Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:	)	
International Comparison and Consumer Survey Requirements in the Broadband Data Improvement Act	)	GN Docket No. 09-47
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act	)	GN Docket No. 09-137

VERIZON AND VERIZON WIRELESS
COMMENTS – NBP PUBLIC NOTICE # 18

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Broadband is a key driver of economic growth and opportunity in the United States. Study after study has confirmed the significant benefits to the economy as a result of increased broadband deployment and adoption. A sampling of these studies is attached,[1] and these studies show that broadband investment has led and will continue to promote tremendous gains in the United States economy, both in terms of increased productivity and job creation. Broadband investment has generated and sustained millions of jobs. By breaking down the traditional barriers of distance and location, broadband also brings ever-expanding economic opportunities to businesses and communities of all sizes and locations.

Broadband plays a critical role in the overall success of our nation's economy. The information, communications, and technology sector contributed over $900 billion to the nation's gross domestic product (GDP) in 2007.[2] Moreover, studies have shown that over $300 billion of the nation's GDP is supported by Internet activity related to the exchange of products, services or information.[3] Broadband Internet access has also substantially increased economic productivity. Even between 1995 and 2002, when Internet access was primarily available through slower dial-up connections, information and communications technology advances were responsible for two-thirds of total growth of productivity, and virtually all growth in worker

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[1] Patrick S. Brogan, *The Economic Benefits of Broadband and Information Technology*, 18 MEDIA L. & POL'Y 65 (2009) *available at* http://www.nyls.edu/user_files/1/3/4/30/84/187/245/Brogan,%20SPRING%202009,%2018%20MEDIA%20L.%20&%20POL%E2%80%99Y.pdf. ("*Brogan Study*") (Attached as Appendix A); Hamilton Consultants, Inc., John Deighton et. al., *Economic Value of the Advertising Supported Internet Ecosystem*, Internet Advertising Bureau (June 10, 2009) *available at* http://www.iab.net/economicvalue. ("*Hamilton Study*") (Attached as Appendix B).

[2] *Brogan Study* at 70.

[3] *Hamilton Study* at 24.

productivity.[4] Replacing dial-up networks with broadband connections accelerates this increase in productivity even more.[5]

Broadband investment – driven in significant part by sustainable facilities-based competition for last mile services – has further spurred the economy.[6] One study has calculated that every dollar invested in broadband results in a ten-fold return on that investment.[7] Information and communications technology investment has grown thirty-three percent since 2003.[8] Broadband providers alone are estimated to have invested more than $64 billion in 2008.[9] Last mile broadband investment includes deployment of fiber networks and, upgrades to cable networks, and implementation of advanced wireless technologies.[10] Verizon FiOS has led the charge with its next-generation fiber-to-the-premises deployment which currently passes more than 14.5 million households and businesses. Verizon Wireless has also invested heavily to deploy mobile broadband services. Its third generation (3G) mobile broadband capability using EV-DO Rev. A technology is available to more than 280 million Americans. Verizon Wireless has also announced plans to deploy its fourth generation (4G) wireless network based on Long Term Evolution (LTE) technology, which promises even faster mobile broadband access. The

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[4] US Broadband Coalition, *Report of the US Broadband Coalition on a National Broadband Strategy* at 9-10 (Sep. 24, 2009) *available at* http://www.baller.com/pdfs/US_Broadband_Coalition_Report_9-24-09.pdf ("*US Broadband Coalition Report*") (citing Dale w. Jorgenson et. al., "A Retrospective Look at the U.S. Productivity Growth Resurgence," Federal Reserve Bank of New York, February 2007).

[5] *Id.*

[6] *Brogan Study* at 75.

[7] *US Broadband Coalition Report* at 10 (citing Michael Curri, Strategic Networks Group, "The Transformative Effects of FTTP" (March 2008), *available at* http://tinyurl.com/6m9cfw).

[8] *Brogan Study* at 73.

[9] *Id.* at 74.

[10] *Id.*

presence of Verizon's and Verizon Wireless's broadband services in the marketplace push all broadband providers to compete based on price, speed, availability, and quality.[11]

Broadband investment has further stimulated job creation and retention. Infrastructure investment is expected to create or retain between 1 million and 2.5 million jobs in the near term.[12] Between 2001 and 2007 the information, communications and technology sector as a whole sustained at least 10 million jobs across the economy.[13] And over the last ten to fifteen years, more than 1.2 million jobs were created that are directly related to the Internet, such as working directly in the building or maintenance of infrastructure, the facilitation of the Internet's use, or Internet advertising and e-commerce.[14] Further, an additional 1.9 billion jobs were created in order to support the Internet-related jobs.[15]

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[11] For example, Cablevision, Comcast, and Time Warner have either begun to offer faster speeds through DOCSIS 3.0 services or announced plans to do so in the near future. *See* Press Release, *Cablevision Breaks the Century Mark - Introduces Nation's First 101-Megabits-Per-Second High-Speed Internet Service, Optimum Online Ultra* (April 28, 2009), *available at* http://www.cablevision.com/about/news/article.jsp?d=042809; Comcast Corporation Q1 2009 Earnings Call Transcript (April 30, 2009), *available at* http://seekingalpha.com/article/134349-comcast-corporation-q1-2009-earnings-call-transcript?page=-1; Todd Sprangler, "Time Warner Cable Queues Up DOCSIS 3.0 In NYC," *Multichannel News* (April 30, 2009), *available at* http://www.multichannel.com/article/230929-Time_Warner_Cable_Queues_Up_DOCSIS_3_0_In_NYC.php. In addition, AT&T is taking interim steps to upgrade its current 3G High Speed Packet Access network to faster speeds. Kevin Fitchard, *AT&T Doubling 3G Capacity*, Telephony Online (Apr. 20, 2009). Sprint and Clearwire plan to offer their competing 4G WiMAX service widely by the end of next year. *See* Verizon at JPMorgan Global Technology, Media and Telecom Conference Transcript, Thompson StreetEvents at 7 (May 18, 2009), *available at* http://investor.verizon.com/news/20090519/20090519_transcript.pdf.

[12] *US Broadband Coalition Report* at 10 (citing Robert Atkinson, Daniel Castro, Stephen Ezell, "The Digital Road to Recovery: A Stimulus Plan to Create Jobs, Boost Productivity and Revitalize America," ITIF, January 2009, http://tinyurl.com/99z48w; Communications Workers of America, "Broadband Investment Creates Jobs," Letter to Congress, December 2008, http://tinyurl.com/n6ja5x).

[13] *Brogan Study* at 81

[14] *Hamilton Study* at 55.

[15] *Id.*

Beyond jobs related to the Internet and information technology sectors, broadband provides economic opportunities for businesses and communities through education and job training opportunities, access to employment information, social networking, and the possibility of teleworking. Broadband "erodes the traditional barriers of time and distance, levels the playing field, gives rural businesses access to national and international markets, and enables very small and home-based businesses to thrive."[16] Broadband benefits small businesses through "more affordable access to job training for employees, improved access to suppliers, and faster outreach to potential and actual consumers through Websites, emails, and e-commerce."[17] Broadband also provides unique opportunities for home-based entrepreneurs.[18] Studies have shown that growing numbers of successful home-based entrepreneurs are due to broadband adoption, use of social networking media, and the growing availability of business support software and services.[19]

Lastly, improving broadband adoption rates is crucial to enabling all communities to participate in the economic opportunities afforded by broadband access. Community centers, such as community colleges and libraries, can serve as access points and training hubs to

[16] Rural Utilities Service Administrator, Jonathan Adelstein, Dep't of Agriculture, Testimony Before the Committee on Small Business, United States House of Representatives, Hearing on the Recovery Act and Broadband: Evaluation of Broadband Investments on Small Businesses and Job Creation, October 28, 2009, *available at* http://www.house.gov/smbiz/hearings/hearing-10-28-09-broadband/Adelstein.pdf.

[17] Assistant Secretary of the Department of Commerce, Lawrence E. Strickling, Testimony Before the Committee on Small Business, United States House of Representatives, Hearing on the Recovery Act and Broadband: Evaluation of Broadband Investments on Small Businesses and Job Creation, October 28, 2009, *available at* http://www.house.gov/smbiz/hearings/hearing-10-28-09-broadband/Strickling.pdf.

[18] *Id*. at 4.

[19] *Id.*

improve broadband adoption, especially for populations with low adoption rates.[20] In addition, community colleges can use high-capacity broadband connections between campuses for classroom instruction, to reduce overall network costs, and to enhance and expand job training classes.[21]

In sum, as the attached studies further demonstrate, not only does broadband investment and expansion serve as the backbone of significant growth in the U.S. economy, but it also provides unprecedented economic opportunities to businesses and communities across the nation.

[20] *See* Joint Center For Political and Economic Studies, Media and Technology Institute, *Broadband Imperatives for African Americans: Policy Recommendations To Increase Digital Adoption for Minorities and Their Communities*, September 2009 at 13, *available at* http://www.jointcenter.org/publications_recent_publications/media_and_technology/broadband_imperatives_for_african_americans; U.S. Chamber Of Commerce, The Impact of Broadband on Senior Citizens, at 5, 31 (Dec. 2008), *available at* http://www.uschamber.com/NR/rdonlyres/edp7qgdm6hxo6d7jm365ckwgynjgkihfk27obqr5csczpf3sgmd6vy2xut45vdljkdoz62wa7y55awtolulbkqr57ih/BroadbandandSeniors.pdf ; American Library Association, *Libraries Connect Communities 3: Public Library Funding & Technology Access Study*, at 47 (Sep. 2009) *available at* http://www.ala.org/ala/research/initiatives/plftas/2008_2009/librariesconnectcommunities3.pdf (surveying formal and informal training opportunities in public libraries across the country).

[21] *US Broadband Coalition Report* at 11.

Respectfully submitted,

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APPENDIX A

THE ECONOMIC BENEFITS OF BROADBAND AND INFORMATION TECHNOLOGY

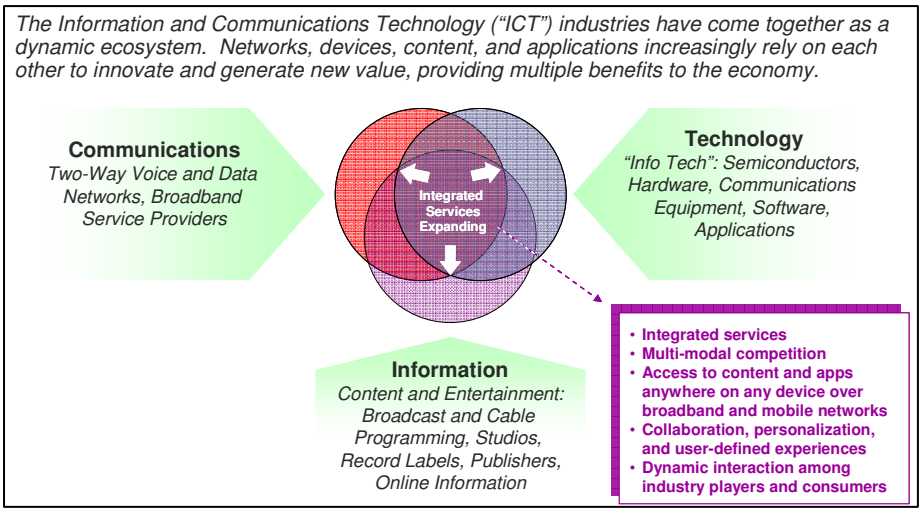
by

Patrick S. Brogan*

I
INTRODUCTION

Developments over the last half-decade have provided critical mass for the phenomenon of "convergence" – the coming together of the information, communications, and technology (ICT) industries technologically, economically, and competitively. In this dynamic and growing ecosystem, providers of broadband communications networks, digital devices, and a limitless array of content and applications all rely on each other to generate new value for consumers and multiple benefits for the U.S. economy. At the same time, ICT industries are competing across traditional industry boundaries. See Figure 1.

Figure 1: The Dynamic ICT Ecosystem



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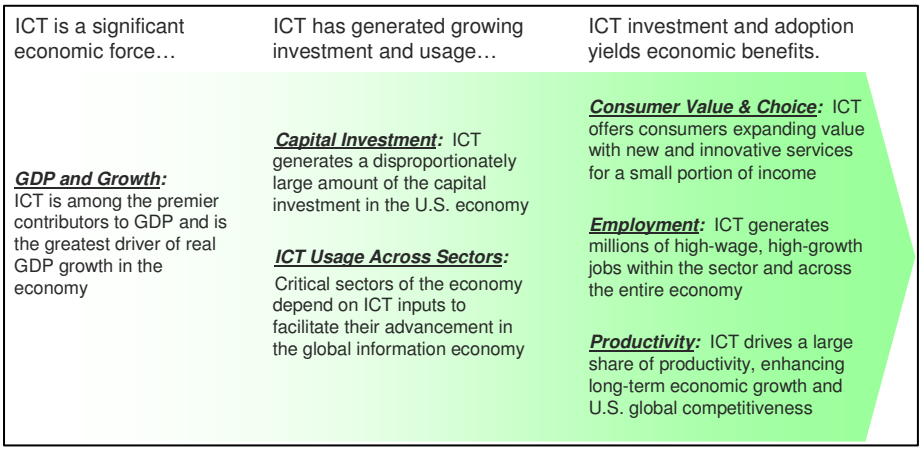
The purpose of this analysis is to illuminate the interdependence and competitiveness of the ICT industries, the growing impact of ICT on the broader economy, and the benefits of continued investment in this young, flourishing ecosystem.

The U.S. economy depends on the continued health of the ICT sector. Given the interdependence of ICT industries, the analysis that follows takes a holistic approach. It describes the economic impact of the full ICT sector, in relation to other sectors and in relation to the economy as a whole. The analysis begins with the contribution of ICT to economic output, or Gross Domestic Product (GDP). It then looks at growing investment in ICT and the use of ICT inputs across the economy. The analysis then explores the broader economic benefits of ICT, including the impact on consumer value and choice, jobs, and productivity. See Figure 2.

Figure 2: Framework for Analysis of ICT Economic Impact



Projecting the sector's successful growth into the future must be the key goal of relevant policymakers. Doing so will require careful attention by policymakers to the entire ICT ecosystem and the checks and balances that exist within it. Any change to current policies bears a heavy burden to demonstrate how that change could improve sector performance and to carefully account for the affects on jobs, growth and innovation as that change ripples through the ICT ecosystem. The risks involved in upsetting the balance that has produced the ICT record of economic success and innovation over the last several years should give pause to any policymaker considering changing course.

Rather, policy should maintain a positive climate of ICT industry and consumer-driven investment, innovation and growth.

II

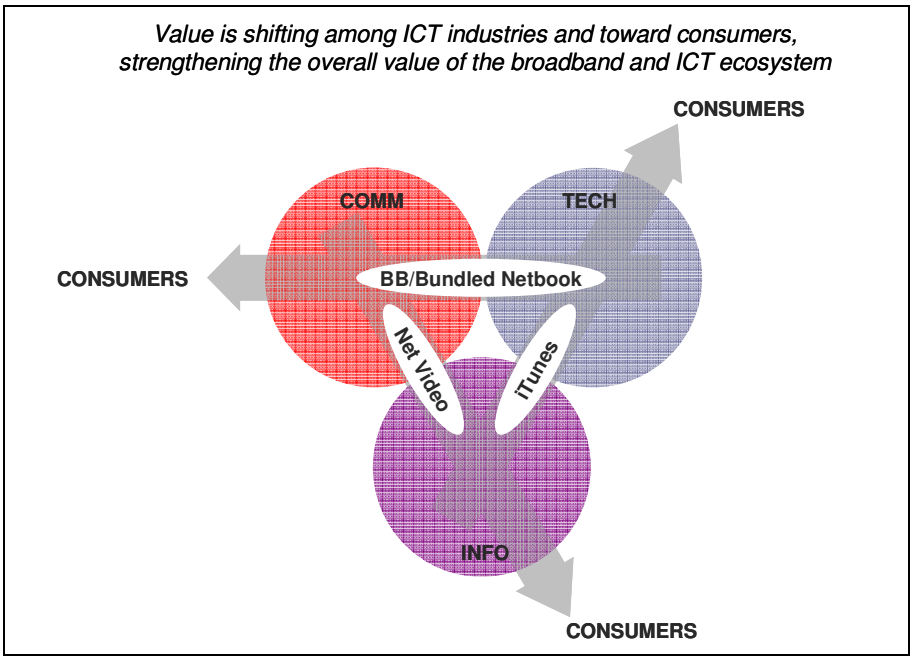
HOW CONVERGENCE HAS ALTERED THE ICT INDUSTRY DYNAMIC

As a result of convergence, the information, communications, and technology (ICT) industries[1] are at the same time interdependent and competitive. Industry players rely on each other to generate new value while competing across traditional industry boundaries to provide integrated services. The result is a relatively unfettered process of dynamic and flexible interaction among ICT players and consumers that has generated massive innovation. Consumers today can access a growing menu of content and applications anywhere, anytime using a growing choice of devices. New products and services are driven by collaboration, personalization, and user-defined experiences.

As this dynamic ecosystem grows, new broadband-enabled business models arise, creating new value and disrupting traditional relationships within industries. Perhaps less noticed, but of great importance, is the shifting of value between and among the ICT industries and consumers. See Figure 3.

[1] For this analysis, "ICT" industries" consist of information (digital or digitize-able content and entertainment), communications (broadband networks), and technology (information technology such as hardware, software, communications equipment). These industries are found in the following categories of the North American Industry Classification System (NAICS): Computer and Electronic Product Manufacturing, Computer Systems Design and Related Services, and the "Information" Industries, which consist of Telecommunications and Broadcasting, Publishing Industries including Software, Motion Picture and Sound Recording Industries, Information and Data Processing Services. The Computer and Electronic Product Manufacturing industry is part of the Durable Goods Manufacturing sector and the Computer Systems Design and Related Services industry is part of the Professional, Scientific, and Technical Services Sector. The analysis at times refers to the ICT sector, which consists of the collective ICT industries. *See* U.S. Census Bureau: North American Industry Classification System (NAICS), http://www.census.gov/eos/www/naics/. *See* Appendix, *infra* at 89, for discussion of GDP measurement as used throughout this paper.

Figure 3: Illustrative Examples of ICT Value Shifts



- iTunes: Apple, a technology company, has become the leading U.S. music retailer[2] using the broadband Internet and computers, disrupting the traditional music distribution chain. Value shifts away from the music industry (information) toward technology and consumers.

- Net Video: Online video services (e.g., Hulu, NBC.com, and ESPN360) are bypassing traditional content distribution, i.e., subscription video, using the broadband Internet. Value shifts away from subscription video toward content providers and consumers.

- Broadband Bundled Netbooks: ISPs have started to offer customers cheap, portable computers at a subsidized rate in exchange for a term contract, like cell phones.[3] Consumer

[2] Press Release, Apple, Inc., iTunes Store Top Music Retailer in U.S., (Apr. 3, 2008), http://www.apple.com/pr/library/2008/04/03itunes.html.

[3] *See generally*, *Get an AT&T Netbook for 50 Bucks – With a Catch*, CHANNELWEB (Apr. 1, 2009), http://www.crn.com/mobile/216402367.

> acceptance of this approach could bring more people online and shift value from and within the technology sector.

Whether well established (iTunes) or more experimental (online video, netbooks), these examples demonstrate how value can shift among ICT industries. Consumers capture value through cheaper, more powerful products and services. Industry value-capture is driven by flexible negotiation and interaction among ICT players. In this dynamic environment, shifting value and interdependence provide the checks and balances needed to ensure that consumers will benefit from sustained investment and innovation.

III
ICT IMPACT ON THE U.S. ECONOMY

A. ICT Impact on GDP and Economic Growth

The analysis begins with an examination of the ICT sector's contribution to GDP. To compare ICT to other sectors, we use GDP-by-Industry data from the U.S. Department of Commerce, Bureau of Economic Analysis (BEA). The data are based on the value-added approach to measuring GDP, as described in the Appendix Part A. The GDP-by-Industry data are provided at various levels of granularity, which allowed us to develop sector groupings appropriate for analysis.[4]

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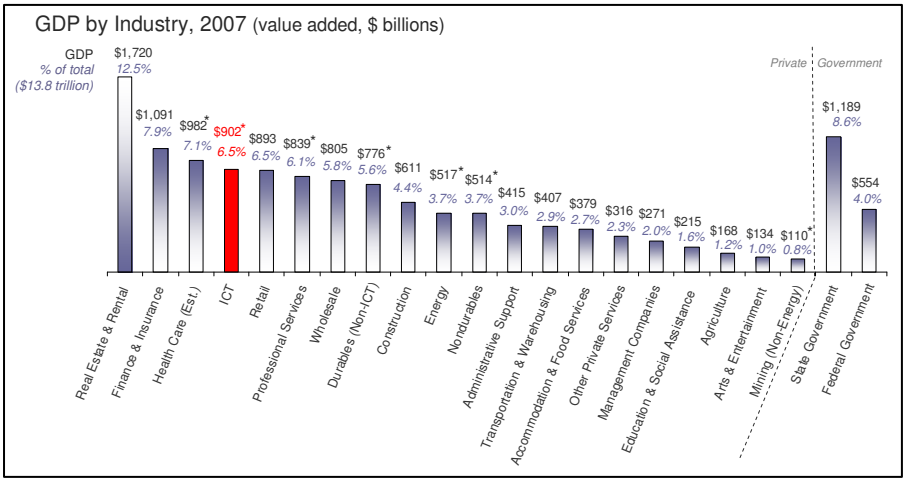
[4] The ICT sector was formed by combining the Computer and Electronic Products Manufacturing industry from the Durable Goods sector and the Computer Systems Design and Related Services industry from the Professional, Scientific, and Technical Services sector and combining them with the Information Sector (consisting of the Telecom and Broadcasting, Information and Data Processing Services, Publishing Industries including Software, and Motion Picture and Sound Recording industries). We shifted Pharmaceuticals from Nondurable Goods Manufacturing to Health Care. Pharmaceuticals were estimated as 44.3% of chemicals product manufacturing, or $110 billion out of $249 billion for 2007, based on the Pharmaceutical portion of Chemical Manufacturing Value Added in the BEA 2002 Benchmark Input-Output Accounts. We also shifted $17 billion from Mining (Gas and Oil Extraction) and $70 billion from Nondurables (Petroleum and Coal Products) and combined with Utilities to form an Energy category. *See* U.S. Department of Commerce: Bureau of Economic Analysis (BEA), http://www.bea.gov/ (last visited Apr. 10, 2009).

The ICT sector contributed over $900 billion to GDP in 2007. ICT was among the top sectors in the economy at about 6.5% of the total GDP. Only the Real Estate, Finance, and Health Care sectors contributed more. See Figure 4.

Figure 4: Industry Contributions to GDP[5]



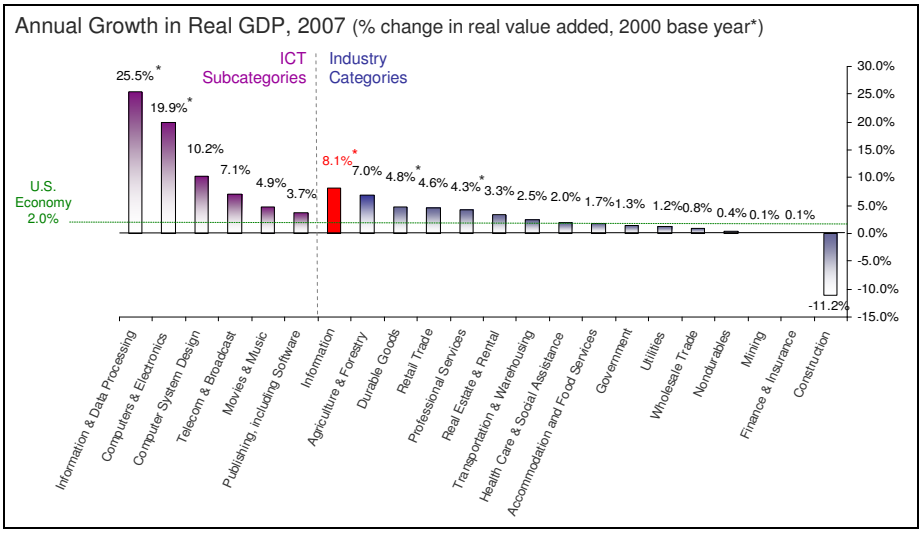
Moreover, ICT was by far the greatest contributor to *real* U.S. GDP growth.[6] Due to data limitations, we discuss *real* GDP in terms

[5] BEA, GDP-By-Industry Data 1998-2007, *available at* http://www.bea.gov/industry/gdpbyind_data.htm (Figures are in nominal dollars, i.e., not adjusted for inflation or deflation).

[6] Real GDP accounts for the fact that consumers and businesses get more "real" output for the dollar from ICT due to declining prices and the increasing power of ICT products and services, such as computers and broadband. Real GDP presents several measurement issues that prevent us from looking at the real GDP of a combined ICT sector. Unlike the nominal GDP data, real GDP figures cannot be combined across industries, as we did with the nominal data to form a combined "ICT sector." This is because the "chaining" process that BEA uses to convert nominal to real dollars for each sector and industry yields real GDP figures that are not additive (i.e., the economy-wide total does not equal the sum of the sectors and the sector totals do no equal the sum of the industries). Therefore, we are limited to looking at growth for the sectors and industries for which BEA provides real GDP data. A note of caution on interpreting the chart: two sectors include ICT industries. These are the Durables and Professional Services sectors, which include Computer and Electronics Manufacturing and Computer System Design and Related Services, respectively. Therefore these sectors' growth rates are overstated compared to rates that would result if the ICT component industry had not been included.

of the categories and subcategories provided in the government data, rather than our composite "ICT "sector. Real GDP for the Information sector—the category that comprises most of our composite ICT sector—grew 8.1% in 2007, greater than any other sector and four times the 2% rate of the economy as a whole. In fact, all of the subcategories comprising our ICT sector outgrew the overall economy: Information and Data Processing Services 25.5%; Computer and Electronic Product Manufacturing 19.9%; Computer System Design and Related services 10.l%; Telecom and Broadcasting 7.1%; Motion Picture and Sound Recording Industries 4.9%; and Publishing Industries (including Software) 3.7%. See Figure 5.

Figure 5: Industry Contributions to Real Economic Growth[7]



B. ICT Investment

We turn next to investment[8] because ICT investment has a disproportionate impact on GDP and is the source of many other economic benefits, such as consumer value and choice, employment, and productivity. We address investment from two perspectives.

[7] *See* GDP-By-Industry Data, *supra* note 5 at tab 97NAICS_VA, GO, II, series code VACHN.

[8] "Investment" as used herein refers to private investment in fixed assets. Governments also invest in ICT, but ICT investment is not broken out of government investment spending.

First, firms across the economy, including firms in ICT and non-ICT industries, invested $455 billion in ICT equipment, software, and structures in 2008. Second, firms from the ICT industries invest in all types of assets, mostly but not exclusively ICT equipment, software, and communications structures. We look at the specific case of broadband service providers, who invested at least $64 billion in 2008, depending on the source and the methodology of estimation.[9]

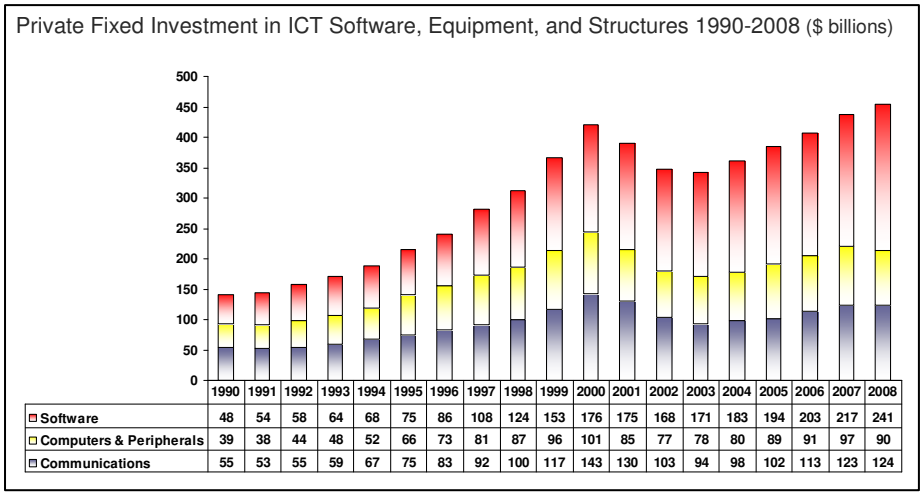
1. *Economy-Wide Investment in ICT*

ICT investment contributes a disproportionately large share of U.S. private fixed investment. Private fixed investment across the U.S. economy in 2008 was $2.041 trillion, about fourteen percent of GDP. This investment consisted of $488 billion in residential investment, $555 billion in non-residential structures, and $999 billion in non-residential equipment and software.[10] Total 2008 investment in ICT equipment, software, and structures was $455 billion, consisting of $241 billion in software, $90 billion in computers and peripherals, plus $103 billion in communications equipment and $21 billion in communications structures. See Figure 6. The $455 billion of ICT investment represented twenty two percent of all private fixed investment and the $434 billion invested in ICT equipment and software accounted for forty three percent of non-structural investment.

[9] Different sources for tracking capital expenditures are discussed in Part III.B.2, *infra* at 73.

[10] BEA, National Income and Products Accounts (NIPA) Table 1.1.5. Gross Domestic Product, *available at* http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N (last visited Apr. 10, 2009).

Figure 6: Nominal Private Fixed Investment in ICT[11]



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Software	48	54	58	64	68	75	86	108	124	153	176	175	168	171	183	194	203	217	241
Computers & Peripherals	39	38	44	48	52	66	73	81	87	96	101	85	77	78	80	89	91	97	90
Communications	55	53	55	59	67	75	83	92	100	117	143	130	103	94	98	102	113	123	124

ICT investment has grown substantially in the last half-decade. Since bottoming after the technology and telecommunications bubble of the late 1990s and early 2000s, annual ICT investment has grown by thirty three percent, from $343 billion in 2003 to $455 billion in 2008. Fueled by broadband, annual communications equipment and structures investment grew thirty two percent from $94 billion to $124 billion during the same period. *Real* annual communications equipment investment, which accounts for the effects of declining prices and the increased power of the equipment, was forty percent greater in 2008 than 2003 and surpassed the peak levels achieved in 2000 during the technology and telecommunications bubble.[12] See Figure 16.

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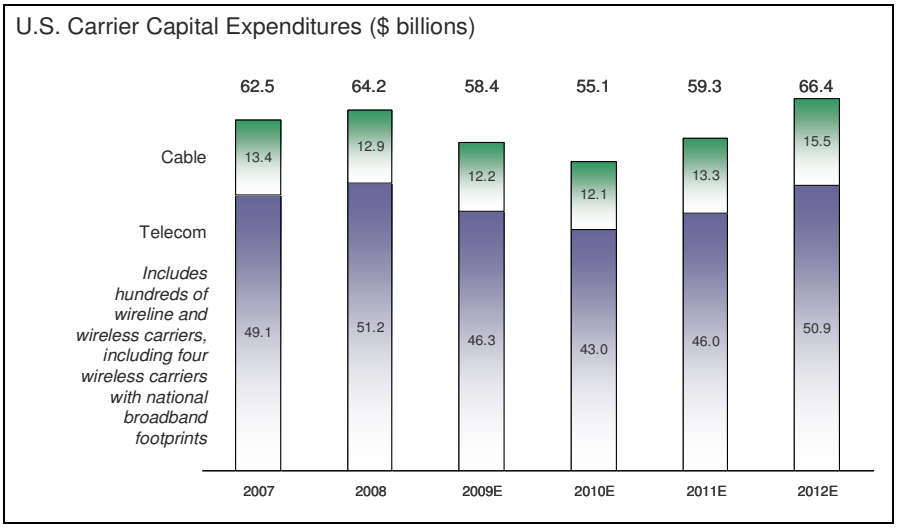
[11]BEA, NIPA Table 5.5.5U Private Fixed Investment in Equipment and Software by Type and Table 5.4.5BU Private Fixed Investment in Structures by Type, *available at* http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N. (Communications structures include telephone, television, and radio, distribution and maintenance buildings and structures. *See* Paul R. Lally, *Survey of Current Business*: *How BEA Accounts for Investment in Private Structures*, BEA (Feb. 2009), *available at* http://www.bea.gov/scb/toc/0209cont.htm (last visited Apr. 10, 2009); *see also* related discussion of definitions and methodology for the Census Bureau's Monthly Construction Survey at http://www.census.gov/const/www/methodpage.html (last visited Apr. 10, 2009).

[12] BEA, NIPA Table 5.5.6U Real Private Fixed Investment in Equipment and Software by Type, *available at* http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N. BEA derives

2. *Broadband Provider Investment*

Broadband providers invested at least $64 billion in 2008. Market research firm the Yankee Group estimates that broadband providers invested $64.2 billion in 2008, up from $62.5 billion in 2007. See Figure 7. The U.S. Census Bureau publishes broader capital expenditure estimates in the $80 billion range. Further, the Census Bureau publishes historical data showing that, like economy-wide investment in ICT, broadband provider investment has grown significantly over the last half-decade. Census estimates indicate annual carrier investment was thirty percent greater in 2007 than 2003.[13]

Figure 7: Carrier Capital Expenditures and Projections[14]



"real" dollar measures by using a method called "chaining" that states current dollars in terms of the purchasing power of dollars in a base year, here 2000.

[13] U.S. Census Bureau, 2007 Annual Capital Expenditure Survey, Table 4a, and 2004 Annual Capital Expenditure Survey, Table 4b, *available at* http://www.census.gov/csd/ace/ (last visited Mar. 31, 2009). (The difference between the Census Yankee Group data cited is likely due to the broader scope of industries covered in the Census survey and differences in methodology. Census capital expenditure estimates are higher, $62 billion in 2003 and $80 billion in 2007.)

[14] Graphic created by US Telecom using source data from Yankee Group. © Copyright 1997-2009. Yankee Group Research, Inc. All rights reserved. Data are in nominal dollars. Includes wired and wireless telecommunications carriers and cable providers. Wireless spectrum license payments are not included.

Broadband era investment is based on a solid foundation of facilities-based last mile competition. The tech and telecom bubble era of the late 1990s to early 2000s was marked by strong ICT investment. Some investment yielded lasting value, such as the build out of corporate data networks, carrier fiber networks, national wireless networks, and the overall growth of the Internet. But much was driven by speculative investment. The broadband era, starting in roughly 2003, provides an instructive contrast. Investment is being driven in significant part by sustainable facilities-based competition for the last mile and continued integration of broadband ICT into the fabric of the economy. Examples of last mile broadband investment include deployment of fiber networks, such as FiOS and U-verse, upgrades to cable networks with DOCSIS 3.0, and implementation of wireless broadband technologies such as EV-DO Revision A, GPRS/HDSPA, WiMAX, and LTE. As noted above, we have surpassed bubble era investment levels.

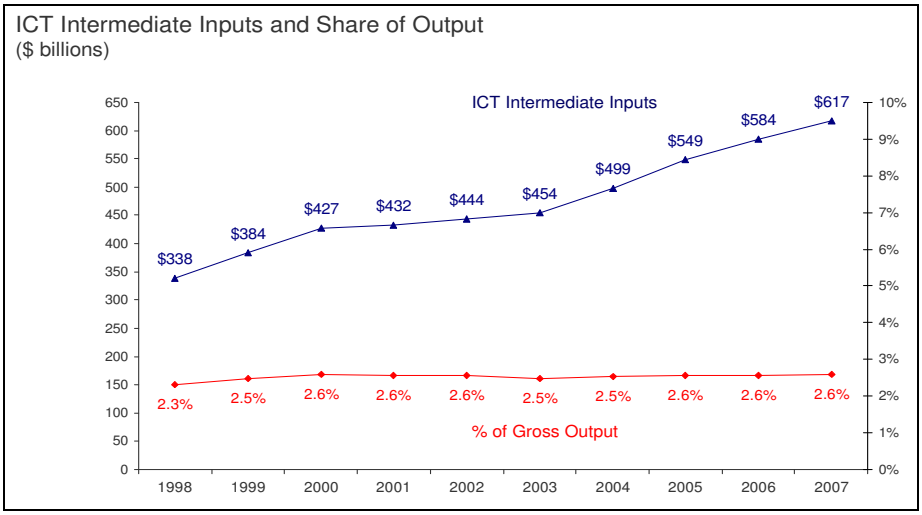
C. Intermediate Use of ICT

The U.S. economy depends on ICT inputs to thrive in the global information economy. Inputs are not directly measured in GDP.[15] Nonetheless, the growing use of ICT inputs indicates that ICT is becoming increasingly ingrained in the way U.S. firms conduct business. Non-ICT sectors spent $617 billion on ICT inputs in 2007 up from $338 billion in 1998. Yet, despite the growing power of the technology, spending on ICT consumed a relatively flat share of total output. See Figure 8. Including ICT sector use, ICT inputs were just

[15] ICT intermediate inputs, or "inputs" for short, are similar to investment, but different in important respects. Inputs are similar to investments in that they reflect adoption and use of ICT technologies and services. But ICT inputs are different from investment in that they are not reflected in GDP—at least not directly. The key difference between an investment and an input is the investment contributes to future production and has a useful life of more than a year, whereas an input is used in production with a year. As shown in Appendix Part A, inputs are used to produce other products and services. Therefore inputs are reflected in GDP only indirectly through the sale of some other final good or service. Otherwise the value of the input would be double counted. For example, a manufacturer builds computer inputs into an automobile, but only the value of the automobile is reflected in GDP. A personal financial advisor utilizes voice and data networking inputs to monitor investments and communicate with clients, but its monthly networking bill is not reflected in GDP except through its fees, which recover its operational costs.

over $1 trillion in 2007.[16] Critical sectors, including Professional Services, Health Care, Finance, and Government (which includes Public Education) are heavy users of ICT inputs. See Figure 9.

Figure 8: ICT Input Growth Over Time[17]



[16] BEA, Industry Economic Accounts, 1998-2007 KLEMS Intermediate Use Estimates, *available at* http://www.bea.gov/industry/more.htm (last visited Apr. 10, 2009).

[17] *See* 1998-2007 KLEMS Intermediate Use Estimates, *supra* note 16.

Figure 9: Non-ICT Industry Spending on ICT Inputs in 2007[18]

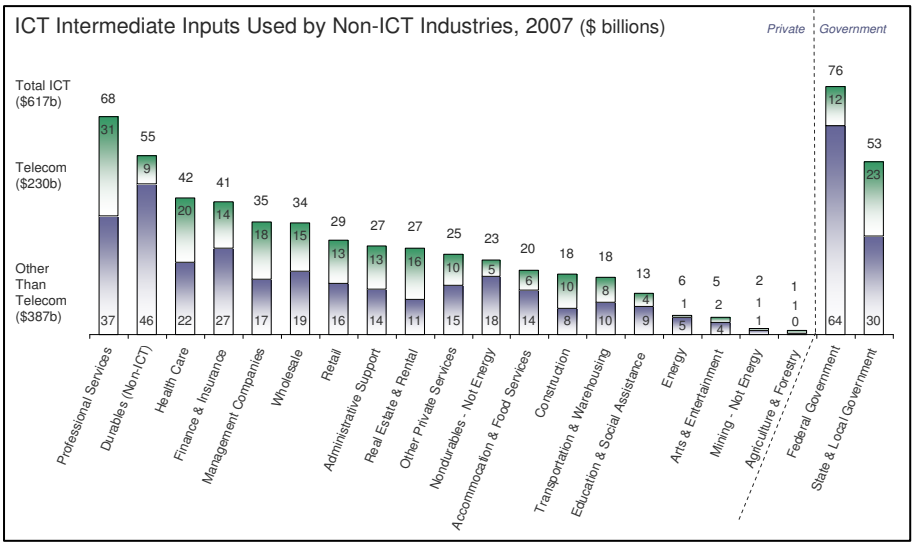
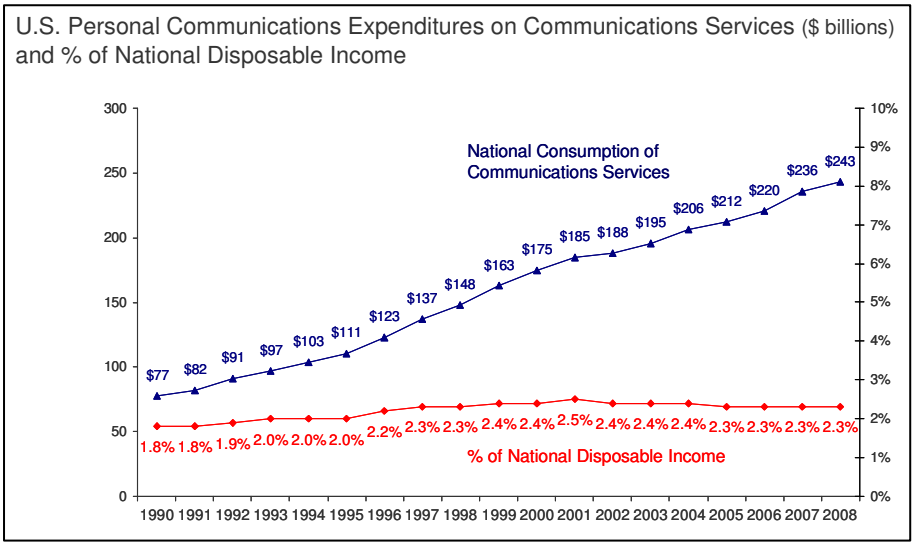


Figure 10: Communications Consumption and Share of National Income[19]



[18] *Id.*

[19] *Id.*

D. Consumer Value and Choice

ICT has provided consumers exponentially better value for a stable share of national income. Since 1990, consumer spending on ICT has grown from $197 billion to $545 billion, 5.1% of national disposable income in 1990, peaking at 5.9% in 2000, and falling to 5.4% last year.[20] Spending on communications services, a subset of ICT, has tripled over the same period, from $77 billion to $243 billion, and at 2.3% of national disposable income, up from 1.8% in 1990 but below its peak of 2.5% in 2001.[21] See Figure 10. Yet consumer value has grown exponentially in the intervening years.

For example, in communications, consumers have *exponentially* more and better choices today. Figure 11 shows that the mix of spending has shifted over time from traditional voice services to broadband, entertainment, and mobile services. Yet, while U.S. communications expenditures as a share of national disposable income have been flat since 1997, we have added over 100 million broadband and video connections, hundreds of new video programming choices, and over 100 million wireless connections.

- In 1990, the Internet was unknown to most of the U.S, yet by mid 2008, 55% of U.S. households subscribed to home broadband.[22] As broadband penetration has grown, new technologies such as fiber and mobile broadband have taken a growing share of new subscriptions. See Figure 12. Prices for basic wireline broadband services have dropped by half since the beginning of the decade. See Figure 13. By 2007, consumers could get 10-20 times the speed they could get for the same price as they paid at the start of the decade.

[20] BEA, NIPA Table 2.4.5U Personal Consumption Expenditures by Type of Product, *available at* http://www.bea.gov/national/nipaweb/nipa_underlying/Index.asp; NIPA Table 2.1 Personal Income and its Disposition, *available at* http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N#S2.

[21] *Id*.

[22] John B. Horrigan, Home Broadband Adoption 2008, PEW Internet and American Life Project (July 2008), http://www.pewinternet.org/~/media//Files/Reports/2008/PIP_Broadband_2008.pdf.

- In 1990, there were approximately 52 million multi-channel video subscribers, compared to 99 million in 2008.[23] In 1994 there were 106 national cable programming networks[24] compared to 565 in 2006.[25]
- In 1990 there were 5 million wireless subscribers compared to 270 million in 2008.[26] Wireless consumers used an average of 140 minutes per month in 1993 compared to 769 in 2007.[27] Wireless data accounted for 18% of wireless service revenue in 2007.[28]

[23] *See* National Cable & Telecommunications Association, http://www.ncta.com/Statistics.aspx (last visited Apr. 8, 2009) (2008 data includes 64 million cable and 35 million non-cable subscribers). 1990 data includes cable subscribers only (as non-cable subscribers were negligible) available at http://www.ncta.com/Stats/BasicCableSubscribers.aspx (last visited Apr. 20, 2009).

[24] *In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, FCC 95-491 at 72 (Dec. 11, 1995), *available at* http://www.fcc.gov/mb/csrptpg.html (visited Apr. 16, 2009).

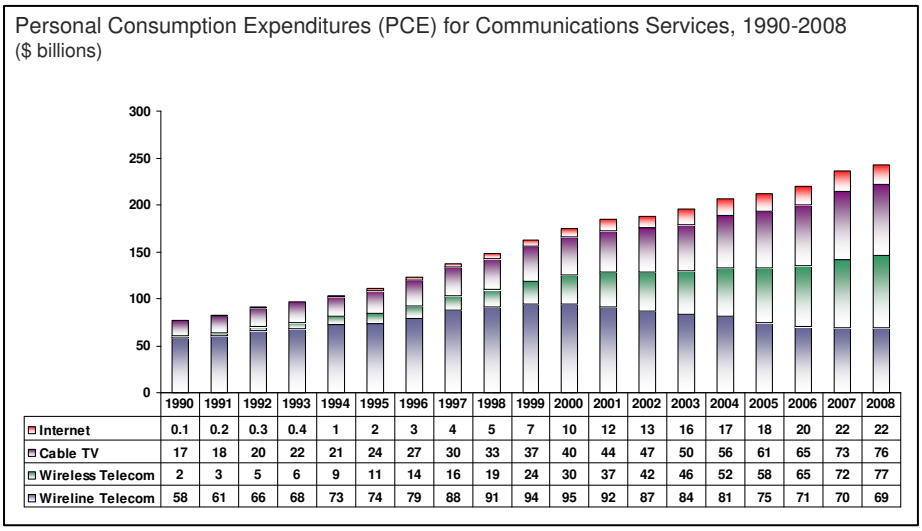
[25] *In the Matter of Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming,* Annual Report, FCC 07-206 at 9 (Nov. 27, 2007), *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-07-206A1.pdf.

[26] Semiannual Wireless Industry Survey, CTIA: THE WIRELESS ASSOCIATION (Dec. 2008) *available at* http://files.ctia.org/pdf/CTIA_Survey_Year-End_2008_Graphics.pdf (visited Apr. 8, 2009).

[27] *In the Matter of Annual Report and Analysis of Competitive Market Conditions With Respect to Commercial Mobile Services*, FCC-DA 09-54, Table 12 at 93 (Jan. 16, 2009).

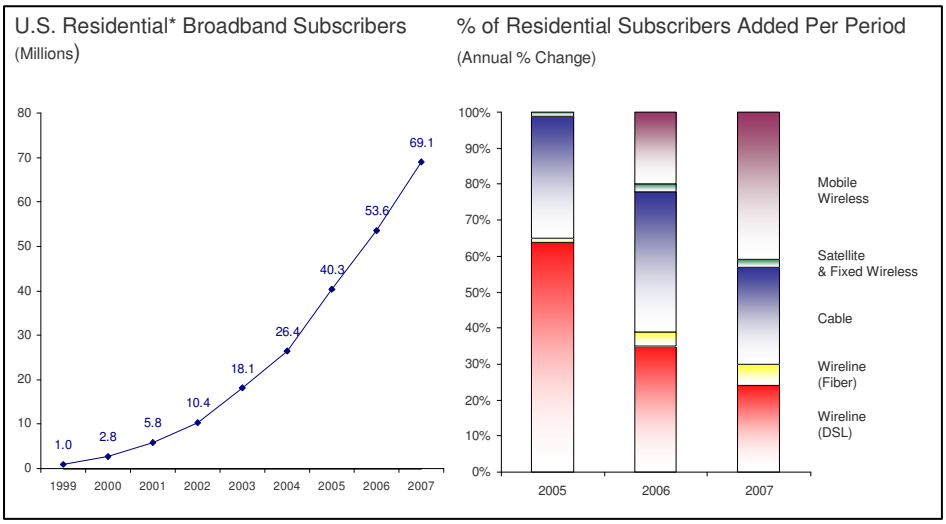
[28] *Id*.

Figure 11: The Changing Mix of Communications Service[29]



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Internet	0.1	0.2	0.3	0.4	1	2	3	4	5	7	10	12	13	16	17	18	20	22	22
Cable TV	17	18	20	22	21	24	27	30	33	37	40	44	47	50	56	61	65	73	76
Wireless Telecom	2	3	5	6	9	11	14	16	19	24	30	37	42	46	52	58	65	72	77
Wireline Telecom	58	61	66	68	73	74	79	88	91	94	95	92	87	84	81	75	71	70	69

Figure 12: The Changing Mix of Broadband Technology[30]



[29] *Id.*

[30] *See* Press Release, FCC, High-Speed Services for Internet Access: Status as of Dec. 31, 2007, (Jan. 16 2009) *available at* http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-287961A1.pdf (Data is based on FCC's most restrictive definition of broadband, i.e., residential "advanced services" that are greater than 200 kbps upstream and downstream.)

Figure 13: Weighted Average Monthly Price for Top 5 ILEC Wireline Broadband[31]

Year	Maximum Advertised Price by Downstream Speed Tier					
	Up to 768 kbps	768 kbps -1.5 mbps	Up to 3.0 mbps	Up to 7.0 mbps	Up to 15 mbps	Up to 30 mbps
2001	*	$50	n/a	n/a	n/a	n/a
2002	$28	$32	*	n/a	n/a	n/a
2003	$28	$30	*	n/a	n/a	n/a
2004	$30	$33	$46	*	*	n/a
2005	$20	$27	$33	$39	*	*
2006	$20	$23	$28	$36	*	*
2007	$18	$25	$28	$39	$51	*

E. Employment

ICT sustained at least 10 million jobs across the economy. Using the most current occupational employment data (2007), we are able see how broadband and ICT contribute to the job market both within and outside of the broadband/ICT industries.[32] In 2007, ICT industries sustained more than 5.7 million jobs, including 3.3 million jobs that are that were not ICT-centric and 2.4 million ICT-centric jobs. Non-ICT industries also employed 4.4 million in ICT-centric jobs. See Figure 14.

ICT jobs are among highest-earning and fastest growing jobs in the U.S. the economy. The ICT industry average wage of $29.43 is 50% greater than the national average hourly wage of $19.56 and ICT occupations pay, on average $27.05, about 38% more than the national average.[33] Based on Labor Department projections for 2006-16, ICT occupations are among the fastest growing in the economy. In fact, network and data communications analysts are the fastest growing occupation in the economy at 53.4% growth over the ten-year period.

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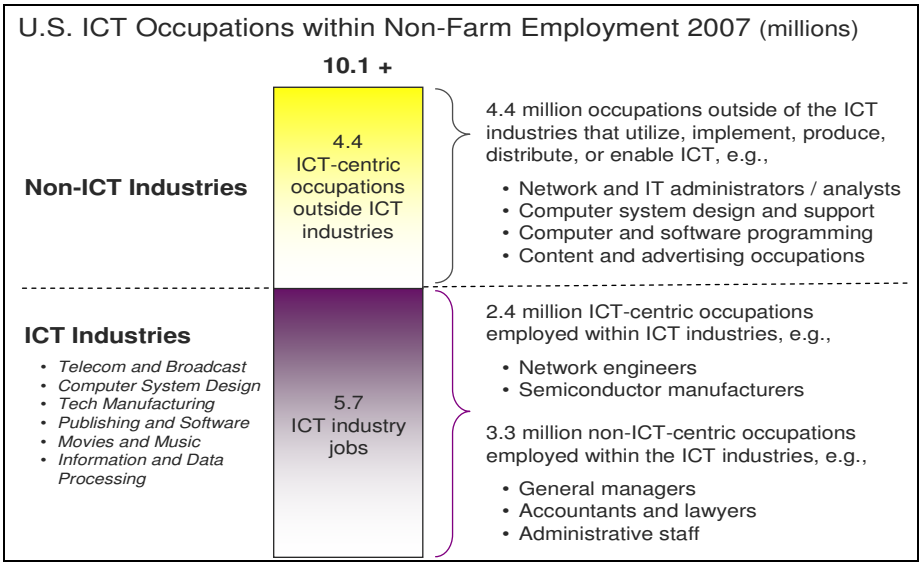
[31] Wireline Broadband Pricing 2001-2007, USTELECOM: THE BROADBAND ASSOCIATION (June 2008), *available at* http://www.ustelecom.org/uploadedFiles/Learn/Broadband.Pricing.Document.pdf (last visited Apr. 10, 2009). Copyright USTelecom 2008.

[32] Bureau of Labor Statistics (BLS), Occupational Employment Statistics 2007, *available at* http://www.bls.gov/oes/oes_dl.htm.

[33] *Id.* Averages are means. Industry and occupational wages are weighted by number of employees.

Altogether, data network analysts, computer programmers and analysts, and database administrators were projected to add 625,000 jobs over ten years.[34]

Figure 14: ICT Employment[35]



F. Productivity

Productivity is among the most significant economic benefit of ICT adoption because productivity is a critical determinant of the long-

[34] BLS, *Employment Outlook 2006-16*, 130 MONTHLY LABOR REVIEW, No. 11, at 58, 95 (Nov. 2007), *available at* http://www.bls.gov/opub/mlr/2007/11/contents.htm.

[35] Occupational Employment Statistics 2007, *supra* note 32. The occupational employment data allow us to look at a cross section of occupations employed by industry. We looked at data for 295 industry subgroups and 800 occupations, classifying industries as ICT or non-ICT and classifying certain occupations as ICT-centric or not. ICT-centric occupations are those that exist to utilize, implement, produce, distribute, or otherwise enable ICT. Examples include network administrators or computer programmers. Jobs not specifically dedicated to ICT functions, but employed by ICT industries, might include accountants, lawyers, and office staff. Data do not capture agricultural or self-employed (9.7 million in May 2007) workers or the "multiplier effect" of jobs created outside of the ICT sectors to support ICT firms and employees (e.g., lawyers, property managers, general management consultants, and others). ICT occupations reported at subgroup level were 2.3 million, adjusted upward to 2.4 million to estimate industry total. See Appendix Part B for list of ICT-centric occupations.

term economic growth and the living standards of our nation. Starting in the mid 1990s, economists began to find evidence that ICT is a significant driver of productivity growth. Productivity will remain critical to future economic growth because, when broken down into its components, GDP growth equals the sum of the growth rates of hours worked and productivity.

To understand how ICT affects productivity, consider that three factors drive growth in productivity, defined as output per unit of labor:

- Labor quality: improved education and skills yield greater output per unit labor.
- Capital deepening: investment in productive capital assets increases output per unit of labor; these assets include both ICT and non-ICT capital.
- Total factor productivity: a catch all to explain what is not otherwise explained, essentially it encapsulates innovation in business organization and production processes; total factor productivity includes both ICT and non-ICT firms.

ICT has no effect on productivity through labor quality or non-ICT capital deepening. ICT has a direct effect on productivity through ICT capital deepening and through total factor productivity within ICT firms. ICT may also have an indirect, or partial, effect on productivity through the total factor productivity of non-ICT firms.

Economists began to investigate the impact of ICT when productivity growth jumped from an average of about 1.5% during the period from 1973 to 1995 to an average at or above 2.5% from 1995 to 2000. Some economists have recently found that the direct impact of ICT from both ICT capital deepening and total factor productivity within ICT firms contributed between half and three-quarters of the productivity growth during the period. [36] The impact of ICT remained

[36] *See* Dale W. Jorgenson, Mun S. Ho, & Kevin Stiroh, *A Retrospective Look at the U.S. Productivity Growth Resurgence*, Federal Reserve Bank of New York, Staff Report No. 277 (Feb. 2007) (finding an average annual growth rate of 2.7% during 1995-2000, of which 1.01% was attributable to ICT capital deepening and 0.48% was attributable to total factor productivity of ICT firms, for a total direct ICT impact of 1.59% (59% of the total impact)). *See also* Stephen D. Oliner, Daniel E. Sichel, & Kevin J. Stiroh, *Explaining a Productive Decade*, Federal Reserve Board,

significant from 2000 through the middle of the decade, but was more muted: between 0.33% and 0.4%.[37]

Recently, economists have begun to look beyond the direct impact of ICT capital deepening and total factor productivity in ICT firms to determine whether ICT has an indirect or partial impact on the total factor productivity of non-ICT firms. The theory is that ICT is a "general purpose technology" that positively affects productivity in non-ICT firms, usually in combination with complementary investments in intangible capital such as training and organizational knowledge needed to utilize the ICT capital. Under this theory, the total factor productivity benefit lags the investment in ICT, possibly by many years. In fact the theory posits a negative concurrent correlation between ICT investment and total factor productivity because an organization's focus is on acquiring and installing technology rather than building the organizational knowledge needed to use it. Some preliminary studies have found some evidence in favor of this general purpose technology theory,[38] though the issue is the subject of ongoing inquiry.

Estimating the current dollar impact of ICT-generated productivity is an imprecise endeavor. We calculated a purely hypothetical "back of envelope" scenario, based on actual real GDP growth for the non-farm business sector of 0.8% and annual

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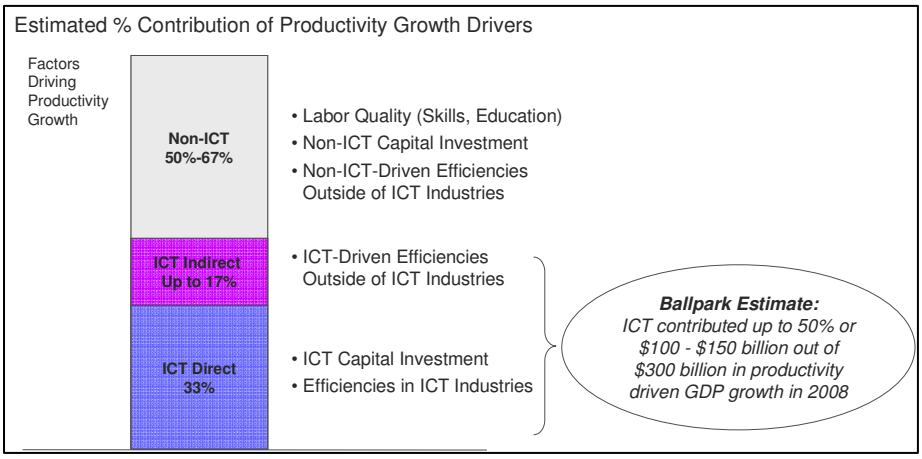
Washington, DC, Finance and Economics Discussion Series (Aug. 2007) (finding that labor productivity grew at an average annual rate of 2.51%, of which ICT capital deepening was 1.09% and total factor productivity for ICT firms was 0.75%, for a total direct ICT impact of 1.84% (73% of the total impact)).

[37] *See* Jorgenson et al., *supra* note 36 at Table 1 (from 2000 to 2005 productivity grew 3.09% annually, of which 0.63% was attributable to ICT capital deepening and 0.4% was attributable to total factor productivity of ICT firms, for a total direct ICT impact of 1.03% (33% of the total impact)); Oliner et al., *supra* note 36 at Table 1 (from 2000 to 2006, productivity grew at an average annual rate of 2.86%, of which 0.61% was ICT capital deepening and 0.51% was total factor productivity for ICT firms, for a total direct ICT impact of 1.12% (39% of the total impact)).

[38] *See, e.g.,* Susanto Basu & John Fernald, *Information and Communications Technology as a General-Purpose Technology: Evidence from U.S. Industry Data*, Federal Reserve Bank of San Francisco, Working Paper (Dec. 2006); Barry P. Bosworth & Jack E. Triplett, *The Early 21st Century U.S. Productivity Expansion is Still in Services*, Int'l Productivity Monitor, No. 14, (Spring 2007).

productivity growth of 2.8% from 2007 to 2008.[39] We estimated that out of roughly $300 billion in productivity-driven GDP growth in the non-farm business sector, ICT could account for about $100 billion, possibly as much as $150 billion or more. Again, this estimate must be taken with a grain of salt. See Figure 15 below and discussion in Appendix Part D.

Figure 15: Illustrative Estimate ICT Productivity Contribution to 2008 GDP



IV
CONTINUED ICT GROWTH IS THE KEY POLICY OBJECTIVE

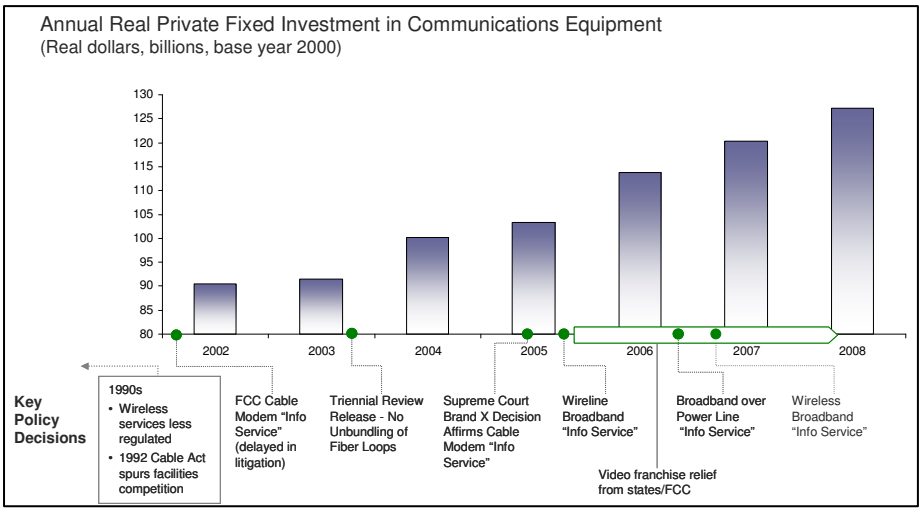
New policy approaches, rooted in the interdependent and competitive nature of the ICT ecosystem, have helped to spur the progress of convergence. Facilitating the continued growth of ICT remains a critical policy objective. The question will be how to encourage continued investment, adoption, and flexible interaction among industry players and consumers so that the ICT ecosystem continues to flourish and innovate. Doing so will require careful attention by policymakers to the entire ICT ecosystem and the checks and balances that exist within it.

[39] Press Release, U.S. Department of Labor, BLS, Productivity and Costs: Fourth Quarter and Annual Averages, 2008 Revised (Mar. 5, 2009), *available at* http://www.bls.gov/news.release/prod2.nr0.htm.

Broadband supports the entire ICT sector and recent broadband policy decisions have helped spur healthy broadband investment. Policies have encouraged competing facilities-based providers to deploy broadband with private capital by moving to greater parity among broadband providers and choosing a monitoring and enforcement approach to protecting consumers rather than prescriptive mandates. In addition, policymakers have begun to break down barriers, encouraging entry into nontraditional markets. Where necessary, policy has turned to public-private partnerships or public investment, such as the recent broadband mapping and stimulus programs. Figure 16 shows that real growth in broadband and communications equipment investment in the last half decade coincided with a series of pro-competition and pro-investment policy decisions.

Any proposed change to current policies bears a heavy burden to demonstrate how that change could improve sector performance and to carefully account for the affects on jobs, growth and innovation as that change ripples through the ICT ecosystem. The risks involved in upsetting the balance that has produced the ICT record of economic success over the last several years should give pause to any policymaker considering changing course. Rather, policy should maintain a positive climate of ICT industry and consumer-driven investment, innovation and growth.

Figure 16: Real Investment Growth for Communications Equipment [40]



V
CONCLUSIONS

ICT is a rapidly integrating, innovative sector requiring broad economic and policy perspectives. ICT industry players increasingly rely on each other to generate new value for consumers. At the same time, ICT industries are competing across traditional industry boundaries, bringing competitive discipline to the innovative process.

The sector has become a major engine of economic output and growth. ICT contributed $902 billion in GDP in 2007 – among the top contributing sectors in the U.S. economy and the primary driver of real, inflation-adjusted growth.

The U.S. depends on ICT to facilitate participation in the global information economy. U.S. industries invested $455 billion in ICT investment in 2008, representing 22% of total investment. Broadband providers alone invested over $64 billion in 2008. Annual network infrastructure investment is up over 30% since 2003. In addition to

[40] BEA, NIPA Table 5.5.6U Real Private Fixed Investment in Equipment and Software by Type, *available at* http://www.bea.gov/national/nipaweb/nipa_underlying/SelectTable.asp. FCC decisions are available at www.fcc.gov.

investment non-ICT sectors used $617 billion in ICT inputs to their production in 2007.

ICT investment and usage yields substantial economic benefits. Consumer ICT spending of $545 billion has been shifting to an increasing volume of innovative technologies and communications services, for a stable-to-declining share of income. ICT provides at least ten million jobs in ICT industries and across the economy (based on 2007 data). Economists have estimated that at least one-third, and likely more of ongoing productivity growth is attributable to ICT. The impact of productivity is to raise incomes, generate economic growth, and enhance U.S. global competitiveness.

The pro-competition and pro-investment environment of recent years has, bolstered the U.S. economy and generated hundreds of billions in investment, innovation, and consumer benefits. Any change to current policies bears a heavy burden to demonstrate how that change could improve sector performance and to carefully account for the affects on jobs, growth and innovation as that change ripples through the ICT ecosystem. Policy should maintain a positive climate of ICT industry and consumer-driven investment, innovation, and growth.

APPENDIX

A. Measuring Economic Output

For the purposes of the analysis, we used the most common measure of economic output, Gross Domestic Product (GDP), as our foundation. Economists measure GDP as economic output for a period, such as a year, in three ways:

- Value Added: The value of gross output, i.e., the sum of total sales receipts across the economy, less the value of intermediate goods and services used as inputs to production.

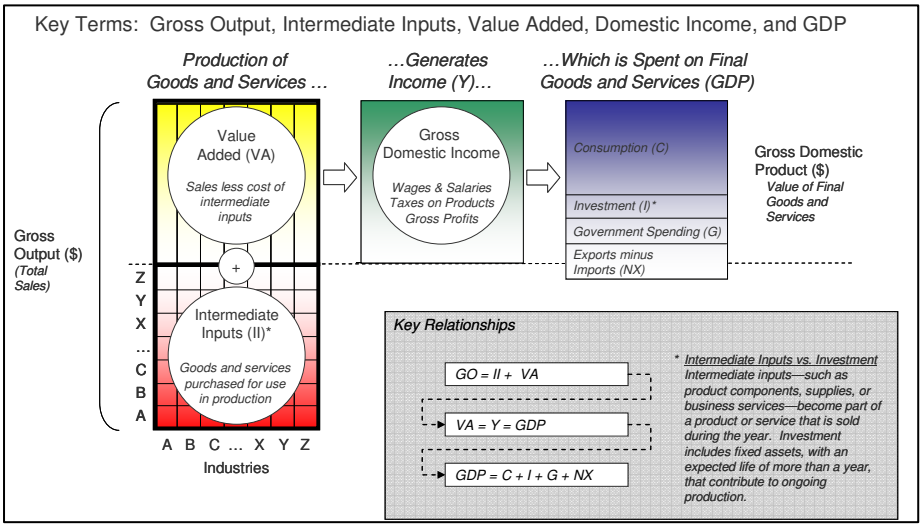
- Income: The sum of employee compensation, taxes on production and imports less subsidies, and gross operating surplus, which is a measure of corporate profitability.

- Expenditures: The sum of the value of "final" expenditures by consumers, businesses, and governments.

Figure 17 is a simple depiction of the key terms and relationships between these three measures.[41]

[41] *See* BEA, *Concepts and Methods of the U.S. National Income and Product Accounts*, Introductory Chapters 1 - 4 (July 2008), *available at* http://www.bea.gov/national/pdf/NIPAhandbookch1-4.pdf (explaining in detail different methods of measuring GDP).

Figure 17: Measuring GDP



The latter two approaches listed are expressed in the familiar macroeconomic equation, which states that GDP equals income (Y) which equals final expenditures, consisting of personal consumption (C), private investment (I), government spending (G), and the net of exports less imports (NX). We can extend the equation to value added (VA), expressing the relationship as GDP = Y = C + G + I + NX = VA.

When measuring GDP, economists exclude intermediate goods and services purchased as inputs to production since their value is already included in the sale of the final product. Investment, on the other hand, is considered a final purchase and is included as part of GDP. This is because investment consists of fixed assets that have useful lives of more than a year and contribute to future production.

We use U.S. Department of Commerce, Bureau of Economic Analysis (BEA) data. Specifically, we use the Annual Industry Accounts for value added measures of GDP, which are appropriate for comparing ICT and other industries. We use the National Income and Product Accounts for expenditure and income measures of GDP, which offer a useful context for ICT consumption and investment. The Annual Industry Accounts are current through 2007 and the National Income and Product Accounts are current through 2008.

To put GDP numbers in context, using the value-added approach, gross output for 2007 was $25.809 trillion. After subtracting intermediate inputs of $12.001 trillion, value added, or GDP, for 2007 was $13.806 trillion. At the time of the writing of this paper, 2008 data for the value added approach were not available. However, using the expenditures approach, we know U.S. GDP in 2008 was $14.265 trillion, consisting of the following components:[42]

- $10.057 trillion in personal consumption expenditures (PCE).
- $1.995 trillion in gross private investment, consisting of $2.041 in fixed private investment, offset by a $46 billion decline in private inventories.
- $2.883 trillion in government spending, consumption plus investment.
- An offset of $671 billion for the net of exports ($1.861 trillion) minus imports ($2.532 trillion).

[42] *See* NIPA Table 1.1.5, *supra* note 10.

B. ICT-Centric Occupation List

The employment analysis is based on U.S. Bureau of Labor Statistics, Occupations Employment Statistics 2007.[43] In our analysis, the following occupations were classified as ICT-centric.

- Advertising and promotions managers
- Advertising sales agents
- Archivists
- Audio-visual equipment technicians
- Audio-visual collection specialists
- Broadcast news analysts
- Broadcast technicians
- Camera and photographic equipment repairers
- Camera operators, television, video, and motion picture
- Communications equipment operators, all other
- Communications teachers, postsecondary
- Computer and information scientists, research
- Computer and information systems managers
- Computer hardware engineers
- Computer operators
- Computer programmers
- Computer science teachers, postsecondary
- Computer software engineers, applications
- Computer software engineers, systems software
- Computer support specialists
- Computer systems analysts
- Computer specialists, all other
- Computer, automated teller, and office machine repairers
- Data entry keyers
- Database administrators
- Desktop publishers
- Electrical and electronic equipment assemblers
- Electronic equipment installers and repairers, motor vehicles
- Electronic home entertainment equipment installers and repairers
- Film and video editors
- Graphic designers
- Job Printers
- Librarians
- Library assistants, clerical
- Library science teachers, postsecondary
- Library technicians
- Media and communication equipment workers, all other
- Media and communication workers, all other
- Motion picture projectionists
- Network and computer systems administrators
- Network systems and data communications analysts
- Radio and television announcers
- Radio mechanics
- Radio operators
- Retail sales for ICT-associated products and services (electronics and communications equipment, content)
- Security and fire alarm systems installers
- Semiconductor processors
- Sound engineering technicians
- Switchboard operators, including answering service
- Telecommunications equipment installers and repairers, except line installers
- Telecommunications line installers and repairers
- Telemarketers
- Telephone operators
- Word processors

[43] Occupational Employment Statistics (4-digit NAICS), s*upra* note 32.

C. Productivity Impact Estimate

We conservatively look only at the non-farm business sector, ignoring farms (a small portion of output) and housing (mostly imputed rents). Real GDP for the non-farm business sector grew 0.8% from $9.128 trillion in 2007 to $9.199 trillion in 2008.[44] Productivity for the non-farm business sector grew 2.8%, meaning real GDP would have fallen 2% without the productivity growth.[45] It follows that without productivity, real GDP for the non-farm business sector would have been $8.943 trillion. To get the nominal productivity impact, we need to convert to nominal dollars and compare to nominal GDP for the period. To convert to nominal dollars, for the sake of simplicity, we assume that the ratio of nominal to real GDP is the same before and after the productivity adjustment. Nominal non-farm business GDP was 10.917 billion in 2008, and real non-farm business GDP was 84.3% of that. Dividing $8.943 trillion by 84.3%, we get a nominal non-farm business GDP of $10.614 trillion *without the productivity impact*. Subtracting from actual non-farm business GDP of $10.917 trillion, we get a productivity impact of roughly $300 billion. We now attribute some portion of this productivity impact to ICT. Based on economic studies that allocated productivity growth to ICT in the 2000 to 2005/6 period[46] we could speculate by extrapolating from the past that a third of the 2008 productivity impact was attributable to ICT capital deepening and total factor productivity of ICT firms. We could further speculate that about one-third of the impact was from labor improvement and non-ICT capital deepening, i.e., not affected by ICT, and the final third was affected attributable to total factor productivity of non-ICT firms. If the ICT impact on total factor productivity of non-ICT firms were zero, the total impact of ICT would be about one-third, or $100 billion dollars. If the ICT impact on total factor productivity of non-ICT firms were half, then the total ICT impact would be about fifty percent, or $150 billion. So a range of $100 billion to $150 billion seems to be a reasonable range for our estimate.

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[44] BEA, NIPA Table 1.3.6, *available at* http://www.bea.gov/national/nipaweb/SelectTable.asp?Selected=N (last visited Apr. 16, 2009)

[45] *See* Productivity and Costs: Fourth Quarter and Annual Averages, *supra* note 39.

[46] *See* Jorgenson et al., *supra* note 36.

APPENDIX B

Economic Value of the Advertising-Supported Internet Ecosystem

June 10, 2009

Authored by

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With

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Executive Summary

In two decades the Internet has become central to social and economic life and is, today, a mature and integral element of the U. S. national economy. It is not only vital infrastructure, it is a spur to entrepreneurship and social change. It has changed the way firms find customers, customers find information, and people manage social relationships. It contributes significant value to the U.S. economy by creating and maintaining jobs, facilitating the rapid flow of information, and generally enabling the growth and prosperity of businesses. The Internet is not just a resource for large corporations: it has created unprecedented opportunities for growth among small businesses and individual entrepreneurs.

Originating as a project funded by the Department of Defense, the Internet grew to maturity without either major public funding or monopoly protection, unlike other categories of infrastructure such as the interstate freeway system, the national defense system, the telephone service, the postal service, and most public utilities. Payments for Internet marketing and advertising services are important sources of revenue that enable the Internet to function. The first contribution of this report is to demonstrate just how important Internet advertising—construed broadly as all those activities that help firms to find and keep customers—is to the maintenance of the Internet and, by extension, to the operation of the United States economy. Further, public policy toward the Internet has largely been defined by the absence of central planning. Perhaps as a consequence, there is little information on the scope and scale of the Internet resource. A second contribution of this report is to map the firms associated with the Internet and to identify the economic and social benefits that flow from it.

The economic analysis has four major components. It:

1. defines the size and scope of the advertising-supported Internet economy and identifies the participants;
2. determines and values employment directly or indirectly created by the marketing-supported internet;
3. calculates the payments by the rest of the economy to the Internet sector
4. estimates the value of the advertising-supported Internet based on the time consumers devote to using the Internet.

In addition, the study identifies further social and economic benefits of the advertising-supported Internet.

Advertising-supported Internet

The advertising-supported Internet refers broadly to all activity on the Web intended to promote marketplace exchange of products, services, or information. Paid online advertising is one component. In addition, most e-commerce websites perform a substantial information and promotional function, to encourage commerce, Therefore, e-commerce providers can be thought of as Internet advertisers. Many websites that do not conduct e-commerce also perform an informational advertising function. On behalf of both for-profit and not-for-profit enterprises, they take the place of magazine advertising, brochures, and direct marketing, educating the consumer on features and benefits of the organization's offerings. Additionally, e-commerce sites and company

websites collect data about customers and prospective customers. They perform an interactive advertising function analogous to sales forces. So, too, do e-mail solicitations, another form of interactive advertising on the Internet. Internet-enabled economic activity is a dynamic system. New advertising methods, such as the development of paid search in 2003, have expanded the amount advertising contributes to funding the Internet.

Employment value

With the first of three methods used to triangulate the contribution of the advertising-supported Internet to the national economy, the study finds that the Internet employs 1.2 million people directly in jobs that build or maintain the infrastructure, facilitate its use, or conduct advertising and commerce on that infrastructure. Under the reasonable assumption that, like other business services, each Internet job supports an additional 1.54 jobs elsewhere in the economy, then 3.05 million, or roughly 2 percent, of employed Americans owe their employment to the advertising-supported Internet. Although there are regional concentrations of employment, these jobs are widely dispersed across the United States. Every one of the 435 U. S. Congressional districts owes some of its employment base to Internet workers.

If an employment-income approach is used to estimate the contribution of the Internet sector, the advertising-supported Internet sustains about $300 billion, or approximately 2 percent. of the U.S. GDP.

Payments to Internet sector

In the second method, the study analyzes the Internet as an independent economic unit, analogous to an island "exporting" services to the rest of the economy and using the revenue so generated to maintain the island's "internal" economy. This assumption of the Internet as an independent island is imperfect because the whole economy is interdependent. However, drawing a line between an internal Internet economy and one that exports value to the rest of the U. S. economic system is a reasonable analytical approximation. Each element of this assumption is documented in the body of the report so that its reasonableness may be scrutinized.

The direct economic value of the services that the Internet provides to the rest of the U. S. economy is estimated at $175 billion. This value is the revenue paid for the services "exported" beyond the borders of the internet's economy to the rest of the U. S. economy, net of what is "imported." It comprises $20 billion of advertising services, $85 billion of retail transactions (net of cost of goods) conducted on the Internet, and $70 billion of direct payments to Internet service providers. In addition, the Internet generates an indirect economic value of activity that takes place elsewhere in the economy due to the Internet sector. If the same multiplier is used as was used for employment, 1.54, then the advertising-supported Internet creates value of $444 billion.

The importance of advertising to funding the Internet has grown materially in the past seven years, while direct consumer payments for ISP services and retail margins have declined in relative importance. A study conducted in 2002 found that advertising contributed 7 percent of the $78 billion paid for Internet services to the U.S. economy. In just seven years, while the value of the Internet has doubled, advertising has increased fourfold and its contribution to the pool of funding for the Internet has grown to 11 percent. Payments to ISPs in these seven years have been stable despite the shift by consumers and businesses to more expensive broadband services. Electronic commerce, although it has doubled in absolute terms, contributes relatively less to funding the Internet today than in 2002. Thus, advertising is the only Internet funding source that has

shouldered more of the burden than seven years ago. It has substantially reduced what consumers have had to pay for access to the Internet and for e-commerce products and services. As online advertising technologies grow in sophistication, advertising is likely to continue to grow faster than other funding sources and to shoulder more of the costs of the Internet.

Time value

The third approach to assessing the value of the advertising-supported Internet is based on the time that people give to the Internet. At work and at leisure, about 190 million people in the United States spend, on average, 68 hours a month on the internet. Using a conservative valuation of this time, this approach values the Internet at $680 billion.

Economic contribution by Internet segment

The following exhibit displays the economic activity of 14 segments of the Internet. The last two columns reflect the employment and value-add numbers discussed above. Note that no total is shown for revenues, owing to double counting both among these segments of the Internet and between the segments and the rest of the economy

Sizes of 14 Internet Segments in 2007*

Company	2007 Internet Revs. ($billions)	2007 U.S. Internet Employees	Estimated 2007 Value Added ($billions)
1. Internet service providers (ISPs) and transport	73.31	181,233	18.1
2. Hardware providers	64.41	65,591	6.6
3. IT consulting and solutions companies	8.15	32,155	3.2
4. Software companies	15.72	27,192	2.7
5. Web hosting and content management companies	5.85	52,835	5.3
6. Search engines/portals	33.84	48,925	4.9
7. Content sites	6.0	59,901	5.9
8. Software as a Service (SaaS)	7.70	31,487	3.1
9. Ad agencies and support services	10.64	29,407	2.9
10; Ad networks	1.19	1,533	0.2
11. E-mail marketing and support**	1.02	10,278	1.0
12. Enterprise staffs and subcontractors responsible for Internet advertising, marketing and web design	15.00	100,000	10.0
13. E-commerce cos., including physical delivery	202.78	508,391	50.8
14. B2B e-commerce	1,350.00	44,233	4.4
Total***		1,193,000	119.1

* The numbers in the first two columns of this table are taken from Section 3, where each segment is discussed individually. The figures for the "Value Added" column are derived from the number of U.S. Internet employees.

** The employees for Internet e-mail campaigns are excluded from #9, advertising, to be able to highlight the e-mail segment. Many Internet ad agencies are involved in email marketing, but their e-mail-oriented employees are listed in the e-mail segment.

***The sum of revenues in the first column is potentially misleading, as some of the revenues for some segments would also show up as a cost in some other segments. In addition, there is "cost of goods" in these numbers, so that they cannot be compared to national gross domestic product.

Social and economic benefits of the Internet

The Internet of today exists largely because firms pay its costs in exchange for the benefits of an advertising, marketing, and transaction medium, much as television has thrived because firms valued it as an advertising medium. But the Internet is more than a medium of commerce. It has produced large social consequences, very different in scope and scale from those of television. It is an infrastructure and a platform, and, consequently, its benefits are broad and open-ended.

Information access: Denial of access to information or costly impediments to its retrieval amount to a drag on economic and social productivity. The Internet provides nearly universal access to vast information resources. Video, audio, and print formats are available. From health-care information to comparative prices, to the performance of elected representatives, consumers and citizens have free access to valuable information. While the Internet has increased the stock of information, it has also improved the productivity of attentional resources because search technologies filter the noise from relevant information and bring people what they need to know when it is needed.

Employment and entrepreneurship: As previously noted, the Internet has created over 1.2 million new jobs in the U.S. over the last 10 to 15 years. Many pay higher salaries than the average U.S. wage. Most of the net new jobs created each year in the U.S. and in the Internet sector are at small companies. Some 20,000 small businesses operate on the Internet, 120,000 individuals are primarily employed as eBay sellers, and 500,000 individuals have part-time businesses on eBay. A recent *Wall Street Journal* report estimates that nearly half a million individuals may make their living as "bloggers," or small publishers of online content. In addition, some of the small Internet companies of a decade or two ago have become major employers Significant examples are Amazon.com, Cisco Systems, Symantec, Google, and eBay, which collectively employ 75,000 people.

Recession-proofing: Internet companies took a tumble in the "Dot Com Bust" of 2000-2002, owing to drastic stock price declines, more so than from declines in Internet usage or e-commerce. The stronger Internet companies, such as Amazon and Cisco, kept growing at that time, despite major stock price drops. In the current recession, the Internet seems to be one of the "pillars of strength," with Internet traffic continuing to grow and revenues of major companies stable.

Fostering further innovation: The Internet has facilitated entrepreneurship that has created innovation nationally and globally. Flexible and powerful web browsers connect users directly to content. New retail forms have emerged, substantially displacing catalog marketing, and spawning a diverse range of consumer services. Social networking offerings have offered a way for people of a wide variety of affinities to share information and viewpoints. The pace of innovation shows no evidence of abating.

Productivity: The Internet has already contributed to increased productivity in many industries, and will likely continue to do so. Internet retailers have between three and four times the labor productivity of bricks-and-mortar retailers selling the same types of merchandise.

International trade opportunities: U.S. information technology companies, and Internet companies in particular, are very global in their sales orientation. Standards and styles for IT hardware and

software, largely set in the U.S., became the international standards. U.S. information technology companies have simply followed their major clients in financial services and other industries around the world, outfitting them with computers, software, and networks. Larger Internet companies earn about half their revenues beyond the U.S.

Environment: A significant benefit of digital connectivity is the saving of natural resources and reduction in environmental pollution. Transmission of information in digital format eliminates some of the need for shipment of documents, thus reducing paper consumption and disposal costs. Voice and video teleconferencing reduce the need for travel.

Inclusiveness: The Internet has made possible greater social and economic inclusion. Some of the jobs created by the Internet, particularly e-selling, publishing, and instant-messaging-based customer services, are not necessarily office-based, a boon to the home-bound or people who need or desire flexibility between their home and work lives.

1. Background

1.1 Purpose of the Study

This study was funded by the Interactive Advertising Bureau, New York City, in order to understand the size, scope, and benefits, both social and economic, of the "advertising supported Internet." The Internet has grown rapidly, and it has also become a major advertising and marketing medium despite its non-commercial beginnings as a network connecting university research centers, defense contractors, and the U.S. Department of Defense.

Narrowly construed, the benefits of the advertising-supported Internet are those accruing from the $23.4 billion[1] spent on advertising and paid search on the Internet in 2008. To put this in perspective, the Internet is today a bigger advertising medium than radio, outdoor advertising (billboard, stadium, etc.), and the Yellow Pages, and about the same size as consumer magazines.

However this study has construed the advertising-supported Internet broadly as all those functions that contribute to promoting marketplace exchange. There are millions of corporate, government, and non-profit websites that are akin to the paid advertising pages appearing in business magazines or mailed brochures. All of these enterprise web sites are self-promotional vehicles with tremendous depth of information compared with a traditional advertisement in the broadcast or print media. And, new software technologies and consulting expertise developed over the past decade can track website visits as one element of lead generation for new customers and also furnish individualized messages based on a user's responses. Similarly, companies can send e-mail appeals to current or prospective customers and allow the target customer to opt in or out of further mailings if he or she chooses. This use of the Internet as a marketing medium is growing.

Unlike traditional ad-supported media, the Internet is more than a medium for promoting products and services. E-commerce websites serve as a storefront, point-of-purchase stimulus, and sales venue. Consumers can see a product promoted and, if they choose, buy and own it immediately. After a few seconds' download of songs, movies, or books, they can consume the product online. A large volume of books, CDs, DVDs, travel, financial products, electronic hardware, office products, and myriad other goods is sold over the Internet to consumers and businesses. Businesses have been very heavily invested for years in having their vendors invoice via the Internet and pay by electronic funds transfer, and are encouraging their B2B customers to conduct all business electronically as well.

Viewed from these perspectives, much of what users do every day on the Internet is to interact with promotionally-oriented material or content supported by advertising. With the exception of information provided by city, state, or the federal government as a public service, nearly all other information is provided with some degree of self-promotion, or because advertising helps to fund it. Universities have very attractive, detailed websites which help them compete for students, faculty, and alumni who might choose to donate money. Companies have websites to make it easier for customers and job seekers to obtain an initial understanding of the company prior to in-person interaction. Politicians have websites to market their positions on issues to the voting public, while also soliciting contributions. Indeed, even some government data provision might be thought of as self-promotion: the better the agency is at putting up its information, the better citizens will feel about the government and the people it elected to office.

[1] IAB published figures

Restrictions on advertising or use of individual-user data could undermine the effectiveness of major elements of the Internet:

- the ad-supported search engines and many content sites that provide information, entertainment, news, and social networking
- the enterprise websites created by companies and other institutions that increasingly are able to individualize the messages
- the e-commerce companies that use data to personalize offers to current customers

These segments, as this report shows, make up half of the employment and economic value of the Internet today.

1.2 The Internet Today

What is the Internet today? Although the Internet in recent years has been pictured as a "cloud" or has been referred to this way because of its vastness and intangibility, it is actually very physical, with three major elements. On the one hand, it is composed of a massive amount of access and network *hardware*—PCs, wireless devices with Internet access, routers, servers, mass storage devices, cable or telephone access lines to homes and businesses, fiber optic cable for long-haul transport, network management equipment, and other hardware. Tens or hundreds of thousands of people design this hardware in the U.S. and manufacture it here or in Asia or Europe. Further downstream, vast numbers of workers install, troubleshoot, maintain, and replace the equipment. For example, the majority of Cisco's 61,000 employees manufacture, sell, and service its routers and other equipment that are used for the Internet.[2]

Next there is the *software* that allows the Internet to operate, and the hundreds of thousands of software developers who write and update it. The engineers who design software for the Internet are part of the total 14 million world-wide population of software developers, 3.3 million of whom are based in the U. S.[3] Internet-related software implements the TCP/IP network-to-network connection protocols in computers and routing equipment. End users create content with the help of text, music, and video editing software. Websites run a wide variety of software that enables the services that draw visitors to the Internet. Software controls how on-line information is stored and accessed, and it can provide security from viruses, spam, or other problems. The software code that runs the Internet is a mix of proprietary and open-source software. Some of the software is buried deep in the equipment, away from the end user; other software implements the e-mail, chat, and web browsing software familiar to any on-line user. Related to software are the IT consulting, outsourcing, and systems integration firms like Accenture, IBM, and Cap Gemini that implement, among other things, Internet-related solutions for their clients, or manage outsourcing, storage, and data manipulation that depends on the Internet for easy data transfer and backup.

The last major element is the *content* available on the Internet. Creative content is generated by millions of individuals—professionals and amateurs—who seek to make it as interesting and

[2] Cisco's 10K of 9/18/07 mentions only Internet Protocol-related products in the description of business, though some is IP telephony.

[3] Robert Mullins, "Software Developer Growth Slows in North America," IDG News Service, March 13, 2007

inviting as possible. Included in this is the content of e-tailers who have to make their services user-friendly to be able to garner orders. Business-operations content, such as e-mail, business documents, services, orders, and other communications that flow across the Internet, is crucial for keeping the economy running efficiently.

1.3 Structure of the Internet

Our study follows, and to a degree builds on, three earlier studies. In 1998, Cisco Systems commissioned what appears to be the first major study to measure the Internet economy. The study, conducted at the Center for Research in Electronic Commerce (CREC) at the University of Texas at Austin, concluded that by 1998 the Internet employed some 1.2 million people in the U.S. and generated $301 billion in annual revenues. While we dispute these employment and revenue measures because they appear not to distinguish intermediate goods and services from final goods and services, and so count the same activity more than once, the report suggested a useful way to conceptualize the Internet.

The CREC study modeled the structure of the Internet as an ecosystem having four "layers," and giving examples of products and services in each layer, plus companies of the era typifying those products and services. Their entire Internet model is reproduced in Exhibit 1-1.[4] Unfortunately there is no breakdown for their numbers, owing to an agreement with the companies they interviewed to use revenue figures only in aggregate.[5]

Exhibit 1-1. CREC Model of the Internet Ecosystem

Layer One: The Internet Infrastructure Layer

This layer includes companies with products and services that help create an IP-based network infrastructure, a prerequisite for a commercially oriented network. The categories in this infrastructure layer include:

- Internet backbone providers (e.g., Qwest, MCI, WorldCom)
- Internet service providers (e.g., Mindspring, AOL, Earthlink)
- Networking hardware and software companies (e.g., Cisco, Lucent, 3Com)
- PC and server manufacturers (e.g., Dell, Compaq, HP)
- Security vendors (e.g., Axent, Checkpoint, Network Associates)
- Fiber optics makers (e.g., Corning)
- Line acceleration hardware manufacturers (e.g., Ciena, Tellabs, Pairgain)

[4] Anitesh Barua, Jon Pinnell, Jay Shutter and Andrew Whinston, "Measuring the Internet Economy: An Exploratory Study," Center for Research in Electronic Commerce, The University of Texas at Austin, 1998.
[5] J.B. Bird, "By the Numbers: How UT and Cisco Teamed Up to Track the Internet," The McCombs School of Business Magazine, University of Texas, Fall/Winter 1999-2000.

Layer Two: The Internet Applications Layer

This layer includes products and services built upon the above IP network infrastructure making it technologically feasible to perform business activities online. The categories in this applications layer include:

Internet consultants (e.g., USWeb/CKS, Scient, etc.)
Internet commerce applications (e.g., Netscape, Microsoft, Sun, IBM)
Multimedia applications (e.g., RealNetworks, Macromedia)
Web development software (e.g., Adobe, NetObjects, Allaire, Vignette)
Search engine software (e.g., Inktomi, Verity)
Online training (e.g., Sylvan Prometric, Assymetrix)
Web-enabled databases (e.g., Oracle, IBM DB2, Microsoft SQL Server, etc., only Internet/intranet related revenues are counted)

Layer Three: The Internet Intermediary Layer

This layer includes Internet intermediaries who increase the efficiency of electronic markets by facilitating the meeting and interaction of buyers and sellers over the Internet. They act as catalysts in the process through which investments in the infrastructure and applications layers are transformed into business transactions. The categories in this intermediary layer include:

Market makers in vertical industries (e.g., VerticalNet, PCOrder)
Online travel agents (e.g., TravelWeb.com, 1Travel.com)s
Online brokerages (e.g., E*Trade, Schwab.com, DLJDirect)
Content aggregators (e.g., Cnet, ZDnet, Broadcast.com)
Portals/content providers (e.g., Yahoo, Excite, Geocities)
Internet ad brokers (e.g., Doubleclick, 24/7 Media)
Online advertising (e.g., Yahoo, ESPNSportszone)

Layer Four: The Internet Commerce Layer

This layer includes Internet commerce that involves the sales of products and services to consumers or businesses over the Internet. The categories in this Internet commerce layer include:

E-tailers (e.g., Amazon.com, eToys.com)
Manufacturers selling on-line (e.g., Cisco, Dell, IBM)
Fee/subscription-based companies (e.g., thestreet.com, WJS.com)
Airlines selling online tickets
Online entertainment and professional services

CREC summed revenues and employment of companies at each layer to obtain a total size and employment for the internet. There are two reasons why this step generates a much larger total than the method we employ. First, although they made a 10-percent reduction in subtotals in anticipation of double-counting, this adjustment is likely far too small. By summing revenues, not value added, the summing over layers ensures large-scale double counting. Second, the CREC included the full value of software and hardware industries on which Internet firms rely, not just the incremental

value attributable to the Internet. These qualifications duly noted, they produced the following total for Internet revenues and jobs:

Internet Layer	Estimated 1998 Internet Revenues (billions)	1998 Attributed Internet Jobs
Infrastructure Layer	115.0.	372,462
Applications Layer	56.3	230,629
Intermediary Layer	58.2	252,473
Commerce Layer	102.0	481,990
The Internet Economy Indicators	**301.4**	**1,203,799**

The CREC's four layers match our three major elements (hardware, software, and content) if their last two layers are both considered content, and facilitating software is drawn out of layer one and put in layer two.

In a second study released in early 2001, also sponsored by Cisco, the same University of Texas group estimated the Internet had grown over 50 percent from 1999 to 2000, to $830 billion and 3.1 million employees. Though supporting data are not available, the $830 billion likely includes B2B e-commerce and is therefore likely to have counted revenues more than once in reaching a total size for the Internet economy.

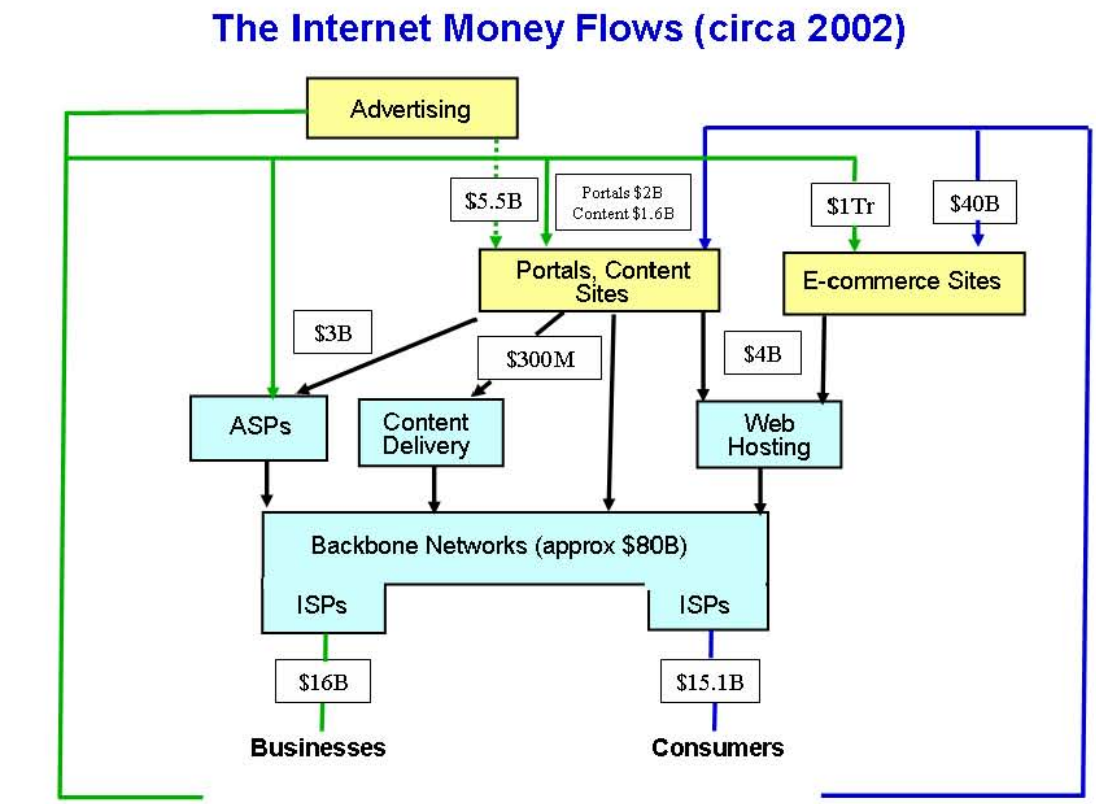
In 2007, four years after the original CREC work, a third study of the economic value of the Internet was conducted. Shawn O'Donnell, of the M.I.T. Program on Internet and Telecoms Convergence, attempted to portray some of the money flows between elements or segments of the Internet. However, he pointed out that "it is relatively easy to gather information on the size of individual Internet industry segments…[but hard to] determine the disposition of revenues in any [one of them]."

O'Donnell explained that his numbers for the size of the Internet are much smaller than CREC's because he omitted hardware and software supporting the Internet, and looked only at dollar flows going into the Internet. His figures for B2C eCommerce and B2B eCommerce are quite low relative to comparable figures today. His figures for the combination of ISPs and backbone networks, equivalent to today's ISP provisioning by telecom and cable companies, is actually somewhat larger, reflecting the cost reduction effect of new technology.[6]

Nevertheless, O'Donnell's model of the Internet and its money flows, reproduced in Exhibit 1-2, represent a major contribution. What we call the hardware and software segments are shown as ASPs, Content Delivery, Web Hosting and Backbone Networks. What we are calling the content segments of the Internet are shown in the O'Donnell model as Advertising, Portals and Content Sites, and E-Commerce Sites.

[6] O'Donnell, Shawn, "An Economic Map of the Internet," *Center for eBusiness @ MIT, http/ebusiness.mit.edu, at MIT Sloan School, September 2002*

Exhibit 1-2

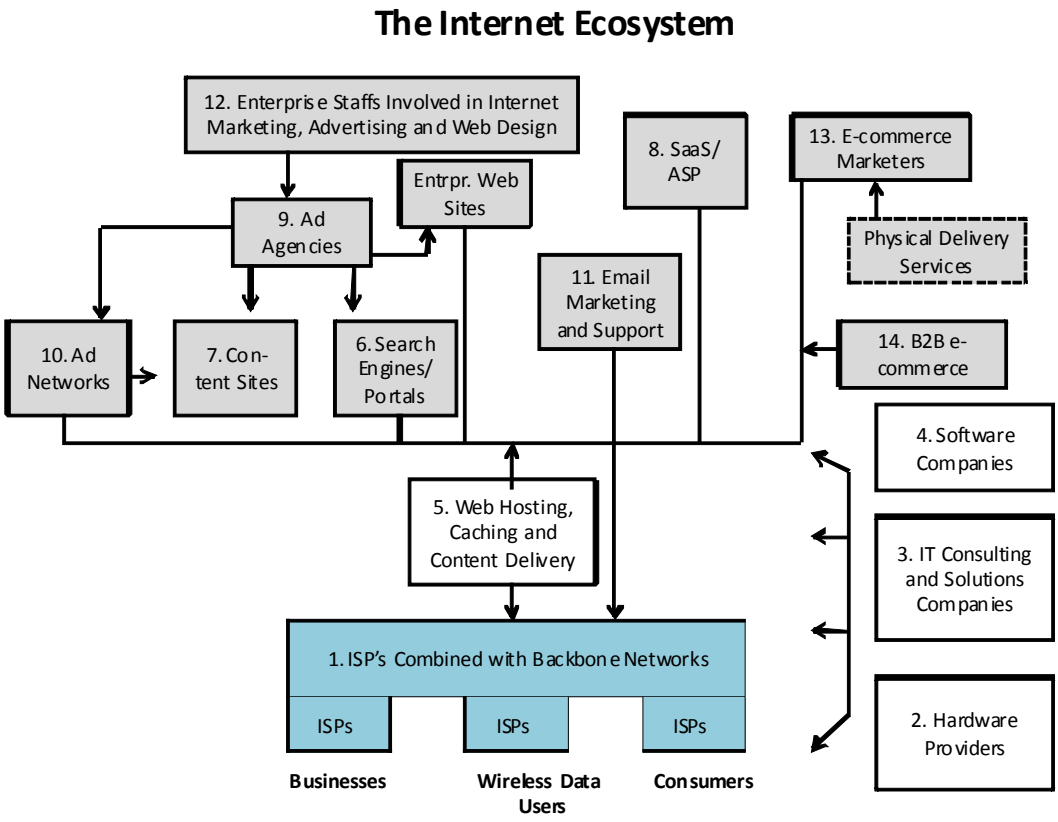


* Source: Shawn O'Donnell, "An Economic Map of the Internet," Center for e-Business at MIT, September 2002

Our model of the structure of thre Internet (Exhibit 1-3) builds most directly on the O'Donnell model. We have updated it to reflect the segments to be observed today and to detail contemporary money flows where we can do so. We have eliminated the "backbone network" segment, because there are now so many alternative paths for sending data, and the networks are so interwoven, that the original structure of a few long-haul networks connecting local networks simply does not apply. Long-haul and short-haul transmission are now carried by Internet service providers (ISPs) which are paid by both net senders of information and net receivers of information, with the charge varying with the bandwidth of the connection. From these ISP charges, the ISPs also cover the cost of long-haul transmission on their own or others' networks.

All dollar volumes have grown rapidly since the O'Donnell portrayal. Ad revenues for search and display are about four times the size of the 2002 numbers. ISP and e-commerce volumes are also up significantly.

Exhibit 1-3. Map of the Internet 2007



The definitions and characteristics of each segment depicted in Exhibit 1-3 are described below. The segment descriptions start with the most physical aspects of the Internet and conclude with the content segments. A representative list of the companies in each segment appears in Exhibit 1-4. More detailed information on companies and employment in each of the segments will be found in Section 3 of the report. Here we simply describe each segment by way of illustration

1. Internet Service Providers and Transport: Every user connects to the Internet through an ISP. The services provided by an ISP depend on the type of connection that the ISP offers. Broadband ISPs (chiefly cable companies, the telephone companies, and, more recently, the wireless companies) usually provide the last link of the connection between the user's premises and the provider's premises. ISPs for dial-up users rely on a telephone company to provide the physical connection to their access point. These ISPs maintain a bank of modems, dial-in numbers, and a connection to the rest of the Internet. A wireless ISP also provides a wireless final link and access to the rest of the Internet. An ISP may also provide additional services to consumers, including email, web hosting, spam filtering, or virus protection. ISPs typically charge users—whether households or businesses and institutions—a monthly fee on a contracted basis. Sometimes the fee is bundled with other services, as in the "triple play" offered by cable and telephone companies for TV, telephone, and Internet access. Laptop users in Internet cafes or wireless "hot spots" may pay an ISP for daily access or even hourly access.

Exhibit 1-4. Companies in the Internet Segments

Internet Segment	Large Companies (>2000 employees)	Small Companies (< 2000 employees)
1. Internet Service Providers (ISPs) and Transport	AOL, Comcast, Cablevision, Time Warner Cable, AT&T/SBC, Verizon, Charter, Qwest and the mobile carriers providing ISP service for the growing wireless Internet business	XO Communications, Level 3 Communications, Earthlink, United Online, Windstream and 4,000[7] or more small dial-up ISPs and local and regional cable companies, independent telephone companies and CLECs (competitive local exchange carriers) for business providing consumer, business and wireless ISP and transport services.
2. Hardware Providers	Apple, Cisco, Corning (fiber), Dell, EMC, Hewlett-Packard, Juniper Networks, IBM , Sun, Nortel, Alcatel-Lucent	Brocade Communications, Foundry Networks, Netgear and a few other smaller companies; many small companies have been acquired over the years by Cisco and others.
3. Internet Consulting, Solutions and Systems Integration Providers	Accenture, Bearingpoint, CSC, EDS, Hewlett-Packard, IBM	Many local and regional IT consultants and systems integrators
4. Software Companies	Adobe, IBM, McAfee, Microsoft, Symantec, Verisign	Secure Computing, Websense and at least several hundred smaller software companies
5. Web Hosting and Content Management Companies	Akamai, 1 and 1 Internet, GoDaddy.com, Yahoo	AIT, Hostway, Pair Networks, Web.com and at least 3-5,000 other small web hosting companies
6. Search Engines/ Portals	Google, Microsoft MSN, Yahoo, AOL	Ask.com, CareerBuilder, Idearc, PubMed and a variety of other specialized portals and search engines
7. Content Sites	Many big media companies like the New York Times, Fox, Time Warner, and ABC have Internet groups, with 1,000 on up employees.	Facebook, MySpace, Affinity Express, YouTube and thousands of small publishers that are ad-supported, subscriber-based, or publish at their own cost

[7] *First Research Industry Profile*, "Internet Service Providers," May 19, 2008

8. Software As a Service (SaaS)	Salesforce.com is the only one approaching $1 billion, though other multi-billion dollar licensed software companies like SunGard, Oracle and SAP are starting to sell and distribute some of their products using the SaaS model.	Convio, Teleo, Salary.com and hundreds of other small companies
9. Advertising Agencies and Ad Services Companies Including Web Design, Web Analytics and Marketing Research	Interpublic, Omnicom, Publicis and WPP Group	At least 1000 small ad agencies (a number of which, like Digitas and Organic, are owned by the larger agencies or holding companies), ad sales networks and marketing research firms that are totally devoted to on-line or have some of their work with on-line advertising and market research
10. Ad Networks	None	Advertising.com (AOL), 24/7 (WPP), Burst Media and Tribal Fusion
11. E-Mail Marketing and Support	None.	Responsys, e-Dialog, EmailLabs, and hundreds of other independent companies or arms of advertising agencies that design and implement e-mail marketing campaigns.
12. Enterprise Staffs and Subcontractors Responsible for Internet Advertising, Marketing and Web Design	None: Even the largest U.S. companies are likely to have no more than 100-200 people in their marketing departments specializing in on-line marketing.	Likely, at least 95% of companies in the U.S. with over 100 employees have a website. They therefore have either a fraction of a person, or one or more staff persons who design and maintain the site and conduct other on-line marketing activities such as e-mail campaigns. They also may use a vendor for these services. There are about 100,000 firms with over 100 employees in the U.S.
13 E-Commerce Companies	Amazon, Staples, Office Depot, Dell, HP Home Office, Travelocity, eBay, and an estimated 10-15 with over 2000 Internet employees each.	There are tens of thousands of companies selling goods and services on the Internet, whether their complete business, or only a portion of it, like L.L. Bean. eBay reports that 124,000 of its sellers use eBay as their prime or only source of income

Because the number of independent long-haul networks is so small, we do not show them as a separate money flow on the Internet map. However, long-haul capacity certainly exists within the

large telephone companies in the U.S., and is continually expanding. So is capacity to handle Internet traffic between the U.S. and other countries via terrestrial cable to Mexico or Canada or via satellite and undersea cable to other parts of the world.

Of interest is that current ISP revenues, which include network charges for sending packets, total only $73.31 billion, compared to the $111 billion for both ISPs and backbone networks that Shawn O'Donnell reflected in his map of six years ago. This decline reflects the drop in long-distance network charges as large-capacity fiber was put in place, and also growing economies in ISP costs. In fact, cost reductions and competition between the cable companies and the telecom companies have recently resulted in a price war between the two groups of players.[8]

2. Hardware Providers: Hardware to make the internet work consists of servers and other storage devices, routers, PCs, wireless access devices, fiber optic cable, and broadband wireless equipment, among other components. Over the years there has been consolidation among hardware suppliers in many areas. Cisco, usually considered the biggest hardware provider to the Internet, has grown through numerous acquisitions—nearly 100 between its founding in 1984 and 2004 alone, with others since then.[9] Makers of storage devices, like IBM and EMC, are in this category, as are the PC makers, like Dell and Hewlett Packard.

3. Information Technology Consulting and Solutions Companies: As the Internet grew, so too, did the need for solutions and services companies. There are some specialist Internet consultancies, but much of the support work has been taken over by the large IT consultancies already in place as far back as the mid-1980s—Cap Gemini Sogeti in Europe, and IBM, EDS, and Accenture (formerly Andersen) in the U.S. Designing local- and wide-area networks, creating for clients entire IT platforms that rely on the Internet, operating data centers where Internet content may be among the material stored or processed, and overall maintenance of IT systems are services offered by these companies in addition to providing in-house IT staffs at enterprises.

4. Software Companies: Software is a major factor in the Internet's success. It manages the flow of information across the Internet as well as enables the design, storage, and movement of content ranging from company web sites and news sites to e-commerce sites. Examples of Internet-related, as opposed to PC, applications or enterprise software are software for:

- network management and ISP management
- content creation and storage, including video
- advertising and advertising services
- e-commerce
- e-mail
- security, compliance and risk management for access devices (PCs and handhelds), data storage, and networks.

Notable suppliers are Symantec, McAfee and Adobe Systems.

5. Web Hosting and Content Management Companies: Independent web hosting companies store the web pages of content and e-commerce sites on their servers, usually located in data centers, and make it accessible to site visitors. Large enterprises may do their own web hosting, and many ISPs

[8] "Price War Erupts for High-Speed Internet Service," *Wall Street Journal*, Tuesday, September 2, 2008

[9] "Cisco's Acquisition Appetite," *Oligopoly Watch (www.oligopolwatch.com)* December 25, 2004

offer web hosting services, at least for simple one-page web sites put up by individuals. Sophisticated web hosters like Akamai also offer caching capability in different parts of the country for very large Internet players, such as Google, Amazon, and the major media sites, in order to relieve bandwidth limitations that would arise if these sites were accessed out of just one data center. Backup hosting is also important for data security and disaster recovery. Uptime performance is an extremely important aspect of web hosting, because all owners of websites have a fear of their sites going down and being inaccessible to customers and website visitors. For some e-commerce companies, one day of downtime could mean $1 million or more of lost orders.

6. Search Engines Portals: Search engines have become a vital part of the Internet user's experience, since they offer an easy, user-friendly way to find information on about any topic. The early beginnings of search capability in the 1990s were confined to just searching the directories of web pages, not the text on individual pages. Then, companies like Aliweb, Webcrawler, Lycos, and Infoseek created the capability to index the text of entire web pages, thus making them searchable. In the late 1990s, the industry saw a proliferation of search engines, including the rise of a new player, Google. Around 2000, Google offered an innovation, PageRank, which ranked web pages in search results according to their value, as measured by the number of links to them from other websites. Also Google focused on being a pure search company, whereas the search engine at Yahoo was embedded in its portal offerings. Portal companies offer the user organized content and links to deeper information within and outside the portal. Some are general portals, like AOL and Yahoo, and some are very specific to an area of interest, like WebMD and One Source. But no portal offers the user the comprehensive access to information that today's general search engines do.

7. Content Sites: Here, informational and educational content sites are distinguished from search engines/portals and e-commerce sites, even though all could, in one sense, be classified as content sites. These content sites are for news, sports, entertainment, research, and social networking. They are supported by advertising placements, subscription (*Wall Street Journal* Online earns from both sources), sales of goods (for example, many medical newsletters), and subsidies from individuals and institutions. Not included here are the websites of enterprises in business, government, or academia that are included in segment 12.

8. Software as a Service (SaaS): This is a rapidly emerging segment of companies providing software to consumers and businesses, wherein the software and all customer input data are stored by the provider company, and accessed from anywhere by user company employees via the Internet. It is rapidly taking share from software that is typically purchased via license and run on users' computers. Now at about $6 billion, this segment is growing 15 percent or more a year. Salesforce.com is the largest independent pure SaaS company. But major licensed software companies like Oracle and SunGard are starting to offer some of their software using the SaaS model.

SaaS is distinct from the software segment (#4) in that it is a product that customers buy to improve their businesses, not software that makes the Internet function well.

9. Advertising Agencies and Ad Support Services: This segment includes advertising agencies and the services that support advertising, like independent web designers, web analytics companies, and market research companies. It makes up an important commercial segment of the Internet. Decades before the Internet existed, advertising became an important facilitator of other information and entertainment media, especially in the radio, newspaper, and television industries. Now advertising

is an important sector for the Internet as well through its funding of search engines and many content sites. Advertisers and their agencies have recently found that the more precisely they can target messages to potential buyers likely to be interested in those messages, the more productive Internet advertising can be. The *Los Angeles Times* announced in early 2009 that its digital operations had become self-financing as it gained online advertising revenues.[10]

Web designers, who support both ad agencies and enterprise entities, are an important element of this segment. They include small firms and freelancers, some working part-time. Web analytics companies and market research companies help to optimize advertising effectiveness.

10. Ad Networks: Ad networks fill the important role of aggregating the inventory of website publishers and selling their combined advertising space to advertising agencies. They also perform the mechanical function of serving the ads to the publisher websites according to the specified contract terms. Often they specialize in particular consumer segments, for example, high-income individuals or seniors. eConsultant maintains a list of 86 ad networks, and many are quite small.[11] Although this is a small segment in terms of employment, it handles a considerable amount of revenue on a pass-through basis. From the standpoint of helping fund myriad small web publishers, it fills a crucial Internet function.

11. E-mail Marketing and Support: This small but important segment of the Internet plays off one of the key features that most users value on the Internet: e-mail. Increasingly, businesses have found that marketing to controlled e-mail lists is a very effective way to provide targeted messages to generate sales leads or actual sales. E-mail marketing campaigns are often combined with other media such as telemarketing, direct mail, or even print and broadcast media. The segment includes companies involved in generating e-mail campaigns as well as companies involved in the software and facilities to enable e-mail marketing efforts.

12. Enterprise Websites (Staffs involved in Internet Advertising, Marketing and Web Design): Increasingly companies are adding specialists in on-line marketing to their marketing staffs to oversee and improve the company website and to work with digital agencies. It is even fashionable, especially overseas right now, for the specialist to have the title of "Online Marketing Officer." Sometimes the capability to design websites and maintain them resides in the IT department of an enterprise. Some enterprises hire subcontractors such as web designers or on-line marketing consultants to bolster enterprise Internet-marketing staffs. Corporations, non-profit organizations, and government agencies are all adding permanent staff in this area.

13. E-commerce: ***E-tailing, E-brokerage, E- banking, E-travel, B2B e-commerce, and Other E-services:*** E-commerce, not a part of the original Internet, has been one of the dramatic success stories. Of all the segments we have identified, it employs the most people, and represents the most revenue. It offers several efficiencies for the consumer in shipping and delivery compared to bricks-and-mortar retailing, and has an immediacy of access and potential for deeper and richer display than catalog marketing, its closest analog. It continues to grow even through the weak economy of 2008. For example, Amazon.com's revenues were at a record high in 2008 while sales of major bricks-and-mortar retailers other than Wal-Mart Stores have faltered. This e-commerce segment

[10] Jeff Jarvis, "History in the Making in LA as Online Ads Hit Target," *Guardian.co.uk*, January 12, 2009

[11] eConsultant Technical Lists, http://lists.econsultant.com/top-10-advertising-networks.html A website called LinkWorth also maintains a long list of ad networks: http://blog.linkworth.com/a-nice-long-list-of-ad-networks/

includes some business purchasing for travel, hotels, and other services, but does not include the large supply-chain purchasing driven by cost reduction in segment 14, B2B e-commerce.

14. B2B e-commerce: This segment is distinguished from segment 13 because, while it is substantial, its economic activity contributes to the gross domestic product only to the extent that value is added to goods and services that are intermediate to finished goods and services.

2. The Advertising-Supported Internet

2.1 Internet Advertising Segments

The Internet system depicted in Exhibit 1-3 contains five commercially-oriented segments.

1. *Advertising placed on content sites*: Internet advertising dates back only a dozen years or so. It grew rapidly in the late 1990s, but then declined for a few years as the dot.com bust dried up venture capital-backed advertising money. But in just seven years Internet advertising exclusive of search has grown from $6 billion in 2002 to $13 billion in 2007

   Whatever form it takes—pop-up advertising, flash animation, video or banner advertising—paid advertising on content sites is very similar to traditional TV, magazine and newspaper advertising, with two exceptions: it can increasingly be targeted to individual Internet users, based on information collected about or supplied by that user, and it routinely allows consumers to click through and receive deeper information from the advertiser. The ability to target and to give more information to consumers have been facilitating factors for the growth of Internet advertising.

2. *Paid search:* The most dramatic growth is in paid search. Paid search was less than $1 billion in 2002**,** and in 2007 was over $8 billion.[12] A relatively small amount of Internet advertising is currently targeted based on user profiles, but experts expect this to grow because of its greater effectiveness.

   Search engines like Google, Yahoo, and Microsoft Network have almost become synonymous in users' minds with the Internet, or at least "getting on the Internet." The value of an ad coming up on the first page of a search was recognized early on, and the search engine companies have been able to monetize this value by charging to place relevant advertisements adjacent to search results. This is similar to the practices of the Yellow Pages, which list all full-page ads in a heading first, half-page ads next, and quarter-page ads third, based on research that showed early placement received the most phone calls. Search engines have also been funded heavily by banner and pop-up advertising targeted to Internet users searching particular types of sites.

3. *e-Commerce*: In 2007, the business-to-consumer (B2C) e-tailer segment grew six times faster than total retail sales, reaching $165.9 billion, which was up 21.8 percent from 2006[13]. Still growing rapidly, e-commerce on the consumer side has its roots in catalog mail order and on the business side with EDI and EFT over private networks. By some measures, consumer e-commerce already comprises about 10 percent of all U.S. retailing. The volume of B2B e-commerce is much larger still, with about half of the $3.5 trillion of supply-chain purchases handled over the Internet.

   E-commerce has proven to be an important area of small-business creativity and participation. While some of the big e-commerce players are conventional retailers (e.g., Sears and Staples), former catalog-only houses (Lands End and LL Bean), or large hard goods manufacturers (Apple and Dell), the biggest e-tailer, Amazon.com, started up only 13 years ago and in that time has created 17,000 jobs. Other top 20 e-tailers include very new medium-sized companies, including Newegg.com (1,500 employees), Netflix (1,500

[12] "IAB Internet Advertising Revenue Report, 2007 full Year Results" IAB, New York, May 2007

[13] Internet Retailer's *Top 500 guide*

employees) and Zappos.com (1,300 employees).[14] More significant is the estimated number of small e-tailers. Over half of e-tail employment is in small businesses that have grown up since the beginning of the dot.com era. eBay, a 13-year-old business has created 15,000 new jobs since 1995 and has spawned an industry of 4 million sellers on its auction system, with 120,000 of them relying on eBay as their primary or only source of income.[15]

4. *Websites of businesses (or their products), government bodies, and non-profits:* No one we could find has been able to provide numbers on how many U.S. businesses have websites. There are 20 million corporations and sole proprietorships in the U.S., ranging from Wal-Mart, with 1.2 million U.S. employees, to self-employed tradespeople and one-person sales and service organizations Likely every business with over $5 million in sales has a website, simply because of the marketing and information value to customers, employees, and potential hires. Even hedge funds, known to be secretive about most of their affairs and especially their specific investment choices, have sites to explain their investment philosophy to potential investors.

   This element may be the "hidden gold" of the Internet. Websites have displaced corporate product literature mailed in advance of a meeting, but they are becoming even richer in depth of information—sometimes using video—and in reaching out to the visitor to try to bring him or her into the "community" of users for that organization's goods or services. Also, these websites, by using visitor registration, are becoming a linchpin for multi-channel marketing and advertising programs targeted at potential buyers.

5. *E-mail marketing:* E-mail is nearly universal: according to a recent Forrester study, 97 percent of consumers and 94 percent of marketers use it. Click-through rates on e-mail marketing messages are around 5 percent, which is a high rate for direct marketing and an indication of the high relevancy of these programs to consumers.[16] This high success is not surprising given that many e-mail programs depend on consumers to "opt-in" and affirm they want to receive e-mails from a company, and marketers allow consumers to "opt out." The IAB has calculated this form of advertising to be worth about $400 million in 2007, and to be growing at the rate of all interactive advertising.[17] However, EmailLabs has said that e-mail advertising expenditure is considerably higher. They projected $950 million in annual marketing spend on e-mail programs in 2006, up 7 percent from 2005. EmailLabs cited a Datran Media study indicating that 83.2 percent of marketers see e-mail as an important marketing tactic, compared to 36.2 percent for display advertising and 27.7 percent for traditional direct mail.

   The e-mail category is not without its problems however. The high success rate for advertisers of this very inexpensive form of advertising has only encouraged more companies to offer it, and propelled a greater frequency of e-mails. In its annual survey of 10,000 Internet households, Forrester found that 71 percent of respondents in 2006 complained they receive too many e-mail offers and promotions, up from 44 percent in 2000. In 2006, 72 percent said they delete most e-mail advertising without reading it, up from 31 percent in 2000. Nevertheless, a substantial minority appreciates the availability of these offers. Again, in 2006, 22 percent of Internet consumers said that e-mails are a "great way" to find

[14] Internet Retailer's *Top 500 guide*

[15] Washington Post article cited on Internet blog, Business and Money eCommerce, Number of Active eBay Sellers. November 23, 2005, posting.

[16] Shar VanBoskirk, "E-mail Marketing comes of Age," Forrester Research, March 2, 2007

[17] I AB annual reports on interactive advertising, IAB website

out about new products or promotions, 13 percent said they read most e-mail ads to see if something "catches my eye," and 5 percent said they *often* buy things advertised through e-mail promotions. [18]

To understand better the advertising-supported Internet, it is useful to place it against the backdrop of all marketing communications in the U.S. Notably, its share of U.S. advertising is about to reach 10 percent. As of 2008, it has surpassed radio and Yellow Pages and is in a close tie with magazines to be the third biggest advertising medium in the US.

But perhaps the bigger story is the share of *all* marketing communications the Internet represents, or, even more telling, is *displacing*, since Internet advertising, website promotion, e-commerce offers on the web, and e-mail offers are increasingly seen by marketers as cost-effective alternatives to print and television advertising. It is noteworthy that newspapers and Yellow Pages are in decline, two media that rely heavily on local advertising, at the same time that the fixed and mobile Internet are beginning to focus more and more on local advertising. These two print media are rapidly losing readership and usage, so their revenues will take even more hits in the future. Some TV viewership will switch to Internet viewing, particularly among the young viewers, which may erode some of the TV advertising numbers. On the marketing communications side, some direct-mail volume is being siphoned off by Internet e-commerce and by websites displacing some business mailings of literature. The Internet promises even to affect consumer sales promotions and incentives by virtue of the fact that these can be issued and used in e-commerce. In summary, the Internet has had a large impact on the advertising and marketing communications market and will likely have a much bigger impact in the future.

2.2 The value of the advertising-supported Internet

This report approaches the assessment of the economic value of the Internet in three ways:

- a value-add approach built up from known Internet employment,
- viewing the Internet as an island-like system exporting to the rest of the economy, and
- a valuation of the time that users spend on the Internet.

Employment-Based Approach to Valuing the Internet: A nation's gross domestic product (GDP) is the aggregate of incomes received by residents of the nation, both individual and corporate, as direct payment for current services to production, plus capital appreciation.[19] It is equal to the sum of the values added at each stage of production by the industries and productive enterprises located in, and making up, the country's domestic economy. The national GDP can be decomposed into sector GDPs, which, in the same spirit, measure the economic activity of each sector.

Our objective is to provide data that, together with reasonable assumptions, can be used to estimate the U.S. domestic economic activity attributable to the advertising-supported Internet. We have computed the number of people receiving direct salary payments for services to this sector at 1.2 million.

For each person directly employed in this sector, other people work in sectors that supply the sector or that benefit from retail and service sector spending by these workers. The sector also helps to

[18] Shar VanBoskirk, "E-mail Marketing comes of Age," Forrester Research, March 2, 2007
[19] Pearce, David W. (1994) The MIT Dictionary of Modern Economics. Cambridge, MA: The MIT Press.

support taxation-dependent areas of the economy, such as government and public sector workers who are employed in federal, state, and municipal services, education, and the military. Thus, this indirect employment, computed by applying employment multipliers to the sector's employment, arises from supplier effects, re-spending effects, and government employment effects. The U. S. Bureau of Labor Statistics publishes statistics on industry employment requirements, which enable calculation of the labor inputs into a sector. Sectors differ in the size of their multipliers. Bivens[20] computes indirect employment that ranges from 372 indirect jobs for every 100 jobs in durables manufacturing to 163 indirect jobs for every 100 jobs in business services. These estimates are inclusive of capital service usage. We assume (without calculation) that the Internet sector will generate 180 indirect jobs for every 100 jobs directly created. Thus our projection of employment due to the advertising-supported Internet economy is 1.98 million indirect jobs and 1.2 million direct jobs, for a total employment of 3.08 million people.

We impute a salary and benefits figure of $100,000 each to these employees as a reasonable estimate. By this method, if an income approach is used to estimate the Internet sector gross domestic product, the advertising-supported Internet sustains about $300 billion of the U.S. GDP.

Internet "Exports" to the Rest of the Economy: The direct economic value of the services that the Internet provides to the rest of the U. S. economy is estimated at $175 billion. This value is the revenue paid for the services "exported" beyond the borders of the internet's economy to the rest of the U. S. economy, net of what is "imported." It comprises $20 billion of advertising services, $85 billion of retail transactions (net of cost of goods) conducted on the Internet, and $70 billion of direct payments to Internet service providers. In addition, the Internet generates an indirect economic value of activity that takes place elsewhere in the economy due to the Internet sector. If the same multiplier is used as was used for employment, 1.54, then the advertising-supported Internet creates value of $444 billion. We cover this methodology in detail in Section 3 of this report.

Time Spent on the Internet: The third method is based on the time that people give to the Internet. We relied on a number of studies of Internet use, some of which were surveys of recalled behavior and others that were based on observation of actual behavior.

According to Nielsen Online, which monitors a panel of users of computers linked to the Internet, about 166 million U.S. residents over age two visited the Internet at least once per month from home and at work, for leisure and work purposes, in December 2008. The estimate by comScore Media Metrix, using a similar methodology but including university locations, is 190 million for 2008. Harris interactive, from a survey of adult Internet users ages 18 and older, estimated 184.0 million users in 2007. An aggregator, eMarketer, reviewed these estimates and estimated the population of Internet users from all locations and of all ages at 192.8 million for 2008. When converted to households, this figure represents 68.7 percent of all U.S. households, and 89.3 percent of Internet households with broadband connectivity. [21]

The age distribution of Internet users suggests that the current estimate of the number of users will need to be updated substantially as the population cohorts age. According to a study by the USC

[20] Bivens, Josh (2003) Updated Employment Multipliers for the U.S. Economy. Economic Policy Institute

[21] eMarketer February 2009 http://totalaccess.emarketer.com.ezp-prod1.hul.harvard.edu/Chart.aspx?N=0&Nr=P_ID:82420 accessed January 22, 2009.

Annenberg Center for the Digital Future, 95 percent of people aged 18 to 24 are Internet users, compared with 65 percent of people between 55 and 64, and 42 percent of people over 65[22].

Estimates of time spent online vary depending on whether at home or at work. Home use has grown rapidly in the past decade, and today 75 percent of adults report some access from home, 43 percent report some access from work, and 32 percent from schools, libraries, cybercafés, and public wireless access points. At home, Nielsen Online reports, from direct observation of its online panel, that 37 hours is spent on line per month. At work, Nielsen reports 80 hours per month. The at-work population is smaller, however: Nielsen's estimate of the ratio is 68.7 million at work to 155.6 million at home, so it estimates the time spent online for all users at 68 hours per month. These data are similar to, but regarded as more reliable than, estimates from a survey by Harris Interactive that place the average time spent online per person at 14 hours a week.[23]

We have estimated the value of an hour spent at work for a representative U.S. worker at $15 per hour, derived from the average wage of non-management, non-agricultural workers in data published by the Bureau of Labor Statistics[24]. There is no market price for an hour spent in recreation or leisure, although there is an opportunity cost. If work time is discretionary, then it has been argued (Bockstael et al., 1987) that the wage rate measures the opportunity cost of leisure time.[25] If not, and in particular for people in school or under-employed, the wage rate over-estimates the value of a leisure hour. As an approximation, we use 10 percent of the wage rate for leisure time. On these assumptions, the time spent on the Internet places a value on the Internet of $680 billion.

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22 USC Annenberg School, Center for the Digital Future (2008), "Surveying the digital future ". Los Angeles: Annenberg School, Center for the Digital Future, University of Southern California.

23 Harris Interactive November 17, 2008 http://www.harrisinteractive.com/harris_poll/index.asp?PID=973 accessed January 22, 2009.

24 http://www.bls.gov/bls/blswage.htm accessed February 17, 2009.

25 Bockstael N, I Strand and W Hanemann (1987), "Time and the Recreational Demand Model," American Journal of Agricultural Economics. 69 (2) 293-302.

3. Companies Involved in the Internet and Their Employees

3.1 Overview of Internet Companies

Today there are a few large companies focused on the Internet, and also many, many small companies, some only a few years old. However, even the largest Internet specialists are not very big compared with large mainstream companies like General Motors (2007 revenues of $181 billion and 266,000 employees), Wal-Mart ($387.53 billion in revenues, and 2,100,000 employees) and Citigroup ($159 billion in revenues, and 160,000 employees).

Here is a list of the biggest "Internet" companies, defined as those with all or most of their employees owing their employment totally or in large part to the Internet:

Largest "Internet Companies" Ranked by Total Employees

Company	Headquarters	Total 2007 Company Revs. ($ bil.)	Total 2007 Company Employment
Cisco Systems	San Jose, CA	34.92	61,535
Symantec	Cupertino, CA	5.87	17,600
Amazon.com	Seattle, WA	14.84	17,000
Google	Mountain View,	16.59	16,805
Yahoo	Sunnyvale, CA	6.97	14,330
AOL, div.TimeWarner	New York, NY	5.18	8,000
Expedia	Bellevue, WA	2.67	7,150
Adobe Systems	San Jose, CA	3.16	6,959
Juniper Networks	Sunnyvale, CA	2.89	5,879
T.D. Ameritrade	Omaha, NB	2.18	3,800
E-Trade	New York, NY	3.57	3,800

For another perspective on size, UPS, Federal Express and the U.S. Postal Service are entities that are in some ways akin to the Internet as content deliverers, except they offer only physical delivery. The combined employment we identify with the Internet in the next section, about 1.2 million U.S. employees spread across thousands of companies, is about the same as the U.S. employment of UPS, FedEx, and the U.S. Postal Service combined.

We consider "large" Internet companies to be those with over 2-3,000 employees that are engaged in producing gear or providing services used for the Internet. They may be companies that have all of their employees involved in Internet work, or only some portion of overall employment. As an example of the latter, AT&T has 307,000 total employees, but only a small fraction of them are working to provide Internet services. Amazon.com is one of the biggest pure Internet companies, and, despite its $15 billion in 2007 revenues, it employs only 17,000 people. Additional employee detail on these and other companies is provided in the next section on Internet employment

3.2 Summary of Employment

The Internet now touches all parts of the economy. Over 80 percent of American households use the Internet, and over half of US households have broadband access. Virtually every business is

affected by the Internet—either through its own on-line presence, or the presence of its suppliers, customers, or competitors. Both consumers and businesses rely on the Internet for research, analysis, sales and service.

Most of the Internet is invisible to the average Internet user, who rarely thinks beyond his or her PC, the content on the PC screen or wireless device, the monthly invoice from the ISP provider, and perhaps a router at home. What the user cannot "see" are the hundreds of thousands of people who support the Internet every day, in contrast to businesses with brick-and-mortar operations or employees who interact with the general public. As mentioned in Section 1.2, the Internet in the U.S. represents a wide array of hardware, software, and content. The people who manufacture, maintain, and operate the Internet are positioned all across the country. Thousands of different companies and proprietorships have Internet-based jobs, which are distributed across the U.S., in every major city and in many suburban and rural locations as well.

A summary of Internet revenues of companies whose products and services make the Internet function is provided below, listed by Internet segment. Also listed is the number of employees in these companies whose jobs exist because of the Internet and who work in the U.S. We omit those Internet employees who work for U.S. companies but live and work outside the U.S. The derivation of these numbers is provided in the remainder of this chapter, where each segment is profiled. Sources for the numbers are specifically identified in comments in an Excel table available on request from the IAB. In many cases we have had to estimate the portion of company employees dependent for their jobs on the existence of the Internet, because the majority of company employees are not part of the Internet other than as everyday users.

The14 Segments of the Internet in 2007*

Company	2007 Internet Revs. ($billions)	2007 U.S. Internet Employees	Estimated 2007 Value Added ($billions)
1. Internet service providers (ISPs) and transport	73.31	181,233	18.1
2. Hardware providers	64.41	65,591	6.6
3. IT consulting and solutions companies	8.15	32,155	3.2
4. Software companies	15.72	27,192	2.7
5. Web hosting and content management companies	5.85	52,835	5.3
6. Search engines/portals	33.84	48,925	4.9
7. Content sites	6.0	59,901	5.9
8. Software as a Service (SaaS)	7.70	31,487	3.1
9. Ad agencies and support services	10.64	29,407	2.9
10; Ad networks	1.19	1,533	0.2
11. E-mail marketing and support**	1.02	10,278	1.0
12. Internet advertising, marketing and web design	15.00	100,000	10.0
13. E-commerce cos., including physical delivery	202.78	508,391	50.8
14. B2B e-commerce	1,350.00	44,233	4.4
Total***		1,193,000	119.1

* The numbers in the first two columns of this table are taken from Section 3, where each segment is discussed individually. The figures for the "Value Added" column are derived from the number of U.S. Internet employees.

** The employees for Internet e-mail campaigns are excluded from #9, advertising, to be able to highlight the e-mail segment. Many Internet ad agencies are involved in email marketing, but their e-mail-oriented employees are listed in the e-mail segment.

***The sum of revenues in the first column is potentially misleading, as some of the revenues for some segments would also show up as a cost in some other segments. In addition, there is "cost of goods" in these numbers, so that they cannot be compared to national gross domestic product.

We also list an estimate of "value add" for the Internet in the third column of the table based on the number of U.S. Internet employees and a factor for depreciation of equipment added where appropriate. This allows us to size the Internet in relation to the U.S. GDP.

We will rely on the Internet company and segment employment analysis for most of our discussion of industry employment. Government statistics on Internet employees are incomplete, since many employment categories do not show a breakout of Internet employment from non-Internet employment. In the 2006 census, the U.S. Census Bureau did break out some specific Internet codes into 6 categories, but they only account for 231,000 of what we estimate to be the total of 1.2 million employees. The only analysis we can make of the U.S. 2006 Census figures is to determine what Congressional Districts they fall in; this process is described in Section 4.2.

3.3 Internet Service Providers and Transport

ISPs represent the second largest Internet segment in terms of employees and revenues billed. Technology improvements and accelerating investment during the 1990s in long-haul fiber at ever greater capacities has driven down the cost of transmission of a packet. Now these long- haul costs have become a smaller part of the overall connection, one reason that the combination ISP and backbone charges are affordable.

The historical investment in building fiber networks to handle long-haul Internet traffic is significant, and there is concern that the integrated carriers are beginning to lose money on this segment of their business. Both the ISP gateway to the customer and the many pieces of the Internet are now seeing new stresses on capacity, and therefore, cost, as more and more video content is viewed and downloaded. Network capacity must be expanded, and possibly ISP connection capacity as well. The additional costs must be borne by users directly or else by some alternate revenue source such as advertising.

Internet access for consumers and businesses is now provided by several types of companies. For consumers, the early "dial-up" ISPs, which provided access at low speed over standard telephone lines in the early years of the Internet, have largely given way to providers of high-speed broadband access, namely, the cable TV companies and both national and regional independent landline telcos.

Businesses generally receive their access through very high-capacity fiber cable, from a variety of players: the national and regional telcos, competitive local exchange carriers (CLECs), and, in recent years, cable companies as well. Increasingly, wireless companies are providing both narrowband and broadband connection for enterprise employees, especially as hand-held Internet devices like the Blackberry proliferate, and computers are used away from the home or office at Wi-Fi hot spots. Of course, very small businesses may purchase ISP service from a telco or cable company just as if they were consumers.

The rest of this section presents the revenues and employees of the significant ISPs and the few remaining wholesale network carriers participating in I/P transport. Embedded in the ISP employee estimates is an assumption that some employees are involved in building and maintaining transport networks that carry Internet traffic between providers of information and users. The revenues of this transport are absorbed as part of ISP revenues, although there is concern in the industry that ISP charges are no longer fully covering the total cost of transport networks.[26]

Consumer wire line ISPs: The names of the major companies offering Internet connection to consumers are familiar—Comcast, AT&T, Verizon, America Online, EarthLink, etc. Their shares of household subscribers are listed below. These data have been helpful in estimating some of the revenue and employee data for companies that do not publish ISP revenues separately.

America Online remains one of the largest ISPs in number of subscribers, but it will likely continue to lose share in its original dial-up business as broadband providers take over the market. AT&T, Comcast, Time Warner, and Verizon are the largest providers of broadband service, attracting consumers with a $40-50/month fee for high-speed service. Also, AOL's value as a combination ISP and portal has diminished because of the ability of search engines such as Google to take over many of the portal functions.

The major ISP companies represent a $31.84 billion business and employ 74,000 workers in this segment of the Internet. These numbers are in line with First Research's finding that the sector comprises 4000 ISPs doing a total of $30 billion in revenue.[27]

2007 Internet Revenues and Employees at Consumer Landline ISPs (Including Network Transport)

Company	Subscribers 2005 (million)	Subscribers 2007 (million)	Total Co. Revenues ($ bil.)	Internet Revenues ($ bil.)	U.S. Internet Employees
Top telephone cos.					
AT&T	5.6	14.2	118.93	5.79	15,092
Verizon	4.6	8.2	93.47	3.34	8,397
Quest	N.A.	2.6	13.78	1.06	2,846
Embarq	N.A.	1.2	5.90	.49	1,492
Windstream	N.A.	.8	3.11	.27	659
Top cable cos.					
Comcast	7.4	13.2	30.89	5.38	17,416
TWC/Road Runner	4.1	7.6	15.95	3.10	8,862
Cox	N.A	3.7	6.72	1.51	5,063
Charter Cable	1.9	2.7	6.02	1.10	3.015
Cablevision	N.A.	2.3	6.48	.94	1,732
Mediacom	N.A.	.7	.73	.28	886
Large Independent					
America Online*	28.0	9.3	Div. of TW	2.44	2,389
EarthLink*	5.2	3.9	1.03	1.03	998

[26] Hamilton interview with Shawn O'Donnell, June 25th, 2008
[27] *First Research Industry Profile*, "Internet Service Providers," May 19, 2008

Other Cons. ISPs	N.A.	21.3	N.A.	5.11	4,951
Total	**83.0**	**91.7**		**$31.84**	**73,778**

Note: Subscribers by provider in 2005 are from Mintel report on ISPs, and are displayed here to show the dramatic rise in cable and telephone broadband subscribers in recent years. Subscriber numbers for 2007 are from Internet.com's ISP Planet "Top 25 ISPs" as of 12/31/07, published 8/10/08. There were some business ISPs in these numbers but we have attempted to remove most of them. Also, there may be some double counting of consumer households, either because a household may buy America Online or Earthlink in addition to a cable or telecom broadband service, or because some telecom providers are counting both retail and wholesale DSL sales. Specific sources are Comcast (2007 10K), Time Warner (2007 10K), Cox (2/28/08 Press Release), Charter (2007 10K), Cablevision (2007 10K), Mediacom (2007 10K), AT&T (2007 Annual Report, which removes its 4.1 million business DSL accounts), Verizon (1/28/08 Press Release), Quest (2/12/08 Press Release), Embarq (2007 10K), Windstream (2/8/08 Press Release), AOL (2/6/2008 Trending Schedules), Earthlink (2007 10K). The totals above match Jupiter Research's estimate of total household subscribers of 91.7 million midway in 2007. "Other household ISPs" are 91.7 million less all the major ISPs listed here. Total company revenues are generally from company 10k's. Internet revenues and Internet employees for all companies are keyed off of actual data for Embarq, Windstream and Earthlink who identify at least their ISP revenues, and in Earthlink's case its Internet employees as well. These calculations are explained in detail in the cell comments for each company in the electronic version of the Appendix Internet employee table. Of note is that AOL and EarthLink both have a low employee per subscriber ratio, since there is no network to install and maintain and no physical home interconnection to install and maintain as with the cable and telecom companies. Revenues for "other household ISPs are calculated at $240[28] per year reflecting that many are still narrow band, and a few are even free. Total revenues are from 10K's for public companies.

Wireless ISPs: A second ISP category is wireless access to the Internet paid for largely by enterprises for use by their employees. It functions much like a consumer service because it is used by individuals solely for their hand-held device or laptop. Extrapolating from a recent study on wireless Internet, there are 71.2 million enterprise wireless customers, of whom 35 percent are broadband customers.[29] Using a rate of $20 per month as an allocation of regular voice service for wireless, and $50/month for broadband, the total revenue from this segment is $26.06 billion. Employees related to this sector, using a weighted average of revenues/employees for the five largest telecom consumer ISPs in the table above, is 67,782.

Business wire line Internet Access: The third ISP category, business Internet access, is more elusive to size. The most recent figures sized it at $12 billion in 2003, with a forecast of low single-digit growth through 2008.[30] Using a 5-percent growth rate, this would put the market at $14.6 billion in 2007. Using the ratio of employees to revenues in landline consumer ISPs, we calculate the number of employees involved in providing business Internet access to be 49,990.

Backbone Networks: The early Internet was a series of local or regional networks all connected by a "backbone" of long-haul communications cable between networks. Over time, most of these were acquired by the major telephone companies which now handle much of the Internet access and Internet transmission. There appear to be two significant exceptions—Level 3 Communications and XO Communications—which remain independent and sell their network capacity wholesale to other networks. The variety of services XO and Level 3 provide to their network services and enterprise

[28] First Research Industry Profile, *Internet Service Providers*, May 19, 2008

[29] Roger Entner, "The Increasingly Important Impact of Wireless Broadband Technology and Services on the U.S. Economy- a Study for CTIA" Ovum, Boston, Massachusetts, 2008

[30] "Despite Price Erosion, Business Internet Access Service Revenues Continue to Grow," *Business Wire* citing a study by Stat/MDR, September 27, 2004. The same study said the total ISP market at the time was $35 billion, not including wireless ISP, which would have made the consumer landline ISP business $23 billion in 2003. The 1/3 to 2/3 ratio of business consumer seems to hold today.

customers besides transmission of Internet traffic include local access. Some of Level 3's revenues also come from content storage and delivery, a business line competitive with Akamai. We estimate the revenues and employment of XO and Level 3 attributable to the Internet as follows:

2007 Internet Revenues and Employees at Independent Internet Backbone Networks*

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Level 3 Commic'ns	Broomfield, CO	4.27	.55	867
XO Holdings	Herndon, VA	1.40	.26	811
Total			**$0.81**	**1,678**

* Neither company states precisely what portion of their revenue is Internet-related so we have attributed half of the category they call "data and I/P" revenues (as opposed to voice traffic) to the Internet as well as a proportional number of employees. We also used the ratio of U.S. revenues to total revenues to calculate what proportion of Internet revenues and employees are purely U.S.

Putting all the types of Internet access together, this segment of the Internet can be summarized as follows:

Total 2007 Revenues and Employees of ISPs and Independent Backbone Companies

Segment	Total 2007 Revs. ($bil.)	U.S. Internet Employees
Landline consumer ISPs	31.84	73,798
Wireless ISPs	26.06	67,782
Landline business ISPs	14.60	37,975
Independent transport companies	.81	1,678
Total ISP and transport employment	**$73.31**	**181,233**

3.4 Hardware Providers

Hardware to make the internet function consists of servers and other storage devices, routers, PCs, wireless access devices, fiber optic cable, and broadband wireless equipment, among other components. Over the years there has been consolidation among hardware suppliers in many areas. Cisco, for example, purchased 73 companies between 1993 and 2000.[31] Acer, the Taiwanese manufacturer of PCs, bought Gateway and Packard Bell in 2007. Hardware is one of the most concentrated of the Internet segments, with many of the leading suppliers of routers, switches, storage devices, computers, and fiber being large companies.

With low-cost labor in Asia, two trends have emerged in the hardware business in this decade. One is new competition by Asian brands of equipment, such as Huawei and Lenovo. Another is the manufacture in Asia of branded equipment designed by U.S. firms here. Some companies use contract manufacture to do this, while others have their own plants located outside the U.S. Thus, much of the U.S. employment in this sector is engaged in product design, software, marketing, sales and service, but not manufacture. We list below the major hardware providers and some of the

[31] *Business Week,* " Cisco's Comeback," 11/24/2003

smaller ones. It is difficult to break out the number of employees in these companies related to the Internet, since none of the companies state it publicly. We have tried to estimate according to the revenues of their lines of business, and have in some cases received some guidance from spokespeople in the companies. We have attempted to be conservative wherever possible. The companies and estimates of Internet employees and Internet revenues are below. Detailed comments to support the numbers are in an Excel spreadsheet available from the IAB on request.

2007 Internet Revenues and Employees at Hardware Providers

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Cisco	San Jose, CA	34.92	27.22	24,614
Hewlett-Packard	Palo Alto, CA	104.29	9.16	10,122
Dell	Round Rock, TX	61.13	9.90	9,567
Apple	Cupertino, CA	24.01	7.92	4,752
IBM	Armonk, NY	98.79	1.07	4,187
Juniper Networks	Sunnyvale, CA	2.84	2.84	2,940
EMC	Hopkinton, MA	13.23	1.32	2,526
Sun	Santa Clara, CA	13.87	1.39	2,291
Alcatel-Lucent	Paris-New Jersey	26.69	1.33	1,925
Foundry Networks	Santa Clara, CA	.61	.61	654
3Com	Marlborough, MA	1.29	.24	581
Nortel Networks	Toronto-No. Carolina	10.95	.55	537
Corning	Corning, NY	5.86	.11	452
Netgear, Inc.	Santa Clara, CA	.73	.58	207
Brocade Commun'ns	San Jose, CA	1.24	.12	118
F5 Networks, Inc.	Seattle, WA	.53	.05	118
Total			**$64.41**	**65,591**

Note: Total revenues are from 10K's. Internet revenues in a few cases are estimated from company spokespeople in public relations, but are left at a conservative 5% for companies making PCs or storage equipment. See Excel table for detail.

There is likely a small amount of double counting in the hardware section, particularly with Nortel and Lucent-Alcatel, but perhaps for some of the router and server providers as well. To the extent that some of their equipment is used for networking or web hosting, then the providers of those services (ISPs and web hosters) would be passing along charges for these capital items through their pricing to their customers. We estimate the double counting to be in the 5-15 percent range.

Not taken into account are chip designers or chip design software (e.g., Synopsis), chip makers (e.g., Intel, Analog Devices), makers of chip manufacturing equipment (e.g., KLA Tencor), makers of other components for PCs, servers, routers, and storage devices, or providers of cell towers like American Tower. We did not think the allocation of employees to the Internet to be a significant enough number to be very important. Distributors like Ingram Micro and Tech Data sell hardware and software products to large enterprises. Just these two distributors have 23,000 people between them. But many of their employees work outside the U.S. and, as discussed earlier for this segment, only a small fraction of most of this IT hardware and software should be allocated to the Internet.

Making certain assumptions, then, perhaps 5-10 percent of distributors' employees might be allocated to the Internet, which would mean 1,000-2,000 employees we have not counted.

3.5 Information Technology Consulting and Solutions Companies

There are a few large firms and many small companies that provide consulting help on Internet-related issues. This may range from helping a bricks-and-mortar retailer install an e-commerce capability to installing security software to assure that the client's PCs will not be exposed to hackers and viruses on the Internet. The large companies—Accenture, CSC, EDS, Hewlett Packard, and IBM—have had large IT consulting and solutions staffs for a long time, but have seen the proportion of Internet-related work grow. Besides them there are Bearing Point and many smaller regional and local IT firms. In addition, we have included the analyst companies which study and consult with the IT industry, and include analysis and advice on the Internet as part of their services.

2007 Internet Revenues and Employees at Information Technology Consulting and Solutions Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
IT Cons. & Sol.				
IBM	Armonk, NY	98.79	2.71	7,164
EDS	Plano, TX	22.13	1.11	4,673
Hewlett Packard	Palo Alto, CA	104.29	.83	3,771
Accenture	New York/Bermuda	19.70	.99	2,805
Comput'r Sci Corp	Falls Church, VA	16.50	.83	2,670
SAIC	San Diego, CA	8.94	.45	2,190
Perot Systems Corp.	Plano, TX	2.61	.13	958
Affiliated Com. Sys.	Dallas, TX	6.16	.31	631
Unisys	Blue Bell, PA	5.65	.24	552
Bearingpoint	McLean, VA	3.46	.17	549
Cognizant Tech. Sol.	Teaneck, NJ	2.14	.11	485
Other IT Consultants		N.A.	3.65	25,034
Analyst firms				
Forrester Research	Cambridge, MA	.21	.07	268
Gartner Group	Stamford, CT	1.19	.12	243
JupiterResearch	New York, NY	.01	.01	62
Yankee Group	Boston, MA	.10	.01	29
Total			**$8.23**	**32,155**

Note: Total revenues are from 10K's and, in the case of Jupiter and Yankee, published articles. Internet revenues are estimated from the company lines of business with supporting comments in an Excel table of Internet companies available on request

3.6 Software Companies

The largest independent software firm in this segment is Symantec Corporation of Cupertino, California, with a total of 17,600 employees in all its locations. Symantec focuses on "software and services that protect, manage and control information risks related to security, data protection, storage, compliance and systems management."[32] Its software is used both for consumer PC security as well as business and network IT security. Several much smaller security software companies include Verisign, Secure Computing, and Websense, each with less than an estimated 5,000 Internet employees. IBM, Microsoft, and Hewlett Packard all create software, some of which is used for Internet-oriented applications.

We are not including in this group software companies selling special-purpose software for PCs over the Internet, as we believe they are covered in e-commerce. Also we are not including applications software sold as "Software as a Service," a segment unto itself that we believe is totally dependent on the Internet for its existence.

We are aware that much enterprise software is accessed by employees over the Internet both in the office and remotely, but choose not to count this as Internet software because it likely could have been used with private data networks had there been no Internet.

There is also network management software used to manage ISP and long-haul connections and networking, but we believe that is absorbed and passed along to users in the ISP segment revenues.

2007 Internet Revenues and Employees at Software Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Symantec	Cupertino, CA	5.87	3.94	6,249
IBM	Westchester Cty., NY	98.79	3.10	6,066
McAfee	Santa Clara, CA	1.31	1.31	2,550
Adobe Systems	San Jose, CA	3.16	1.58	2,088
Verisign	Mountain View, CA	1.50	.92	2,085
Microsoft	Redmond, WA	60.42	2.16	1,951
BEA Sys./Oracle	San Jose, CA	1.54	.38	855
Websense	San Diego, CA	.21	.21	790
Secure Computing	San Jose, CA	.24	.24	776
Interwoven	San Diego, CA	.23	.23	700
Stellent/Oracle	Eden Prairie, MN	.19	.14	448
Eltron	Nashua, NH	.04	.04	162
Other Software Cos.		N.A.	1.47	2,472
Total			**$15.72**	**27,192**

* Detail to support these numbers is provided in the Excel spreadsheet available on request.

Some large software companies are not included because they are based in Europe, including Bitdefender of Germany, Panda of Spain, and Parallels, Inc. of Switzerland. Parallels, of unknown size, was formerly headquartered in Seattle. Parallels just purchased SWsoft of Herndon, Virginia,

[32] Yahoo Finance, Profile for Symantec

with about 900 employees. SWsoft develops software for running data centers, especially for web hosting companies.

3.7 Web Hosting and Content Management Companies

Web hosting services are provided by a variety of types of companies. Large portal companies, chiefly AOL and Yahoo, offer it as one of their many services. Some mid-sized companies offer hosting as their primary service and pride themselves in publicizing how many web sites they currently host, e.g., AIT hosts 210,000 websites, Hostway 600,000, and The Planet 2.2 million. A third category specializes in domain name registration, usually with web hosting, but also possibly having domain name registration as its primary focus. 1 and 1 Internet, a German-owned company is in this category, as are Network Solutions and Register.com. A fourth category not only hosts web sites, but provides for other Internet services that help the client to do marketing, including web site design, e-mail marketing services, on-line advertising, or e-tailer services. Examples are Aplus.Net and Datapipe, Inc.

This is one of the Internet segments, along with content publishers, web designers, ISPs, e-mail marketers, e-tailers and e-mail marketers, where the number of small businesses involved is large. The High Sites reported in the summer of 2008 that Web Hosting Stuff, a rating agency for Web Sites, provides user ratings and reviews for 8,158 web hosting companies around the globe.[33]

In terms of revenues, this is not a large segment of the Internet, even though it is a critical element. Most everyday users of the Internet are either using e-mail or searching out and using websites. With the rapid decline in hardware costs over the years, making servers quite inexpensive, hosting companies can offer their services for a simple web site for as low as $4.00 to $5.00 a month. Since the industry is so fragmented, it is difficult to estimate its size. For web hosting, if one figures one half of all websites are in the U.S., or 54 million, and hosting costs a minimum of $5.00 a month, then the total hosting market is at least $3.24 billion. We can add to that an estimate for the size of the domain name registration business, a much smaller business.

Many of the companies in the table below are private or are owned by another company. Therefore, accurate figures are not available for some companies. The figures for total revenues, Internet revenues, and U.S. Internet employees for some companies have been estimated using benchmarks of number of employees or web sites hosted by other companies. Therefore, all the figures below should be considered very rough approximations. From everything we have seen and read, however, there are no companies with 5,000 employees or more devoted to the web hosting business.

2007 Internet Revenues and Employees at Web Hosting Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
GoDaddy Gp.	Scottsdale, AZ	.23	.23	2,000
The Planet	Houston, TX	.18	.14	1,620
Verio/NTT	Englewood, CO	.38	.38	1,500
Rackspace Hosting	San Antonio, TX	.36	.29	1,293
1&1 Internet	Chesterbrook, PA	.29	.09	1,191

[33] www.thehighsites.com, July 10, 2008

Website Pros	Jacksonville, FL	.08	.08	752
Network Solutions	Herndon, VA	.06	.06	720
Hostway	Chicago, IL	.06	.06	540
SAVVIS	Town & Country, MO	.79	.24	535
Navisite	Andover, MA	.13	.13	492
Register.com	New York, NY	.06	.06	489
IPowerWeb	Phoenix, AZ	.06	.06	250
AIT	Fayetteville, NC	.03	.03	130
Aplus.Net	Overland Park, KS	.01	.01	130
Datapipe	Jersey City, NJ	.04	.04	123
Pair Networks	Pittsburgh, PA	.03	.03	120
All Other			2.84	38,667
Total			**$4.77**	**50,552**

Note: Revenues and employees derived largely from Hoovers and estimates based on like companies. (See Appendix table detail)

Related to web hosting are companies that manage the storage and movement of content around sites on the Internet. They help to eliminate capacity bottlenecks on transport networks. One noteworthy service is provided to many companies by Akamai and several of its competitors: wide-spread, geographically distributed infrastructures of data servers that connect to many of the data networks that comprise the Internet. These firms move content, and then "cache," or store it at numerous locations around the U.S. and the world. This helps insure that users of that content receive it quickly from a nearby location rather than entirely from a single, central server which might be subject to congestion or other network delays.

2007 Internet Revenues and Employees at Content Management Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Akamai.	Cambridge, MA	.64	.64	1,170
Internap	Atlanta, GA	.23	.23	378
Radiance Tech.	Sunnyvale, CA	.06	.06	270
Limelight Ntwks.	Tempe, AZ	.10	.10	217
FatWire Corp	Mineola, NY	.02	.02	100
Mirror Image	Tewksbury, MA	.01	.01	82
GlobalSCAPE	San Antonio	.02	.02	66
Total			**$1.08**	**2,283**

Note: Revenues and employees are from 10Ks and Hoovers estimates.

The sum of the web hosting and content management companies is in the table below:

Total 2007 Revenues and Employees of Web Hosting and Content Management Companies

Segment	Total 2007 Revs, ($ bil.)	U.S. Internet Employees
Web hosting companies	4.77	50,552
Content management companies	1.08	2,283
Total Web Hosting and Content Mgmt.	**$5.85**	**52,835**

3.8 Search Engines/Portals

This segment includes two types of companies, search and portal, though in the case of Yahoo and others, they are combined into one. A search company scans the web or proprietary content using key words. Portals also offer search tools, but their presentation is one of web pages of information under organized topic headings alongside links to other sites.

The general search engine segment, which emerged from the original browser business to allow Internet users to scan the entire Web, is quite concentrated in the U.S., with Google and Yahoo now the dominant players. Microsoft has tried to buy Yahoo to shore up its distant third position in the marketplace, as seen from basic search statistics shown below. Ask.com was purchased by IAC/Interactive and is part of their Media group along with other small Internet businesses.

The importance of this segment is evident in usage statistics. Recent Nielsen figures show that of the top five most trafficked websites by U.S. users, four are the general search engine/portals, and in this order: #1 Google, with 123 million unique visitors in July of 2008 (up from 76 million three years ago), #2 Yahoo! with 116 million unique visitors in July 2008, #3 MSN, and #5 AOL Media Network.[34]

For searches alone, Google leads the group significantly:

Volume of searches in the U.S., May 2008

www.google.com	68.29 %
search.yahoo.com	19.95 %
search.msn.com	4.33 %
www.ask.com	4.23 %
Other	3.21 %

Source: Hitwise, May, 2008

Specialty search engines and portals on the Internet either have been transformed from earlier on-line services available on private networks, e.g., Lexis/Nexis, or have been created to serve a particular need that an Internet search engine or portal could fill effectively, e.g., Monster.com and Career Builder for job listings.

[34] Melanie Lindner, "What Are People Actually Doing on the Web?," *Forbes.com,* 8/20/08

The major general and specialty companies and their Internet employees are listed below:

2007 Internet Revenues and Employees at General Search and Portal Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Google	Mountain View, CA	16.59	16.59	15,124
Yahoo	Sunnyvale, CA	6.97	6.62	10,725
AOL/T-W	New York, NY	5.18	2.37	5,224
Microsoft	Redmond, WA	60.42	2.92	3,855
Ask.com/IAC	Oakland, CA	6.37	.76	2,025
Total			**$29.26**	**36,953**

2007 Internet Revenues and Employees at Targeted Search and Portal Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Monster Wlwd.	New York, NY	1.35	1.35	4,168
Careerbuilder	Chicago, IL	.67	.67	2,000
LexisNexis	Miamisburg, OH	8.94	1.27	1,846
WebMD	New York, NY	.33	.32	1,116
Idearc	DFW Airport, TX	3.19	.29	643
Factiva	Monmouth Jct., NJ	.29	.29	600
One Source	Concord, MA	.69	.08	580
FindLaw	Eagan, MN	.10	.10	500
Hoover's	Austin, TX	.11	.09	222
Thomas Publ.	New York, NY	.06	.02	180
MapQuest	Denver, CO	.10	.10	117
Total			**$4.58**	**11,972**

The sum of the two sub-segments is in the table below:

Total 2007 Revenues and Employees of General and Targeted Search Engines and Portals

Segment	Total 2007 Revs. ($ bil.)	U.S. Internet Employees
General Search Engine and Portal Companies	29.26	36,953
Targeted Search Engine and Portal Companies	4.58	11,972
Total Search Engine and Portal	**$33.84**	**48,925**

3.9 Content Sites: News, Entertainment, Research, Information Services

The content industry is fairly fragmented, comprising a small number of very large groups and many small firms. Our estimates are constructed from reliable data on the major companies, and a cap on

total sector employment from Federal data on the total number of "Internet Publishing and Broadcasting" employees at 46,545.

2007 Internet Revenues and Employees for Large Media Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
AOL/TW	New York, NY	88.50	15.12	7,000
News Corp (Fox Interactive, WSJ)	Los Angeles, CA	33.00	.90	2,500
NBC Universal (GE)	New York, NY	15.42	.65	2,000
CBS	San Francisco, CA	14.07	.56	1,800
Disney	North Hollywood, CA	35.51	.50	1,500
Viacom/MTV	New York, NY	13.42	.50	1,500
New York Times Co.	New York, NY	3.20	.33	1,056
Gannett	McLean, VA	7.44	.31	1,000
Washington Post Co.	Washington, DC	4.18	.114	300
Meredith	Des Moines, IA	1.6	.059	200
Conde Nast	New York, NY	2	.06	200
Forbes	New York, NY	N.A.	.07	200
Other		N.A.	N.A.	27,280
Total			**$18.99**	**46,545**

Notes: http://www.nypost.com/seven/12262008/business/it_could_get_cond__233__nasty_145978.htm
http://www.washpostco.com/phoenix.zhtml?c=62487&p=irol-SECText&TEXT=aHR0cDovL2NjYm4uMTBrd2l6YXJkLmNvbS94bWwvZmlsaW5nLnhtbD9yZXBvPXRlbmsmaXBhZ2U9NTQ5OTQ2MiZhdHRhY2g9T04mc1hCUkw9MQ%3d%3d
http://www.washpostco.com/phoenix.zhtml?c=62487&p=irol-newsArticle&ID=1112934&highlight=
http://247wallst.com/2009/05/03/the-sun-sets-on-businessweek-forbes-and-fortune/
http://www.broadcastingcable.com/article/112652-Viacom_Posts_Gains_in_Q4_Full_Year_2007.php
http://www.broadcastingcable.com/article/110441-Viacom_s_Aggressive_Online_Plan.php
http://www.meredith.com/investors/AR2007/Report.pdf

There are many small Internet publishers and broadcasters. In its specialized study of the Internet a few years ago, the U.S. Census Bureau reported NAICS code 516110, "Internet Publishing and Broadcasting" with 46,545 employees. Since for the large media companies, Internet revenues are still a small part of overall revenues, we do not believe any of them are counted in 516110. So we believe these two categories of employment do not overlap at all.

2007 Internet Revenues and Employees for Social Networking Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
MySpace (Fox Interactive)	Santa Monica, CA	.525	.525	1,000
Facebook	Palo Alto, CA	.15	.15	1,000
Classmates	Woodland Hills, CA	.193	.193	500
Buzznet	Hollywood, CA			80

LinkedIn	Mountain View, CA	<0.1	<0.1	300
Digg	San Francisco, CA			100
Twitter	San Francisco, CA	0	0	20
Total				3,000

Notes: http://www.businessinsider.com/myspace-ad-revenues-closing-in-on-aols-twx-nws-2009-2
http://kara.allthingsd.com/20080131/chatty-zuckerberg-tells-all-about-facebook-finances/
http://investor.untd.com/releasedetail.cfm?ReleaseID=328752
http://www.techcrunch.com/2008/05/05/allen-co-pitching-linkedin-at-1-billion/
http://www.techcrunch.com/2007/01/28/linkedin-raises-nearly-13-million-more/
http://www.linkedin.com/companies/buzznet
Twitter data is for 2008.

Total 2007 Revenues of Content Sites

Segment	Total 2007 Revs. ($ bil.)	U.S. Internet Employees
Large media companies	165.90	9,856
Small Internet publishers and broadcasters	8.50	46,545
Social networking companies	6.47	3,000
Internet games companies	1.00	500
Total Publisher and Social Networks		**59,901**

* The large number of people in this category reflects a BLS category for "Internet Publishing and Broadcasting." U.S. Dept. of Labor, *National employment Matrix*

3.10 Software as a Service (SaaS)

Salesforce.com has led the way with enterprise-application software that customers do not have to license, but rather can simply pay a monthly fee to use over the Internet. Salesforce.com, a customer relationship management (CRM) application, turned out to be a very good application of this concept, since all organizations need some type of software to track customer contacts and orders. Salesforce.com is available anywhere a traveling salesperson has Internet access, so entering and using customer information does not involve having to access the company file server. With this success and others, the SaaS market is believed to have grown to $6.3 billion in 2006, and was expected to be about $7.7 billion in 2007.[35] One source of growth in this area is the migration by large software providers, such as SAP, Oracle, and SunGard, toward offering some of their software products as SaaS. Oracle for example just started to provide its "CRM on Demand" as a SaaS offering.

[35] Sources: Gartner projection mentioned in Jon Brodkin, Microsoft leas series of Web-hosting announcements; Software-as-a-service provides new opportunities for hosting industry, *Network World*, July 26, 2007 and IDC projections mentioned in "SWsoft, 1&1 Internet, develop web-hosting APS SaaS, *WebSiteHostDirectory.com* June 19, 2007.

2007 Internet Revenues and Employees at Software as a Service (SaaS) companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Salesforce.com	San Francisco, CA	.75	.75	2,476
Digital River	Eden Prairie, MN	.35	.35	949
RightNow Tech.	Bozeman, MT	.11	.11	617
Epicor Sftwr.	Irvine, CA	.43	.09	581
Concur Tech.	Redmond, WA	.13	.13	546
Salary.com	Waltham, MA	.11	.11	443
Vocus	Lanhan, MD	.06	.06	341
NetSuite	San Mateo, CA	.11	.11	338
Taleo	Dublin, CA	.13	.13	328
Convio	Austin, TX	.04	.04	320
Workday, Inc.	Walnut Creek, CA	.02	.02	185
All Other			5.81	22,063
Total			**$7.70**	**31,487**

3.11 Advertising Agencies and Ad Support Services

A key segment in the marketing-supported Internet is the advertising agencies that create advertising for their clients and then buy placement for it among online publishers and other Internet entities. There are many agencies specialized in the Internet, and the largest global agencies also have a number of acquisitions or home-grown groups that design online advertising. From what we can glean, these ad agencies design ads for both B2B and B2C advertisers.

The first group to consider is the specialist agencies, some of which are owned by large global agencies, as indicated.

2007 Internet Revenues and Employees at Specialist Interactive Ad Agencies*

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Digitas	Boston, MA	.43	.43	2,500
Sapient Corp.	Cambridge, MA	.16	.60	1,500
Razorfish	Seattle, WA	N.A.	.30	1,150
Rapp Collins	New York, NY	N.A.	.25	825
Ogilvy Inter.	New York, NY	.16	..20	500
IBM Interactive	Chicago, IL	.27	..27	475
Wunderman	New York, NY	.16	.16	400
AKQA	San Francisco, CA	.13	.13	274
Organic	San Francisco, CA	.13	.13	325
R/GA	New York, NY	.10	.10	250
#11 thru 50		NA	2.14	12,935
Total			**$9.64**	**26,074**

* Companies, their headquarters, and their sales are provided in "Top50 Digital Agencies." For companies lacking published employee numbers we are using the rate of 25 people for every $10 million of ad revenue. Further detail on sources of revenue and employment data can be found in the Excel spreadsheet.

2007 Internet Revenues and Employees at Large Global Ad Agencies*

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Omnicom	New York, NY	12.65	0.76	6,000
WPP Group	London	12.38	0.75	6,000
Publicis	Paris	6.38	0.40	3,000
Interpublic	New York, NY	6.55	0.40	3,000
Total			**$2.31**	**18,000**

Internet Revenues and Employees at Web Analytics and Marketing Research Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Double Click/Google	New York, NY	.35	.35	850
Harris Interactive/Harris	Rochester, NY	.23	.2	818
Omniture	Orem, UT	.14	.1	713
Nielsen Online	New York, NY	.10	.1	500
ComScore	Reston, VA	.09	.0	452
All Other		.30	.30	600
Total			**$1.0**	**3,333**

3.12 Advertising Networks

As mentioned in Section 1.3, ad networks play an important function in bringing buyer and seller of ad space together. They do this by aggregating publishers, many of them small, and connecting them with advertisers through their ad agencies. eConsultant maintains a list of about 86 ad networks, many of which are quite small.[36]

2007 Internet Revenues and Employees at Advertising Networks

Company	Headquarters	Total 2007 Company Revenues ($billions)	2007 Internet Revenues ($billions)	U.S Internet Employees
Value Click	W Lake Village, CA	0.65	0.65	1,333
24/7 WPP	New York, NY	0.20	0.20	39
Platform A/AOL	Baltimore, MD	0.27	0.27	270
Burst Media	Burlington, MA	0.04	0.04	97
Tribal Fusion	Emeryville, CA	0.03	0.03	70
Total			1.19	**1,533**

[36] eConsultant Technical Lists, http://lists.econsultant.com/top-10-advertising-networks.html A website called LinkWorth also maintains a long list of ad networks: http://blog.linkworth.com/a-nice-long-list-of-ad-networks/

3.13 E-mail Marketing and Support

E-mail campaigns, both B2C and B2B, have been growing rapidly, and most marketers see them as a useful customer acquisition and customer retention tool. DMnews.com reported in early 2007 a study by Datran in which 1,500 marketing professionals from 50 different companies were surveyed on their e-mail marketing intentions. The study found that 70 percent of the marketers planned to increase 2007 e-mail spending for customer acquisition, and 63 percent planned on increasing e-mail budgets for customer retention. EmailLabs, in its "Statistics and Metrics" section on its website, cited the same Datran Media survey wherein 83 percent of marketers surveyed said they view e-mail marketing as one of the most important advertising tactics they planned to use in 2007. This was a higher percentage than any other medium. EmailLabs also pointed to a Jupiter Research study stating that spending on e-mail campaigns would be $950 million in 2006, up from $885 million the previous year.[37] Projecting the same growth rate, 2007 spending would be $1.02 billion.

Because most of the e-mail specialist marketing firms are privately owned, or divisions of larger companies which do not report results by division, it is hard to identify the revenues and employee counts of the significant firms. However, Hoover's has provided estimates for some of the oft-mentioned specialists, and these happen to be very small companies; this suggests that all are fairly small companies. Many ad agencies also design and deliver e-mail campaigns as part of an integrated marketing campaign, and some are delivered in-house by enterprises as well as by ISPs. Marketingprofs.com in a prospectus for a conference on Digital Marketing in 2008 provides a list of over 80 e-mail marketing firms. We believe there may be 500 or more providers of e-mail campaigns if ad agencies and in-house are included.

There is general agreement that the total revenue for e-mail marketing efforts is around $1 billion. We have removed the e-mail marketing revenues from the Internet advertising revenues in 2007 of $21 billion, so they can be isolated here. This eliminates a potential source of double-counting. The employees are estimated from a weighted average of employees-to-revenue of the companies for which we have both revenue and employee data. Forrester labels it a fairly "mature" industry, even though there remains some room for growth.

We have tried to list all the major companies for which we could find revenue and employment data. Some are independent companies and some, like Epsilon Interactive and Yesmail, are divisions of larger companies. The revenues for each one of the e-mail marketers listed are fairly small—all are doing $50 million or less in annual revenue. CheetahMail and Postfuture/Harte-Hanks are often mentioned as important players, but they are excluded, since CheetahMail appears to be quite small. We could not separate out Postfuture numbers from aggregated Harte-Hanks information, but what we have from pre-acquisition years suggests that Postfuture has only $10-$15 million in sales.

2007 Internet Revenues and Employees at E-mail Marketing Companies*

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Epsilon Interactive	New York, NY	.05	.04	350
Constant Contact	Waltham, MA	.05	.05	318

[37] EmailLabs, "E-mail Marketing Statistics and Metrics, 2007

Axciom Digital	San Mateo, CA	.03	.03	280
ExactTarget	Indianapolis, IN	.03	.03	268
Return Path	New York, NY	.02	.02	200
Responsys, Inc.	San Bruno, CA	.02	.02	162
Yesmail (*info*GROUP)	Portland, OR	.01	.01	128
e-Dialog	Lexington, MA	.01	.01	123
EmailLabs	Menlo Park, CA	.01	.01	114
Datran	New York, NY	.01	.01	95
Silverpop	Atlanta, GA	.01	.01	90
All Other		N.A.	.78	8,150
Total			**$1.02**	**10,278**

* EmailLabs in its Statistics and Metrics" on its website cites a Jupiter Research study saying spending on e-mail campaigns would be $950 million in 2006, up from $885 million the year before. Projecting the same growth rate, 2007 spending would be $1.02 billion. The "all other" is a plug number of revenues to bring the total e-mail marketing revenues to $1.02 billion. "All other" employees are calculated using a factor of $95,701in revenue per employee, determined by the composite numbers of 6 of the e-mail marketers above that have fairly similar revenue/employee ratios.

3.14 Enterprise Involvement in Internet Advertising, Marketing and Web Design

Just about every larger business, government agency, or non-profit has a website. These sites help stakeholders—customers, distributors, investors, business partners, employees, and job applicants—understand the company or agency. These sites may be developed by ad agencies like Digitas and Razorfish, by web design firms, many of which are sole proprietorships, by in-house staffs in the larger companies, or even by departments in a few large companies, like IBM Global Services. The U.S. Department of Labor notes that 25 percent of graphic designers, of which web designers are a part, are self-employed.[38]

Estimates of annual web development activity are hard to come by. One source puts the worldwide number of websites at 108 million in 2007, up from 70 million in 2005.[39] Worldwide, 38 million new sites were created in two years, although presumably many new ones were developed outside the U.S. in less mature markets. In addition to that activity, all websites are potentially in need of upgrade or enhancement every year. Clearly there is extensive web development, both for new and existing sites.

Because web development is scattered over so many firms and individuals, rather than build up employment from disaggregated numbers, we have instead tried to estimate the total number of web designers in the U.S. Web designers are counted in a broad Bureau of Labor Statistics category that includes computer systems analysts, database administrators, and computer scientists; these number some 1 million people in the U.S. The author of a recent analysis suggested that 100,000 web designers within this group might be a safe estimate, given that so many other categories are covered. The analyst also pointed to an InfoWorld compensation survey in 2004 stating that the average web designer salary was $61,000. Given that billings to a web design client must include benefits, management, marketing, and other overhead, revenue per web designer of $150,000 seems a minimum, although in very small firms that might be too high. Combining these numbers, the

[38] U.S. Department of Labor Occupational Outlook Handbook, Graphic Designers

[39] "WWW FAQs," Boutell.com, citing the Netcraft Web Server Surveys done in 2005 and 2007, February 15, 2007

Internet revenue for web design is $15 billion. Of course, some of this web design is done in ad agencies so there is the need to back out web design from ad agency figures.

3.15 E-commerce: E-tailing, E-brokerage, E-banking, E-travel, B2B E-commerce, and Other E-services

The $165.9 billion in annual revenues of e-retailing to consumers in 2007[40] is larger than the 2007 sales of J.C. Penney ($19 B), Macy's ($26 B), Sears ($51 B), and Target ($63 B) combined, although still only half the size of Wal-Mart, at $388 billion annually.

Still, the comparison to Wal-Mart is an interesting one. Wal-Mart has 2 million employees world-wide, so each million of Wal-Mart's staff represents retail sales of $194 billion, a retail volume not much larger than all of current e-tailing. Yet the e-tailing industry is selling its $165.9 billion of merchandise with only 151,000 people, plus a sizeable cadre of delivery people who deliver the merchandise to homes and businesses. This is a major labor productivity improvement in the general economy, as we will point out in section 5.4.

According to annual reports and our estimates, the top 10 e-tailers alone employ over 40,000 people; the remainder of the top 500 employ another 50,000 workers; and all other e-tailing employ nearly 60,000.

The delivery of e-tailer packages serves to employ a large number of people at the Post Office, UPS, FedEx, and other shippers. The entire e-tailing industry is estimated to employ approximately 131,000 delivery people and overhead staff. This estimate is based on the fact that Amazon alone spends $1.2 billion in shipping, and shipments per employee at UPS and the U.S. Postal Service average around $100,000**.**

This volume of shipping has not gone unnoticed by delivery organizations. UPS, in January, 2008, when reporting its 4th quarter earnings, noted that it was "pleasantly surprised" by a late surge of Internet-based purchases that accounted for what it estimated to be one-third of its holiday business in November and December.[41]

Back in 2005 the U.S. Postal Service was already giving the Internet credit for helping to grow its business. While first-class mail revenue had dropped from the previous year, package revenue had increased 2.8 percent, and officials were giving the Internet a good part of the credit. A comment by one manager was revealing:

[40] Internet Retailer's *Top 500 Guide*, 2008 edition, Chicago, Illinois. Internet Retailer's top 500 e-tailers account for $101.7 billion of their $165.9 billion estimated total, or 61%, and of that, the top 100 account for $87.7 billion or 53% of total e-tail. Forrester Research in 2006 projected on-line retail sales at only $157 billion including autos and auto parts (Internet Retailer seems not to include autos, suggesting a bigger discrepancy of numbers). The reason for Internet Retailer's high number may be the inclusion of the on-line sales of the three big office supplies stores, and the on-line sales of many large department and general merchandise stores. Internet Retailer seems to have collected its data carefully by survey and published data on individual companies, with projections for the rest of the industry, so we are accepting their information.

[41] Dave Hirschman, Cox News Service, "UPS Reports Record Profit", Friday, January 27, 2008, provided in *PalmBeachPost.com*

"Six years ago, people were pointing at the Internet as the doom and gloom of the Postal Service, and in essence what we've found is the Internet has ended up being the channel that drives business for us.[42]"

James Cochrane, U.S. Postal Service Manager of Package Services

E-tailing alone, aside from other areas of e-Commerce, is now the second largest U.S. Internet employer after the ISPs. E-tail sales grew nearly 22 percent from 2006 to 2008, and high growth rates will likely continue. Some e-tail sales occur outside U.S. borders, but the vast majority of people working in e-tailing and delivery of e-tail packages are U.S.-based

2007 Internet Revenues and Employees at E-Tailers

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Amazon.com	Seattle, WA	14.80	14.80	12,750
Staples	Framingham, MA	19.37	5.60	6,395
Office Depot	Delray Beach, FL	15.53	4.90	5,596
Dell, Inc	Round Rock, TX	61.13	4.20	4,796
HP Home Office	Palo Alto, CA	104.30	3.36	3,837
OfficeMax, Inc.	Naperville, IL	9.08	3.16	3,609
Apple, Inc.	Cupertino, CA	24.00	2.70	3,083
Sears Holdings	Hoffman Estates, IL	50.70	2.59	2,958
CDW Corp.	Vernon Hills, IL	8.15	2.41	2,752
QVC	Westchester, PA	7.40	1,88	2,147
Best Buy	Richfield, MN	40.02	1.78	2,033
SonyStyle.com	San Diego, CA	20.92	1.77	2,021
Walmart.com	Bentonville, AK	387.53	1.58	1,804
Newegg.com	City of Industry, CA	1.90	1.90	1,800
J.C. Penney	Plano, TX	19.86	1.50	1,713
Circuit City	Richmond, VA	64.40	1.20	1,599
Netflix	Los Gatos, CA	1.21	1.21	1,542
Costco	Issaqua, WA	64.40	1.20	1,370
Target	Minneapolis, MN	64.37	1.15	1,313
Rest of Top 500			56.08	49,799
All Other			64.20	57,009
Total E-tailers			**$165.90**	**171,194**
Delivery factor*			Rev. Eq.	131,347
Total w/delivery				**282,336**

Note: Total e-tailer sales of $165.9 billion are from Internet Retailer's *Top 500 Guide.* Internet employees are calculated based on company Internet sales volume by using a ratio of 1.142 employees per million of sales. This ratio was calculated from the actual experience of pure e-tailers Amazon, Newegg, Netflix, Zappos, Blue Nile, and Bidz.com. Amazon and Newegg figures above are actual employees.

* Packages sold by e-tailers are generally shipped by the U.S. Postal Service or one of the private delivery services. Based on Amazon's published data that the company spent $1.2 billion on outbound shipping in 2007, we have been able to calculate the number of delivery people, and their management and administrative people, required to deliver all e-tailer packages.

[42] "Postal Service Finds a Friend in the Internet," *New York Times*, August 2, 2006

In addition to e-tailing, e-commerce also includes e-brokerage for investments, e-banking, e-travel services like airlines, hotels, rental cars, and agents like Travelocity. Lastly, but far from least, B2B e-commerce generates a sales volume 50 or more times that of e-tailing to the consumer.

Taking first *e-brokerage,* a number of companies developed this business over the last twenty-five years for investors who preferred trading without a personal agent and who did not want a full-service brokerage like Merrill Lynch or Smith Barney. Before the rise of the Internet, Charles Schwab had already broken with tradition by offering "discount brokerage" with low trading commissions. DLJ Direct was one of the first to offer Internet trading; it was eventually absorbed by Harris, which in turn was absorbed by E-Trade, a California up-start that made personal stock trading on the Internet better known through its heavy advertising expenditures. Ameritrade also emerged as another large player, but has generally kept a lower profile. Schwab, in turn, began to promote e-brokerage in addition to its other services. Traditional brokerages and some large banks, including Bank of America and Wells Fargo, have entered the business more recently. In fact, the latter two banks offer "free" trading subject to conditions like minimum balances.

We have estimated the number of employees for the e-brokerage industry by keying off of Ameritrade's number of accounts and the number of people in its organization, which yields 1,623 accounts per employee. We have used this figure for estimates of E-trade and Schwab. For Scottrade, we have the actual number of employees, and they appear to be a pure e-brokerage organization.

2007 Internet Revenues and Employees at E-brokerage Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Charles Schwab	San Francisco, CA	4.99	2.88	4,252
Ameritrade	Omaha, NB	2.18	1.96	3,494
E-Trade	New York, NY	3.57	1.96	2,896
Scottrade	St. Louis, MO	1.03	.82	1,000
Think or Swim	Chicago, CA	.32	.32	653
TradeStation	Plantation, FL	.15	.15	302
Options Express	Chicago, IL	.25	.25	265
Total			**$8.50**	**12,815**

Note: Using summer, 2007, comparative numbers for accounts in Ameritrade, E-trade and Schwab, we calculated Internet employees at each of the three companies by using Ameritrade's ratio of 1,623 accounts per employee for its 6.3 million accounts. Schwab and E-Trade at this time had 6.9 million and 4.7 million accounts, respectively. Internet revenues for all but Ameritrade and Scottrade are calculated using a figure of $677,486 per employee.

We were unable to find a good accounting of the number of employees and revenues in the e-banking industry. There are very few banks that solely offer Internet banking services. Meanwhile, all the major banks and most of the regional and local banks offer some form of e-banking, whether it be simple account look up, ability to pay bills over the Internet, or services like mortgage lending or securities brokerage. The publicly traded banks do not try to break out their revenues and employment for Internet banking, likely because it overlaps so much with traditional paper and

check-based banking. E-banking is heavily used by U.S. consumers. According to Forrester Research, 55 percent of U.S. Internet users do some or all of their banking over the Internet.[43]

E-travel is another significant source of Internet employees. It has more Internet employees than e-brokerage, but still far less than e-tailing. Not only have the e-travel companies successfully expanded their business, the airlines have also pushed people-free reservations services in their discount structures, since e-travel reservation service generate lower costs than using travel agents or customer service representatives of the airlines. Below is a listing of Internet revenues and employees for the major e-travel companies.

2007 Internet Revenues and Employees at E-travel Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
Travelocity	Southlake, TX	2.80	2.80	9,000
Expedia	Belleview, WA	2.67	2.67	3,575
Orbitz	Chicago, IL	.87	.87	1,590
Priceline.com	Norwalk, CT	1.41	1.41	326
Total			**$6.47**	**17,740**

Besides e-tailing, e-brokerage, e-banking and e-travel, there are a few other miscellaneous e-commerce businesses that are oriented toward the consumer or individual business person. (E-commerce that is B2B for supply chain efficiency is a segment covered in the next section.) The most noteworthy of this "other" category is the e-auction companies, with eBay the clear leader. The company has had growing pains of late, but has been very successful in terms of size and growth rate during the first decade of the millennium. It has an even higher number of Internet employees in the U.S. than Amazon.com, making it the largest e-commerce Internet employer as of the end of 2007. However, eBay, due to business contraction, had to start laying off employees, about 10 percent of its workforce, in late 2008.

2007 Internet Revenues and Employees at Other E-Services Companies

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	2007 Internet Revs. ($ bil.)	U.S. Internet Employees
eBay	San Jose, CA	7.67	7.67	15,500
eBay sellers*	Everywhere		59.00	170,000
Total			**$66.67**	**185,500**

* The sellers are those eBay sellers for whom eBay is the only or primary source of income plus full-time equivalent employment at 10% of those who earn part-time income; the revenues are eBay's estimate of the Gross Merchandise Volume (GMV) of all sellers on eBay (source: eBay Government Relations publications, 2008.)

[43] Melanie Lindner, "What Are People Actually Doing on the Web?," *Forbes.com*, 8/20/08

3.16 B2B e-commerce

So-called B2B e-commerce did not start out as an internet service; rather it began, in the 1960s and 1970s, as private line services and commercial network services sold to multiple users and known as electronic data interchange (EDI). The first systems were proprietary, developed by large companies in industries like transportation and pharmaceuticals. Later, standards for data input were developed, so that many different industries could use the same network.[44] Value-added networks (VANs) were created by GTE, IBM, and others to serve a variety of industries and companies with EDI and other services. Meanwhile, driven by financial institutions, systems were created for payments processing. EDI tended to be used over VANs by large enterprises like General Motors or General Electric to reduce their supply costs. Owing to the need for special terminals, special software, and extensive training for the supplier user, small business tended not to adopt EDI.

Use of EDI over the Internet was hampered until the industry created good security systems and software that allowed data to be as secure as over the existing VANs. Once this happened, however, use of EDI began to expand into the small-business arena because of its lower cost compared to VAN-based EDI. Internet-based EDI received a significant boost in 2002, when Wal-Mart mandated its adoption among suppliers.

Today, the U.S. Census estimates total U.S. B2B e-commerce at $2.7 trillion annually.[45] According to a survey of 200 companies in the U.S., about half of B2B e-commerce is Internet-based and this portion is growing.[46] The employment in B2B e-commerce is of two types. One is the employment in establishments that provide Internet EDI software, which the Census has aggregated in NAICS code 425110. Those employees total 8,467, and we will conservatively estimate that half are working on Internet-based EDI. Then there is a larger group of employees of enterprises using EDI, which one source estimates at 80,000 companies with at least $5 to $6 million in net income.[47] A conservative guess is there is one employee in each firm concerned with maintaining or upgrading the EDI system. Using the 50-percent rule, this provides employment of 40,000. The total Internet staff in this segment, then, number 44,233.

Total 2007 Internet Revenues and Employees at B2B E-Commerce Companies

Segment	Total 2007 Revs. ($ bil.)	U.S. Internet Employees
EDI Software Companies	130.00	4,243
Companies Using EDI	1,220.00	40,000
Total B2B E-Commerce	**$1,350.00**	**44,243**

[44] Paula Tallim and Johan Zeeman, "Electronic Data Interchange: An Overview of EDI Standards for Libraries," *Iflanet,* 1993

[45] *U.S. Census E-Stats (http://www..census.gov/estats*

[46] "Internet-Based EDI Poised to Surpass VANs," *www.computer economics.com*, August 2006

[47] "EDI Market Size," *Articles Base,* 4/26/08

4. Companies and Employment by Geography

4.1 Company headquarters and total employees by geography

In the previous section, wherever possible we identified the largest companies within each of the fourteen Internet segments. These encompass 700,000 of the 1.2 million U.S. Internet employees. Only company headquarters locations were listed, but many of these companies have employees, sometimes operating out of their homes, spread over many locations in the U.S. or overseas. (Of course, in cases like cable, telephone, hardware, IT consulting, large media, and large retailer companies, the majority of employees are working in areas that do not contribute to the Internet.) While it is simplistic to allocate these companies by geography based on just their headquarters locations, doing so nevertheless starts to paint a picture of both geographic diversity and intensity.

The distribution of these companies by state, listed in order of number of Internet employees, is shown below. The states are listed in order of the heaviest concentrations of Internet employees.

California

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
Cisco Systems	Cupertino	34.02	61,535	24,614
Google	Mountain View	16.59	16,805	15,124
Yahoo	Sunnyvale	6.97	14,300	10,725
Hewlett Packard	Palo Alto	104.29	17,200	10,122
Apple, Inc.	Cupertino	24.01	21,600	7,835
Jupiter Networks	Sunnyvale	2.84	5,879	2,940
McAfee	Santa Clara	1.31	4,250	2,550
Salesforce.com	San Francisco	.75	2,606	2,476
Sun Microsystems	Santa Clara	13.87	34,200	2,291
SAIC	San Diego	8.94	43,800	2,190
Verisign	Mountain View	1.50	4,251	2,085
Adobe Systems	San Jose	3.16	6,959	2,088
Ask.com/IAC	Oakland	6.37	17,000	2,025
Value Click	Westlake Village	.65	1,344	1,344
Other*		3.15	7,608	5,375
Total		**$228.42**		**90,415**

*All other companies headquartered in California that are cited in this report.

New York

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
IBM	Armonk	98.79	386,558	18,555
Time Warner Cable	New York City	15.95	45,600	8,862
Verizon Comm.	New York City	93.47	235,000	8,397
Omnicom	New York City	12.69		6,108

Monster Worldwide	New York City	1.35	5,210	4,168
Accenture	New York City	19.70	170,000	2,805
Ogilvy Interactive	New York City	.35		2,200
Interpublic	New York City	6.55	43,000	2,059
Cablevision	Bethpage	6.48	14,471	1,732
AOL	New York City	5.18	8,000	1,613
Rapp Collins	New York City	.6		1,235
WebMD	New York City	.33	1,175	1,116
Total		**$261.44**		**58,850**

Texas

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
AT&T/SBC	San Antonio	118.93	310,000	15,092
Dell, Inc.	Round Rock	61.13	88,200	9,567
EDS	Plano	22.13	139,500	4,673
The Planet	Houston	.18	2,250	1,620
Rockspace Hosting	San Antonio	.36	2,021	1,293
Total		**$202.73**		**32,245**

Washington State

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
Amazon.com	Seattle	14.84	17,000	12,750
Microsoft	Redmond	60.42	91,000	5,906
Expedia	Bellevue	2.67	7,150	3,575
Ave A/Razorfish	Seattle			1,150
Total		$77.93		**23,381**

Pennsylvania

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
Comcast Corp.	Philadelphia	30.89	100,000	17,416
1&1 Internet	Chesterbrook	.29	3,572	1,191
Total		**$31.18**		**18,607**

Massachusetts

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
EMC	Hopkinton	13.23	37,700	2,526
Akamai	Cambridge	.64	1,300	1,170
Digitas	Boston	.39	2,500	1,300
Sapient	Boston		6,217	1,500
Total		**$14.26**		**6,496**

Colorado

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
Quest	Denver	13.78	37,000	2,846
Verio/NTT	Englewood	.38	3,000	1,500
Total		$14.16		**4,346**

Other Major Companies and States

Company	Headquarters	Total 2007 Co. Revs. ($ bil.)	Total 2007 Employees	U.S. Internet Employees
Cox Comm.	Atlanta, GA	6.72	22,530	5,063
Charter Comm.	St. Louis, MO	6.02	16,500	3,015
Computer Sciences	Falls Church, VA	16.50	89,000	2,670
Go Daddy Group	Scottsdale, AZ	.23	2,000	2,000
Career Builder	Chicago, ILL	.67	2,000	2,000
Alcatel-Lucent	Murray Hill, NJ	26.69	77,000	1,925
Lexis/Nexis	Miamisburg, OH	8.94	13,000	1,846
Embarq	Overlook Park, KS	5.90	18,000	1,492
Total		**$71.67**		**20,011**

4.2 Census Data for Internet Employees by Geography

In the 2006 U.S. Commerce Business Census, there were six classifications of establishments and their employees that could be considered as Internet-specific. All establishments and their employees are captured by the government according to their zip code. Thus, it is possible to allocate establishments and employees by Congressional District using a computer program that provides this function. The establishments do not have names of companies attached to them in the government database for reasons of privacy. Also, an establishment in the government data base is just a specific location for a company. Some companies may be represented by 10 or more separate establishments.

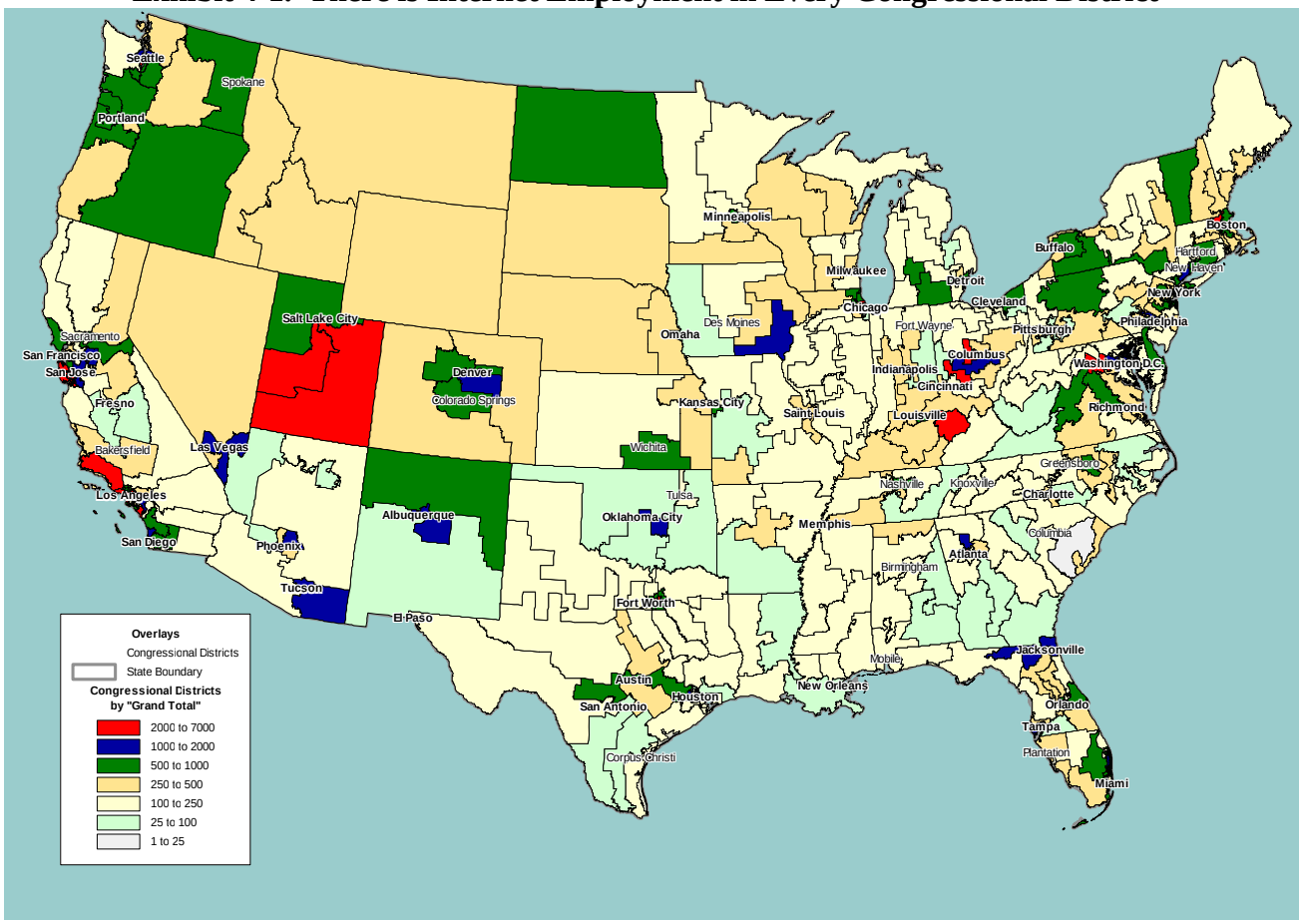
We decided to work with just the employee data and allocate that data by Congressional District. The six codes, and their combined employment of 231,109 employees are listed below.

425110	B to B Electronic Markets	8,467 employees
454111	Electronic Shopping	83,626 employees
454112	Electronic Auctions	5,353 employees
516110	Internet Publishing and Broadcasting	46,545 employees
518111	Internet Service Providers	68,688 employees
518112	Web Search Portals	18,430 employees
	Total	231,109 employees

The resulting analysis is provided in the spreadsheet available on request to the IAB. It revealed that every Congressional District has at least 17 employees, and some as many as 6,500. Twenty-four districts have at least 1,000 identified Internet employees.

This distribution is plotted in the map that follows onto the congressional districts of the USA.

Exhibit 4-1. There is Internet Employment in Every Congressional District



Source: U.S. Census Dept. 2006; six Internet NAICS codes

5. Benefits of the Advertising-Supported Internet Ecosystem

5.1 Overview of Types of Benefits

The benefits of the Internet to U.S. commerce and to U.S. users are many, ranging from providing near universal access to all sorts of information to stimulating job creation by small business. The advertising-supported Internet, whether it be through ad-supported content, enterprise-supported websites, or e-commerce company activity, has transformed the ways the U.S. and the rest of the world conduct information search, communications, social networking, and purchase transactions.

The benefits of the Internet can be categorized as follows:

- Providing universal access to an almost unlimited source of information everywhere in the world except where censorship is an official government polity
- Creating employment
- Providing one of the pillars of economic strength during the 2008-2009 recession
- Fostering innovation either in ways of using the Internet itself or in business and consumer practices enabled by the Internet's features and functionality
- Increasing productivity (output per unit of capital or labor, or more consumer utility at lower cost)
- Making a significant contribution to the U.S. balance of trade
- Saving natural resources (e.g., by being more "green" in lowering CO2 emissions, or reducing the use of paper in mailings)
- Promoting or facilitating a social good such as workplace flexibility, low-cost education, and access to critical information (such as medical information).

5.2 Providing Universal Access to Unlimited Information

The Internet is an opening to the world that has allowed consumers almost anywhere to select at any time the news, sports, reference information, and entertainment that they want. Content from large enterprises, government, small business, and even other individuals is increasingly available to all, in print, audio, and video. Access is limited neither by the number of channels, as with television, nor what was selected that day by the editorial staff of a publication.

A few examples of easy, universal access to information include:

- Half of U.S. car buyers conduct research online before purchase and an increasing number are checking price online.[48]
- As an indication of how much information there is on the Web for individuals to use on a free, marketing-supported basis, at the time of the dot.com meltdown earlier this decade, 12 percent of Internet users, or 13 million people at the time, said a favorite website of theirs had gone out of business; but of these, two thirds said they had found other websites that provided the same information or service. Of the 17 percent of users who were asked to pay

[48] Amie Kim, "2006 Attitudes and Perceptions among Major Groups" in www.autoretailing.org,, Harris Interactive.

for access to a Website or content that had previously been free, half found a free alternative, 38 percent decided not to access the information online, and only 12 percent decided to pay for it.[49]

- Firstmile.US pointed out in 2006 that broadband and the "killer app," entertainment, would eventually create more immediate and broader-based access to first-run movies, compared to traditional theater distribution and DVD rental and sales. Since then, sales of movie downloads to computers or TVs using set top boxes have greatly expanded, and some producers have experimented with "one single release, all forms of distribution, all over the world," as a way to capture maximum profits and reach as broad an audience as possible.[50]
- For digitized, information-type goods, including music, books, and video, the Internet has allowed a great many more offerings to reach the market than could be distributed by bricks-and-mortar retailers or catalog houses. Not limited by shelf space or page count, the Internet has proven to be a very effective channel of distribution for both niche products and products on the tail of the fashion life cycle. Chris Anderson, author of *The Long Tail*, postulates that not only do consumers have access to items they would have had difficulty finding, but that overall demand for the category is likely to increase, since consumer tastes are better matched to offerings.[51]
- Glen Urban at the MIT Sloan School says that by increasing access to information, the Internet has increased consumer power relative to marketers. In addition, the Internet allows consumers greater choice, easier transactions, greater communication among consumers about products and services, and increasing control over the ads and information they receive from marketers.[52]

Concerns were raised as early as during the Clinton administration about possible constraints to the Internet and the negative impact these might have on growth and availability of information. Ira Magaziner, a senior White House advisor, wrote in 1997 in the report, "Framework for Global Electronic Commerce," in favor of a market-driven Internet. "Business models must evolve rapidly to keep pace with the breakneck speed of change in technology. . . . Government attempts to regulate are likely to be outmoded by the time they are finally enacted." Around the same time, Robert Litan, director of economic studies at the Brookings Institute, wrote, "The Internet has given us the greatest rate of return on a public infrastructure investment ever. And it has flourished because we have not yet taxed or regulated it to death—though those are live issues."[53] Perhaps partially due to these warnings from both right and left leaning institutions, the Internet indeed has not been highly taxed or regulated, and it has flourished in the decade since.

5.3 Creating Employment

The Internet has created over 1.2 million jobs in the last 10 to 15 years, many paying higher salaries than the average wage in the U.S. Many of the businesses that exist because of the Internet are

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[49] Lee Rainie, Tom Spooner, Bente Kalsnes, and Sharon Nof, "The Dot.com Meltdown and the Web," *Pew Internet and American Life Project,* Washington, D.C., 2001

[50] "Entertainment, the Broad Killer Ap," *A FirstMile.US perspective"* 800-925-5595, January, 2006

[51] Chris Anderson, "The Long Tail: Why the Success of Business Is Selling Less of More," *Wired,* 2004

[52] "A Blueprint for Profit in a time of Growing Consumer Power," a review of Glen Urban's book, *Don't Just Relate, Advocate, in Knowledge at Wharton, November 21, 2005*

[53] Steve Lohr, "The Economy Transformed, Bit by Bit," *The New York Times,* December 30, 1999.

small. The Small Business Administration defines small business as under 500 employees.[54] According to this definition, there are at least 20-30,000 small businesses doing business as Internet companies, not counting the 100,000+ individual sellers on eBay who make their primary living from this activity.

An important new employment category created by the Internet is small publishers. Internet advertising has created opportunities for individuals to earn or to supplement their incomes by offering news, advice, stories, or entertainment to audiences over the Internet. Data on the number of small or "long tail" publishers are hard to come by. However, in April, 2009, the *Wall Street Journal* estimated, based on several sources of data, that of approximately 20 million US "bloggers" (i.e., publishers that create content via "weblog" or "blog" software), 1.7 million make at least some money off their publishing, and as many as 452,000 use blogging as a "primary source of income."[55] The *Journal* concludes that bloggers rank behind lawyers (555,700) and ahead of computer programmers (394,710) in terms of number of US employees in the category.[56] A survey of bloggers suggests that for those whose sites attract 100,000 or more individual visitors per month, the average annual income is $75,000 (the median is much lower, at $22,000).[57] By virtually eliminating content distribution costs, facilitating discovery of content, and, importantly, creating new means of advertising to generate revenues, the Internet allows anybody with advice to give or a story to tell to find an audience, and potentially to turn a passion into a profession.

Also, what were once small Internet companies a decade or two ago have grown to be quite large, and in the process have created many new jobs for the economy. Significant examples of such companies and their estimated employment in the U.S. are: Amazon.com (12,750 U.S. employees), Cisco (27,700 U.S. employees), Google (15,100 U.S. employees), Symantec (6,250 U.S. employees) and eBay (15,500 corporate employees plus 768,000 independent professionals who sell on eBay as their primary or secondary source of income[58])

Small business is crucial to the U.S. economy. Small firms employed 50.9 percent of the private sector work force and generated 50.7 percent of the non-farm private GDP, as measured in the 1998-2004 period.[59] Even more impressive, is how significantly small business contributes to new job creation in the total economy. In 2004, for example, small firms had a net gain of 1.86 million new jobs, while large firms (over 500 employees) had a net loss of 181,000 jobs.[60] According to an MIT study published around the same time:

> " ….large businesses do almost nothing in terms of job creation. The last time we looked—for the period 1994-1998—the largest firms lost 2 million jobs in aggregate. Over the same period small companies created 10 million jobs."[61]

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[54] "The Small Business Economy; A Report to the President," Small Business Administration Office of Advocacy, 2007
[55] "America's Newest Profession: Bloggers for Hire," *Wall Street Journal*, April 21, 2009, http://online.wsj.com/article/SB124026415808636575.html.
[56] Ibid.
[57] "State of the Blogosphere/2008," Technorati, Downloaded from http://technorati.com/blogging/state-of-the-blogosphere/blogging-for-profit/
[58] eBay Government Relations publications, 2008
[59] "The Small Business Share of GDP, 1998-2004, submitted by Kathryn Kobe, Economic Consulting Services, LLC, April 2007, and as cited in "The Small Business Economy…SBA Office of Advocacy, 2007.
[60] The Small Business Economy; A Report to the President," Small Business Administration Office of Advocacy, 2007
[61] Justin Martin, David Birch, "Slump? What Slump? Small Business Guru David Birch on Why Entrepreneurs Are Alive and Well..", *CNNMoneyy.com*, December 1, 2002

Figures released recently by the U.S. Small Business Administration tell the same story, though in less dramatic terms: Firms with fewer than 500 employees make up 99.7 percent of all employer firms, employ half of all private sector employees, have created 60-80 percent of all new jobs over the decade 1996-2006, hire 40 percent of high-tech workers, are 52 percent home-based and 2 percent franchises, and comprise 97 percent of all identified exporters.[62]

Employment creation also appears to be related to the age of the business as well. The data for 1996 showed that firms that year that were two years old or older cut employment 7-36 percent overall, with the biggest cuts in the older firms. Job growth that same year for companies less than two years old was 150 percent. Chad Moutray, chief economist for the Small Business Administration's advocacy office at the time, said, about these data:

> "I think what small businesses do is they continue to innovate. In order to gain their niche in the global economy they need to find something that nobody is doing and innovate on it."[63]

The innovation that has occurred with Internet companies appears to follow this pattern. Further, as early as 2002, two-thirds of U.S. small businesses were using the Internet as a tool to help them improve their businesses. Thirty-six percent were using the Internet to make travel plans, thirty-six percent were using it to purchase office supplies, equipment, or other business services, thirty-four percent for conducting industry or market research, twenty-nine percent for marketing or advertising, and twenty-four percent simply to network with other entrepreneurs.[64]

5.4 Providing One of the Pillars of Economic Strength During the 2008-2009 Recession

Internet companies were at the center of the economic downturn of 2000-2002, when the industry had clearly been overbuilt, and large economic bets were made on weak business plans. This time around the story is the opposite. The 2008 recession, which could continue for two or more years, is seeing major industries like mortgage lending, new home construction, commercial lending, luxury travel, and auto production fall into severe depression.[65] However, the IT and related Internet industries, perhaps chastened by the recession of eight years ago, are faring much better. Internet-related software companies like Symantec and Adobe Systems continue to grow revenues, albeit at a slower pace. Cisco, Juniper, and other hardware companies are also growing as their businesses expand around the world. Amazon.com is one of the few retailers besides Wal-Mart that has grown during the recession. Below are year-over-year third-quarter changes in revenues for the major Internet companies. So far, all but one showed fairly strong growth.

Change in Revenues 3rd Calendar Quarter Year over Year

Company	Business Description	% Change in Revenue 3Q '07 to 3Q '08
Google	Search Engine	+31.0
Amazon.com	E-tailing	+31.0
Yahoo!	Search Engine	+12.7
Cisco	Routers, Servers	+8.2
Expedia	E-travel	+9.2

62 Jeff Cornwall, "Updated U.S. Small Business Facts," *The Entrepreneurial Mind,* August 22, 2007
63 Martin Wolk, Small Business Having a Big Impact on Jobs," *MSNBC.com,* February 3, 2004
64 Wayne Kamamoto, "Two Thirds of Small Businesses Using the Internet," *Internet.com,* March 29, 2002
65 Mike Moffatt, "Recession? Depression? What is the Difference?" *About.com:economics,* 2008

Adobe Systems*	Graphics Software	+4.0
Juniper Networks	Routers	+29.0
Symantec	Security and other Software	+7.0

*Adobe's fiscal third quarter ended August, 2008

5.5 Fostering Further Innovation

The Internet is an important innovation, at least as radical and habit changing as the invention of the automobile, airplane, electrical devices, telephone, television, and the computer. The Internet has also fostered other innovations: web browsers and search engines negated the need for proprietary networks to connect users to desirable content. In turn, the major search engines discovered new ways to fund their service: as banner advertising reached its limits of effectiveness in the online medium, these companies invented "paid search." Since payment was based on click-through by consumers, even small advertisers could afford paid search, if their key words were targeted at a small segment of Internet users.[66] One industry expert predicts, "We can see that the sine qua non for interrupt-and-repeat advertising—one way communication from advertiser to user—is vanishing from online advertising."[67]

E-tailing is an enormous Internet success. It is far surpassing paper-based catalog marketing, which was honed to a fine edge in the 1980s and 1990s by such companies as Lands End and L.L. Bean. As mentioned earlier, total e-tail volume today is greater than the combined revenues of Macy's, Sears's J.C. Penney's, and Target combined. E-brokerage, e-banking, and travel reservations and purchase over the Internet are commonplace. This increased availability of goods was predicted earlier by the well-known strategy academic, Michael Porter, who talked about "atomistic competition," whereby market forces and entrepreneurial ways drive offerings down to the individual level.

Internet access speeds and the availability of increasingly complex and data rich content have combined to encourage consumers to pay more per month for access. You Tube, news sources with video, and streaming over the Internet of TV shows and movies have all motivated the residential consumer in the U.S. to switch to broadband access, despite monthly fees that can be two or three times the cost of narrowband. The Advertising Research Foundation (ARF) reported that as early as 2004, residential adoption of broadband had reached 80 percent among all U.S. Internet users.[68]"

The Internet has also fostered innovations in social communications. Through blogs, users can make comments about an issue or product, protect their identity if they wish, and obtain ideas and answers from other interested users. In addition to individual blogs, blogs may be sponsored on company websites and have become part of stock analysis and signed news articles. This innovation has made the Internet very human scale and democratic. Technorati tracks 133 million total blogs, with 1.5 million posted to in the last seven days (a fair definition of "active").[69] More recently, social

[66] Des Laffey, "Paid Search: The Innovation That Changed the Web," *Kelley School of Business, Indiana University*, 2006,

[67] Stephen Rappaport, "Lessons from Online Advertising: New Advertising Models for all Media," *Advertising Research Foundation, 2004*

[68] Stephen Rappaport, "Lessons from Online Advertising: New Advertising Models for all Media," *Advertising Research Foundation, 2004*

[69] Technorati, "State of the Blogosphere/2008," http://technorati.com/blogging/state-of-the-blogosphere/

networking websites have offered a way for people of a wide variety of affinities to share information and viewpoints.

5.6 Increasing Economic Productivity

The Internet has already contributed to increased productivity in many industries, and will likely continue to do so. It has had a significant impact on time and labor saving in areas such as business and consumer purchasing, auctions, information search, and capacity utilization in travel and hospitality through dynamic pricing, availability alerts, and instantaneous reservations.

Examples of productivity increases include:

- 51 percent of leisure/unmanaged business travel was estimated as early as 2006 to have been booked online[70]
- According to a recent Forrester Research study, half of Internet users shop on the web, 42 percent read news online every week, 55 percent of users bank, 23 percent buy airline tickets, and 20 percent book hotel rooms[71] All these activities have a lower cost structure using the web than their traditional, telephone-ordering, counterparts.
- Guy Kawasaki, Silicon Valley entrepreneur, who at one time was approached to head Yahoo, says that with today's free software and the ease of buying for-hire programmers, one can start a web business for just $12,000, based on his own recent experience.[72]
- We are observing the very slow but steady decline in the expensive traditional distribution system for Hollywood movies, as video streaming to computers and TV's increases. For many years the only way cinemas have made money is through concessions, while losing money on the feature films. We will see these expensive pieces of real estate go by the wayside, just as drive-in movie theaters did for different reasons.[73]
- A recent study conducted of consumers who use the Internet in Germany, France, and the U.K. found these consumers are twice as likely to be influenced in their purchases by the Internet compared to television and eight times as likely to be influenced by the Internet compared to the print media. They go to social media and product rating sites to get information on products, even if they do not buy them online. They trust the opinions of others more than the push messaging of traditional advertising messages. As an example, in the U.K., 66 percent of online consumers said that the Internet helps them to make better decisions, but only 28 percent actually trust the information companies provide on the web.[74]
- Some academics point to the productivity of Internet advertising: "None of the traditional advertising media could offer such a combined channel capacity of communication, transaction and distribution. The expanded function of Internet advertising comes from its horizontal integration of three key marketing channel capacities (communications, transaction and distribution) and vertical integration of marketing communications, including advertising, public relations, sales promotion and direct marketing." They also point out,

[70] "NACTAS 2005 & 2006 Online Study," Forrester Research, 2007
[71] Melanie Lindner, "What Are People Actually Doing on the Web?," *Forbes.com,* 8/20/08
[72] Lee Gomes of the Wall Street Journal, "In New Net Economy, Everyone Gets to Be Stupid," *Associated Press,* May 16, 2007
[73] "Entertainment, the Broad Killer Ap," *A FirstMile.US perspective"* 800-925-5595, January, 2006
[74] Matt Rhodes, "Internet: Twice as Influential as TV; Eight Times as Print Media," *FreshNetworks Blog*, June 16, 2008.

"…the real power of internet advertising lies in its integration with conventional advertising to maximize impact."[75]

As noted previously, the Internet has been a boon to small business. In 2002, a Small Business Administration survey found that 57 percent of small businesses were using the Internet (slightly lower than the study previously cited in section 5.3). Of the small businesses using the Internet, 61 percent had a website. With the website in place, 67 percent of those small businesses said they gained new customers, 56 percent increased total sales and 56 percent attracted new types of customers. A full 65 percent of those with a website believed they either made a profit on it, or broke even, but all felt the cost was low.[76]

E-commerce is a demonstrable area of productivity improvement from the Internet. E-commerce sellers usually can offer discounts to consumers because they are saving on the costs of running a retail store. They still need warehouses and some inventory, so their savings are not necessarily in assets employed. But they enjoy operations savings in labor, retail rents, and related services like utilities.

The table below shows that E-tailer revenues per employee are higher than for traditional retailers, even considering that their prices, and thus revenue per item, are often lower. Of "traditional" retailers, only Costco comes close to the levels of revenue per employee as the e-tailers, and Costco uses a very unique retailing formula for success. Besides lower prices, savings from e-tailer costs go toward website creation and maintenance, with improved customer service, or operating profits.

Company	Type of Retailer	Revenues per Employee	Revenues per Asset
Books/Gen'l Merchan.			
Borders Group, Inc.	Traditional	$136,429	1.92
Costco	Traditional	920,000	3.28
Sears	Traditional	150,454	1.85
Wal-Mart	Traditional	180,380	2.32
Amazon.com	All E-commerce	872,647	2.29
Overstock.com	All E-commerce	900,711	3.27
Computers/Electronics			
Best Buy	Traditional	266,820	3.14
Circuit City	Traditional	255,935	2.14
Newegg.com	All E-commerce	1,266,667	N.A.

Some smaller wholesalers are eying e-commerce sales as a way to drive additional business, especially as their sales to retailer customers drop off. To maintain sales levels, they either have to fight with other wholesalers for additional retailer business, or do an "end run" and sell directly to

[75] Hairong Li and John Leckenby, "Internet Advertising Formats and Effectiveness," *Thorson &n Schumann,* October, 2004

[76] Joanne Pratt of Pratt Associates," E-Biz.com: Strategies for Small Business Success," *U.S Small Business Administration Office of Advocacy,* 2002; statistics are from executive summary.

consumers, treading carefully while they compete a bit with their own customers. A September, 2008, *Wall Street Journal* article describes three such wholesalers in the Northeast who have done this: a wholesaler of glass and tiles, a wholesaler of jewelry, and a wholesaler of mattresses and bedding. The consumer gains through lower prices; the wholesaler gains larger gross margins that help to pay for web design, e-commerce capability, and increased customer service; and the economy potentially gains in overall productivity through the elimination of some middlemen. For one of these wholesalers, online sales exceeded regular wholesale sales in just one year.[77] Of course some large companies which call themselves wholesalers, like Costco and Staples, have been in the e-tail business for several years and sell several billion dollars of goods this way.

5.7 Making a Significant Contribution to U.S. Balance of Trade

In the last several decades, the U.S. has run significant trade deficits with the rest of the world, partly due to oil imports, the strong dollar which makes U.S. goods expensive to the rest of the world, trade restrictions by other countries, and the lack of aggressiveness of some U.S. companies to sell outside North America (historically, many U.S. companies had most of their non-U.S. sales in Canada).

U.S. information technology companies, and Internet companies in particular, from the beginning have been very global in their sales orientation. Standards and styles for IT hardware and software, largely set in the U.S., became the international standards. U.S. information technology companies followed their major clients in financial services and other industries around the world, outfitting them with computers, software, and networks. As time went on, these U.S. IT companies began to serve large foreign customers. The "global reach" of IBM was observed three or four decades ago. As of 2007, only 43 percent of IBM's sales are in the Americas. The other 57 percent is in Asia/Pacific or Europe, the Middle East, and Africa. The figures for Accenture are the same. In hardware, 67 percent of Hewlett-Packard's total sales are outside the U.S., and for Sun Microsystems, 59 percent of sales are outside the U.S. Apple and Dell, less global, still earn 20-35 percent of their revenues from outside the U.S. Microsoft has almost 38 percent of its sales outside the U.S.

The big U.S. Internet companies are also very globally-oriented. Below are the larger Internet companies ranked by the volume of sales outside the U.S. The total volume of sales outside the U.S. for just this group of 12 companies is $40 billion, equal to 50-100 percent of one month's trade deficit for the U.S., depending partially on the price of oil.

Non U.S. Revenues for Largest Internet Employers

Company	Total 2007 Company Revs. ($bil.)	Total 2007 Revenues Outside U.S.	Percent of 2007 Revenues Outside U.S.
Cisco Systems	$34.92	$15.63	44%*
Google	16.59	7.96	48
Amazon.com	14.84	6.74	45*
Symantec	5.87	2.78	47*
Yahoo	6.97	2.24	32
Adobe Systems	3.16	1.65	52*

[77] Shelly Banjo, "Wholesalers Set up Shop Online to Tap Consumers," *Wall Street Journal*, Sept. 18, 2008, p. B9.

Juniper Networks	2.89	1.62	57
McAfee	1.31	.63	48
Netgear	.73	.45	62
Verisign	1.50	.25	17
Salesforce.com	.75	.19	25
Akamai	.64	.14	22
TOTAL	**$90.17**	**$40.28**	**45%**

* For Cisco and Amazon, sales outside the U.S. do not include sales to Canada. Symantec's and Adobe's sales outside the U.S. do not include sales to the rest of the Americas, which are included with their U.S. sales

5.8 Saving Natural Resources and Lowering Pollution

Concurrent with economic productivity, the Internet in some instances has also reduced society's need for natural resources such as petroleum-based fuels and wood pulp for paper. As mentioned in Section 5.2, half of car buyers are doing research online before buying.[78] Other online information searches, along with the growth of e-tailing, is likely to be saving on gasoline costs.

Consumers are finding the Internet a convenient tool to help them make ecological choices. A recent market survey report noted that among factors influencing online consumer purchase decisions for a product or brand, the fourth most chosen factor was "eco-friendly usage" at 42 percent. This followed "reputation of manufacturer/supplier" (64 percent), "friend/family comments" (50 percent), and "better for you ingredients" (43 percent). And the seventh most often selected factor was "eco-friendly production/packaging" at 35 percent. Implicit in these findings is the fact that the Internet is providing the kinds of information that helps consumers to make such product evaluations. The interest of online buyers in making eco-friendly purchases is evident in another set of findings. Eighteen percent of U.S. adult online shoppers say that when making an online purchase they search for environmentally friendly products "every time" or "almost every time." Another 31 percent say "some of the time." And, the majority of online shoppers say they will pay at least a nominal premium for an environmentally-friendly product. Forty five percent said they would pay a 5-percent premium and 22 percent said they would pay a 10-percent premium. Eight percent said they would pay a fairly hefty premium of 15-20 percent or more. The other 25 percent would not pay a premium.[79]

A recent survey of small-business people in California queried respondents on uses they might make of broadband if they had it. Of the top ten uses they mentioned, three had "green" implications:

- *"Virtual" face-to-face meetings and consultations between provider and client:* Half of the business owners surveyed suggested two-way video/audio capabilities in real time at high resolution in one-on-one meetings with their customers. This was particularly important for professional services firms such as accountants, financial planners, insurance agents, and attorneys.
- *Videoconferencing among project team members*: The small-business people saw an advantage in having team members be able to meet from their homes or offices. A furniture designer said that broadband could allow designers, fabricators, installers, and clients to hold a virtual conference in the client's home, where the furniture was about to be installed. A

[78] Amie Kim, "2006 Attitudes and Perceptions among Major Groups" in *www.autoretailing.org*, Harris Interactive
[79] Paul Verna, "Green Online: Growing Awareness," *eMarketer*, June, 2008

surgeon and a chiropractor said that videoconferencing would allow them to confer in real time with other medical professions and even have them "present" during examinations or consultations.

- *Convenient Training Sessions and Continuing Education Courses:* The majority of the business people surveyed said that real-time, interactive training sessions via two-way video could save travel time and expense and often overnight stays in a local hotel.[80]

There has emerged in recent years a spate of companies in the "demand automation" software business. This type of web-based software adapts education on the company's products, services, and benefits depending on the user's response at any one point along the way. The users are scored for their likelihood of buying interest, so that by the time a sale lead is passed to a salesperson to make a personal sales call, it is already well known that the user is a true prospect. Sales closure rates improve, and wasted sales calls are reduced.

5.9. Promoting or Facilitating a Social Good

Because the Internet can be accessed from nearly anywhere, some of the jobs created by the Internet, particularly e-selling and instant-messaging-based customer service, can be done from home, providing opportunities to homebound workers or workers who desire extra flexibility. For employees of traditional companies, remote access to e-mail or Internet content has also provided greater possibilities for work-at-home. Jeff Landers, in 2006, pointed out that the majority of new business start-ups that year in the U.S. were owned by women, and that 50 percent of businesses were home based.[81] One inference is that women working out of their homes, and likely using the Internet, are finding it easier to start businesses. Another source notes that a 2002 study by the Center for Women's Business Research estimated that privately-held women-owned businesses accounted for almost 30 percent of all privately-owned businesses in the U.S. [82]

As mentioned earlier, Guy Kawasaki says that an entrepreneur can launch a web business more easily than ever before. This benefits the many "idea people" who can try to start a global business with low capital. Kawasaki was able to launch his latest venture, www.Truemors.com (True Rumors) with just his time and $12,000 for for-hire software programmers in addition to the use of free software.[83]" Kawasaki contends that even with the most expensively prepared, carefully fashioned business plan, no one can really predict the success of a new Internet business; society benefits when the price of entry is low so that many ideas to be tested without wasting investor money.

Charitable fund-raising has benefited from the Internet. Sites like Network for Good facilitate connections between non-profits and volunteers or donors. In 2007, $1.1 billion was given to charities over the Web. While constituting just 1 percent of overall charitable giving in the U.S., the web segment is a growing proportion. On-line charitable auctions are an emerging trend and seem to offer major productivity improvements as well. Cynthia Thomas, of the New Hampshire Center for Environmental Education, reports that it used to take 6 months to raise the $100,000 needed for

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[81] Jeff Landers, *StartUp Nation Blogs*, March 8, 2006.
[82] [82] "Web-based Businesses," in Net Industries, 2008
[83] Lee Gomes of the Wall Street Journal, "In New Net Economy, Everyone Gets to Be Stupid," *Associated Press*, May 16, 2007

the annual budget, but using an online charity site it now takes only one month.[84] Some of the larger sites that run charitable auctions (for a fee of around 9 percent) are EBay's Giving Works, Charity Folks, and Charity Buzz.

Other examples of the potential for or actual delivery of social good by the Internet include:

- A manufacturer of medical wellness devices in a recent California survey mentioned the advantage to both patient and manufacturer of high resolution video that allowed customer service reps to observe if and how patients were wearing the medical devices in their homes.[85]
- A 2006 Pew study of the Internet collected attitudinal data that could be interpreted as showing gains from the Internet in improving general "quality of life." Note the following:
    - The share of online Americans who say the Internet has greatly improved their ability to do their job grew from 24 percent to 35 percent between 2001 and 2006.
    - The share of online Americans who say the Internet has greatly improved the way they obtain information about health care has grown to 20 percent from 17 percent over the same time period.
    - The share of Americans who say the Internet has greatly improved their ability to shop has doubled in this time frame—from 16 percent to 32 percent.
    - The share of online Americans who say the Internet as greatly improved the way they pursue hobbies and interests has grown to 33 percent in 2006, up from 20 percent in 2001.[86]

A recent eMarketer study reviewed recent research on the importance of the Internet to mothers in the U.S. with children under the ages of 18 living at home. These mothers feel more plugged into the world because of the Internet (88 percent feel this way) and use it at a higher rate, on average, than other women for both child- and parenting-related information as well as for search, news, and entertainment content. Indeed, 89 percent of online mothers with children use the Internet either 2-3 times per day or "many times" per day. Eighty-five percent believe technology has made their life easier as a mother, and 66 percent said they have relied more on technology as a parent than they had before. Interestingly, they access the major types of sites at about the same frequency as do other women, but show a much higher usage of "conversational media," sites focused on chatting, blogging, and socializing.[87]

There is general agreement as to the value of the Internet, and to its tremendous impact on Americans' lives. With this report we have tried to assess, qualitatively and quantitatively, the magnitude of that impact at a moment in time. We hope that by deepening the understanding of the Internet economy, we will provide data that will further the discussion of policy choices that the country faces as the Internet economy becomes a larger and more integrated part of the US economy as a whole.

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[84] :Lawrence Delevigne, "Online Auctions Raise Big Bucks for Charity," *Business Week*, July 23, 2008

[85] Estaban Soriono, PhD, "Broadband Video Access and Economic Advancement: Cable's Unrealized Potential for Big Impact on Small Business," *California Small Business Education Foundation,p12,* October, 2005

[86] Mary Madden, "The Importance of the Internet Is Growing," *Pew/Internet,* April 2006

[87] Deborah Aho Williamson, "Moms Online, Browsing, Researching, Buying," *eMarketer,* March, 2008

6.0 Appendix

6.1 Origins and History of the Internet[88]

The Internet grew out of the formation of ARPANET in the 1960s by the Advanced Research Projects Agency, a research arm of the U.S. Defense Department (D.O.D.). ARPA's leadership sought to develop technologies to allow computers to work with each other across great distances. What can be considered the dawning of the Internet was a message sent from a UCLA computer to a computer at Stanford using new interface software to link the disparate computers. Though the system crashed after only the first two letters of "log on," i.e. "lo" were successfully transmitted, the Internet was effectively launched.[89] Before long, the experimental network connected the D.O.D with universities and high-tech defense contractors.

As a sponsor of advanced technology research, ARPA was not the ideal operator for a growing communications network. Over the course of the 1970s and 1980s, control of the network passed from ARPA to other defense department agencies, plus NASA and the National Science Foundation (NSF). These separate networks were connected to each other, with the NSF taking the lead in the development of long-distance links.

When the NSF created its NSFNET network, in the 1980s, to connect its supercomputers, it chose the same TCP/IP (Transmission Control Protocol/Internet Protocol) protocols used on ARPANET for "internetworking," or connecting networks to other networks. NSF also funded and oversaw a high-speed national backbone network to connect widely distributed research centers. The "Internet" term within the name TCP/IP, signifying the common language used to connect what were then networks carrying mostly scientific and defense-oriented information, has carried over to today to represent the gigantic hardware/software and commercially-oriented structure we call "the Internet."

With the sponsorship of NSF and its backbone network the Internet began to grow rapidly. The Domain Name System (DNS) was established in 1984. In the decade from 1985 to 1994, the Internet grew from 200 interlinked networks to well over 45,000, and from 1,000 hosts (end user computers) to well over 4 million. Packets transmitted (a packet being a small segment of data, averaging 200 bytes in size) increased from 85 million in 1988 to 86 billion by the end of 1994. Most Internet traffic rode on NSFNET through 1995, when it reverted back to a small research network and handed control of what we know as the Internet to privately-owned, interconnected networks run by companies such as UUNet, PSINet, AT&T, and others. There followed the growth of proprietary online networks, first CompuServe and then Prodigy, Microsoft MSN, and AOL to which consumers and individual business people subscribed for email and Internet access, as well as news, weather, and shopping services.

Cisco and other hardware providers supplied more and more gear to route Internet packets, while IBM, Compaq, Apple, Dell and others supplied the PC's and storage devices that made the Internet a desktop or laptop phenomenon, and allowed storage of data and websites. Today we are in the

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[88] Much of the historical information in this section is drawn from Jeffrey K. MacKie-Mason and Hal R. Varian, "Economic FAQs about the Internet," in Lee W. McKnight and Joseph P. Bailey, editors, *Internet Economics*, Massachusetts Institute of Technology, 1997.

[89] Jonathan Zittran, *the Future of the Internet…and How to Stop It*, Yale University Press, 2008, p. 27

middle of the new wave of important Internet hardware – the handheld devices, like Blackberries and iPhones that provide web access and use of email.

All this growth from the mid-1980s to the mid-1990s preceded the era of large-scale consumer e-commerce and Internet advertising. B2B e-commerce began to develop as Electronic Funds Transfer (EFT) and Electronic Data Interchange (EDI) connecting supply-chain members began to move from private data networks, like those owned by GE and IBM, to the Internet. Such a move to a public network was enabled by the development of security software to protect B2B e-commerce flows. Security software further enabled consumer e-commerce and other aspects of the Internet. A variety of web browser companies like Mosaic, which became Netscape, Lynx, and a few other smaller firms, also came to the foreground in the 1990s to take on the task of helping users find what they wanted on the web.

Toward the end of this period, some signs of the coming consumer-oriented commercial support of the Internet began to emerge. In 1994, the first shopping malls appeared on the Internet, Pizza Hut pioneered pizza ordering over the Internet at its Santa Cruz, California, location, RT-FM in Las Vegas was the first cyber station to broadcast, and the Internet's first banner ads appeared on HotWired.com.[90] Jeff Bezos founded Amazon.com in 1994, and Pierre Omidyar founded eBay.

Netscape issued its historic IPO in August 1995. Sun launched Java. Domain names, originally subsidized by NSF, became a commercial operation in 1995 with the implementation of a $50 annual fee charged for each domain name. The value of a domain name as a brand soon became clear when, in 1996, CNET bought tv.com for $15,000, and business.com was sold for $150,000 in 1997.

These early sales of domain names foretold the eventual value and success of the Internet as a consumer mass medium. But they also were indicative of what would become a huge investment bust toward the end of the 1990s. As consumer interest in the Internet began to grow, venture money poured into consumer business ideas for the Internet that were either ahead of their time, or simply ideas that would never have a significant market. Venture money initially drove large expenditures of advertising dollars, as investors believed early branding investments would later bear fruit. With the failure of so many Internet ventures in the 1999-2001 period, Internet advertising actually declined for two years, dropping 12 percent from 2000 to 2001, and another 16 percent the next year, 2002.

The "Internet company" of today looks different from the 1990s. No one speaks of "backbone networks" anymore because costs of long-haul data transmission have declined so dramatically that these specialists are now simply embedded in the telecommunications network. Portals and search engines (of which three command the market for search in the U.S. – Google, Yahoo, and Microsoft's MSN) dominate consumer relationships (in terms of share of online time or audience).

Today there are a few large companies focused on the Internet, and also many, many small companies, some only a few years old. However, even the largest Internet specialists are not very large compared to mainstream companies like General Motors (2007 revenues of $181 billion and 266,000 employees), Wal-Mart ($387.53 billion in revenues, and 2,100,000 employees) and Citigroup ($159 billion in revenues, and 160,000 employees).

[90] Hobbes Internet Timeline v8.2, http://www.zakon.org/robert/internet/timeline/

6.2 About the Authors

Hamilton Consultants, Cambridge, MA Hamilton specializes in helping companies design and implement sound marketing and business strategies. We believe we are hired by the client to make things happen, usually in terms of increasing revenues.

Much of our work takes place in the "information industries" (on-line services, telecommunications, computer hardware and software, publishing, media and entertainment) and in engineering-intensive industries (pharmaceuticals, oilfield services, complex manufacturing). We also work in financial services, energy consumer durables, and consumer packaged goods.

Professor John Deighton, Harvard Business School Professor John Deighton is the Harold M. Brierley Professor of Business Administration at Harvard Business School, where he has been on the faculty since 1994. He is an authority on consumer behavior and marketing, including particularly direct and interactive marketing.

He is editor of the *Journal of Consumer Research*, a leading journal publishing interdisciplinary studies of consumer behavior, and was the founding co-editor of the *Journal of Interactive Marketing*, which reports scholarly research on marketing and the Internet. He is a Trustee of the Marketing Science Institute, a board member of the Direct Marketing Education Foundation, and a Director of the Berkman Center for Internet and Society at the Harvard Law School.

His research has received a number of commendations, including the "best article" award of the American Marketing Association for an article in the *Journal of Marketing*, and he was named "outstanding educator" by the Direct Marketing Education Foundation. He was a visiting scholar at the University of Tokyo and at Duke University's Teradata Center for Customer Relationship Management.

He has published extensively on digital marketing tools and their transformative effect on the practice of marketing. Some of his *Harvard Business Review* articles on this topic include 'The Future of Interactive Marketing,' and 'Manage Marketing by the Customer Equity Test.' His research on marketing management and consumer behavior is published in the *Journal of Consumer Research*, the *Journal of Marketing Research*, the *Journal of Marketing*, *Organizational Behavior and Human Decision Processes*, and other scholarly journals. His case writing includes cases on Hilton Hotels' frequent guest program, DoubleClick, CVS.com, Snapple, Chateau Margaux, Siebel Systems, the novelist James Patterson, and USA Today Online.

He has taught in many of Harvard Business School's programs, as course head of the first year MBA course in Marketing, and elective courses in Business Marketing, Consumer Marketing and Interactive Marketing. Currently he teaches the first year MBA marketing course, the marketing courses in the Owner/Presidents Executive Program, is course head for the Strategic Market Management executive course and teaches on the executive education offering in brand marketing.

Prior to joining the Harvard Business School he was on the faculties of the University of Chicago, where he received the Hillel J. Einhorn award for excellence in teaching, and the Amos Tuck School, Dartmouth College. His Ph.D. is in marketing from the Wharton School, University of Pennsylvania. He has an undergraduate chemical engineering degree from the University of Natal

and an MBA from the University of Cape Town. His applied research includes consulting with a number of U.S and international corporations.

Professor John Quelch, Harvard Business School John A. Quelch is the Lincoln Filene Professor of Business Administration at Harvard Business School. Between 1998 and 2001 he was Dean of London Business School and, between 2001 and 2008, Senior Associate Dean at Harvard Business School. Prior to 1998, he was the Sebastian S. Kresge Professor of Marketing and Co-Chair of the Marketing Unit at Harvard Business School.

Professor Quelch is on sabbatical in Shanghai in 2009. He is the La Caixa Visiting Professor of International Management and Chairman of the Academic Advisory Council at the China Europe International Business School (CEIBS).

Professor Quelch is well-known for his teaching materials and innovations in pedagogy. Over the past twenty years, his case studies have sold over 2.7 million copies, third highest in HBS history. In 1995, he developed the first HBS interactive CD-ROM exercise (on Intel's advertising budgeting process). In 1999, he developed and presented a series of twelve one hour programs on Marketing Management for the Public Broadcasting System. His ***Marketing Know:How*** blog, published by Harvard Business School Publishing and syndicated through BusinessWeek.com, is now available in Chinese and Vietnamese.

Professor Quelch's research focus is on global marketing and branding in emerging as well as developed markets. His current research projects address (a) understanding the contributions of marketing to the functioning of democracies and (b) formalizing appropriate marketing and customer metrics for periodic review by boards of directors. Professor Quelch is the author, co-author or editor of twenty-five books, including ***Greater Good: How Good Marketing Makes for Better Democracy*** (2008), ***Business Solutions for the Global Poor: Creating Social and Economic Value*** (2007), ***The New Global Brands*** (2006), ***Global Marketing Management*** (5th edition, 2006), ***The Global Market*** (2005), ***Cases in Advertising and Promotion Management*** (4th Edition, 1996) and ***The Marketing Challenge of Europe*** 1992 (2nd edition, 1991). He has published fifteen articles on marketing strategy issues in the ***Harvard Business Review*** and many more in other leading management journals such as ***McKinsey Quarterly*** and ***Sloan Management Review.***

Professor Quelch has served as an independent director of twelve publicly listed companies in the USA, UK and Iceland. He is currently a non-executive director of WPP Group plc, Pepsi Bottling Group, Epiphany Biosciences, Inverness Medical Innovations and BBC Worldwide Americas. He also serves pro bono as Chairman of the Port Authority of Massachusetts and as Honorary Consul General of Morocco in New England. Professor Quelch has been a consultant, seminar leader and speaker for firms, industry associations and government agencies in more than fifty countries. He is a member of the Council On Foreign Relations.

He was born in London, England, was educated at Exeter College, Oxford University (BA and MA), the Wharton School of the University of Pennsylvania (MBA), the Harvard School of Public Health (MS) and Harvard Business School (DBA). In addition to the UK and USA, he has lived in Australia and Canada.

6.3 About the Interactive Advertising Bureau

The Interactive Advertising Bureau (IAB) is comprised of more than 375 leading media and technology companies who are responsible for selling 86% of online advertising in the United States. On behalf of its members, the IAB is dedicated to the growth of the interactive advertising marketplace, of interactive's share of total marketing spend, and of its members' share of total marketing spend. The IAB educates marketers, agencies, media companies and the wider business community about the value of interactive advertising. Working with its member companies, the IAB evaluates and recommends standards and practices and fields critical research on interactive advertising. Founded in 1996, the IAB is headquartered in New York City with a Public Policy office in Washington, D.C. For more information, please visit www.iab.net.