier (CLEC) sectors contracted by over one trillion dollars. In 2002, WorldCom and four publicly traded CLECs filed for bankruptcy. The year 2003 saw the beginning of a recovery in the communications sector, as several communications providers, including Covad, McLeod and Teligent emerged from bankruptcy to improve their financial positions. In April 2004, WorldCom, now called MCI, came out of bankruptcy as well.

One of the most important features of the transformation of the telecommunications sector is the rapid pace of the rollout of high-speed broadband services to residential consumers. As of 2003, the FCC estimated that there were over 20 million residential and small business high-speed lines in service. As of April 2004, the Pew Internet and American Life Project estimated that 48 million adult Americans have broadband connections at home.

In addition, consumers are viewing mobility not only as a convenience, but as a necessity, demanding continuous contact with both voice and data communications networks. There has been an explosion in cell phone use and increasing demand for Web access and other advanced features with these devices. Satellite broadband providers are bringing high-speed Internet connections into areas where other technologies would be prohibitively expensive. Worldwide, wireless networks have also permitted regions with deficient wireline infrastructure to compensate in a cost-effective fashion.

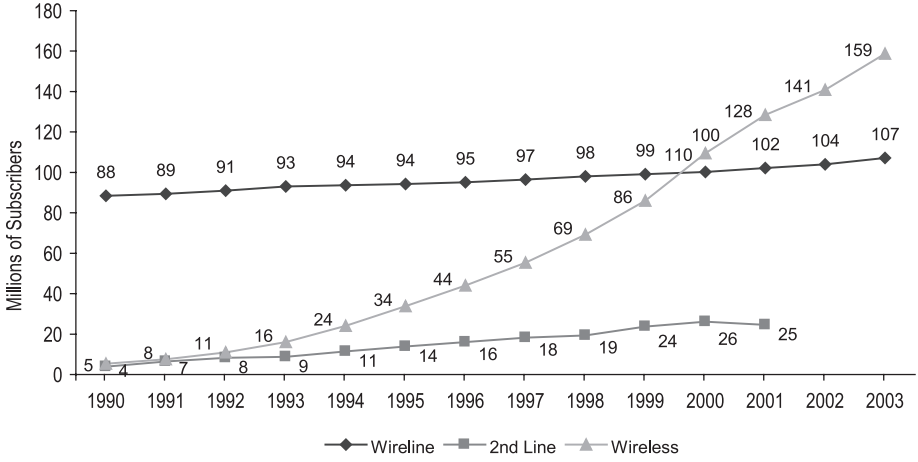
While the 1996 Telecommunications Act reduced regulation in some areas, the industry is still subject to a patchwork of sometimes-conflicting statutory and regulatory authorities. In March of 2004, the U.S. Court of Appeals for the D.C. Circuit struck down major parts of the rules the FCC adopted in 2003 concerning the mandatory unbundling obligations of incumbent local exchange carriers and, in June of 2004, the Solicitor General decided not to appeal the decision to the Supreme Court. The FCC is now in the process of developing new rules to implement the Appeals Court decision.

U.S. Telephone Subscribership

The U.S. communications industry has undergone dramatic changes in the past few years, with the emergence of mobile wireless telephone networks, broadband Internet access, Voice over Internet Protocol (VoIP) and the beginning of a fixed wireless network in some areas. While wireline telephone service continues to provide the primary voice and data communications links for most American households, wireless now accounts for 45 percent of all end user lines.[1] As alternatives to wireline communications have become more prominent, the total number of access lines provided by the wireline companies has declined.

- As of November 2003, U.S. local exchange companies were providing 107 million U.S. households with residential telephone service. Growth since 1985 has been only 1.64 percent per year.[2]
- The most recent data on wireline telephone penetration show an overall penetration rate of 94.7 percent in November 2003. This represents a 0.5 percent decrease from the penetration rate of 95.2 percent in July 2003.[3] The penetration rate was at 80.1 percent for households with an annual income under $5,000.[4]
- Due to wireless telephone and broadband Internet services, the number of U.S. households with more than one phone line is declining. By the end of 2001, approximately 24.6 million American households had two or more telephone lines – down from 26.2 million in 2000.[5]
- As shown at right, starting in the latter part of 2000, cellular subscribers in the U.S. exceeded residential wireline telephone subscribers and the gap has continued to widen. The average annual growth rate for wireless subscribers from 1990 to 2003 was 30.5 percent.[6]
- Since its peak level of 188.3 million total lines in December 2000, the number of access lines provided by the incumbent local exchange carriers (ILECs) has been steadily decreasing. As of December 2003, there were only 173.1 million access lines, representing an 8.1-percent decrease.[7]
- The total number of end-user switched access lines (ILEC and CLEC) has been decreasing since December 2000, falling 6 percent from 192.6 million to 181.4 lines in December 2003.[8]

U.S. Telephone Subscribers



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Residential Wireline* (millions of households)	88.4	89.4	91.0	93.0	93.7	94.2	95.1	96.5	98.0	99.1	100.2	102.2	104.0	107.1
2nd Lines ** (millions of residential lines)	3.9	6.5	8.3	8.8	11.4	13.9	16.0	18.3	19.3	23.7	26.2	24.6	n/a	n/a
Wireless*** (millions of subscribers)	5.3	7.6	11.0	16.0	24.1	33.8	44.0	55.3	69.2	86.0	109.5	128.4	140.8	158.7

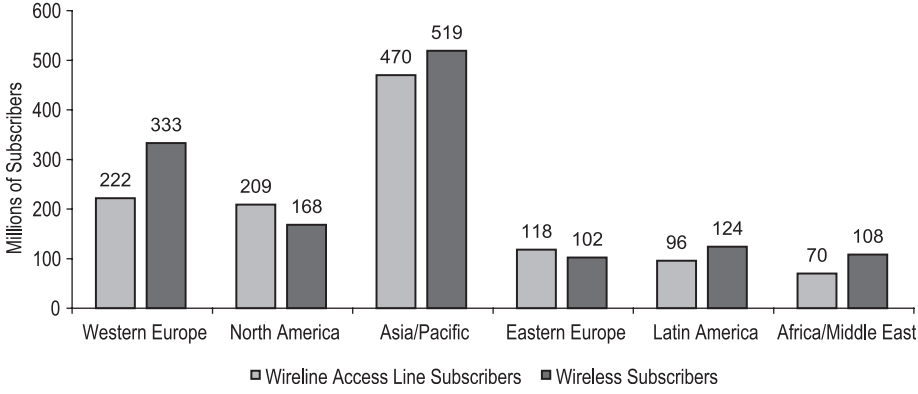
* Data reported as of November for the year indicated
**FCC staff estimates as of year indicated
***CTIA Semi-Annual Wireless Industry Survey (December of year indicated)
Sources: Federal Communications Commission and CTIA-The Wireless Association™

Wireless Communications Service

Although the requisite technology for a national wireless network was available since the early 1970s, it took another 10 years for the regulatory authorities to define the services that could be offered and decide how to allocate the necessary spectrum for private firms to provide these services. With the necessary framework in place, the U.S. has experienced a great boom in wireless telephone services during the past decade, and there were about 159 million cellular subscribers in the U.S. by the end of December 2003.[9] Americans still lag behind their Western European, Japanese and now Chinese counterparts in cellular phones as a percentage of cellular and fixed-wire phones.

- Between December 2001 and December 2003, U.S. wireless subscribership grew by 44.9 percent (see previous page). Growth from December 2002 to December 2003 was 12.7 percent, an increase over the 9.7 percent growth from the same period a year earlier.[10]
- In 2003, the world's mobile user base grew by over 17 percent to reach a total of 1.35 billion subscribers. At the end of September 2003, the Asia Pacific region had a mobile penetration rate of roughly 18 percent and Latin America had a penetration rate of 21.4 percent, leaving much room for growth in the mobile market.[11]
- According to CTIA- The Wireless Association™ (CTIA) data, wireless subscribers in the U.S. used more than 800 billion wireless minutes during 2003, an increase of one-third over the 600 billion minutes used in 2002.[12]
- In addition to simple voice services, cell phone companies increasingly are providing other services, such as text messaging, wireless gaming and wireless Internet. According to mobile marketing solutions provider Endpocket, more than one-third of U.S. mobile phone owners use text messaging. Age is an important factor in the use of text messages, which is used by 57 percent of mobile phone users aged 18 to 25.[13]

Wireline vs. Wireless Subscribers (2003)



Worldwide Wireline and Wireless Telephone Subscribership

	2002		2003		2007*		2003	2007*
	Wireline	Wireless	Wireline	Wireless	Wireline	Wireless	Wireless as a percent of all phones	
Western Europe	220	311	222	333	226	362	60%	62%
Germany	34	37	34	40	34	50	54%	60%
France	53	59	53	64	55	69	55%	56%
Italy	28	54	28	58	28	62	68%	69%
Spain	18	34	18	37	18	42	67%	70%
UK	35	51	35	55	35	58	61%	62%
North America	210	151	209	168	206	210	45%	51%
United States	193	139	189	155	186	195	45%	51%
Latin America	91	101	96	124	108	174	56%	62%
Asia/Pacific	427	434	470	519	640	741	52%	54%
Japan	76	74	77	260	78	92	51%	54%
China	214	208	240	80	300	387	52%	56%
Eastern Europe	110	74	118	102	144	130	46%	47%
Africa/Middle East	64	84	96	108	88	180	61%	67%
Worldwide Total	**1123**	**1155**	**1185**	**1353**	**1411**	**1797**	**53%**	**56%**

* Projections
Source: IDATE

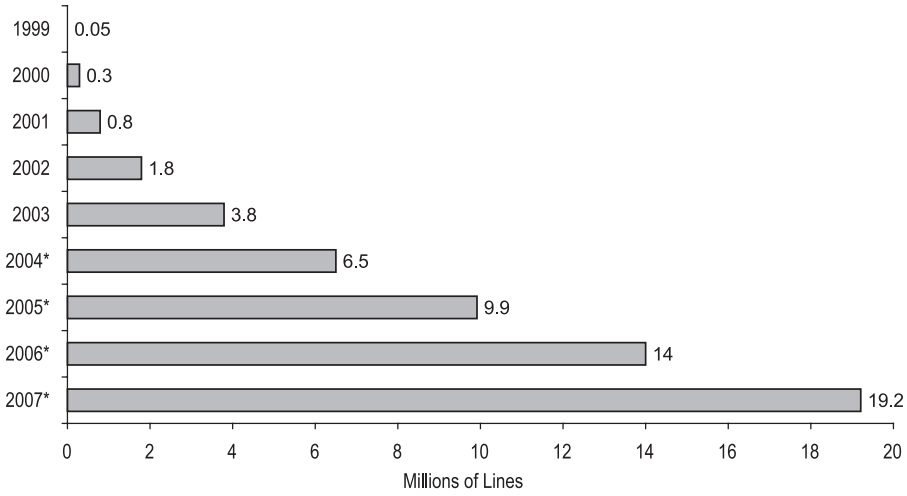
Voice over Internet Protocol

Voice over Internet Protocol (VoIP) allows consumers to make telephone calls using a broadband Internet connection rather than an analog phone line. VoIP technology permits voice to be offered as an application that can ride over the same data stream that is used for broadband, making it possible for current broadband providers to offer VoIP services using the infrastructure already in place. VoIP can also be offered as a software application, allowing independent providers, such as Vonage, to offer VoIP over the public Internet.

The popularity of VoIP is a relatively recent development. With the success of independent start-ups like Vonage, however, several leading telephone and cable companies have announced plans to roll out VoIP services in 2004.

- In the short time VoIP has been widely available, it has attracted considerable attention, with 27 percent of online Americans having heard of the service, and 13 percent of those considering subscribing.[14]
- Vonage, the early leader in U.S. VoIP, had more than 100,000 lines in service as of March 2004 and is adding about 15,000 new lines each month.[15]
- According to Gartner, at the end of 2003, there were 150,000 U.S. VoIP subscribers. Gartner also predicts that this number will grow to one million by the end of 2004 and reach six million by the end of 2005.[16]
- Businesses spent an estimated $2 billion on IP capable telephone systems in North America in 2003, according to Gartner Dataquest, which also predicts that enterprise spending on IP phone systems will more than double over the next four years, reaching $4.2 billion in 2007.[17]
- In 2003, IP telephony equipment represented 56 percent of all sales, up from 1.4 percent of sales in 1999. By 2007, IP telephony equipment is projected to account for 97 percent of all business telephony sales, according to Gartner.[18]
- According to TIA, VoIP will grow steadily over the next four years, increasing from 6.5 million lines in 2004 to 19.2 million lines in 2007.[19]
- According to TeleGeography, VoIP users in the U.S. generated 24.5 billion minutes of traffic in 2003 – 12.8 percent of the time spent with VoIP technology worldwide.[20]
- According to Juniper Research, broadband service providers' revenues from VoIP services will grow by 355 percent from 2004 to 2009.[21]

Residential Broadband Subscribers



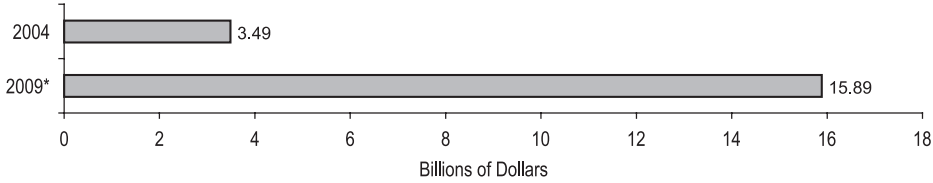
* Projections
Sources: eMarketer, TIA

VoIP Traffic Among U.S. Internet Users (in millions of minutes)

	1998	1999	2000	2001	2002	2003*
VoIP	150	1,655	5,954	10,147	18,045	24,519
PSTN traffic	93,000	108,000	132,027	146,095	155,165	166,615
Total traffic	93,150	109,655	137,981	156,242	173,210	191,134
VoIP Share of International traffic	0.2%	1.5%	4.3%	6.5%	10.4%	12.8%

* Estimate
Sources: TeleGeography, Inc., PriMetrica, Inc.

Broadband Service Providers' Revenues from VoIP Services Worldwide



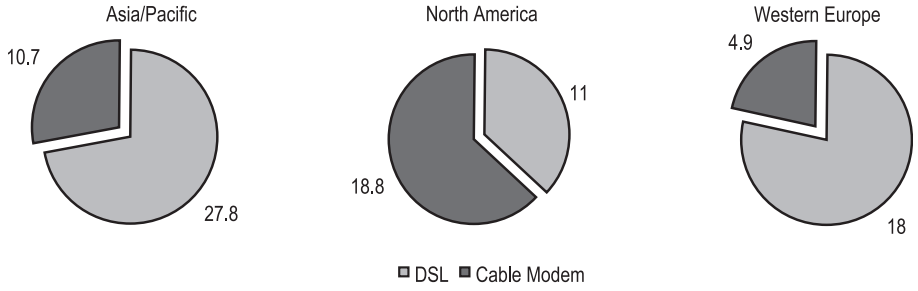
* Projection
Sources: Juniper Research, eMarketer

Broadband Subscribership

Broadband connections to the Internet provide far greater access speeds than traditional dial-up connections, enabling the user to take greater advantage of current web site content offerings. While, as yet, there is no "killer app" to make broadband compelling to all consumers, new applications and services, such as VoIP, may soon make broadband compelling to all. Even without a definitive "killer app," there has been substantial growth in the availability and adoption of broadband.

- The FCC estimates that there were 28.2 million high-speed lines at the end of 2003.[22] Of these, 26 million were residential and small business lines.[23]
- According to the Pew Internet and American Life Project, as of February 2004, 24 percent of all adult Americans had broadband access at home, while 34 percent had broadband access either at home or on the job.[24]
- Jupiter Research predicts that the broadband market will more than double in the next four years. The number of U.S. households with broadband access will increase from 21.5 million at the end of 2003 to over 46 million in 2008. This number will represent half of online households and 40 percent of all U.S. households.[25]
- eMarketer projects that the number of dial-up households in the U.S. will decline by 9.7 percent between 2003 and 2007, while total broadband households will grow by 21.8 percent.[26]
- Dial-up subscribership fell slightly for the first time in 2003, dropping 0.2 percent to 47.7 million from a peak of 47.8 million in 2002. As migration to high-speed access continues, the dial-up market will continue to decline, dropping to an estimated 39.5 million by 2007, according to the Telecommunications Industry Association.[27]
- Although cable has an estimated 64 percent of the market, DSL is now growing at a faster rate. DSL is projected to grow 37 percent in the U.S. between 2003 and 2007, while cable growth is only projected at 25 percent.[28]
- DSL is the dominant high-speed solution in Europe and Asia/Pacific, with each area having almost three times as many DSL users as cable. The U.S., on the other hand, has almost twice as many cable users as DSL users.[29]

Broadband Internet Connections: DSL vs. Cable Modem (end of 2003, in millions)



Worldwide Broadband Subscribers (millions)

	2002		2003		2007*		Annual Growth 2003-2007*	
	DSL	Cable	DSL	Cable	DSL	Cable	DSL	Cable
Western Europe								
France	1.41	0.28	3.23	0.38	9.47	1.42	34%	38%
Germany	3.00	0.05	4.80	0.07	16.12	0.86	34%	88%
Italy	0.75	n/a	1.80	n/a	8.04	n/a	48%	0%
Netherlands	0.43	0.76	0.82	0.94	2.01	1.87	26%	17%
Spain	0.96	0.35	1.68	0.50	4.56	1.31	28%	27%
Sweden	0.43	0.18	0.61	0.21	1.74	0.61	30%	30%
UK	0.53	0.77	1.63	1.34	8.37	4.07	51%	32%
North America								
USA	6.26	11.25	9.04	16.27	31.81	39.76	37%	25%
Asia Pacific								
Japan	5.65	1.95	11.79	2.36	32.48	4.87	29%	20%
S. Korea	6.39	3.72	7.62	4.19	10.29	5.25	8%	6%

* Projections
Source: IDATE

Competition Among Broadband Providers

According to the FCC, cable and DSL lines accounted for 92 percent of all high-speed lines in the U.S. Cable and DSL lines make up 97.5 percent of residential and small business high-speed lines.[30] Alternative technologies such as fiber, wireless and satellite are available, but accounted for only 3.4 percent of the broadband market as of December 2003.[31]

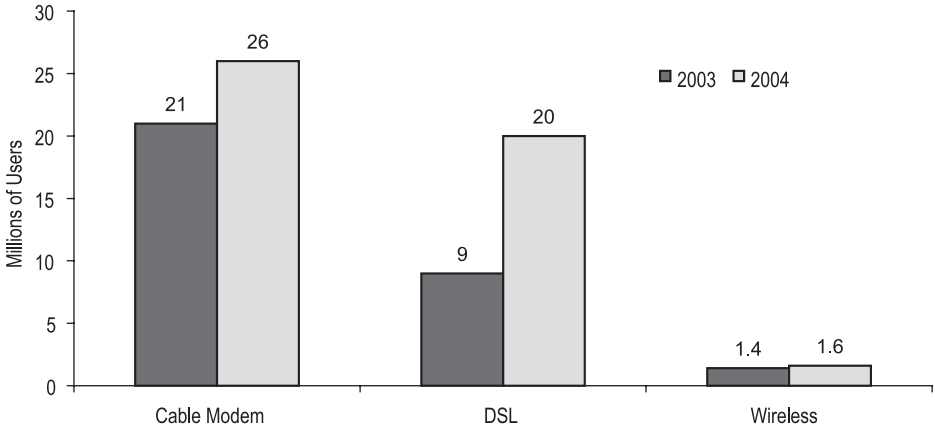
- Cable companies have maintained their dominance over DSL providers in the U.S. broadband market. At the end of the first quarter of 2004, cable accounted for 61.9 percent of U.S. broadband subscriptions.[32]
- Comcast, the industry leader for 2002, improved on its position in 2003 by adding 1.66 million customers. For the first quarter of 2004, Comcast added another 390,000 subscribers, taking its share to 34 percent. Time Warner retained the second position with 20.4 percent, followed by Cox with only 12.6 percent.[33]
- As shown at right, among the ILECs, SBC still leads with 38.6 percent of the DSL subscribers. Verizon remains in second place with a 26-percent market share. Each has a sizeable advantage over number three competitor Bell South, which holds a 15.8-percent share of DSL subscribers.[34]
- While both cable and DSL are growing in popularity, DSL is growing at a faster rate. The number of DSL users is expected to grow by 122 percent from 2003 to 2004, compared to only 24-percent growth for cable over the same period.[35]
- While cable modem and DSL services dominate the broadband industry, many rural areas still do not have broadband service. A new solution being tested in several areas is to provide broadband over power lines (BPL). BPL solutions provides services at 1 Mbps through any power outlet. As of April, Allentown, PA, Cincinnati, OH, and Manassas, VA were offering BPL commercially to consumers and businesses.[36]
- The largest BPL provider is Cinergy in the Cincinnati area, with services being made available to about 55,000 homes in 2004. Cinergy offers several levels of service starting at 1Mbps for $29.95 a month.[37]

Major U.S. Broadband Providers by Subscribership Q1 2004

DSL Provider	Subscribership (millions)	Share	Cable Provider	Subscribership (millions)	Share
SBC	3.96	38.6%	Comcast	5.68	34.0%
Verizon	2.66	26.0%	Time Warner	3.42	20.4%
Bell South	1.62	15.8%	Cox	2.15	12.6%
Qwest	0.74	9.7%	Charter	1.65	10.2%
Covad	0.55	5.4%	Cablevision	1.13	6.6%
Sprint	0.35	3.4%	Adelphia	1.07	6.4%
Total	**10.26**	**100%**	**Total**	**16.67**	**100%**

Source: Leichtman Research Group

U.S. Home Broadband Market



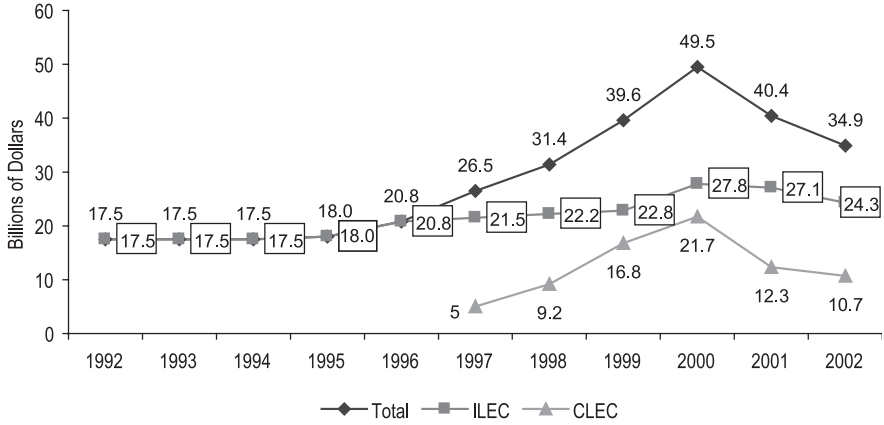
Source: Pew Internet & American Life Foundation

Communications Infrastructure

The late 1990s witnessed an unprecedented build-out of "backbone" – the voice and data fiber-optic networks capable of transmitting data as fast as 10 gigabytes per second (nearly 20 times the top transmission rate of twisted copper wire). Presently, a large portion of fiber-optic capacity remains unused, though fiber is becoming a more commonly used voice and data solution. Fiber is emerging as an alternative to cable and DSL in rural and underserved areas, reaching an estimated 1.4 million households by 2007, according to Telecommunications Industry Association (TIA) estimates.

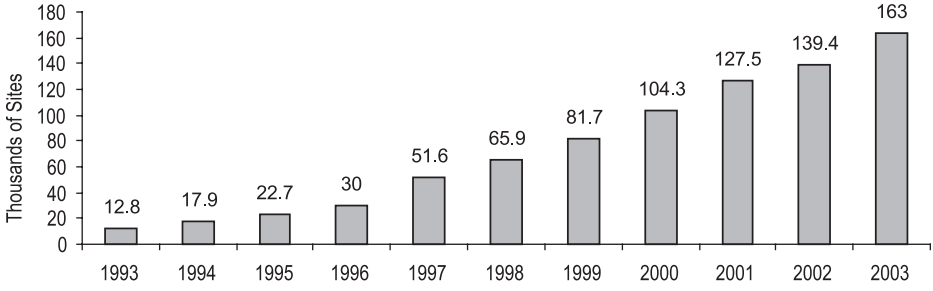
- Telecommunications investment by ILECs and CLECs, while much higher than after the Telecom Act of 1996, has trailed off considerably since 2000.[38]
- Between 1999 and 2003, high-speed lines grew from 2.8 million lines to 28.2 million lines, an increase of over 900 percent.[39] The greatest increases were seen in cable and ADSL, which grew by 15 million and 9.1 million lines, respectively. Fiber lines doubled in number, from 300,000 to 600,000.[40]
- U.S. carrier spending on fiber-optic equipment is projected to reach $24.3 billion in 2004, up from $17.1 billion last year, according to the TIA.[41] Growth for fiber deployment rates will slow from a phenomenal 68.7 percent last year to a meager 5.8 percent in 2004.[42]
- Fiber lines with speeds of over 200 kbps in at least one direction increased 10 percent between December 2002 and December 2003, from 548,000 to 602,000 lines.[43]
- As seen at right, fiber is becoming a more common solution for communications infrastructure. Among all large ILECs, fiber is now being installed at a higher rate than copper, with fiber-to-copper ratios greater than one since 2000.[44]
- There has been a rapid expansion in wireless infrastructure as well. According to CTIA, the number of cell sites in the U.S. increased by 440 percent from 1996 through 2003, and by over 1,100 percent since 1993. This includes a 16.5-percent increase from 2002 to 2003.[45]

Telecommunications Investment



Sources: FCC, looksmart.com

Cellular Antenna and Equipment Sites in Commercial Use



Source: CTIA

Ratio of Fiber Strands to Copper Pairs

	1996	1997	1998	1999	2000	2001	2002	2003
BellSouth	0.53	0.59	0.68	0.77	0.71	0.77	1.16	0.63
Qwest	0.5	0.6	0.81	0.94	1.11	1.38	1.42	1.39
SBC	0.43	0.52	0.57	0.56	0.73	0.98	1.12	0.56
Verizon	1.02	1.08	1.26	1.31	1.53	1.68	1.79	1.89
All Large ILECs	0.69	0.77	0.89	0.92	1.06	1.25	1.41	1.11

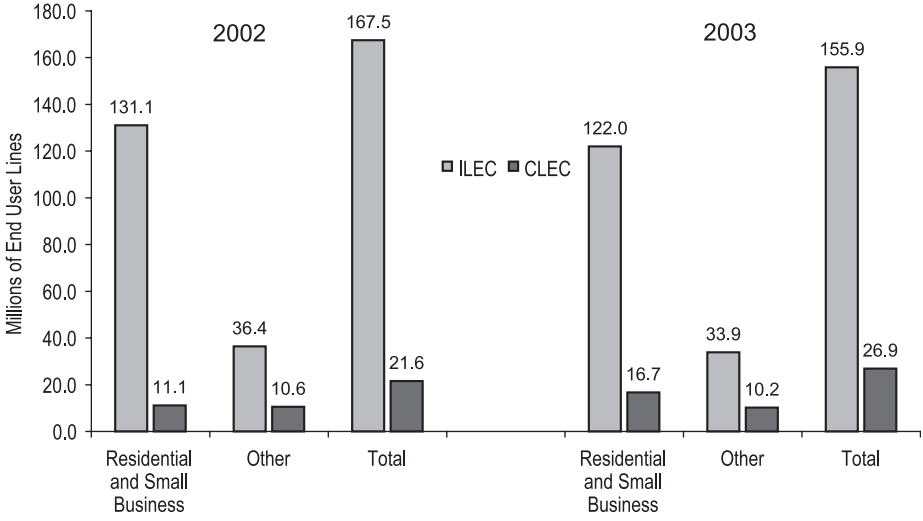
Source: FCC ARMIS Report

Competition in Local Phone Markets

The Telecommunications Act of 1996 opened local telephone markets to competition, requiring incumbent local exchange carriers (ILECs) to share their network facilities with new entrants (competitive local exchange carriers, or CLECs). The CLECs initially grew rapidly. Between 1995 and 2000, the number of CLECs increased from 57 to 485, and CLEC revenues increased 16–fold, from $637 million to nearly $11 billion. The CLECs' share of the local market doubled between June 2000 and June 2002 to 11.4 percent, and increased to 14.7 percent in June of 2003. Although CLECs have suffered enormous financial problems, their market share, access lines and revenues have gradually increased. At the same time, both ILECs and CLECs face increasing competition from cable telephony, wireless carriers, and new entrants, such as VoIP.

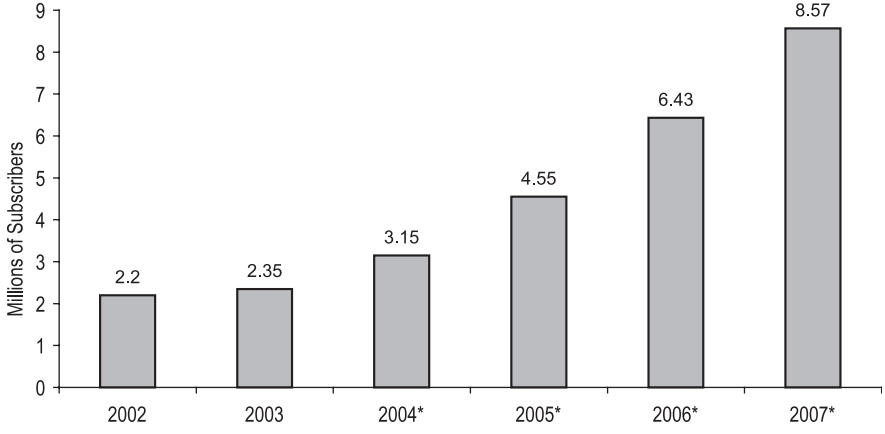
- According to FCC data, during the second half of 2003, cable-telephony lines increased by 6 percent to 3.2 million lines. The 3.2 million reported cable-telephony lines constituted about 11 percent of switched access lines provided by CLECs and about 2 percent of total switched access lines.[46]
- Between December 2002 and December 2003, the number of end-user lines provided by ILECs decreased by almost 11 million.[47]
- CLEC end-user lines increased by almost 5 million over the same period, with most of the growth coming in home and small business end-user lines.[48]
- Residential cable telephony is poised for rapid growth in the next few years, with growth of over 260 percent projected between 2003 and 2007, according to Morgan Stanley.[49]

End-User Lines



Figures as of December of year indicated
Source: FCC

Residential Cable Telephony Suscribers



* Projections
Sources: Morgan Stanley, PFF

Chapter 4
Financing the Digital Economy

The rapid development of the digital economy during the last half of the 1990s was made possible by matching investment capital with revolutionary new ideas. The IT sector, in particular, benefited from the support of private venture capital firms, which provided about $5 billion to start-ups in 1995 and almost $115 billion five years later. By the end of 1999, these investments were concentrated in Internet startups, stimulated by the spectacular profits reaped from initial public offerings (IPOs) of Internet-related companies. At their peak in early 2000, America Online, Cisco, Oracle, Dell and Microsoft provided returns of 100,000 percent or more to IPO purchasers.

Starting in early 2000, financial difficulties became the norm. The dot-com bubble began to burst in the second quarter of 2000 and, by the end of the year, the downturn had spread broadly throughout the IT and telecommunications sectors.

Funding for new IT ventures fell between the second quarter of 2000 and the fourth quarter of 2002, before starting to recover in 2003. In addition, IT sector revenues have shown moderate year-over-year increases since the fourth quarter of 2002. IPOs are also on the rebound, and the number of NASDAQ IPOs has increased dramatically since the start of 2004.

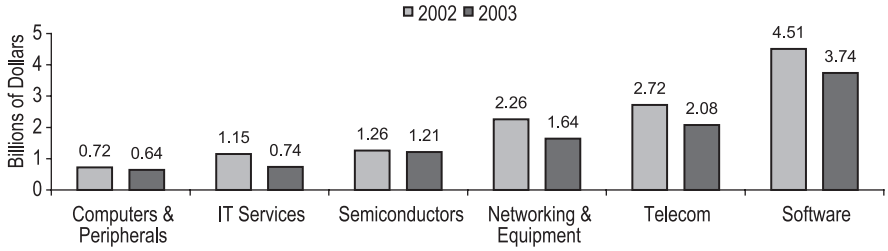
Between the first quarter of 2000 and the fourth quarter of 2002, leading telecommunications and computer stock indices fell precipitously. Since the first quarter of 2003, however, the indices have been slowly rising. While still well below the high points of the boom period of 1999-2000, the leading telecommunications and computer indices have leveled off and started to post gains. Both the NASDAQ telecom and computer indices have grown over 40 percent from Q1 2003 to Q1 2004.

Funding for New Ideas

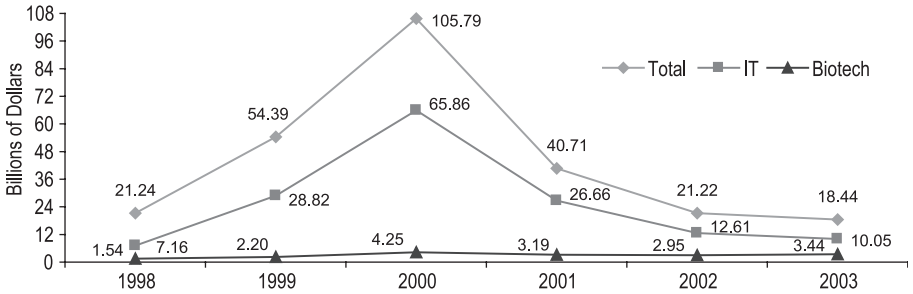
Venture capitalists have historically provided the seed money for companies with new ideas. For successful startups, Initial Public Offerings (IPOs) have provided additional capital to finance expansion and growth, as well as large payoffs to early investors. In the last half of the 1990s, the IT sector accounted for an unusually large portion of both venture capital financing and IPOs. Activity in both areas declined dramatically starting in 2000. Venture capital investment leveled off in 2003 and started to move up towards the end of the year.

- The National Venture Capital Association (NVCA) reports venture capital investment for the fourth quarter of 2003 totaled $4.9 billion, up from $4.4 billion in the third quarter. This was the highest level since the second quarter of 2002, when the total reached $6 billion.[1]
- As the data opposite show, since 1999 IT has accounted for more than half of venture capital funding. Biotech – the other "hi-tech" sector – accounts for a substantially smaller amount.
- The MoneyTree Survey reports that between 2001 and 2002, there was a 47-percent decline in the amount of cash for equity investments by venture capital firms. The decline from 2002 to 2003 was much smaller at only 13.1 percent.[2] Also, in 2003, 54 percent of all venture capital financing went to six IT sector industries – software (20 percent), telecom (11 percent), networking & equipment (9 percent), semiconductors (6.5 percent), IT services (4 percent) and computers and peripherals (3.5 percent).[3]
- In the first quarter of 2004, software reclaimed the title of the single largest venture-capital-funded industry category from biotechnology, garnering $956 million compared to biotech's $943 million, according to the NVCA.[4]
- According to IPO Monitor, 2003 saw 103 new offerings, which raised a total of $30.9 billion.[5] This included 18 IPOs in the technology sector and 15 in the computer and communication sectors (a subset of technology).[6]
- Internet search engine Google has announced that it will go public in 2004 for an estimated $2.5 billion. Google will offer its shares through an OpenIPO, or Dutch auction, where the offering price is the price that clears the market.[7]
- Examples of successful OpenIPO offerings are Genitope, which last year priced 3.7 million shares at $9 through W.R. Hambrecht, Overstock.com, and Peet's Coffee and Tea.[8]

Venture Capital Investments By Industry

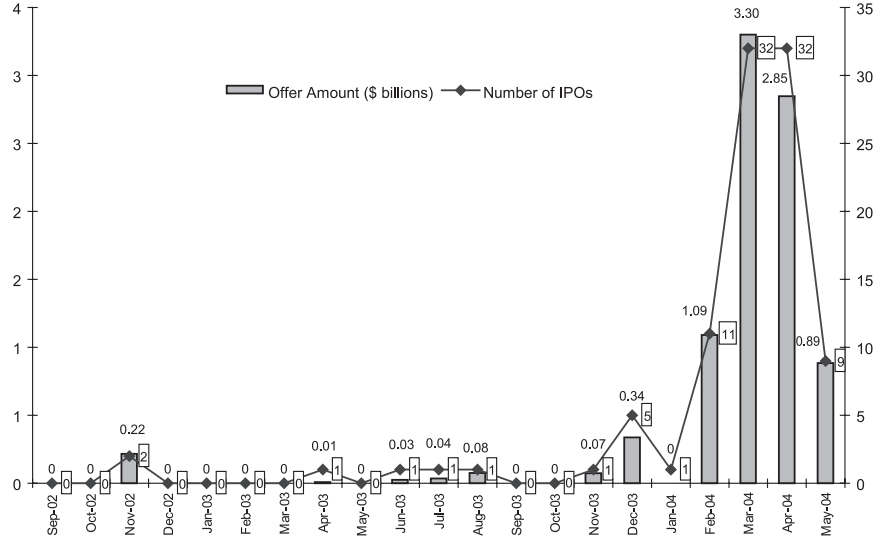


Venture Capital Investments, 1998-2003



Source: MoneyTree Survey

NASDAQ IPOs



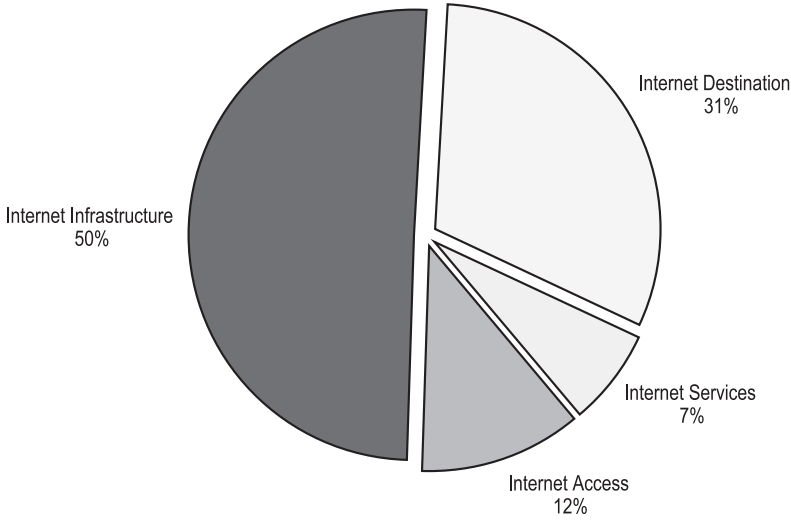
Source: NASDAQ/EDGAR Online Pro

Mergers and Acquisitions

The high stock prices associated with the IT boom allowed acquiring companies to trade their own stock for those of the acquired firms. As a result, web-related mergers and acquisitions (M&As) mushroomed during the late 1990s. Since the dot-com bubble burst in 2000, an enormous consolidation has taken place. In 2001 and the first two quarters of 2002, almost 2000 web mergers and acquisitions took place, with an average of 323 per quarter.[9] Since the middle of 2002, the volume of consolidations has slowed dramatically, averaging112 M&As per quarter over the last six quarters.

- The number of Internet-related deals decreased 59 percent in 2003, down from 1,087 in 2002. Spending on Internet properties fell 60 percent, a drop of $14.2 billion from the 2002 total.[10] The number of deals for the second quarter of 2004 (93) was the lowest total on record (from Q3 1999 on). The value of these deals, however, was greater than that of the 134 Internet deals of the previous quarter, $3.5 billion compared to $2.8 billion.[11]
- According to NVCA, in the first quarter of 2004, 77 venture-backed companies were merged or acquired for a total value of $4 billion, up considerably from the 71 mergers valued at $2.3 billion during Q4 2003. The last time venture capital-backed M&A values surpassed $4 billion was the first quarter of 2001.[12]
- Software companies were the largest targets in Q1 2004, with 23 deals and a total value of $1.35 billion. The largest deal of the quarter was a software deal, EMC Corporation's acquisition of VMWare for $625 million.[13]
- Computers and peripherals was the largest sector in terms of average deal size in the first quarter of 2004. The four deals completed had an average value of $131.1 million.[14]
- In 2002, infrastructure, with 72 percent, accounted for the lion's share of mergers and acquisitions. Infrastructure only accounted for 50 percent – still the largest category – in 2003. Destinations gained 13 percentage points, and access 9 points, from 2002 to 2003.[15]

Internet Sector Mergers & Acquisitions (2003)



Web Mergers and Acquisitions

	2000 Total	2001 Total	2002 Q1	2002 Q2	2002 Q3	2002 Q4	2003 Q1	2003 Q2	2003 Q3	2003 Q4	2004 Q1	2004 Q1
Number of Deals	910	1289	334	312	229	212	107	113	113	110	134	93
Deal Volume ($B)	88.2	39.7	4.7	7.6	5.5	5.6	0.7	1.8	3.9	2.8	2.8	3.5
Average Deal Size ($M)	96.9	30.8	14.1	24.4	24.0	26.4	6.5	15.9	34.5	25.5	20.9	37.6

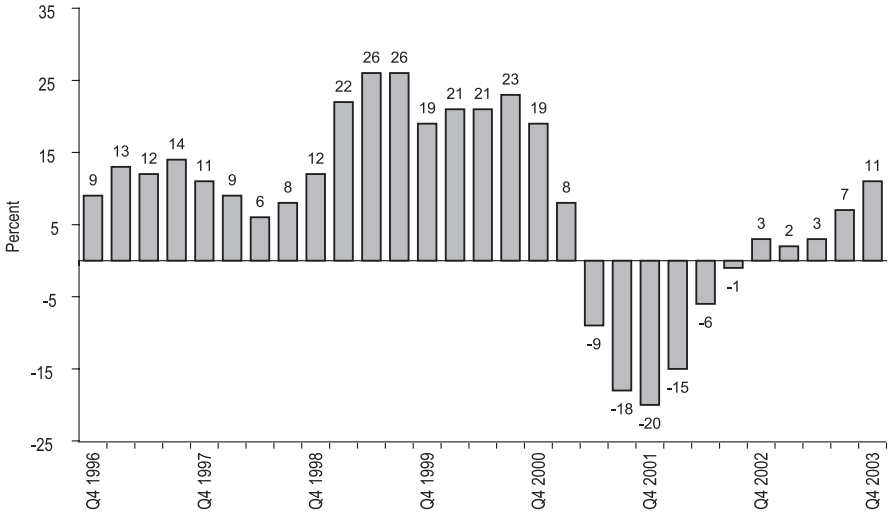
Source: The 451 Group/Webmergers

IT-Sector Revenue Trends

While virtually all sectors experienced substantial losses in both revenue and market capitalization since the collapse in the second half of 2000, it remains true that the IT revolution created enormous wealth, as reflected by the astronomical growth that many IT companies achieved. After a period of negative year-over-year revenue change starting in the second quarter of 2001, IT revenue year-over-year percentage change turned positive in the last quarter of 2002 and has remained positive since then.

- Morgan Stanley's analysis of technology companies shows six consecutive quarters of negative year-over-year revenue change, from the second quarter of 2001 through the third quarter of 2002.[16]
- This measure turned positive in the last quarter of 2002, and Morgan Stanley reported an average increase in revenues of 3 percent.[17]
- Each quarter of 2003 saw an increase in revenues, with the greatest being an 11-percent increase in the fourth quarter of 2003.[18]
- Industry sectors with the highest year-over-year growth rates were Semiconductors, Applications Software, EMS/Distributors/Connectors and Enterprise Systems and PC Hardware, which posted year-over-year growth rates of 25 percent, 12 percent, 12 percent and 10 percent, respectively, for Q4 2003.[19]
- Semiconductor growth can be attributed to the revenue growth of Advanced Micro Devices, Broadcom, Texas Instruments, Intel and STMicroelectronics. These companies experienced year-over-year (Q4 2002 to Q42003) growth rates of 76 percent, 62 percent, 29 percent, 22 percent and 18 percent, respectively.[20]
- All IT sector industry groups experienced increases in year-over-year revenue growth rates from the fourth quarter of 2002 to the fourth quarter of 2003.[21]

IT Revenue
(year-over-year percentage change)



Source: Morgan Stanley

IT Revenue by Industry Group
(year-over-year percentage change)

	2002				2003			
Industry Group	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Semiconductors	-25	-8	7	9	7	6	14	25
Internet & PC Applications Software	8	14	17	13	9	11	9	12
EMS/Distributors/ Connectors	-23	-7	7	6	-3	1	3	12
Enterprise Systems and PC Hardware	-10	-5	3	6	6	6	7	10
Software	-14	-12	-5	-5	-2	1	3	10
Computer Services & IT Consulting	3	5	2	1	4	7	9	10
Wirelin/Wireless Networking Equipment	-33	-20	-26	-11	-12	-12	4	5
Total	**-15**	**-6**	**-1**	**3**	**2**	**3**	**7**	**11**

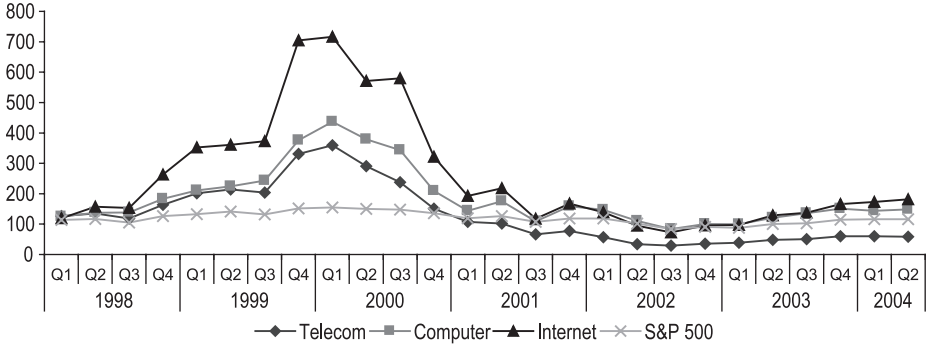
Source: Morgan Stanley

IT-Sector Stock Indices

IT-sector company valuations have been on a roller coaster ride that brought spectacular returns to early investors in the latter half of the 1990s, but eviscerated the holdings of many newcomers after 2000. Various IT-sector stock indices suggest that investors who invested in the computer and/or the Internet sector at the end of 1997 and held on through the first quarter of 2004 are slightly ahead of the market as a whole, while those whose portfolios were concentrated in the telecommunications sector have experienced much lower than average returns.

- From the first quarter of 1997 through the first quarter of 2000, the NASDAQ computer and telecommunications indices rose 454 percent and 446 percent, respectively.[22] The increase in the Inter@ctiveWeek Internet index was nearly twice as great – 850 percent.[23] During the same period, the broader market, as reflected in the S&P 500, rose 98 percent.[24]
- The collapse of the IT sector in the second quarter of 2000 wiped out most of these gains, as the NASDAQ telecom and the Inter@ctiveWeek Internet indices both fell by over 80 percent between then and the second quarter of 2003,[25] while the NASDAQ computer index fell by over 70 percent[26] and the S&P fell by 35 percent.[27]
- From the second quarter of 2002 to the fourth quarter of 2003, all four of these indices have seen modest gains. The NASDAQ telecom index rose 22 percent,[28] the NASDAQ computer index 23 percent,[29] the S&P 15 percent,[30] and the Inter@ctive Internet index has risen 41 percent between June 2003 and June 2004.[31]
- From the end of 1997 through the first quarter of 2004, the NASDAQ telecom index is down 56.8 percent,[32] while the Inter@ctive Internet index is down 56.6 percent.[33] During the same period, the NASDAQ computer index is up 39.6 percent.[34]

IT-Sector Stock Indices*



		NASDAQ Telecom	NASDAQ Computer	Inter@ctive Week Internet	S&P 500
1998	Q1	126.64	124.95	119.56	113.53
	Q2	134.67	137.24	157.00	116.84
	Q3	118.57	137.95	153.21	104.80
	Q4	163.38	183.33	262.68	126.67
1999	Q1	201.66	210.94	352.27	132.56
	Q2	213.67	224.09	360.52	141.45
	Q3	203.78	243.07	372.51	132.18
	Q4	331.18	375.88	704.73	151.40
2000	Q1	359.43	436.63	716.40	154.42
	Q2	290.44	378.88	570.97	149.89
	Q3	238.08	343.24	579.31	148.03
	Q4	151.15	209.32	321.61	136.05
2001	Q1	107.01	143.54	193.05	119.57
	Q2	101.49	175.28	217.81	126.17
	Q3	66.24	109.17	117.95	107.27
	Q4	77.18	158.48	167.23	118.31
2002	Q1	56.67	146.52	139.25	118.24
	Q2	33.78	110.23	94.57	102.00
	Q3	28.84	83.94	72.32	84.01
	Q4	35.48	100.60	95.67	90.66
2003	Q1	38.63	99.50	96.78	87.40
	Q2	47.81	120.58	128.71	100.42
	Q3	50.93	135.57	137.65	102.63
	Q4	59.87	151.12	165.61	114.58
2004	Q1	59.98	143.44	173.33	116.05
	Q2	58.30	148.29	181.57	116.47

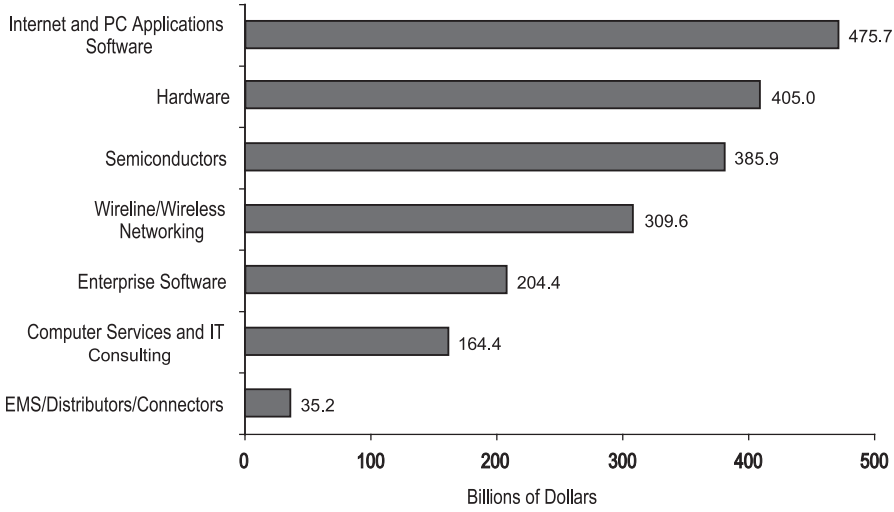
All indices are scaled so that 1997 Q4 = 100
Source: Yahoo! Finance

Internet Company Market Valuations

Several Internet companies have achieved astronomical growth as a result of their participation in the digital revolution. Technology companies have been able to sustain this growth even after the market crash in 2000 due to the value they provide to business and personal users. The prevalence and importance of high technology in everyday activities has allowed IT companies, such as Microsoft, AOL and Cisco, to post significant gains over their relatively short existences.

- As seen at right, Microsoft has seen a greater lifetime market appreciation since its IPO than any other IT firm. With a lifetime appreciation of $276.1 billion, Microsoft stock price had risen by 35,351 percent as of the end of 2002.[35]
- Semiconductors represented the largest segment of the technology stock market, accounting for $1.98 billion in market value, more than four times as much as Internet and PC applications software, the second largest sector.[36]
- Software, data networking, semiconductors and services have dominated the technology IPO landscape during the past 23 years, with these five industry groups accounting for 74 percent of the market cap of all technology companies as of December 31, 2002.[37]
- Software, the largest segment, accounts for $510.6 billion in market cap, or 30.6 percent of total technology IPOs market value.[38]
- Two of the top five performing technology IPOs (Microsoft and Oracle) are from the software industry. Data networking and PCs each have two of the top ten technology IPOs, Cisco and Ascend Communications, and Dell and Compaq, respectively.[39]
- Microsoft and Cisco, the two leaders in market value at the end of 2002 have continued their growth. In the 18 months since, Microsoft's stock price has increased 11.5 percent, while Cisco's has grown by 77.3 percent.[40]

Technology Stock Market Value As of May 7, 2003



Best-Performing Technology IPOs based on Market Value Creation

	Lifetime Market Appreciation ($B)[a]	Lifetime Percent Change in Price	Price (12/31/02)	Market Value at IPO ($M)	Current Market Cap ($B)[b]
Microsoft	276.1	35,351	26	519	276.6
Cisco	92.9	20,860	13	226	93.2
Dell Computers	68.7	30,100	27	123	68.9
AOL Time Warner	57.9	14,481	13	62	58.6
Oracle	56.7	23,228	11	188	56.9
SDL	40.7	Acq	Acq	101	41.1
Qualcomm	26.7	3,539	36	314	28.7
Compaq Computers	25.0	Acq	Acq	279	25.3
First Data	24.9	544	35	1,738	26.6
Ascend Communications	21.1	Acq	Acq	146	21.4
Network Solutions	20.6	Acq	Acq	275	21.1
eBay	19.6	2,161	68	715	20.1
Seagate	18.3	Acq	Acq	182	18.5
E-Tek Dynamics	14.9	Acq	Acq	377	15.4
EMC	13.2	2,579	6	234	13.4

[a] Market value at 12/31/02 or acquired (Acq) market value minus market value at IPO
[b] Market value at 12/31/02 or acquired (Acq) market value

Source: Morgan Stanley

Chapter 5
Electronic Commerce

Despite the IT-sector meltdown between 2000 and 2002, electronic commerce has become an increasingly important part of the U.S. economy. Americans are increasingly using the Internet for commercial activity, including shopping, purchasing, travel, banking and stock trading.

Leading online sales destinations, such as Amazon.com and eBay are among the strongest firms serving the business-to-consumer (B2C) market. In addition, more "bricks-and-mortar" retailers have developed successful "bricks-and-clicks" operations.

The much larger Internet business-to-business (B2B) market continues to grow rapidly. E-marketplaces have emerged that enable firms to buy and sell goods more efficiently, reducing the costs of effecting transactions and enabling firms to collaborate more productively through "supply chain management."

After two years of decline, online advertising revenues rebounded in 2003, reaching the highest level since their peak in 2000. The resurgence of online advertising revenue has helped to strengthen the financial prospects of portals and other Internet destinations that rely on such revenues to finance "free" services to consumers. This can be attributed in large part to consumers turning to the Internet for a larger variety of commercial purposes and with greater frequency.

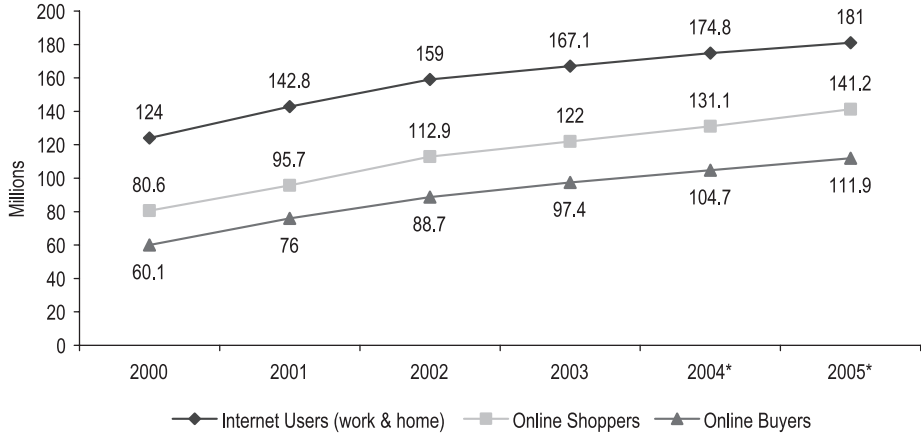
The past year has seen remarkable advances in online delivery of music, movies and other content. With the launch of iTunes, Apple, ushered in a new wave of pay per song online music options. New competitors, such as Wal-Mart's online music store and Roxio's Napster, together with existing services, now provide consumers with a multitude of online service offerings, including downloading or streaming. Movies are also now available online through services such as Movielink, CinemaNow and as of June 2004, Starz! Ticket on Real Movies. These services offer either pay per movie download services or subscription services. All three major game suppliers also have online services, which have seen rapid growth since inception.

Individuals Engaged in Online Commerce

The number of online purchasers in the U.S. has been increasing steadily, a trend that is expected to continue as Internet penetration, particularly broadband penetration, rises and consumers become more familiar with purchasing online. The dollar volume of online buying is rising at an even faster rate, reflecting broad-based adoption of e-commerce.

- According to a February 2004 survey by the Pew Internet and American Life Project, 3 percent of those Americans with Internet access buy a product online in a typical day, [1] and 65 percent have bought a product online at some time.[2]
- As shown at right, eMarketer projects that both the number of individuals purchasing and the number shopping (seeking product information) online will almost double between 2000 and 2005.[3]
- According to the UCLA Internet report, broadband users are more apt to perform tasks online than are dial-up users. As seen at right, the average time spent online per week was significantly greater for broadband users than for dial-up customers in all categories.[4]
- Goldman Sachs reports that 63.1 percent of online shoppers were satisfied with their online shopping experience during the 2003 holiday season, up 4.1 percentage points from the previous year.[5]
- According to Dieringer Research Group, the Internet had a strong influence on multi-channel shoppers in 2003. They estimate that in 2003 direct online spending reached $93.1 billion, and that Internet-influenced offline spending reached $137.6 billion.[6]

U.S. Online Users and Online Buyers



Internet user figures from March 2004, shopper and buyer figures calculated from user figures with percentages from April 2003.

* Projections
Source: eMarketer

Daily Online Activities (average hours pre week)

	Broadband	Dial-up
Email	4.8	3.0
Professional Work	3.4	1.3
Browsing	3.3	2.1
Instant Messaging	3.3	1.3
Download Music	2.3	0.7
Hobbies	1.9	1.4
Games	1.6	1.2
News	1.3	1.0
Trading Stocks	1.2	0.5
Entertainment Information	1.1	0.8
Shopping	1.0	0.7

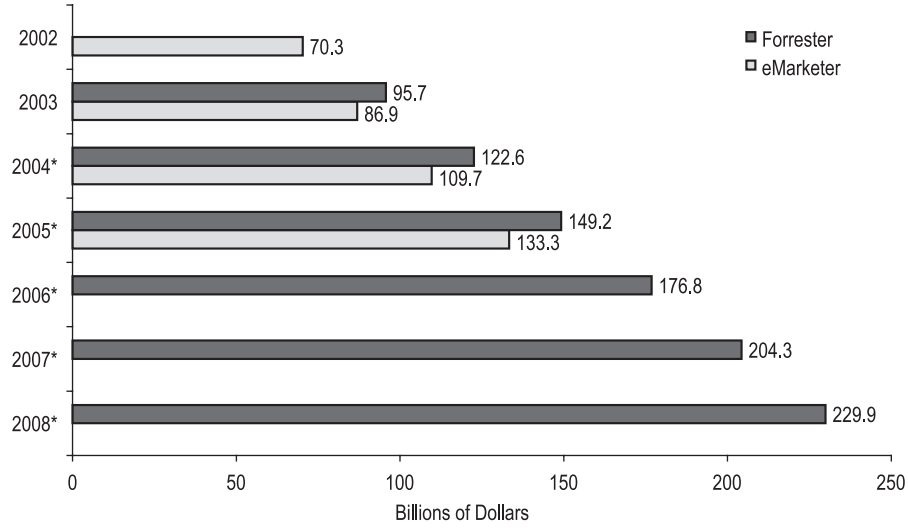
Source: UCLA Center for Communication Policy

Business-to-Consumer (B2C) E-Commerce

Estimates of sales volume in the online business-to-consumer (B2C) market (and even its definition) can vary widely across analysts, based on a variety of factors, such as types of products covered and the extent of online activity. What is clear is that substantial growth is taking place across the entire spectrum of consumer-oriented e-commerce categories and that online commerce accounts for economically significant shares in several consumer goods categories.

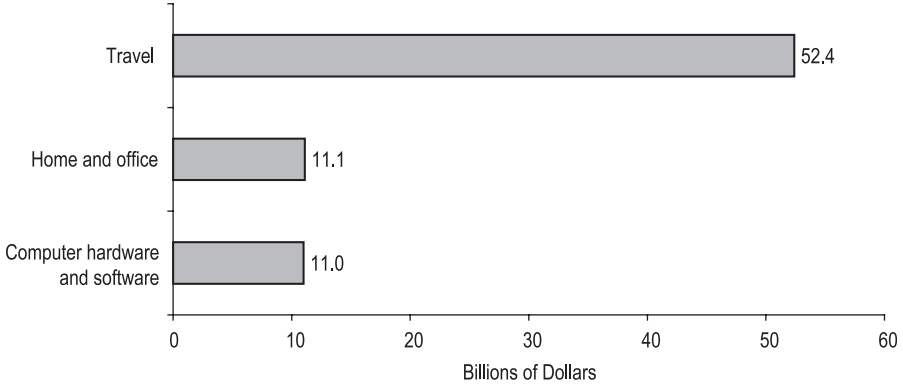
- The Census Bureau provides quarterly estimates of online retail sales, excluding online sales of travel and other services. By this measure, B2C sales reached $15.5 billion for the first quarter of 2004, representing 1.9 percent of total sales and an increase of 30 percent over a year earlier.[7]
- Online buying during the 2003 holiday season totaled $18.5 billion in the U.S, which was a 35-percent increase from the 2002 holiday season. The largest category of online holiday retail sales was clothing ($3.7 billion), followed by toys and video games ($2.2 billion), consumer electronics ($2.0 billion), computer hardware ($1.7 billion) and video/DVD ($1.6 billion).[8]
- Online retail sales in 2003 totaled $55.9 billion, according to BizRate.com, representing a 25-percent increase over 2002.[9] eMarketer projected online retail sales of $55 billion for 2003 and further that online sales will reach $88.1 billion by 2005.[10]
- The estimates and projections of B2C e-commerce made by two prominent analysts displayed at right illustrate the variance in B2C e-commerce estimates. Figures for 2004 vary from a low of $109.7 billion by eMarketer to $122.6 billion by Forrester. According to Forrester, B2C revenues will reach $229.9 billion by 2008.[11]
- According to BizRate.com, the fastest growing online retail category was food and wine, which grew by 208 percent from the third quarter of 2002 to the third quarter of 2003. Gifts and flowers were the second largest gainer, growing 198 percent, followed by office supplies and entertainment, which grew by 182 percent and 181 percent, respectively.[12]
- Shop.org and Forrester project that the top online retail category for 2004 will be travel, with $52.4 billion in sales, followed by home and office ($11.1 billion) and computer hardware and software ($11 billion).[13]

U.S. B2C E-Commerce Revenue Projections



* Projections
Source: eMarketer

Online Retail Sales Categories in the U.S. by Select Category 2004



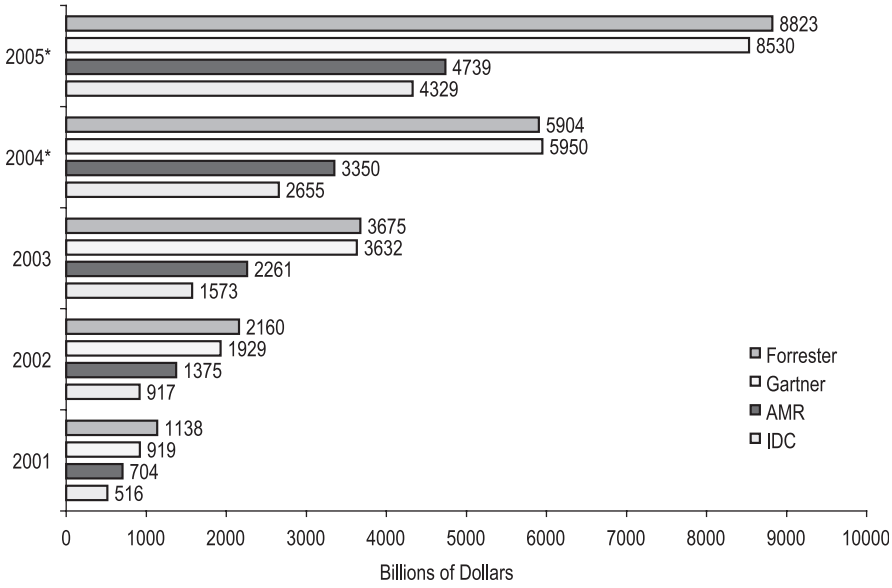
Sources: Shop.org, Forrester Research, eMarketer

Business-to-Business (B2B) E-Commerce

The dollar volume of B2B e-commerce far exceeds that of B2C e-commerce. In part, this is because businesses have transacted with each other electronically since the 1970s by means of the Electronic Data Interchange (EDI) network. While EDI remains the principal mode for B2B e-commerce, companies are increasingly communicating with each other through the public Internet, through Intranets (in-house networks), and through Extranets (business-to-supplier networks). These alternative networks use XML-based languages, and will eventually supplant EDI as the primary vehicle for these transactions.

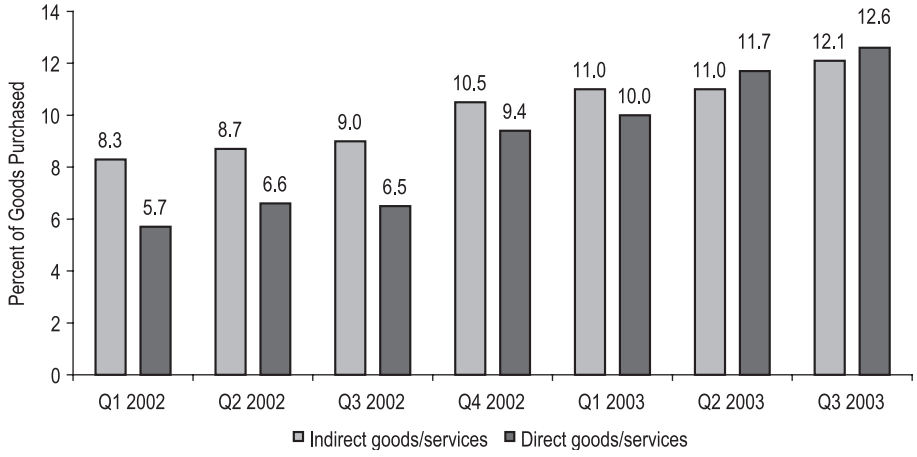
- In an April 2004 report, the Census Bureau reported that e-commerce accounted for 19.6 percent of manufacturing shipments, 11.7 percent of merchant wholesale trade sales, 1.4 percent of retail trade sales, and 0.9 percent of selected service revenues in 2002.[14]
- The relative importance of B2B activity was evident from the fact that it accounted for 92.7 percent of all e-commerce in 2002, slightly lower than in 2001. EDI's importance is illustrated by the fact that it accounted for 86 percent of the e-commerce sales in merchant wholesale trade in 2002, totaling $275 billion.[15]
- Estimates of worldwide B2B markets vary, but as shown at right, experts claim that the market approximately tripled between 2001 and 2003. They also predict the market to more than double between 2003 and 2005.[16]
- Forrester projects B2B e-commerce revenues of $8.8 trillion in 2005, more than double the lowest projection.[17]
- The average amount of purchasing done online by U.S. manufacturers and non-manufacturers has been increasing steadily. The purchase of both direct and indirect goods and services via the Internet has expanded, with indirect goods increasing by 45.8 percent from Q1 2002 to Q3 2003, and direct goods increasing by 121 percent over the same period.[18]
- For 2003, American companies reported that an average of 11 percent of their overall indirect materials procurement was conducted online.[19]
- In 2001, the U.S. led with 54 percent of businesses placing orders online. While that number grew slightly in 2002 to 56 percent, Sweden led with 70 percent of its businesses placing orders online in 2002.[20]

B2B E-Commerce Revenues Worldwide



*Projections
Source: IDATE

U.S. Business Purchases Completed Via the Internet



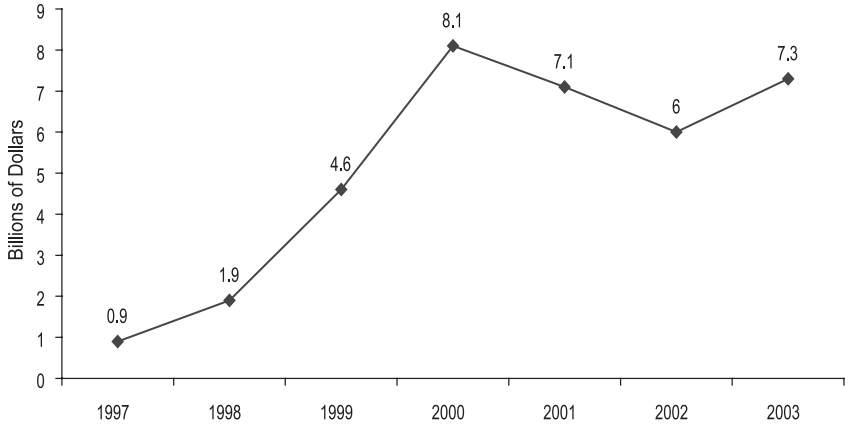
Sources: Forrester Research, eMarketer

Online Advertising

Online advertising is a major source of revenue for many Internet sites. These revenues frequently support a variety of services – including Internet access, e-mail, and customized homepages – that are provided to consumers without charge. Online advertising revenues grew dramatically during the late 1990s before leveling off in the second half of 2000 and declining in 2001 and 2002. This decline dimmed the financial prospects of many portals and other Internet destinations, whose business models depended on continued growth. Starting with the fourth quarter of 2002, online advertising revenues began to rebound, rising slowly through 2002 and the first three quarters of 2003 and then increasing by 21.7 percent in the fourth quarter of 2003.[21]

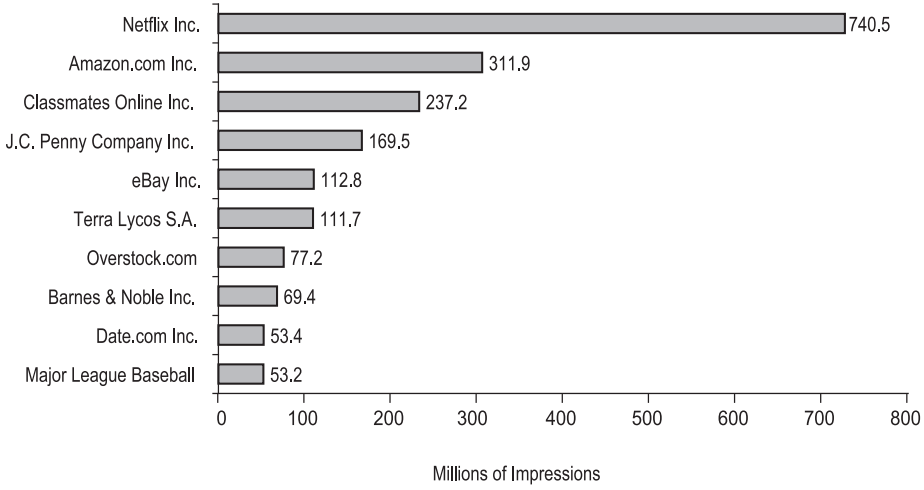
- The Interactive Advertising Bureau (IAB) estimates that U.S. online advertising spending peaked in 2000, reaching $8.1 billion, before dropping 26 percent over the next two years. The sector has since staged a comeback, rising 21.7 percent from $6.0 billion in 2002 to $7.3 billion in 2003.[22]
- IAB estimates that online advertising accounted for approximately 3 percent of overall advertising spending in 2003, up from 2.5 percent in 2002.[23]
- According to IAB figures, total Internet advertising revenues were 17 percent of television advertising revenues, 40 percent of cable TV advertising revenues, and 59 percent of magazine advertising revenues in 2003.[24]
- The top ten sellers of advertising accounted for 71 percent of all advertising revenues for the fourth quarter of 2003, down 1 percentage point from the same period a year earlier.[25]
- In 2003, keyword searches became the leading format for online advertisements, accounting for 35 percent of revenues in 2003, up from only 15 percent in 2002. Display (or banner) ads were second, accounting for 21 percent in 2003, down from 29 percent in 2002. Classifieds accounted for 17 percent of revenues, up from 15 percent a year earlier.[26]
- Pop-up and pop-under advertisements, controversial forms of online advertisements, accounted for only 6 percent of ads in 2003.[27]
- For the week ending January 11, 2004, Netflix Inc. was the leading online advertiser of consumer goods, displaying more than twice the number of impressions as Amazon.com Inc, the next leading advertiser.[28]

Web Advertising Revenues



Source: Interactive Advertising Bureau

Leading Online Advertisers of Consumer Goods (week ending January 11, 2004)



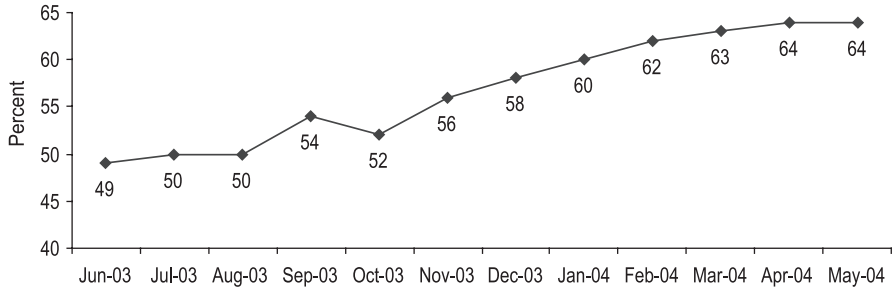
Sources: Nielsen//NetRatings, eMarketer

Spam

As Internet usage becomes increasingly important and common in every day life, so has online advertising and communications. While services such as email generally have been a great convenience, spam, unsolicited email advertisements, has become a growing problem among the ranks of emailers. Spam continues to grow despite legislation aimed at curbing the problem. According to Brightmail, 64 percent of all email was identified as spam in May 2004, up from 60 percent in January 2004 when the CAN-SPAM Act took effect. [29] After the success of the Federal Trade Commission's (FTC) Do-Not-Call registry, the concept of a Do-Not-Email registry was proposed, but the FTC reported to Congress in June 2004 that such an approach was impractical and unworkable at the present time.

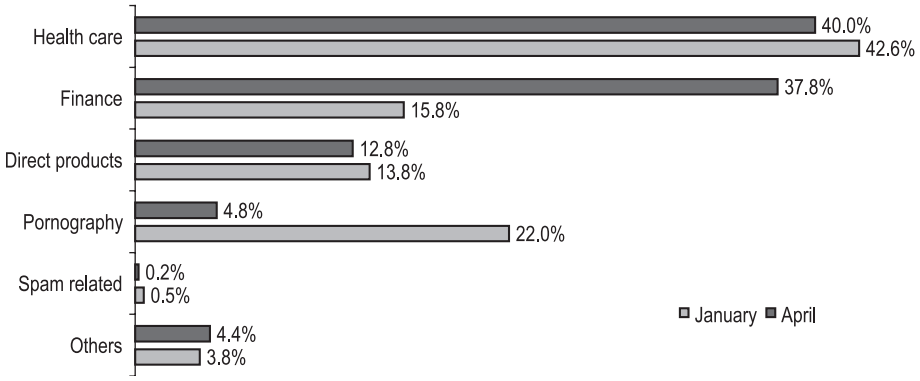
- The Radicati Group estimates that the volume of worldwide spam messages totaled 15 billion in 2003, and that this figure will grow by 115 percent to 35 billion in 2004.[30]
- According to Pew, 29 percent of email users say they have reduced their overall use of email because of spam, while 63 percent said that the influx of spam has made them less trusting of email in general.[31]
- The most common type of spam, health care solicitations, accounted for 40 percent of all spam worldwide in April 2004, and consisted mainly of ads for lifestyle drugs, such as Viagra, Xanax or diet pills.[32]
- Finance emails replaced pornography as the second most common type of spam, accounting for 37.8 percent in April 2004, up from only 15.8 percent in January. Pornography-related spam fell precipitously, from 22 percent in January to just under 5 percent in April.[33]
- As seen at right, U.S. companies that employ anti-spam solutions save a considerable amount of both time and money over those that do not employ an anti-spam solution.[34]
- Nucleus Research estimates that spam will cost large U.S. companies nearly $2,000 per employee in lost productivity for 2004. Unsolicited email reduced employee productivity by 1.4 percent.[35]

Percentage of Total Internet Mail Identified as Spam



Source: Brightmail

Worldwide Spam by Category (2004)



Sources: Clearswift, eMarketer

Average Productivity Cost of Spam & Savings of Anti-Spam Solutions in the U.S. in 2004

	Without anti-spam solution	With anti-spam solution
E-Mail Users		
Daily time spent by each user	10 minutes	5 minutes
Average annual (cost)/savings to firm	($4.10) million	$783,000
IT Staff		
Daily time spent by each user	43 minutes	19 minutes
Average annual (cost)/savings to firm	($85,000)	$13,000

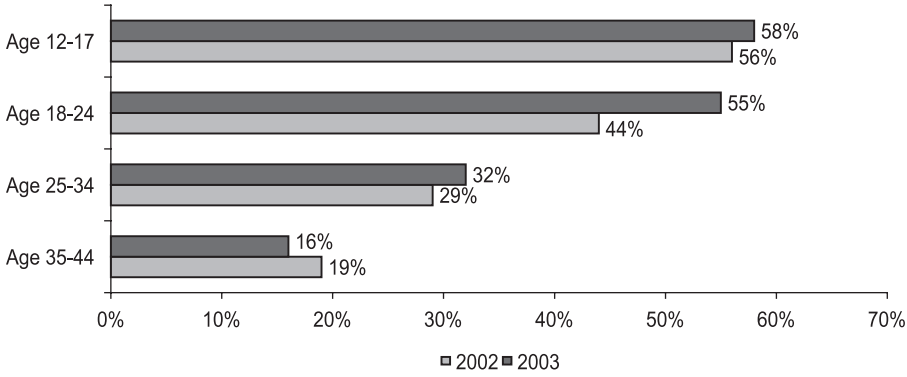
Source: eMarketer

Online Music

In recent years, the music industry has combined vigorous campaigns against peer-to-peer (P2P) piracy with extensive efforts to establish attractive online music services to compete with file-sharing applications. Many firms are now offering paid online music services. These services, including Apple's iTunes, Wal-Mart's online music store and Roxio's now-legitimate Napster, offer individual songs for about one dollar each and other options as well. Consumer acceptance of these services has expanded, with 17 percent of current music downloaders now using paid services, according to Pew.[36]

- As shown at right, revenues generated by online music sales are projected to grow substantially in the future. Gartner projects that revenues will increase by 95 percent from 2003 to 2004, from $89.5 million to $174.7 million, and by 590 percent from 2003 to 2006.[37]
- Apple's iTunes has sold 50 million songs as of March 2004, accounting for over half of the U.S. music downloading business.[38]
- In March 2004, the six most popular online music services were visited by more than 11 million U.S. Internet users. Third place iTunes had 2.3 million unique visitors that month.[39] Second-place Roxio reached 2.6 million Americans in March, behind leader Musicmatch.com with 11.2 million visitors.[40]
- As shown at right, copying music files over the Internet, usually in violation of copyright laws, varies sharply by age group. Over half of people age 12 to 24 say they have downloaded music files from the Internet (either legally or illegally) in 2003, as compared with fewer than one-third of those age 25 to 34.[41]
- Copying of music files on the Internet increased among most age groups. The number of people age 18 to 24 who download music files increased from 44 percent in 2002 to 55 percent in 2003.[42]
- According to IDATE, 65 billion music files were downloaded in the U.S. in 2003, representing 43.3 percent of worldwide downloads.[43]

Online Music Downloaders by Age Group



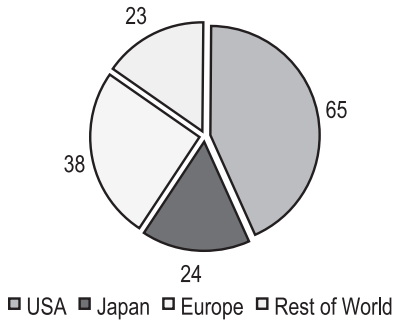
Source: Edison Media Research

Online Music Revenues in the U.S. ($ millions)

	2002	2003	2004*	2005*	2006*	2007*	2008*
Gartner	29.5	89.5	174.7	329.7	618.2		
IDC	45.5	150.3	384.3	771.6	1,211.8		
US Bancorp		16.9	104.0	127.9	236.7	390.5	535.0

*Projections
Source: eMarketer

Number of Music Files Downloaded in 2003 (billions)



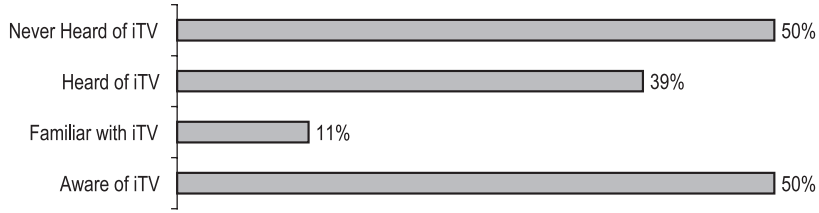
Source: IDATE

Online Video and Games

Movie studios and video game makers are also seeking to distribute their content in various digital formats, including online, but face risks of online (and off-line) digital piracy. Copying of high-quality video is limited by the large size of good quality video files, but improved compression technologies and the increased adoption of broadband connections have diminished this barrier. And while DVDs are encrypted, programs to crack this protection are widely available.

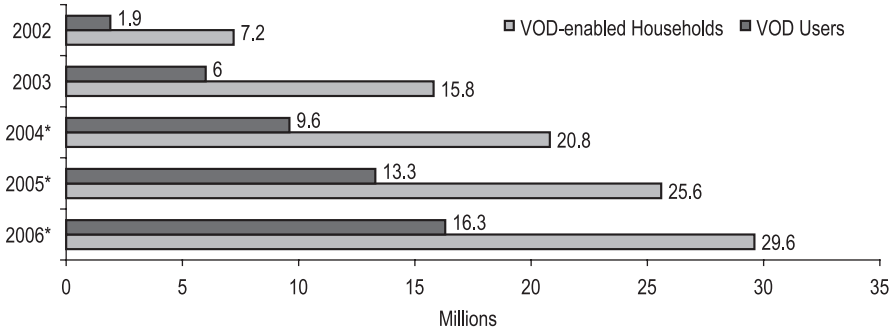
- As of December 2003, 50 percent of Americans were aware of Interactive TV (iTV), with 11 percent being familiar with it, and 39 percent having heard of iTV, but knowing nothing about it.[44]
- Video-on-Demand (VOD) users have steadily increased, growing by 405 percent from 2002 to 2004. By 2006, eMarketer projects that there will be 16.3 million VOD users in the U.S.[45]
- Both unit and dollar sales of computer and video games were stable between 2000 and 2002. Unit sales increased by 7 percent in 2003, while dollar sales were roughly unchanged.[46]
- In 2003, dollar sales of online capable console video games exceeded $1 billion, a 167-percent increase over 2002.[47]
- According to the ESA, 54 percent of computer and video games sold were rated "E" for everyone, 30.5 percent were rated "T" for teen, and 11.9 percent were rated "M" for mature audiences.[48]
- According to ESA data, in 2004, 43 percent of most frequent game players say they play games online, up from 37 percent in 2003 and 31 percent in 2002.[49]
- Real Networks Inc. and Starz Encore Group LLC are launching an Internet movie subscription service giving viewers access to about 100 movies for a monthly fee. Competitors to the service include Movielink, which charges per movie download, and CinemaNow, which lets users buy subscriptions or pay per movie.[50]

Awareness and Familiarity with iTV in the U.S.



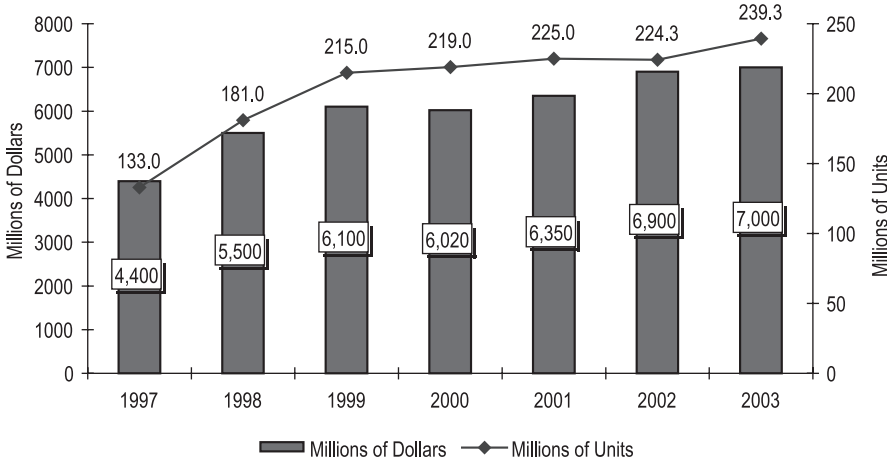
Sources: Ipsos-Insight, eMarketer

Video-on-Demand in the U.S.



* Projections
Source: eMarketer

U.S. Computer and Video Game Sales



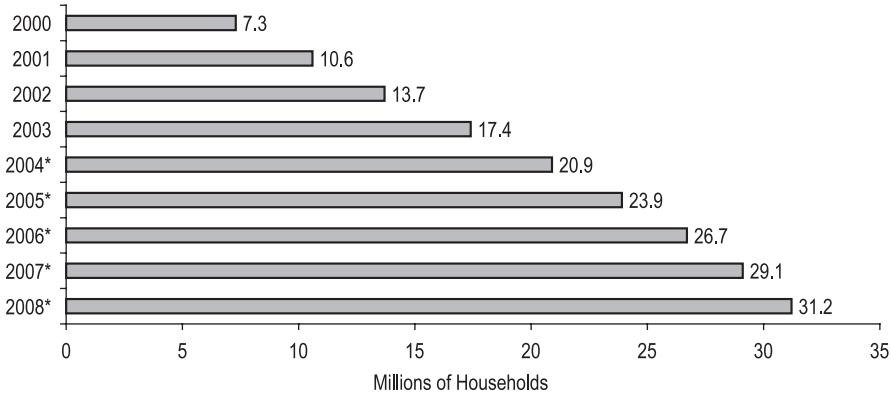
Source: Entertainment Software Association

Online Finance

While online banking appears to offer numerous advantages to both consumers (in terms of convenience) and banks (in the form of lower costs), it has been relatively slow to catch on in the United States. Paying bills online, while having similar advantages, also has had only limited acceptance. In contrast, online securities trading grew relatively quickly, fueled by the stock market boom. Online brokers accounted for 45 percent of all trades on the New York Stock Exchange and NASDAQ in early 2000, and still account for a respectable percentage.[51]

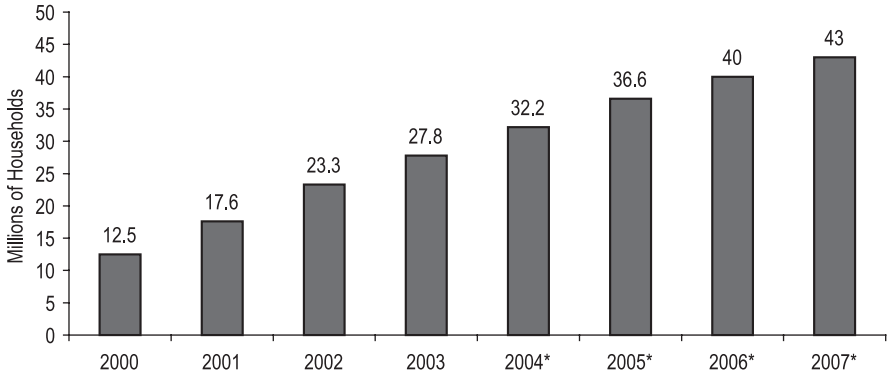
- According to eMarketer, 27.8 million U.S. households banked online in 2003, representing 26.1 percent of all households and 39.5 percent of online households.[52] Online banking is expected to increase to 38.7 percent of all households and 50.6 percent of online households in 2007.[53]
- According to Unisys Corporation and Global Future Forum, 64 percent of banks worldwide offer online banking. Online banking is most prevalent in North America, where 80 percent of banks offer online services, compared to 66 percent in Asia and only 47 percent in Europe.[54]
- As seen at right, Forrester found that 7.3 million U.S. households paid bills online in 2000. This grew to 17.4 million households in 2003 and is forecast to increase to 31.2 million in 2008.[55]
- The leading reasons why U.S. consumers enroll to pay bills online include wanting to spend less time paying bills (55 percent), wanting to get better organized (46 percent) and wanting better control of money (40 percent).[56]
- U.S. consumers who pay bills online also participate in other online banking activities. Of those who pay bills online, 57 percent access accounts, 53 percent transfer funds, 34 percent research financial information, and 25 percent access bank contact information.[57]
- As seen at right, Forrester found that 7.1 million U.S. households traded securities online in 2003. Forrester projects that this figure will almost double to 13.4 million by 2008.[58]

U.S. Households Paying Bills Online



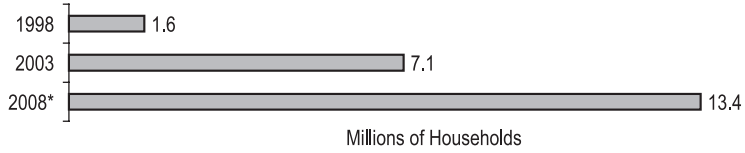
* Projections
Sources: Forrester, eMarketer

U.S. Households Banking Online



* Projections
Source: eMarketer

U.S. Households Trading Securities Online



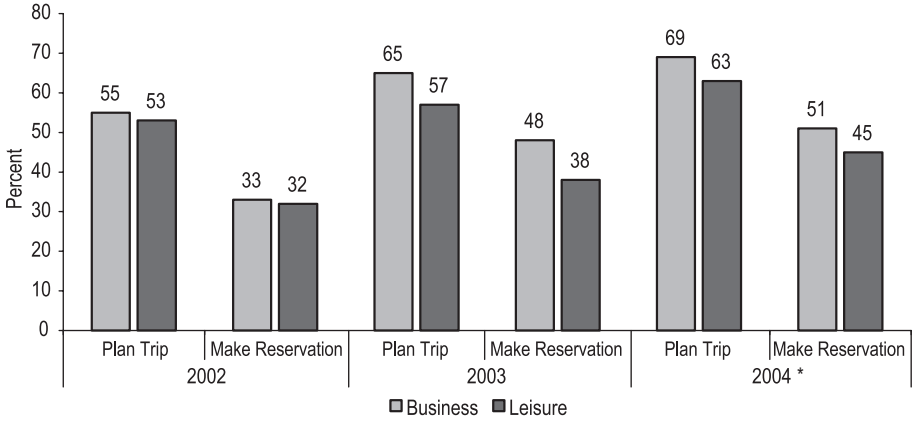
* Projection
Sources: Forrester, eMarketer

Online Travel

Online travel has consistently accounted for the largest single segment of the B2C market. Consumers can now use the Internet to search for a wide variety of air travel itineraries, car rentals, hotels or combine them into a single package. Many of these services are available through travel agency sites that offer a full assortment of options. Travelocity, Expedia, Cheap Tickets and Orbitz are among the most familiar. Some sites offer only specific services (e.g. hotels.com), while many sites distribute services for a single company (e.g. airline and car rental company sites).

- As seen at right, airline ticket sales reached $26.9 billion in 2003, or 63 percent of all online travel bookings. They are projected to increase to $60.1 billion in 2009, but their share will fall to 54 percent. Online sales of lodging will grow in importance, increasing from 29 percent of total sales in 2003 to 36 percent in 2009.[59]
- According to PhoCusWright, more than 35 million Americans purchased travel online last year, up 17 percent from 2002. Also, 19 million more researched destinations or prices online.[60]
- Forrester projects that for 2004, the Internet will generate nearly $53 billion on leisure travel bookings alone, representing nearly 22 percent of the travel industry's revenues.[61]
- A Yesawich, Pepperdine, Brown &Russell/Yankelovich study projects that 69 percent of business travelers and 63 percent of leisure travelers will use the Internet to plan some aspect of their travel in 2004.[62]
- Leisure travelers in the U.S. spent $42.9 billion online in 2003. By 2009, that figure is projected to reach $110.5 billion, a 157.6 percent increase.[63]

U.S. Travelers Who Use the Internet

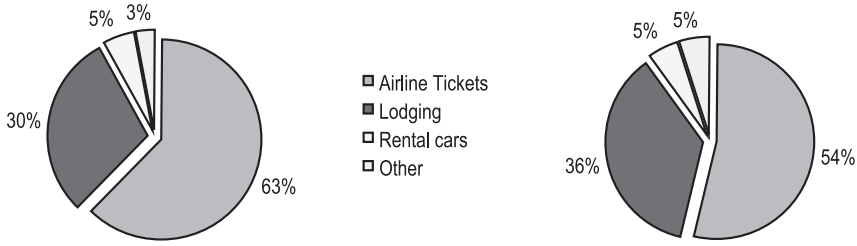


*Projection
Source:Yesawich, Pepperdine, Brow &Russell/Yankelovich Partners

U.S. Online Leisure Travel Sales (in billions of dollars)

	2003	2004*	2005*	2006*	2007*	2008*	2009*
Airline Tickets	26.9	32.8	38.5	43.8	48.8	54.2	60.1
Lodging	12.6	16.4	20.5	24.7	29.6	34.9	40.1
Rental cars	2.0	2.3	2.7	3.3	4.0	4.6	5.2
Vacation packages/tours	0.8	0.9	1.1	1.6	2.2	2.8	3.3
Cruises	0.5	0.5	0.7	0.9	1.2	1.5	1.7
Amtrak	0.1	0.1	0.1	0.1	0.1	0.1	0.2
Total	**42.9**	**53.0**	**63.6**	**74.4**	**85.9**	**98.1**	**110.6**

U.S. Online Leisure Travel Sales



* Projections
Source: Forrester Research

Chapter 6
The Digital Economy

The performance of the U.S. economy during the second half the last decade was truly extraordinary. From 1995 to 2000, real gross domestic product increased at an annual rate of more than 4 percent, up from 2.37 percent for the first half of the decade. During the same period, labor productivity, the source of higher wages and better living standards, increased at 2.5 percent annually, nearly double the pace of the previous 25 years.[1]

This outstanding performance was primarily due to investments in information technology and telecommunications equipment and services, which fueled a period of growth and productivity not seen for many years. Just as the IT and telecom sectors played a disproportionate role in the economic expansion of the 1990s, they also played a prominent role in the ensuing economic slowdown.

The collapse of the IT sector preceded, and to a large extent drove, the more general economic slowdown that became evident in 2001. IT investment spending declined, share values fell precipitously, dozens of prominent firms went bankrupt and hundreds of thousands of jobs were lost.

After two years of decline, the IT sector rebounded strongly in 2003. From the first quarter of 2003 through the first quarter of 2004, the major segments of IT investment spending posted growth figures of between 12 and 25 percent.[2] Moreover, the evidence suggests that the IT-led productivity increases of the late-1990s will continue as the economy continues to strengthen. The Department of Commerce's most recent report on the digital economy concludes "recovery in IT-producing industries and the increased use of IT throughout the economy are once again helping to drive very rapid productivity and output growth."[3]

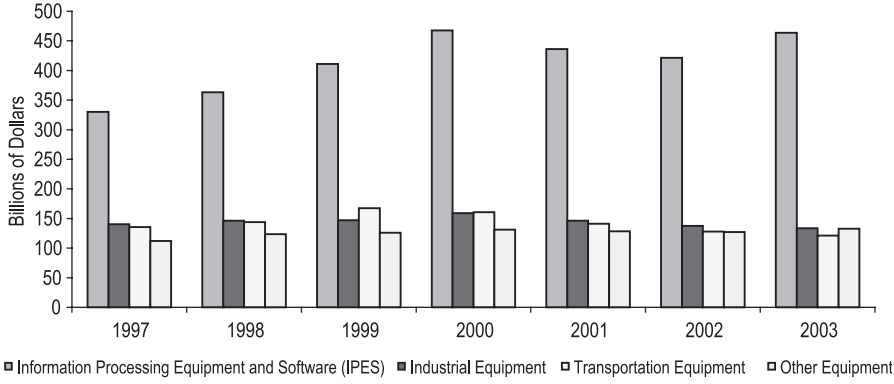
The return of IT jobs has been much slower. After experiencing severe job cuts during the economic downturn, employment in the IT sector is showing some signs of beginning to stabilize. In 2003, the telecommunications and computer industries were not the sectors hardest hit by job cuts for the first time in two years.[4] But many IT industries are still losing jobs and it is not clear if and when IT workers will see a return to the high levels of demand experienced before 2000.

The U.S. Economy's Investment in IT

IT investment was a principal source of the outstanding performance of the economy during the 1990s. As the accompanying table shows, IT spending, which includes computing hardware, software and communications products and services, accounted for a steadily increasing share of total investment spending during the 1990s. IT spending continued to grow into 2000, then turned down during the last quarter of 2000 and continued declining through 2002. IT-sector investment rebounded strongly in 2003, growing by about 10 percent, and has continued growing into 2004.[5] As of the first quarter of 2004, IT spending has gained 16.1 percent over the first quarter of 2003.[6]

- The rise in IT spending during 2003 was particularly strong in the computers and peripheral equipment sector, which posted a 16.7-percent increase. During the first quarter of 2004, software posted the largest gain of just over 4 percent.[7]
- In addition to investing in IT equipment and software, businesses in 2002 spent about $270 billion on communications services, up almost 5 percent from 2001.[8] (Communications services do not show up in these investment figures, because they are considered a cost of production.)
- According to InformationWeek, the top 500 companies spent an average of $353 million on IT in 2002 and an estimated $369 million on IT for 2004. While still below the average of $484 million spent on IT in 2001, this represents an upward movement after two years of decline.[9]
- The U.S. federal government will spend $59 billion on IT by the end of 2004 reports INPUT. It goes on to project that Federal IT spending will increase at a compound annual growth rate of 6.6 percent over the next five years, reaching $81 billion by 2009.[10]
- In the first quarter of 2004, businesses were investing in information processing equipment and software at a seasonally adjusted annual rate of $506.5 billion, with IT spending accounting for over half of all business investment in new equipment.[11]

Selected Private Fixed Investment Components ($ billions)



	1997	1998	1999	2000	2001	2002	2003
Information processing equipment and software (IPES)	330.3	363.4	411.0	467.6	436.4	421.3	463.8
Industrial equipment	140.4	146.4	147.0	159.2	146.2	137.5	133.6
Transportation equipment	135.5	144.0	167.6	160.8	141.3	128.0	121.3
Other equipment	112.1	123.5	126.0	131.2	128.2	127.1	132.7
Total private fixed investment	1317.8	1438.0	1558.8	1679.0	1643.4	1583.9	1673.0
IPES share of total (percent)	25.1%	25.3%	26.4%	27.8%	26.6%	26.6%	27.7%

Growth of IT-Sector Investment

	2001*	2002*	2003*	2003 Q1**	2003 Q2**	2003 Q3**	2003 Q4**	2004 Q1**
Private fixed investment	-2.12	-3.62	5.63	0.73	1.49	4.26	3.32	2.00
Information processing equipment and software	-6.67	-3.46	10.09	2.85	3.44	5.76	2.87	3.22
Computers and peripheral equipment	-15.98	-2.23	16.69	2.24	7.72	8.88	4.71	0.47
Software	-1.59	-3.17	7.86	2.12	2.42	4.22	1.78	4.09
Other	-6.47	-4.28	8.99	3.90	2.39	5.61	2.79	3.89

*Percent changed over previous year.
**Percent changed over previous quarter.
Source: Bureau of Economic analysis

The IT Sector's Impact on Economic Growth and Inflation

Although the IT sector is a relatively small segment of the U.S. economy, in recent years it has had a disproportionate impact. Between 1996 and 2000, IT-producing industries represented between 8 and 9 percent of the economy, but accounted for 1.4 percentage points (or 30 percent) of the economy's 4.6-percent annual average growth.[12]

- Since 1995, IT-producing industries have become more concentrated in the service sectors. The Department of Commerce estimates that IT software and computer services and communications services represented about 59 percent of the IT-producing sector in 1996, but accounted for 71 percent in 2003. These sectors continued to show positive growth after 2000, although at a reduced rate, contributing to the mildness of the recession.[13]
- IT contributed disproportionately to economic growth during the late 1990s and into 2000. In 2001, IT proved it could have a negative impact on the economy as well, decreasing GDP growth by one-tenth of a percentage point, or 16.7 percent below the level it would have achieved without IPES. In 2002, IPES was again a positive influence, albeit a negligible one, accounting for only 2/100 of a percentage point, or 0.9 percent of GDP growth. 2003 saw a resurgence of IPES, as it accounted for 0.54 points, or 17.4 percent of GDP growth.[14]
- IT prices have been declining since the mid 1990s, providing additional downward pressure on inflation rates. The producer price index for the computer sector fell by over 78 percent between 1994 and 2003.[15]
- The decline in prices was even more pronounced for personal computers and laptops. The price of personal computers and workstations dropped by almost 95 percent between 1994 and 2003, and another 1.4 percent in the first four months of 2004.[16] Similarly, portable computer prices fell by 96.6 percent between 1994 and 2003, and another 4.3 percent in the first four months of 2004.[17]
- The rate of price decline has if anything intensified in more recent years. Between 1999 and April 2004, prices for both PCs and laptops have fallen well over 65 percent.[18]

IT Producing Industries' Contribution to Real Economic Growth

	1997	1998	1999	2000	2001	2002	2003
				percent			
Changes in real gross domestic product*	4.5	5.0	4.2	4.7	0.1	2.3	2.9
				(percentage points)			
IT contribution**	1.5	1.6	1.5	1.1	0.1	0.1	0.8
All other industries**	3.0	3.4	2.7	3.6	0.0	2.2	2.1

*Percentage change estimates based on Census and BEA data. GDP represented by Gross Domestic Income, which accounts for differences with table below.
**Percentage point
Source: Department of Commerce

Contribution of Core Components to Gross Domestic Product Growth*

	1992-1995	1996-1999	2000	2001	2002	2003	2003 Q1	2003 Q2	2003 Q3	2003 Q4	2004 Q1
Gross Domestic Product Growth	3.10	4.10	3.70	0.50	2.20	3.10	2.00	3.10	8.20	4.10	4.20
Contribution of:											
Gross private domestic investment	1.03	1.49	0.99	-1.47	-0.18	0.64	-0.57	0.73	2.17	2.19	1.12
Information processing equipment and software (IPES)	0.44	0.74	0.75	-0.10	0.02	0.54	0.64	0.64	1.05	0.07	0.67
Personal consumption expenditure	2.17	2.77	3.17	1.68	2.38	2.22	1.80	2.34	4.89	2.29	2.65
Other components of GDP	-0.09	-0.15	-0.50	0.29	-0.01	0.27	0.74	0.02	1.14	-0.33	0.39
GDP growth without IPES	2.66	3.36	2.95	0.60	2.18	2.56	1.36	2.46	7.15	4.03	3.53
GDP growth without investment component	2.07	2.61	2.71	1.97	2.38	2.46	2.57	4.37	6.03	1.91	3.08

* Percent change at annual rate
Source: Bureau of Economic Analysis

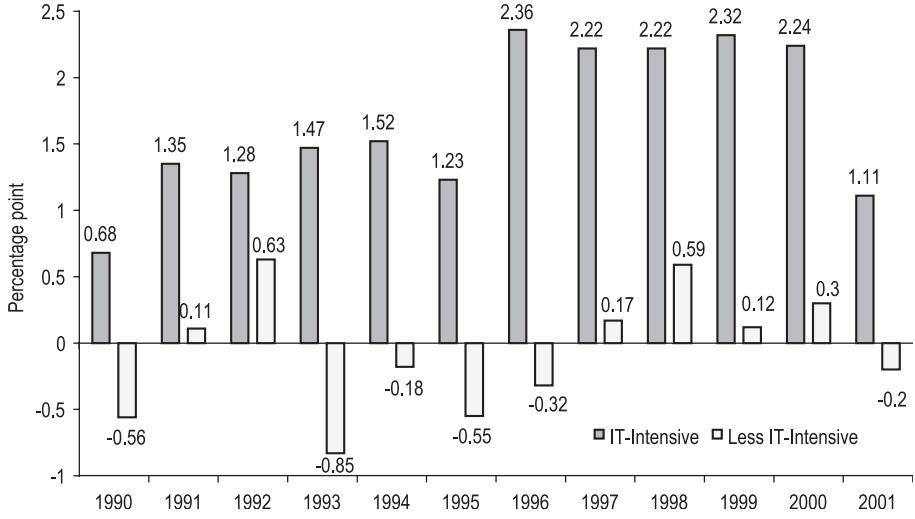
The IT Sector's Impact on Productivity

During the second half of the 1990s, average productivity (non-farm output per hour of labor) grew at a rate of 2.5 percent per year, 1.1 percentage points above the pace of the preceding two decades. It is now generally recognized that the efficiency gains in the IT sector accounted for a substantial portion of this accelerated productivity.

The *Digital Economy 2003* report from the Department of Commerce analyzes the relative contribution to growth and productivity of the various sectors of the economy according to their "IT-intensity" – a measure of the ratio of IT capital per FTE (full-time equivalent worker). The industries are then aggregated into two groups – "IT-intensive" and "less IT-intensive" – each accounting for a 50-percent share of aggregate nominal GDP. In this way, the Department of Commerce analysis shows clearly the disproportionate impact of IT on the increase in productivity.

- As the data opposite show, from 1995-2001 IT-intensive industries posted GDP growth figures almost twice those of less IT-intensive industries (5.68 percent compared to 3.09 percent). Average annual GDP growth also accelerated more in IT-intensive industries, increasing by 2.55 percentage points from 1995-2001 to 1989-1995, compared to a 1.29-percentage points increase for the less IT-intensive industries.[19]
- IT–intensive industries are also responsible for most of the 2.19-percent productivity growth during the same period. Productivity increased at an average annual rate of 3.67 percent in IT-intensive industries, as compared to 0.83 percent in the less IT-intensive sectors.[20]
- Productivity growth in the IT-intensive sectors remained strong at 3.1 percent during the 2001 recession, as compared with -0.26 percent for the remainder of the economy.[21]
- The finance and insurance sector was primarily responsible for this impressive performance, contributing 68 percent of the 0.91-percent productivity change for the economy as a whole. Within this sector, the largest contributions came from IT-intensive industries, including securities and commodity brokers, holdings and other investment offices and nondepository institutions.[22]
- The output of IT-producing industries has risen steadily since 1997, increasing from $666.1 billion in 1997 to $871.9 billion in 2003, or 30.9 percent.[23]

Contributions to Overall Labor Productivity by Industry Type in U.S. Non-farm Business Sector



Growth in GDP, FTE and Productivity by IT-Intensity*

	Average Growth 1989-2001	Average Growth 1989-1995	Average Growth 1995-2000	Growth 2000-2001	Average Growth 1995-2001
GDP Growth					
IT-Intensive	4.41	1.13	6.76	0.29	5.68
Less IT-Intensive	2.44	1.80	3.68	0.17	3.09
All Industries	3.41	2.45	5.20	0.23	4.30
FTE Growth**					
IT-Intensive	1.33	0.73	2.87	-2.73	1.93
Less IT-Intensive	2.01	1.80	2.59	0.43	2.23
All Industries	1.77	1.42	2.69	-0.68	2.13
Productivity Growth***					
IT-Intensive	3.03	2.39	3.79	3.10	3.67
Less IT-Intensive	0.42	0.00	1.05	-0.26	0.83
All Industries	1.60	1.02	2.44	0.91	2.19

*Growth figures are annual
**Full-time equivalent worker
***GDP growth minus FTE Growth
Source: U.S. Department of Commerce

Employment in the IT Sector

As the IT sector expanded in the 1990s, so did IT-related employment. From 1993 to 2000, IT-producing industries added jobs at more than twice the rate as the private sector as a whole – a total of 1.8 million jobs. This expansion came to an abrupt halt in 2000 and in the ensuing two years the IT sector lost over 600,000 jobs.[24]

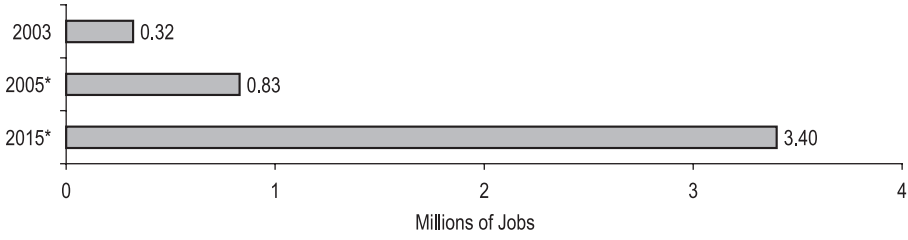
- As the data opposite show, employment in the software and computer services sector grew at a 12.2 percent annual rate during 1993-2000 – double the average rate for all IT-producing industries and almost five times the rate for the private sector as a whole.[25]
- During both years of the downturn, communications equipment accounted for the greatest percentage decreases – 6.4 percent in 2001 and 17.6 percent in 2002. Overall, more than 10 percent of IT-production jobs were lost between 2001 and 2002.[26]
- In 2002, the average wage for IT-production workers was $67,440, almost double the $36,520 wage for private sector workers generally. Wages in the software publishing and software reproducing sectors averaged $99,440 and $92,260, repectively among the highest in the IT industries.[27]
- According to BLS, between 2002 and 2012 software publishers will see the greatest growth in employment, rising from 256,000 jobs to 429,700 jobs. Computer systems design and related services will also see large growth, increasing from 1.2 million jobs to 1.8 million jobs over the same period.[28]
- BLS also reports that computer software engineers will be among the ten fastest growing occupations over the decade between 2002 and 2012, with those focusing on applications growing by 46 percent and those in systems software growing by 45 percent.[29]
- As shown opposite, Forrester Research estimates that 320,000 jobs were outsourced in 2003 and that this figure will grow to 3.4 million by 2015.[30]
- Also as shown opposite, according to a CFO.com study, 22 percent of U.S. businesses that outsource reported savings of 25 percent in labor costs, while 20 percent saved between 21 and 25 percent. Ten percent reported no savings from outsourcing. [31]

IT-Producing Industry Sector Employment

	Employment (millions)				%Change	
	1993	2000	2001	2002	2000-2001	2001-2002
Computer Hardware	1.36	1.68	1.60	1.38	-5.0	-13.8
Software and Computer Services	0.95	2.13	2.16	1.96	1.6	-9.2
Communications Equipment	0.28	0.32	0.30	0.25	-6.4	-17.6
Communications Services	0.95	1.25	1.29	1.19	3.1	-7.6
All IT-Producing Industries	3.24	5.38	5.35	4.78	-0.6	-10.7
All Private Industries	91.86	111.00	110.71	108.89	-0.3	-1.6

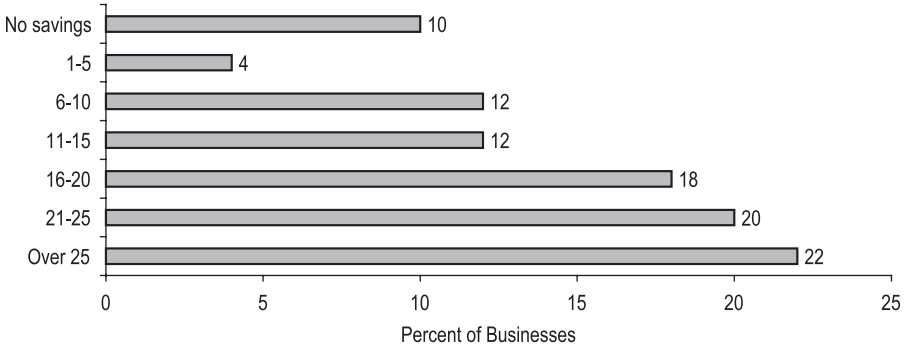
Source: Department of Commerce

Number of U.S. Service Jobs Moving Offshore



*Projections
Sources: Forrester Research, eMarketer

Percent Savings from Offshoring Initiatives Cited by U.S. Businesses



Sources: CFO.com, eMarketer

Appendix: Internet Timeline, July 2003-June 2004

2003

July 1: Court says Gator-style ads are legal. A federal court rules that pop-up ads for rivals of U-Haul International, placed atop the moving company's own site by a third-party software application, are legal. U-Haul had filed suit against software maker WhenU.com alleging that its application, which delivered competitors' ads to U-Haul's site, constituted trademark infringement, unfair competition and copyright infringement.

July 8: McDonald's serves up wireless web access. The company announces a second trial of Wi-Fi access, equipping dozens of restaurants in the San Francisco Bay Area with the gear its customers need in order to surf the Web. Earlier in the year, the company began offering service at 10 restaurants in Manhattan.

July 31: Orbitz antitrust investigation dropped. A Justice Department investigation finds no evidence that the joint venture had resulted in higher fares or made Orbitz dominant in online air travel distribution. Rivals had charged that Orbitz's relationship with airlines had given it an unfair "most-favored nation" status, guaranteeing that the company received the airlines' lowest prices on many fares.

August 21: FCC releases new broadband rules. Six months after voting, the FCC finally releases rules that give incumbent local phone companies considerable new powers in advanced broadband services, eliminating requirements that they have to share these new networks with potential rivals. But the Commission leaves in place many rules that force the phone companies to share their existing networks for voice and DSL service.

August 22: Marketers, FBI unite to curb spam. The Direct Marketing Association, which has about 47,000 members, forms Operation Slam Spam, a group of members and industry leaders who work with the FBI to identify and prosecute spammers.

August 25: DVD-copying code loses free speech shield. The California Supreme Court holds that the First Amendment does not preclude the use of IP laws to block Web publishers from posting a controversial piece of software called DeCSS, used to help decrypt and copy DVDs. An industry technology coalition called the DVD Copy Control Association (DVD CCA) had sued dozens of people in California courts, claiming that posting the software online violated its members' IP rights.

August 25: AOL launches blogging service. America Online launches a new feature called AOL Journals in an effort to piggyback on the grassroots popularity of Web logs, or "blogs." The service lets people publish their own daily musings and complement their text with photos and picture albums. Users can also arrange their journals by topics, such as sports, relationships or books.

September 8: RIAA sues file swappers. The Recording Industry Association of America (RIAA) sues 261 alleged file swappers, launching a legal campaign against

Internet users who made numerous files available for widespread copying through P2P services.

September 12: Copy-protected CDs take step forward. For the first time in the United States, BMG Music promises to release a music CD with anticopying protection, a move that opens a new round of technological experimentation for record labels.

September 15: States seek to regulate VoIP. Wisconsin regulators inform Santa Clara, Calif.-based 8x8 that its Packet8 Internet voice-calling service is subject to the same rules as traditional phone companies, marking the second major move by a state against Internet-based voice providers. The Wisconsin Public Service Commission (PSC) informs 8x8 that it cannot provide voice-calling services within Wisconsin without the PSC's certification, and that its bills for all voice calls within the state are void.

September 16: Study: Students unfazed by piracy. Nearly two-thirds of college students surveyed say they would download pirated software, according to a study released by the Business Software Alliance. Only a third of those students who download commercial software pay for it.

September 17: Commerce Department extends agreement with ICANN for three years. The agreement gives ICANN limited regulatory authority over the Internet's domain name system. ICANN will be expected to meet several milestones relating to domain name system management, including a long-term strategy for selecting new domain name suffixes. It will also work toward the transparency and accountability of its processes and continue to pursue agreements with the operators of domain suffixes for countries.

October 6: Court rejects FCC cable ruling. The United States Court of Appeals for the 9th Circuit holds that the FCC erred when it ruled in March 2002 that cable broadband networks are an "information service" rather than a "telecommunications service." Under the 9th Circuit's view, cable broadband could be subject to regulations that force them to resell their services to third parties.

October 8: Court's call: Hands off VoIP. A federal judge enjoins the Minnesota Public Utilities Commission from applying traditional telephone rules to Vonage, a broadband VoIP pioneer. The judge reasons that Vonage provides an "information service" rather than a "telecommunications service."

October 9: Napster re-launches. A brand-new Napster launches a year after the file-swapping service was sold in pieces in bankruptcy court. The new digital music service, owned by CD- and DVD-burning software company Roxio, is now an authorized music distributor, offering a mix of products similar to Apple Computer's iTunes download store and Roxio's Pressplay monthly digital music subscription service.

October 20: U.S. lawmakers form anti-piracy caucus. A group of federal lawmakers form the Congressional International Anti-Piracy Caucus to fight intellectual property piracy issues, both online and offline. Representatives from movie studios, record labels and software industry trade associations will participate.

November 6: Colleges offer alternatives to P2P file sharing. Napster announces a deal with Pennsylvania State University to give students access to music funded by student fees, in an attempt to replace campus file-swapping with legal listening. The trial project is the first of what will likely be a number of similar efforts over the next year, as colleges work with online music services and record labels to offer students authorized alternatives to networks such as Kazaa.

November 24: Number portability rule goes into effect. Implementing a requirement first adopted in 1996, the FCC mandates that wireless and landline carriers allow consumers to keep their existing phone numbers when switching services.

December 12: Canada deems P2P downloading legal. Downloading copyrighted music from peer-to-peer networks is legal in Canada, although uploading files is not, Canadian copyright regulators say in a ruling. The Copyright Board of Canada also imposes a government fee of as much as $25 on iPod-like MP3 players, putting the devices in the same category as audio tapes and blank CDs. The money to be collected from levies on "recording mediums" goes into a fund to pay musicians and songwriters for revenues lost from consumers' personal copying.

December 16: Bush signs anti-spam bill. President Bush signs the "Can-Spam" (Controlling the Assault of Non-Solicited Pornography and Marketing Act) bill creating the first federal law regulating spam. The measure makes it possible to imprison senders of falsified e-mail headers and/or improperly labeled "sexually oriented" messages. It also clears the way for an anti-spam version of the National Do Not Call registry.

December 18: Walmart.com opens online music store. Retailing giant Walmart unveils an online music service, which sells songs for 88 cents each, undercutting the 99 cent price offered by Apple's iTunes and other major competitors.

December 19: Court refuses to enforce RIAA subpoenas. A federal appeals court, overulling a district court ruling in April 2003, holds that the the RIAA cannot use provisions of the Digital Millenium Copyright Act to subpoena Internet service providers for the identity of possible file swappers on their networks. Instead, the RIAA may file "John Doe" lawsuits and then subpoena the subscribers' information.

Dec 22: News Corp. acquires DirecTV. Following approval from the FCC, News Corp., which owns Fox Studios, acquires the largest US satellite television provider, DirecTV, in a $6.6 billion merger.

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January 8: Feds seek wiretap access via VoIP. The FBI and the Justice Department ask the FCC to order companies offering Voice over Internet Protocol (VoIP) service to rewire their networks to guarantee police the ability to eavesdrop on subscribers' conversations.

January 14: Supreme Court limits telephone suits. The Supreme Court rules that Verizon Communications Inc. and other large regional telephone companies cannot be sued under antitrust laws based on allegations that they fail to adequately open their networks to rivals as required by the Telecommunications Act of 1996, emphasizing the existing regulatory oversight under the 1996 Act.

January 22: Google spawns social networking service. Google launches Orkut.com and joins hugely popular sites such as Friendster and Meetup.com in the hot market for online social networking.

February 11: Comcast offers $66 billion for Disney. Comcast Corp., the largest US cable company, makes an unsolicited bid to merge with Walt Disney Co. The proposed merger is an effort by Comcast to add media content to its distribution system.

February 12: FCC: 'Pure' VoIP not a phone service. Handing a partial victory to Internet phone providers, federal regulators say that voice communications flowing entirely over the Internet are not subject to traditional government regulations. The FCC, in a split decision, approves a request from VoIP provider Pulver.com to be immune from the hefty stack of government rules, taxes and requirements that apply to 20th-century telephone networks.

February 20: Judge: DVD-copying software is illegal. After eight months of deliberation, a San Francisco federal judge rules that software company 321 Studios' popular DVD-copying products are illegal. The judge writes that federal law makes it illegal to sell products that break through DVDs' antipiracy technology, even if consumers have a legal right to make personal copies of their movies.

February 26: VeriSign files lawsuit against ICANN. VeriSign, the leading operator of domain name registries, alleges that the Internet Corporation for Assigned Names and Numbers (ICANN), the body that oversees the Internet's domain name system, is blocking its efforts to introduce new beneficial products and services, and that this pattern of regulatory interference breaches its registry agreement with VeriSign and violates the antitrust laws.

February 26: Justice Department files lawsuit against Oracle. The Justice Department files a lawsuit against software maker Oracle's $9.4 billion bid to acquire software maker Peoplesoft.

March 2: Joint venture plans to offer broadband over power lines. Current Communications Group and Cinergy, a midwestern power company, announce one

of the first large scale rollouts of broadband over power line (BPL) technology in the US with plans to cover over 24 million customers. In February, the FCC proposed rules for utility companies that seek to offer Internet access through their electricity grids in the hope that BPL will help jump-start the use of the grid network to deliver high-speed Net access to U.S. households, especially in hard-to-reach rural areas.

March 2: Court rebuffs FCC's new telecom rules. Federal judges rule the FCC is wrong to force local phone companies to share network bandwidth with broadband rivals, but also say regulators are justified in saying that the incumbent phone companies do not have to share their new advanced broadband networks, which use technology such as fiber optics, with potential competitors.

March 8: China leads in worldwide DSL subscribership. In 2003, China (excluding Hong Kong) accounted for the most DSL subscriptions in the world at 10.95 million. Its surge pushed Japan into second place with 10.27 million, the United States into third place with 9.12 million and South Korea fourth at 6.43 million, according to industry consortium, the DSL Forum.

March 9: EU passes tough new antipiracy law. The European Parliament passes legislation aimed at cracking down on copyright pirates, ranging from DVD counterfeiters to illicit Internet Viagra sellers. Aimed largely at large-scale commercial counterfeiting operations, the bill prompts a surge of last-minute protest from civil liberties groups worried that draconian provisions could be applied to ordinary Net surfers, such as individual music swappers.

March 10: FCC launches broad rulemaking on VoIP. The FCC releases guidelines and questions for public comment that it will use to decide what rules, if any, will govern companies providing Internet telephone services. The agency will use the public comments to determine whether calls that travel over the Internet and the traditional phone network should be regulated.

March 11: AT&T enters VoIP market. AT&T, through a service named CallVantage, begins selling unlimited local and long distance Internet phone service for $40 a month. Aside from the traditional phone companies, AT&T is battling a small coterie of VoIP start-ups that have helped seed the U.S. Internet voice market. They include 8x8; Vonage, which has about 150,000 subscribers; and VoicePulse, a smaller VoIP provider known for the special features only a broadband network could provide.

March 24: EU slaps record fine on Microsoft. The European Union issues its ruling in the long-running case against Microsoft, fining the American software giant over $600 million, the heaviest punishment in any European competition case to date. The European Competition Commissioner rules that Microsoft failed to provide rivals the information they needed to compete fairly in the market for

server software and that the company illegally bundled Windows Media Player with Windows, stifling competition from other media player providers.

March 26: Bush calls for universal broadband access. President Bush endorses universal, affordable access to broadband by 2007 in a move applauded by technology and telephone companies seeking tax and regulatory breaks from Congress and the FCC.

April 20: MCI emerges from bankruptcy. Shedding its former name of WorldCom, telecommunications company MCI emerges from bankruptcy with about the same number of customers as when it first filed but with $10 billion less in annual revenue. Since 2002, MCI had been mired in corporate fraud and accounting scandals. It filed the largest-ever corporate bankruptcy case in July of that year.

April 21: FCC rules AT&T must pay access charges on VoIP service. The FCC rules that AT&T must pay access fees to local landline companies for completing long-distance calls, even when those calls travel partly over the Internet. The FCC says its ruling affects only calls that begin and end on the public switched telephone network and use Internet Protocol networks in between.

April 26: Bush proposes deregulatory measures for broadband. President Bush orders federal agencies to streamline the process of granting broadband providers access to federal land. The White House stresses that Bush is backing the FCC's efforts to deregulate fiber-optic connections, as well as the FCC's development of specifications for broadband over power lines and a Senate proposal to curb taxes on Internet access.

April 28: Comcast withdraws bid for Disney. Comcast Corp. withdraws an unsolicited bid to acquire the Walt Disney Co. after Disney refuses to consider the offer.

April 29: Google files for IPO. Internet search engine Google files an IPO, seeking to go public with a $2.7 billion offering.

May 13: FCC proposes wireless services on vacant TV channels. The FCC proposes rules to permit wireless Internet access on vacant television channels currently unused by broadcasters in order to help expedite the rollout of high-speed Internet services. Under the proposal, computers and other devices can use the spectrum dedicated to vacant TV channels within a given metropolitan market to transmit data over unlicensed, high-speed data connections via wireless technology like Wi-Fi.

May 19: Pull out of the ICF. Leading members such as Verizon Communications and BellSouth pull out of the Intercarrier Compensation Forum (ICF) attempting to negotiate a replacement for the outmoded access charge regime, bringing the effort to the brink of collapse.

May 31: FCC hosts Memorial Day interconnection negotiations. The **FCC** sponsors talks in an attempt to reach private agreements governing the rates that long-distance companies must pay to offer local phone service over networks owned by regional companies.

June 9: Bush administration won't appeal phone decision. The Solicitor General decides not to appeal a March 2004 federal appeals court decision to throw out FCC rules requiring regional phone companies to lease their networks to rivals at discounted rates.

June 15: FTC: Thumbs-down on 'do not e-mail' list. The U.S. Federal Trade Commission, which manages a national "do not call" list designed to let people opt out of telemarketing calls, says that similar technology would be useless in fighting spam because unscrupulous marketers will use it as a source of valid e-mail addresses.

June 15: Apple expands iTunes to Europe. The company launches its music store in UK, French and German markets. Each of the 700,000 tracks are available to download for 79 pence ($1.43) each in the U.K. and 99 European cents ($1.19) in Germany and France.

June 21: Cable operators and phone companies begin offering "triple play" packages. Cablevision Systems introduces a "triple play" bundle of services, offering high-speed Internet access, Internet-based phone calls and digital cable for $90 a month. Local telephone carrier BellSouth announces it will begin trials of a new video over DSL service in order to add digital cable to its provision of phone and Internet service.

June 23: The IPO is back. Customer relationship management software maker Salesforce.com launches its IPO, hoping to raise $85 million. Investors hope that initial public offerings from Salesforce.com and search engine Google will set the stage for a comeback in the technology sector.

June 24: Court rejects media ownership rules. A federal appeals court rejects FCC rules adopted in June 2003 that would have eased restrictions on major media companies and allowed them to buy more outlets.

June 30: Court upholds Microsoft settlement. A federal appeals court upholds Microsoft's antitrust settlement, reached in November 2001 with the Justice Department and several states, rejecting one state's appeal for stiffer remedies.

June 30: Judge enjoins state regulators' ruling on VoIP. A federal district court rules that the New York State Public Service Commission cannot require Internet voice provider Vonage to file for a telephone operator's license.

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[28] Bureau of Labor Statistics, *BLS Release 2002-12 Employment Projections,* (February 11, 2004) (www.bls.gov/emp).
[29] Bureau of Labor Statistics, *BLS Release 2002-12 Employment Projections,* (February 11, 2004) (www.bls.gov/emp).
[30] Forrester Research as reported in eMarketer, *Number of U.S. Services Jobs Moving Offshore, 2003, 2005 & 2015 (in millions),* (May 2004).
[31] CFO.com as reported in eMarketer, *Outsourcers a Small but Confident Group.* (June 11, 2004).

The digital revolution has changed the way we make goods and provide services, transforming virtually every industry and creating whole new categories of products and businesses — all at breathtaking speed. Simply keeping track of what is happening, let alone comprehending it, often seems an overwhelming task.

This sixth edition of The Digital Economy Fact Book is dedicated to providing a factual basis from which analysis of the digital economy can begin. It seeks to sort out the myths from the realities, the hyperbolic hopes from the sober projections. In six key sections, it presents the best available information on:

- The Growth of the Internet
- The Hardware Sector
- The Communications Sector
- Financing the Digital Economy
- Electronic Commerce
- The Digital Economy

In each section, the authors present the best and most recent historical data, along with projections from the leading research firms, on topics like Information Appliances, Online Music, Venture-Capital Investments in the IT Sector, Broadband Subscribership and the Contribution of the IT Sector to Economic Growth.

This edition also includes a month-by-month timeline of key events affecting the digital economy during 2003-2004.

The Digital Economy Fact Book is a must-have reference source for anyone interested in the changes happening in today's fast-moving economy.

The Progress & Freedom Foundation
1401 H St., NW, Suite 1075, Washington, D.C. 20005
Phone: 202-289-8928 Facsimile: 202-289-6079
E-mail: mail@pff.org Web: http://www.pff.org