

Chapter 2

Origins, Growth, and Geographies of the Global Internet

To appreciate the complexity, implications, and geography of the internet, it is vital to understand where it came from and how it came to be. Toward this end, this chapter sketches the broad outlines of the world's internet in several stages. It opens with an overview of the seminal technologies that make the internet possible, fiber optics and satellites, which together comprise the infrastructure of cyberspace. Second it traces some of the highlights of the internet's history, from its origins with the U.S. military to its explosive growth and commercialization today. In the process, it charts the uneven geographies of growth over time and space. The third section addresses the digital divide, or sociospatial inequalities in internet usage, which are found to one extent or another across the planet. Finally, the chapter concludes with a brief regional survey of internet usage in various world regions to highly the spatially uneven character of its deployment and implications.

2.1 Fiber Optic Networks and Satellites

Two technologies—satellites and fiber optic lines—form the primary technologies deployed by the global telecommunications industry, including the internet. Although they overlap to a great extent, satellite and fiber optics carriers exhibit market segmentation. Economically, both reflect the typical cost structure of telecommunications, i.e., high fixed costs and barriers to entry and low marginal costs. However, firms offering these services serve overlapping, but slightly different markets: satellites overwhelmingly dominate mass media transmission, although fiber carriers have recently begun to invade this market (e.g., cable television). Fiber carriers are heavily favored by large corporations for data transmissions and by financial institutions for electronic funds transfer systems, in part because of the higher degrees of security and redundancy this medium offers.

The world's network of satellites and earth stations comprise a critical, often overlooked, element in the global telecommunications infrastructure. Since the late

1950s, the world has launched more than 5,500 satellites, the vast majority of which were sent into orbit by the U.S. and the USSR/Russia. In addition to military applications, satellites are used extensively by telecommunications companies, multinational corporations, financial institutions, and the global media to link far-flung operations, including international data transmissions, electronic funds transfer systems, telephone networks, teleconferencing, and media sales of television and radio programs. Satellites in orbit appear in a variety of sizes and degrees of technological sophistication. Large satellites capable of handling international traffic sit 35,700 km (22,300 miles) high in geostationary orbits, which are by far the most valuable orbital slots because only in that narrow sliver of space do satellites and the Earth travel at the same speed relative to each other, making the satellite a stable target for signals transmitted upward from earth stations. Because such orbital arcs are a scarce resource, their distribution is strictly controlled through international organizations. The cost of launching satellites and the fuel needed to maintain them in their proper orbit are also constraints to their economic viability. Satellites typically have a 10 year life span, primarily because they exhaust their available fuel, necessitating their eventual replacement by a new, frequently much improved, generation. From its vantage point, a broad-beam geostationary satellite can transmit to (i.e., leave a “footprint” over) roughly 40 % of the earth’s surface, creating instantaneous time–space convergence, so that only three or four are sufficient to provide global coverage. Because the cost of satellite transmission is not related to distance, it is commercially competitive in rural or low density areas (e.g., remote islands), where high marginal costs often dissuade other types of providers, particularly fiber optics providers (Warf 2006, 2007).

The terrestrial counterpart of the satellite is the earth station. There are tens of millions of earth stations located worldwide, ranging in size from one-half meter to 30 m. The vast majority, however, can only receive information, not transmit it (i.e., downlink only). When microwave signals are sent over great lengths and become broadly diffused, earth stations require large, powerful antennas to receive them. The distribution of the world’s 483 publicly-owned earth stations designed for international traffic (Fig. 2.1) reveals they are concentrated in the largest and wealthiest countries, particularly the U.S., which, with 70, has vastly more than any other state. Countries without these facilities (e.g., Afghanistan), or those with an insufficient number to satisfy domestic demand, must rely upon leased connections to other nations.

Although satellites are used for internet access in some parts of the world, increasingly the technology has been marginalized by the growth of fiber optics. Fiber optics are long, thin, flexible, highly transparent rods of quartz glass (or less commonly, plastic) about the thickness of a human hair that can transmit light signals through a process of internal reflection, which retains light in the core and transforms the cable into a waveguide. They can transmit voice, video, or data traffic at the speed of light (299,792 km/s); because light oscillates much more rapidly than other wavelengths (200 trillion times per second in fiber cables v. 2 billion per second in a cellular phone), such lines can carry much more information than other types of telecommunications. Modern fiber cables contain up to 1,000



Fig. 2.1 Distribution of earth stations capable of international traffic. *Source* Compiled by author from CIA Factbook, <http://www.odci.gov/cia/publications/nsolo/factbook>

fibers each and are ideal for high-capacity, point-to-point transmissions. Moreover, fiber cables do not corrode or conduct electricity, which renders them immune to electromagnetic disturbances such as thunderstorms. The transmission capacities of fiber optics grew rapidly in the late twentieth century as the microelectronics revolution unfolded. Financial and producer services firms were at the forefront of the construction of a vast, seamless integrated network of fiber cable because they allowed the deployment of electronic funds transfer systems, which comprise the nervous system of the international financial economy, allowing banks to move capital around a moment's notice, arbitrage interest rate differentials, take advantage of favorable exchange rates, and avoid political unrest (Warf 1995). Fiber carriers are heavily favored by large corporations for data transmissions and by financial institutions for electronic funds transfer systems, in large part because of the higher degrees of security and redundancy this medium offers. Although their transmission costs have also declined, satellites have failed to match the latest leaps in fiber optics capacity and can compete with transoceanic submarine cables only with great and mounting difficulty; today, 94 % of all international telecommunications is transmitted via cables (Warf 2006). As their competitive edge has eroded, satellite providers have been steadily forced to serve markets in low-density regions, relatively low-profit arenas compared to the lucrative high-volume, corporate data transmissions market.

Large fiber networks are generally owned and operated by consortia of firms. Until the 1990s, all commercial fiber lines were built, used, and paid for by a handful of monopoly carriers such as AT&T, British Telecom, Japan's Kokusai Denshin Denwa (KDD), known informally in the industry as "The Club." The Club system allowed telecommunications carriers to construct and own undersea cables and to serve as their users or vendors. Typically, landing facilities are owned by carriers from the country in which the facility is located but the "wet links" (undersea cables) are jointly owned by club members. Under the club system, AT&T, for example, ventured aggressively into the international fiber optics market as it globalized in the face of declining market share in the U.S.,

often by entering strategic alliances that stretched across national borders. Similarly, Sprint affiliated with France Telecom and Deutsche Telekom to form Global One in 1996, and AT&T and British Telecom acquired a 30 % share of Japan Telecom. Under the Club system, capacity was allocated and payments made before or during construction of the network. Members were required by national regulators to sell capacity to non-members on a non-discriminatory basis close to cost. Allegations arose that Club members discriminated against new entrants by offering disadvantageous conditions of membership, such as capacity prices. However, as deregulation encouraged new entrants into the cable markets, the Club system began to fragment. Private systems, in which carriers invite non-carrier investors such as banks, emerged as an alternative system, and recently, non-carrier systems have also appeared.

The network of fiber lines linking the world constitutes the nervous system of the global financial and service economy, linking cities, markets, suppliers, and clients around the world, and the backbone of internet traffic (Fig. 2.2). The geography of global fiber networks centers primary upon two distinct telecommunications markets crossing the Atlantic and Pacific Oceans, connecting two of the major engines of the world economy, North America and East Asia. In 1988, in conjunction with MCI and British Telecommunications, AT&T initiated the world's first trans-oceanic fiber optic cable, Trans-Atlantic Telecommunications (TAT-8), which could carry 40,000 telephone calls simultaneously. The trans-Atlantic line was the first of a much broader series of globe-girdling fiber lines that AT&T erected in conjunction with a variety of local partners. Because large corporate users are the primary clients of such networks, it is no accident that the original and densest web of fiber lines connects London and New York, a pattern that extends historically to the telegraph and telephone (Hugill 1999). The next generation, TAT-9 and TAT-10, which began in 1992, could carry double the volume of traffic of TAT-8. The third generation, TAT-11 to TAT-13, was the first to use EDFA rather than older repeaters. Newer generations of cable were even more powerful. Starting with the Trans-Pacific Cable (TPC-3) in 1989 connecting New York and Tokyo, a growing web of trans-Pacific lines mirrored the rise of East Asian trade with North America, including the surging economies of the Newly Industrialized Countries. In 1996, the first all-fiber cable across the Pacific, TPC-5, was laid. In 2006, a consortium including Verizon and five Asian providers announced plans to lay an 11,000 mile U.S.–China link that would support 1.28 terabits of information—60 times the capacity of the next largest cable—in time for the Beijing Olympics in 2008. In 2007, Google announced the purchase of large quantities of trans-Pacific fiber cable with the aim of launching a multi-terabit Unity service in 2009.

The complex interplay of deregulation, globalization, and technological change increased the international transmission capacities and traffic volumes for fiber optics carriers explosively. Between 1988 and 2003, for example, trans-Atlantic fiber optic cable capacity increased from 43,750 voice paths to 45.1 billion (103,000 %), while across the Pacific Ocean, cable carriers' capacity rose from 1,800 voice paths to 1.87 billion (an astonishing 1.6 billion %).

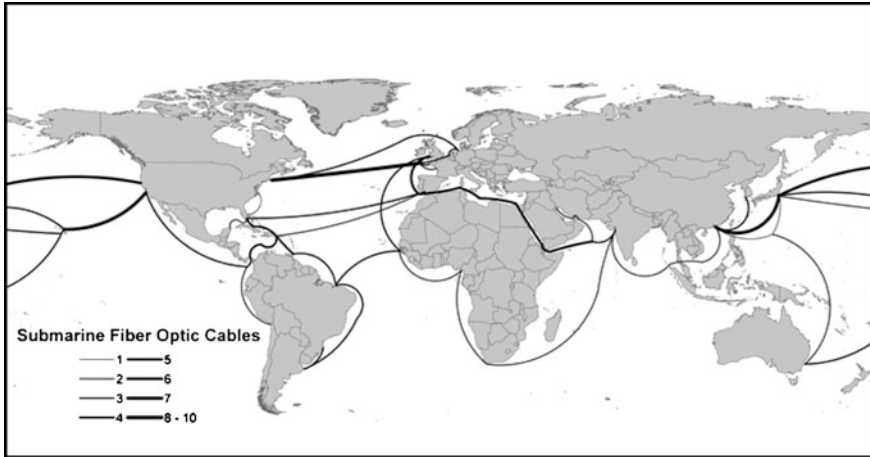


Fig. 2.2 The world's major fiber optic cables. *Source* After Staple (2007)

In addition to the two major markets, fiber lines have extended into several newer ones. In 1997, AT&T, NYNEX and several other firms (including, for the first time, non-telecommunications firms) opened the self-healing Fiberoptic Link Around the Globe (FLAG), a system that eventually expanded to 55,000 km connecting Europe and Southeast Asia. The world's longest submarine telecommunications network, FLAG, the world's longest submarine telecommunications cable, filled a void in undersea cable capacity between Europe, the Middle East, and Asia. It also hooked into regional systems such as the Asia Pacific Cable Network, a 12,000 km system linking Japan, South Korea, Taiwan, Hong Kong, the Philippines, Thailand, Vietnam, and Indonesia, as well as the Caribbean Fiber System (i.e., the Eastern Caribbean Fiber System, Antillas 1, Americas 1, and Columbus 2). Unlike earlier systems, FLAG allowed carriers to purchase capacity as needed, rather than compelling them to purchase fixed quantities.

Although they overlap to a great extent, satellite and fiber-optic carriers exhibit market segmentation. Fiber is heavily favored by large corporations for data transmission and by financial institutions for electronic funds transfer systems. Satellites tend to be used more often by international television carriers. Telephone and internet traffic use both. These two types of carriers are differentiated geographically as well: Because their transmission costs are unrelated to distance, satellites are optimal for low-density areas (e.g., rural regions and remote islands), where the relatively high marginal costs of fiber lines are not competitive. Fiber-optic carriers prefer large metropolitan regions, where dense concentrations of clients allow them to realize significant economies of scale in cities where frequency transmission congestion often plagues satellite transmissions. Satellites are ideal for point-to-area distribution networks, whereas fiber-optic lines are preferable for point-to-point communications, especially when security is of great concern. Historically, the primacy of each technology has varied over time. From

1959 to 1980 (i.e., before the widespread adoption of fiber optics), satellites enjoyed limited competition from transoceanic copper cable lines with low capacity rates. From the 1970s onward, the microelectronics revolution allowed fiber-optic lines to erode the market share of traffic held by satellites. New techniques of data transmission, such as the so-called frame delay format, raise speeds of transmission nearly 30-fold over the 1990s technology.

2.2 Origins and Growth of the Internet

The internet originated in the 1960s under the U.S. Defense Department's Agency Research Projects Administration (ARPA), which designed it to allow computers to communicate with one another in the event of a nuclear attack. Much of the durability of the current system is due to the enormous amounts of federal dollars dedicated toward research in this area (Hafner and Lyon 1996; Murphy 2002). ARPA grouped together several young, ambitious computer scientists, including Paul Baran, who invented packet switching, and related innovations such as neural networks, queuing theory, adaptive routing, and file transfer protocols. In the process, ARPA gave birth to a network quite different from the centralized system of the telephone company (i.e., AT&T), which relied on analogue information: rather, digitization facilitated a decentralized, then distributed network, which subsequently became a model for rhizomes, a popular trope in poststructuralist analyses. The nucleus of what would become ARPANET initially connected universities such as Stanford, UCLA, the University of California at Santa Barbara, and the University of Utah. The initial military goals were soon supplemented by civilian ones. In 1972, Ray Tomlinson adapted computer messages for personal use, inventing email.

From 1984 to 1995, the internet was administered by the National Science Foundation, which deployed it to connect academic supercomputers in a select series of campuses across the country. Simultaneously, some of the world's first cybercommunities began to take route, such as the WELL (Whole Earth Lectronic Link) in San Francisco. The famous European Particle Physics Lab (CERN) developed hypertext and Universal Resource Locators (URLs), the system of addresses used on what would become the World Wide Web, including file transfer protocol (FTP) and specifications of pages fetched using the HTTP protocol.

In the 1990s internet control was privatized via a consortium of telecommunications corporations. The internet emerged on a global scale through the integration of existing telephone, fiber-optic, and satellite systems, which was made possible by the technological innovation of packet switching, TCP/IP (Transmission Control Protocol/Internet Protocol), and Integrated Services Digital Network (ISDN), in which individual messages may be decomposed, the constituent parts transmitted by various channels, and then reassembled, virtually instantaneously, at the destination. In the 1990s, graphical interfaces developed in Europe greatly simplified the use of the internet, leading to the creation of the World Wide Web. Tim Berners-Lee, often

called the “father of the World Wide Web,” played a key role in this process. Soon thereafter private web browsers sprouted like mushrooms, including Netscape, Internet Explorer, and Firefox. The number of websites grew exponentially, from roughly 1 million in 1990 to more than 4 billion in 2011.

The microelectronics revolution initiated enormous decreases in the cost of computers and exponential increases in their power and memory. Of these, the continued decline in the price of personal computers (PCs) looms large. Following Moore’s Law, which speculates the cost of computers falls in half every 1½ years, PCs have become increasingly ubiquitous in many countries, and relatively fast, low-end machines are readily available for relatively modest sums. Indeed, fiber optics arguably transformed the internet from a communications to a commercial system, accelerating the pace of customer orders, procurement, production, and product delivery (Malecki 2002). Spurred by declining costs, deregulation, and an increasingly tech-savvy public, the growth of the internet has been phenomenal; indeed, it is arguably the most rapidly diffusing technology in world history. Global access to the internet is deeply conditioned by the density, reliability, and affordability of national telephone systems, which form the heart of the architecture of cyberspace. For this reason, the distribution of internet hosts also mirrors the enduring legacy of the superpower bifurcation during the Cold War: Soviet-backed regimes distrusted the telephone, which allows two-way communication, and preferred television, which allows only one-way flows of information.

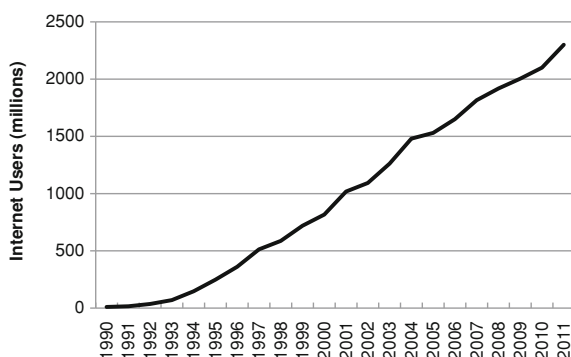
With rapid declines in the cost of computer technology, a glut of fiber optics that led to dramatic falls in communications prices, easy-to-use graphical interfaces, and the clear potential for all sorts of as-yet unheard of applications, it is no wonder that internet usage worldwide began to grow exponentially. The number of users soared from roughly 10 million in 1990 to more than 2.25 billion in December, 2011 (Fig. 2.3), an average rate of increase of almost 14 % per year. The distribution of the world’s internet users in 2011 (Fig. 2.4) reflects the size of different national populations and their internet penetration rates. Four countries—China, the U.S., India, and Japan—had more than 100 million users each, although with more than 513 million users China exceeds the next three largest countries combined. With other countries with significant pools of users such as South Korea and Indonesia, approximately 922 million internet users were located in Asia, or almost half of the world’s total (Table 2.1). In contrast, the world’s poorest region, sub-Saharan Africa, had relatively small populations of netizens. These broad regional differentials were reflected in the linguistic structure of the internet as well (Table 2.2). While English remains the premier tongue used today on the Web—the digital lingua franca of 536 million people—Chinese, spoken by 445 million netizens, is the second-most heavily used language, and growing rapidly, followed by Spanish (153 million users). Other languages such as Japanese, Portuguese, German, Arabic, French, and Russian are also significant.

Internet use (“penetration”) rates varied considerably by country in 2011 (Fig. 2.5). Whereas the vast bulk of the populations in economically developed countries use it, including near-universal rates in Scandinavia, penetration rates are markedly lower in the developing world (but growing by leaps and bounds).

Fig. 2.3 Growth in world internet users, 1990–2011.

Source

internetworldstats.com



Internet penetration rates (percentage of people with access) among the world's major regions, ranging from as little as 0.2 % in parts of Africa to as high as 96 % in Scandinavia. By the end of 2011, penetration was 77 % of the U.S. population. Inequalities in access to the internet internationally reflect the long-standing bifurcation between the First and Third Worlds. While no country is utterly without internet access, the variations among and within nations in accessibility are huge. Given its large size, the United States—with more than 245 million users—dominates when measured in terms of absolute number of internet hosts. The world's highest penetration rates (Table 2.3) are found in Iceland (97.8 %), followed by Norway (97.2 %), Sweden (92.9), and Luxembourg (91.4 %); Eastern Europe lags considerably behind, and in Russia only 44 % of the population uses the internet. In Asia, access is by greatest in South Korea (82.7 %) and Japan (80 %); about 38 % of China is hooked up, although the numbers there are growing rapidly, and already amount to more than 513 million users. In Latin America, the largest numbers of users are found in Brazil (79 million, or 39 %) and Mexico (42 million, 36.9 %). The internet in the African continent is largely confined to South Africa, although it is growing explosively there. In all cases, per capita incomes are the key; the internet can only be used by people with resources sufficient to own computers and learn the essential software. Variations in the number of users is also reflected in the geography of internet flows (although flow data are much harder to come by than are place-specific attribute data): 75 % of all international traffic on the internet is either to or from the United States, fueling fears among some people that the internet is largely a tool for the propagation of American culture.

The most salient feature about the internet may be its exceedingly rapid rate of growth. Very few technologies in world history, with perhaps the exception of the mobile phone, have exhibited such explosive rates of adoption. As penetration rates soared around the planet, millions of new users have been brought on line. Figure 2.6 portrays national differentials in the growth of internet usage. Explosive growth is readily evident in sub-Saharan Africa and the Middle East, where growth rates between 2000 and 2011 exceeded 10,000 % (and sometimes reach absurdly high rates such as 182,900 %, albeit from a very small base). In contrast, growth



Fig. 2.4 Distribution of world’s internet users, December 2011. *Source* internetworldstats.com

Table 2.1 Internet users by major geographic region, December 2011 (millions)

Asia	922.3
Europe	476.2
North America	272.1
Latin America	215.9
Africa	110.9
Middle East	68.6
Oceania	21.3

Source Internetworldstats.com

Table 2.2 Largest languages used on the Internet, December 2011 (millions)

English	536.6
Chinese	444.9
Spanish	153.3
Japanese	99.1
Portuguese	82.5
German	75.2
Arabic	65.4
French	58.8
Russian	59.7
Korean	39.4

Source Internetworldstats.com

rates in the entire Western Hemisphere, Europe, Russia, Japan, and Oceania were relatively modest by comparison. Thus, while the internet was largely confined to the developed world early in its history, it is growing the most rapidly in the developing world today, particularly in Africa and Asia. This growth brought 1.325 billion new users on-line during this period, who were unevenly distributed



Fig. 2.5 Map of internet penetration rates, December 2011. *Source* internetworldstats.com

Table 2.3 Internet penetration rates for 20 best-connected countries, December, 2011

Iceland	97.6
Norway	94.8
Sweden	92.5
Netherlands	88.6
Denmark	86.1
Finland	85.3
Luxembourg	85.3
United Kingdom	82.5
South Korea	81.1
Australia	80.1
New Zealand	79.7
Germany	79.1
Japan	78.2
Singapore	77.8
Belgium	77.8
Canada	77.7
United States	77.3
Switzerland	75.3
Estonia	75.1
Austria	74.8
Israel	71.6

Source internetworldstats.com

across the face of the planet (Fig. 2.7). Most (59 %) of the world’s netizens, therefore, are relatively recent additions to the world’s population of internet users. In China, for example, more than 490 million of its netizens, or 96 %, began after 2000, and the same proportion in India witnessed 116,000 new internet users log-in.

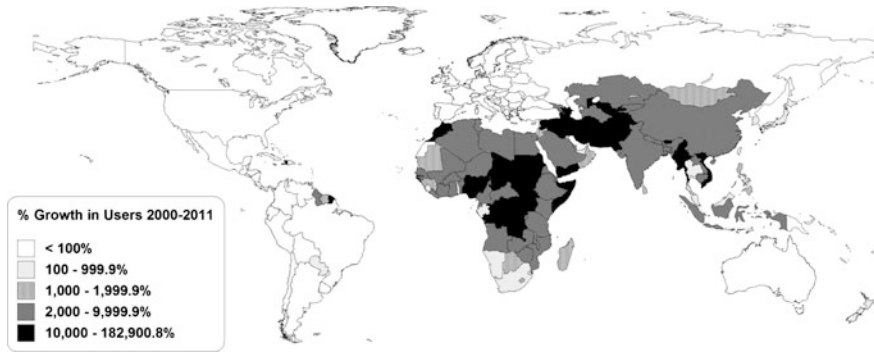


Fig. 2.6 Map of growth in internet users, 2000–2011. *Source* internetworldstats.com

2.3 Digital Divides

Clearly internet usage is highly uneven among and within countries. The digital divide, or social and spatial differentials in internet access, has been the subject of a growing body of literature (Norris 2001; Korupp and Szydluk 2005; Warf 2001), revealing how digital communications are enfolded in relations of wealth and power in ways that reproduce inequalities in cyberspace. Howard et al. (2010, p. 111) point out, “The causes and consequences of the digital divide have become a contested area of research. Understanding the digital divide is crucial to understanding the role of the Internet in contemporary social development.” Fundamentally this question is about who has access and can use the internet and who does not. “Access” and “use” are admittedly vague terms, and embrace a range of meanings, including the ability to log-on at home, school, cybercafé, or work (DiMaggio et al. 2001). Rather than a simple access/non-access dichotomy, it is more useful to think of a gradation of levels of access, although data of this subtlety rarely exist. Thus, it is increasingly common to speak of “digital differentiation” rather than a divide (Selwyn 2002, 2004).

The digital divide is a complex, changing, and multi-dimensional phenomenon that reflects the diverse channels through which social inequalities are reinscribed in cyberspace. Everywhere, class markers such as income and education are strongly correlated with internet access and use. Everywhere, age plays a key role: the elderly are inevitably the least likely to adopt the internet. In many places, gender is important too: in North America the gendered divide has disappeared, but in Europe it persists, and in the developing world it is pronounced. The digital divide is also a geographical phenomenon. Everywhere, large urban centers tend to exhibit higher rates of connectivity than do rural areas (Mills and Whitacre 2003; Warf 2001).

As the uses and applications of the internet have multiplied, the costs sustained by those denied access rise accordingly. At precisely the historical moment that contemporary capitalism has come to rely upon digital technologies to an



Fig. 2.7 Distribution of new internet users, 2000–2011. *Source* internetworldstats.com

unprecedented extent, large pools of the economically disenfranchised are shut off from cyberspace. As the internet erodes the monopolistic roles once played by the telephone and television, and as the upgrading of required skill levels steadily render information technology skills necessary even for lower wage service jobs, lack of access to cyberspace becomes increasingly detrimental to social mobility. Indeed, those excluded from the internet may be more vulnerable to social forces they do not and often cannot perceive than ever before.

Because personal computer ownership rates are relatively low in much of the developing world, and because Internet Service Provider (ISP) individual access charges are often high, many users rely upon privately-owned internet cafés for access rather than individual ISP accounts. Cafés are particularly important for those who lack dial-up access at home or at work or who simply cannot afford personal computers of their own. In the developing world, internet cafes tend to be most commonly found in commercial districts frequented by tourists, exhibit a range of ownership structures from sole proprietorships to international chains, and charge access prices that vary widely among and within countries. In addition to for-profit cybercafés, many non-profit and non-governmental organizations have established networks of neighborhood telecenters, which have played catalytic roles in community development in many areas.

In addition to international discrepancies in access, internet usage also reflects the power-geometries *within* countries (Massey 2005) through which the poor, elderly, ethnic minorities, and rural areas enjoy markedly less access (Chakraborty and Bosman 2005; Mills and Whitacre 2003). Unfortunately, relatively little is known about this issue, in large part due to lack of data on the topic. However, the enormous growth rates of the internet mean that digital divides are rapidly changing, and as access improves for many hitherto marginalized groups, may slowly decline over time.

The latest frontier in the digital divide is unquestionably the arena of broadband delivery services, which varies widely in availability among the world's countries (Fig. 2.8). Broadband applications include digital television, business-to-business linkages, internet gaming, telemedicine, videoconferencing, and internet



Fig. 2.8 Map of broadband penetration per 100 inhabitants, 2010. *Source* International Telecommunications Union. *Note* Because an Internet subscription may be shared by many people, the penetration rate will not reflect the actual level of access to broadband Internet of the population

telephony. With large, graphics-intensive files at the heart of most internet uses today (e.g., downloading forms, reading on-line newspapers), broadband has become increasingly imperative for Web browsing. However, the geography of broadband access replicates the globe's geographies of wealth and power—it is largely confined to the economically developed world. There are strong reasons to believe that far from eliminating the digital divide, broadband reproduces it, gives it new form, and in some cases, accentuates it.

Claims that access to the internet is readily available to all, and therefore its effects cannot help but be beneficial and democratic, must be viewed with great skepticism. Technologies, including telecommunications, are never socially or spatially neutral in their impacts. There is a persistent and continuing need to link the understanding of cyberspace with very real spaces of class and power. All the existing social categories of wealth and power are replicated in cyberspace, at least in terms of access to the equipment and technical know-how necessary to gain entree. At the global level, the internet is likely to reinforce or even deepen existing divisions between the haves and have-nots, between the developed and developing worlds, as much as it is likely to eliminate them, connecting a global digerati with increasingly disconnected from the local environments of their own cities and countries. Castells (1997, p. 351) likens cyberspace to Athenian democracy:

While a relatively small, educated, and affluent elite in a few countries and cities would have access to an extraordinary tool of information and political participation, actually enhancing citizenship, the uneducated, switched off masses of the world, and of the country, would remain excluded from the new democratic core, as were slaves and barbarians at the onset of democracy in classical Greece.

Thus, the internet represents the Athenian vision of democracy writ large, an issue that figures prominently in debates about internet censorship (Chap. 3).

Rosy and premature predictions that the internet would unleash human potential in low income communities, level hierarchies and blur the lines of authority have given way to more realistic assessments that point to the exacerbated social and economic tensions that accompany the diffusion of this technology in many communities, enhancing the divisions between the information “haves” and “have nots.” This division mirrors the increasing polarization of Western societies in general, noting the disintegration of the public sphere and the commodification of private ones. In an age in which social life is not only increasingly mediated through computer networks but fundamentally altered by them, the annihilation of public spaces and their reconstruction around the increasingly commodified, privatized spaces of cyberspace has disturbing implications for those without the wealth and power to gain access to the internet. Participation in electronic communities reflects the social contexts that shape the adoption and diffusion of internet technology; thus, the definition of “access” must be broadened from simply owning a computer and logging into the internet to include the institutional and cultural forces that entice and encourage people to remain digitally connected. As the internet has diffused through progressively broader tiers of Western society, albeit unequally, new users frequently resemble the general population with greater frequency; fears that the “digital divide” will remain in perpetuity, therefore, may be exaggerated.

Lastly, it is abundantly evident that geography still matters. Access to the internet is deeply conditioned by where one is, which is in turn a reflection of relations of wealth and power. Long standing categories of core and periphery are all too apparent within cyberspace, such as the divisions between developed and less-developed nations or cities and rural areas. Thus, electronic systems simultaneously reflect and transform existing topographies of class, gender, money, and ethnicity, creating and recreating hierarchies of places mirrored in the spatial architecture of computer networks. Far from eliminating differences among places, systems such as the internet allow their differences to be exploited. As both a site of fixed investments and a space of flows, the internet in an age of hypermobile capital must be judged as much in terms of equality of access as efficiency of use, by the ways it generates benefits to those who need it most as well as to those who use it heavily.

2.4 Regional Geographies of the Global Internet

Despite some proclamations that cyberspace is spaceless, that distance is dead, or that we live in a flat earth, the reality of internet usage is that it is thoroughly interpenetrated with regional, national, and local political systems, economies, and cultures. Thus, the geography of the internet is deeply conditioned by, and in turn shapes, the spatiality of the world’s socioeconomic systems. To shed more light on this topic, this section offers a brief tour of the regional dimensions of the internet in the world’s major regions.

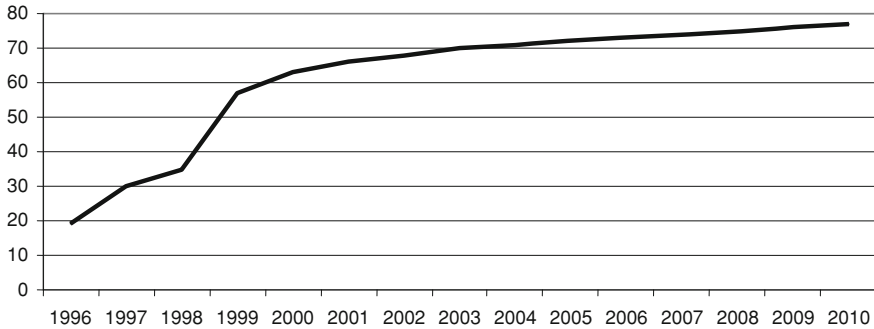


Fig. 2.9 U.S. internet penetration rates, 1996–2010. *Source* Calculated by author from internetworldstats.com

2.4.1 North America

U.S. penetration rates have grown steadily over time (Fig. 2.9), reaching 78 % in 2011. However, internet use was highly uneven across the country (Fig. 2.10), and was typically highest in wealthier, better educated states in the West and Northeast and lower in the South. Although internet penetration rates in the U.S. are not as high as Scandinavian nations, they remain higher than many other urbanized, industrialized countries, and Americans as a whole still constitute the largest and most influential national bloc of internet users in the planet. Several factors have conspired to accelerate internet usage in the U.S. among and within different social groups. Almost 80 % of Americans use a PC once or more per week either at work or at home, the vast bulk of which are networked. Because the value of a network rises proportional to the square of the number of users, the internet and the PC made each other increasingly powerful and attractive. Simultaneously, the rise in user-friendly graphics interfaces greatly facilitated internet access for the parts of the population lacking in sophisticated computer skills. Moreover, as the number of applications of the internet has grown, the hours of usage have increased steadily to more than 9 per week. The rise in PC ownership has been a central claim of those who argue the digital divide will disappear on its own accord.

Throughout the 1995–2011 period, growth in internet use among various socio-demographic groups was rapid, often spectacular (Table 2.4). Average internet penetration rates—including access at home, work, or school—more than quadrupled, from 14 to 77 %; by 2011, 245 million Americans were using the internet regularly. The innovation, the most rapidly diffused technology in world history, went from a tool or toy of a minority to an essential implement used by the vast majority. Every social group, as differentiated by age, gender, race/ethnicity, educational level, or household income, experienced marked gains. Thus, to the extent that the digital divide persists in the U.S. (and other economically advanced countries), it must be understood within the context of this sustained and rapid increase in the number of users and proportion of the population.

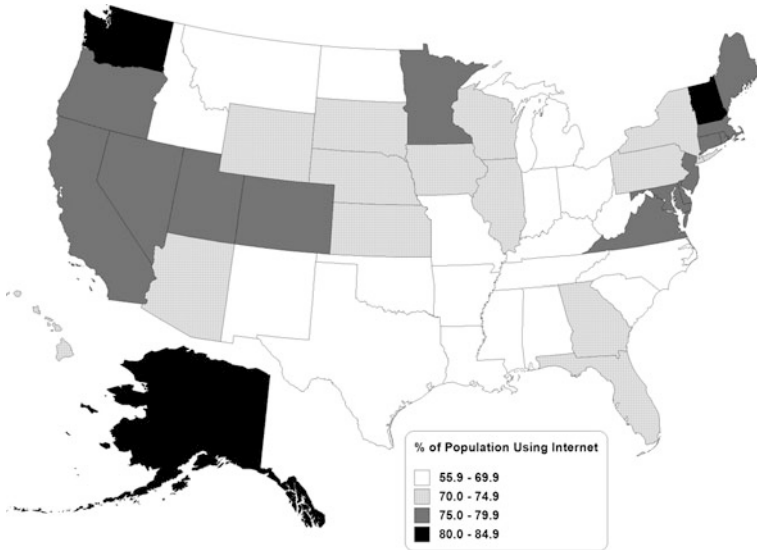


Fig. 2.10 Map of proportion of U.S. adults using the Internet, 2010. *Source* Author, using data from www.census.gov/compendia/statab/cats/information_communications.html

This growth, however, did not occur at identical rates among all social categories. Take, for instance, age. The young (i.e., under 30 years of age) steadily exhibited the highest internet penetration rates, reaching 83 % in 2011. For many children who grow up surrounded by digital technologies, the internet is hardly mysterious. In contrast, in both benchmark years, the elderly experienced the lowest rates of internet usage (a mere 2 % in 1995 v. 33 % in 2011), as well as the slowest rate of increase in users. Many elderly find new technologies to be difficult or intimidating, do not appreciate the potential benefits, and are easily frustrated by their lack of technical skills. The digital divide, therefore, is closely wrapped up with generational differences.

One dimension of the U.S. digital divide that has drawn the most serious scrutiny concerns racial or ethnic differences. Given the profound inequalities in U.S. society in terms of income, educational opportunities, and employment that exist between whites and ethnic minorities, it is not surprising that this gap is manifested in terms of access to cyberspace, i.e., i.e., much of the racial ravine in digital access is due to income discrepancies. In 1997, for example, white internet usage rates were more than double that of Latinos/Hispanics (37.7 v. 16.6 %), and roughly double that of African-Americans (19.0 %). In 2011, internet access rates for whites remained well above those for minorities or the national average. There are signs, however, that this dimension of the digital divide is slowly, if hesitantly, diminishing. Today, the majority of ethnic minorities uses the internet, and the relative difference between them and the white population has declined significantly. There are important differences within minority populations, however. Among African-Americans, internet usage tends to be concentrated among the young and the college-educated,

Table 2.4 Growth in adult U.S. internet users, 1995–2010

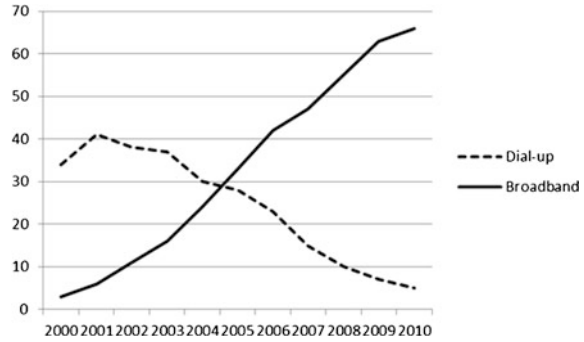
	On-line (%)		Growth in percentage
	2010	1995	
<i>Age</i>			
18–29	88	21	67
30–49	87	18	69
50–64	78	9	71
65+	42	2	40
Total	77	14	63
<i>Sex</i>			
Men	78	18	60
Women	77	10	67
<i>Race/Ethnicity</i>			
White	78	21	57
Black	66	11	55
Latino/Hispanic	84	14	72
<i>Education</i>			
<High school	47	2	45
High school graduate	67	8	59
Some college	89	20	69
College graduate	94	29	65
<i>Household income</i>			
<\$30,000	56	8	48
\$30,000–\$49,000	82	15	67
\$50,000–\$75,000	93	23	70
>\$75,000	95	32	63

Source <http://www.census.gov/population/socdemo/computer/2007/tab02.xls> and <http://www.census.gov/compendia/statab/2010/tables/10s1121.xls>

particularly women. Likewise, the Latino population is far from heterogeneous, and significant discrepancies in internet access and usage remain among various sub-groups; usage rates tend to be much higher among bilingual Latinos than those who speak only Spanish. Indeed, among English-dominant Latinos, internet usage rates are identical to Whites. Generally, Mexican-Americans and those with origins in Central or South America had lower rates of access than do Cuban-Americans or Puerto Ricans. In short, while racial or ethnic discrepancies in internet access and usage remain, all groups have experienced significant growth in uses and the relative differences between them have declined.

Persistently underlying the digital divide in the United States are vast socio-economic differences, particularly education and household income, which effectively serve as markers of class. Although populations at all of four broad educational levels (less than high school, high school graduate, some college, college graduate) exhibited gains in internet access, profound differences remain. Among college-educated Americans, internet usage is almost universal (91 %); those with a high school education or less are users witnessed a growth from

Fig. 2.11 Broadband v. dial-up access for U.S. internet users at home, 2000–2010.
Source Redrawn from Smith (2010)



2 % in 1995 to 35 % in 2011. Educational level, therefore, is a prime predictor of who is on-line and who is not. Similarly, income remains a useful measure of who has access and who does not, particularly at home. In 1995 roughly one-third of upper-income households (over \$75,000 annually) used the internet; by 2006, this share had risen to 93 %. Rapid growth rates also occurred among those of more modest means, although less than a majority (45 %) of poor households (less than \$30,000 annually) were users in 2011. Thus, as with race/ethnicity and educational level, absolute discrepancies persist but relative differences declined as internet usage rates advanced most rapidly among those with hitherto the least access.

Schools remain perhaps the most important arena in which the digital divide is manifested and reproduced. In an age in which the acquisition of skills to participate in advanced producer services is key to upward social mobility, this issue assumes special importance. Inequalities in school funding are mirrored in the prevalence of the internet in public classrooms: while 99 % of schools offer children access to networked PCs in one way or another, these rates vary significantly in terms of quality of access. After home and school, public libraries are the third-most common point of internet access for children, especially for lower income minorities; however, libraries have limited hours and often lack high-speed connections. Not surprisingly, the digital divide in schools has strongly racialized overtones: white students are much more likely than are minorities to use the internet in the classroom or school library.

In 2011, roughly 44 % of the U.S. population used broadband technologies of one sort or another, and dial up access declined proportionately (Fig. 2.11). This proportion is relatively low compared to most of the economically developed world; indeed, under the Bush Administration, the U.S. slipped from third to 13th place internationally in terms of relative access to broadband services, and Americans pay 10–20 times as much per megabit over broadband as do their counterparts in Korea and Japan. Broadband accessibility closely mirrors that of the internet as a whole: it tends to be most prevalent among the young, whites, the well-educated, and rises monotonically with household income. Moreover, broadband is unevenly distributed spatially among U.S. states (Fig. 2.12). Broadband technologies have been slow to reach rural America: whereas 86 % or

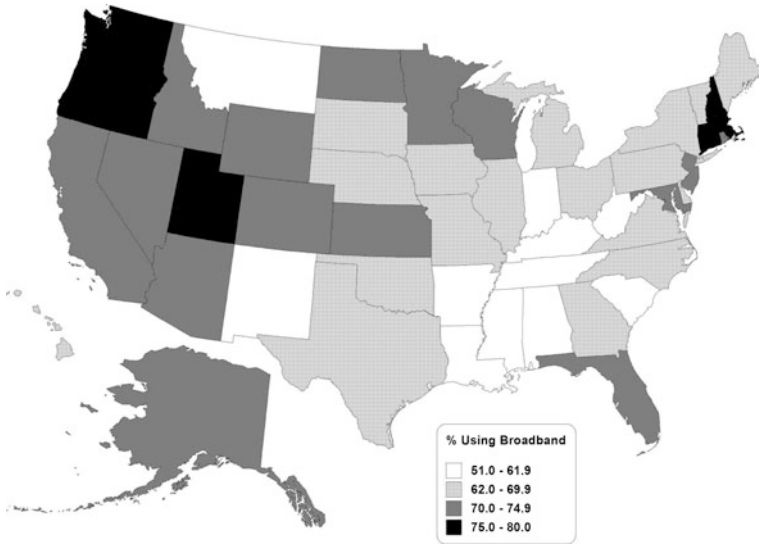


Fig. 2.12 Map of U.S. broadband Internet usage rates, 2010. *Source* Author, using data from http://www.census.gov/compendia/statab/cats/information_communications.html

residents in cities with more than 100,000 residents have access to DSL, very few in towns with less than 10,000 people do so.

Canada also faces a digital divide (Sciadas 2002; Howard et al. 2010), with, for example, markedly lower rates of use in Atlantic Canada, which tends to be poorer, more rural, and demographically older than the rest of the country. Unlike the U.S., however, the Canadian government has aggressively promoted broadband services in rural areas and free internet access in public libraries and community centers.

2.4.2 Europe

Europe provides a panoply of internet use that ranges from the exceptionally high to the very low. In 2011, 345 million netizens lived in the continent (excluding Russia), with an average penetration rate of 73 %. However, rates of usage varied widely, and were typically much higher in Northern and Western Europe than in the eastern and southern parts, reflecting long-standing socioeconomic differentials. There is thus a significant digital divide among, as well as within, European countries (Demoussis and Giannakopoulos 2006). Indeed, Orviska and Hudson (2009) argue that internal variations in internet usage exceed those among countries. While income is important in explaining internet access and use, age seems to be a major variable everywhere, as the young are invariably the most likely to log into cyberspace (Brandtzaeg et al. 2011).

Germany, with 67 million netizens (82.7 %), has the largest national population of users in Europe. Despite a relatively egalitarian social structure and government policies aimed at ameliorating discrepancies in internet access, the German digital divide persists. Younger residents are more likely to be users than older ones. A schism remains entrenched between urban and rural areas for reasons that include structural differences and individual characteristics (Schleife 2010). Regional discrepancies also persist: whereas Berlin exhibits much higher usage than the national average, Bavaria and the states of former East Germany lag behind.

France was relatively slow to adopt the internet, in part because of the legacy of its older Minitel system and a lag in deregulating its telecommunications market from the France Telecom monopoly. Today it harbors 50 million users, with a penetration rate of 77 %. In the 2000s, marked discrepancies in internet access were evident by income as well as between the largest metro areas and rural regions. The French government tackled that country's digital divide aggressively, including a program to offer 1.2 million of its poorest citizens a free PC with internet connection (Sayer 2006) as well as a subsidy to reduce PC costs to "1 € per day" for university students. In contrast to the *laissez faire* attitude of the U.S., the French also implemented street cyberkiosks, an annual internet festival, and subsidies for technicians to help with home internet installment. Nonetheless, broadband usage has been delayed there, and is roughly the same as the median rate of the EU.

In Britain the internet diffused rapidly, and today includes 84 % of the population. The British digital divide follows the familiar contours of age, income, education, and urban location, reflecting and reinforcing sociospatial differentials in opportunities for learning (Eynon 2009). British internet use was amplified by a national policy encouraging broadband use was adopted in 2003, when the technology rapidly grew in popularity to include 85 % of the country's netizens. British residents under age 25 were three times as likely as those over 65 to use the web (Helsper et al. 2008). Unlike the U.S. and Scandinavian countries, in which women are the largest pools of users, the digital divide in Britain is characterized by heavier male usage. As in all industrial countries, mobile internet access is growing rapidly in popularity. Non-internet users in Britain report they do not engage with cyberspace because they are "not interested," find the technology confusing, or cannot afford access, pointing to a mixture of digital choice and digital divide (Reisdorf 2011).

The European Union has adopted a series of telecommunications policies designed to promote internet access, particularly the diffusion of broadband. In 2005, the European Commission launched i2010, an initiative promoted to enhance internet access across the continent. This goal was explicitly articulated in the Lisbon Strategy of 2010, which was implemented with the broader aim of accelerating the continent's shift into a knowledge-based economy. The European Digital Agenda stipulates that by 2013 all EU citizens should have access to broadband internet, a goal unlikely to be met.

In all the Scandinavian nations, including Iceland, a well-educated "leisure class" (Florida 2004) has become adept at using information technology for a wide

variety of purposes. In part due to sustained and aggressive promotion by their respective national governments, Scandinavian states are well known to exhibit some of the world's best developed internet infrastructures, including broadband and wireless internet services, and exceptionally high levels of usage. Indeed, penetration rates in all Scandinavian nations exceed 90 %, often reaching as high as 96 %. Thus, what is essentially universal access to the internet has thus essentially eliminated the digital divide in Scandinavian states, in marked contrast to the highly unequal state of affairs in the United States. This state of affairs reflects a wealthy, highly educated populace as well as liberal government programs that aggressively promoted internet and other forms of telecommunications usage. In Sweden and Canada, for example, a steady convergence of internet, telephony, and video services has occurred, blurring once separate markets and reducing costs to consumers (Wu 2004). Finland in particular has had exceptional success in providing wireless services, a reflection of that nation's lead in mobile and cellular telephony (e.g. Nokia) for more than a generation (Palmberg 2002; Steinbock 2001). In Scandinavia, as in most of the world, internet usage has been particularly popular among the young. Given that schools in Scandinavia actively promote learning of information technologies, the widespread popularity of such devices among the young is not surprising. Indeed, an adolescent blogosphere has formed in which views are expressed, identities shaped, and connections forged (Bjanason et al. 2010; Kaare et al. 2007). Generally, information technologies in Scandinavia, as elsewhere, reinforce communities forged through face-to-face contacts rather than generate new ones (Thulin and Vilhelmson 2005).

In Southern Europe, where internet use lags behind that in the northern parts of the continent, the internet still plays an important role in the lives of Italians, Spaniards, and Portuguese. In Italy, its use predictably follows the long-standing north-south divide. Fiber connections and broadband were until recently largely confined to prosperous metropolitan areas such as Rome and Milan. Thus, while penetration rates in the Piedmont resemble those of Northern Europe, the Mezzogiorno, home to one-third of the population, has less than one-quarter of its netizens, although this gap appears to be declining. Italy also faces a tremendous age barrier in internet use: 79 % of Italians under age 30 use the web, but only 7 % of those over 65 do so. The Spanish case is similar, with Madrid and Barcelona dominating the country's internet connectivity. Rural areas such as Extremadura and Castilla y León lag well behind. PC ownership in Spain and Portugal lags well behind the EU average, and both countries exhibit a pronounced gender bias in favor of males. The Spanish government responded with a series of subsidized *telecentros* in rural areas, but dropped the program in 2006. Most regional governments adopted complementary programs, including subsidized wifi access in parks and public buildings.

Eastern Europe lags well behind the west in internet access. Typically, poorer countries have worse digital divides than do wealthier ones, and in Europe Greece and Bulgaria exhibit some of the worst regional differentials (Vicente and López 2011). In the Czech Republic, one of the region's better-connected countries, widening income differentials have been manifested in an enlarging, not

diminishing, digital divide (Lupač and Sladek 2008). With assistance from the United Nations, Poland launched Internet Republic, a project aimed at facilitating internet access in rural areas. Broadband in the country, roughly 17 %, is among the lowest in Europe. Hungary's urban-rural schism is the dominant feature of its digital divide, and the government's eHungary Program, launched in 2003, trumpeted internet access in the schools and 3,000 public access points.

2.4.3 Russia

In Russia, the internet began in the early 1990s to serve large financial institutions; the growth in individual and residential users occurred only after the banking crisis of the late 1990s, when a series of regional data transmission nets popped up (Perfiliev 2002). However, in the mid-1990s, O'Lear (1996) found Russian environmentalists using e-mail to network and share information. By 2011, with a 44 % penetration rate, roughly 61.5 million netizens lived in the country. Access to the internet, however, is socially and spatially uneven, often slow, and subject to severe political oversight. In Russia, many inter-city communications networks still rely heavily on copper cable wires, when most of the world's telecommunications traffic has moved decisively into fiber optics cable. As in many countries, Russian internet use has been concentrated in the largest cities, particularly Moscow and St. Petersburg. A persistent rural-urban divide remains however: "Private providers have not developed outside of large cities not only because of the lack of advanced telecommunications infrastructure and high construction costs, but also because potential markets of regular internet users remain very small" (Perfiliev 2002, p. 419).

In a country where newspapers, television, and radio stations are already under tight government control, the Russian internet has emerged as the last bastion of relatively uncensored speech. The Putin government gradually sought to extend its influence over the internet, essentially following the Chinese model of granting the secret service extensive monitoring powers, ostensibly on the grounds of fighting corruption (Troianovski and Finn 2007). As Russia's penetration rate increased, threatening to broaden the sphere of public debate and give rise to autonomous voices, the administration responded by purchasing independent websites, promoting pro-government websites, and fostering a network of government-friendly bloggers. Russia's internet surveillance law, the System for Operational-Investigative Activities, allows state security services unfettered physical access to internet service providers and requires them to report statistics about users.

2.4.4 *Central Asia*

In Central Asia, privatization and deregulation of telecommunications have occurred much more slowly than in most of the world, and are often handicapped by governments fearful of losing control over a vital means of information control. In 2007, the Kazakh operator Kazakhtelecom was the region's first state-owned company to actually offer its shares for sale, but only 4.1 % have been sold. The Kyrgyz government has gradually liberalized its telecommunications sector, which improved the affordability of internet access there and made use of cyberspace more attractive and profitable; however, as OpenNet Initiative (2010a) points out, "Kyrgyzstan is an effectively cyberlocked country dependent on purchasing bandwidth from Kazakhstan and Russia." Some governments cling to the older model of state-owned telecommunications, such as Afghanistan and Uzbekistan, in which UzbekTelecom retains a legal monopoly status even as it is being privatized. In 2001, following a brief window of privatization that opened with independence in 1991, Turkmenistan granted a monopoly over data services to TurkmenTelecom, driving several smaller internet service providers (ISPs) out of business.

As in most of the world, the most active Central Asian netizens tend to be young and well educated, including students, government employees, and those working for large corporations. In Kyrgyzstan, one-half of users are students and 75 % are under age 30. Ninety percent of Uzbeki users have a post-secondary education (Wei and Kolko 2005). Not surprisingly, often elites situated in urban areas tend to exhibit the highest rates of connectivity. In Uzbekistan, for example, 85 % of netizens live in urban areas (Wei and Kolko 2005), 70 % of whom are concentrated in Tashkent (Privacy International 2003; OpenNet Initiative 2010c). In Kyrgyzstan, 77 % of internet users are located in Bishkek. In Turkmenistan, 95 % of users are in the capital, Ashgabat (OpenNet Initiative 2010b). In Kyrgyzstan, the majority of Internet users depend on cafes (Privacy International 2003; Srinivasan and Fish 2009). In Uzbekistan, roughly 40 % of users do so from their homes, 40 % use their place of work, but 30 % use cybercafés (OpenNet Initiative 2010c). In Kazakhstan, half of users have internet access from their homes. In Afghanistan, cybercafés are essentially confined to the airport in Kabul and a few luxury hotels. In Tajikistan, a network of 400 cafes are the dominant points of entry into cyberspace; the average café costs \$US 0.73/h, compared to the national minimum salary of \$US 7.00 per month. However, strict licensing requirements have reduced the number of Tajik cybercafés. In Turkmenistan, private internet cafes are illegal, although the government monopoly TurkmenTelecom operates 15 cafes in the country (OpenNet Initiative 2010b). Prices in these cafes in 2007 averaged \$US 4/h (compared to an average income of \$US 100/month), although after President Berdimukhamedov reprimanded the Minister of Communications for such high charges they dropped to \$US 2/h. In 2008 TurkmenTelecom began to offer dial-up home access, but at such high prices it is unaffordable to most residents, an implicit form of censorship designed to limit

internet access (Lambroschini 2011). Clark and Gomez (2011, p.8), however, argue that rather than fees, it is the technical skills of staff that make cybercafés accessible to unskilled users. Throughout Central Asia, internet cafes tend to be clustered in commercial districts frequented by tourists, particularly business districts, hotels, and airports. Cybercafes are also major points of government control over the internet: those in which customers attempt to access banned websites are routinely closed, and customers who access pornography typically face steep fines. However, as internet penetration rates climb, including more access at home, the importance of cybercafés is likely to diminish.

2.4.5 East Asia

Chinese internet use, of course, stands in a class by itself. China's first international internet connection began in 1987, when the country was linked to Germany (Jing 2007). Today its largest ISPs are China Netcom and China Telecom. Large numbers of Chinese rely on internet cafes, where they are subject to strict censorship (Chap. 3). Domestically-produced portals tend to be highly popular, including Sina.com and 163.com, as well as home-grown search engines such as Baidu. Indeed, only 6 % of Chinese computers have internet linkages outside of the country (Crampton 2007). From modest beginnings, and in the context of sustained, explosive economic growth, Chinese internet use has grown rapidly (i.e., 20-fold between 2000 and 2011). With more than 513 million users in 2011, China forms the largest single national pool of netizens in the world, with a penetration rate of 38.4 %. Indeed, Chinese has become the second-most heavily used language in cyberspace today (Table 2.2). The Chinese blogosphere, with 20 million blogs and counting, has become an increasingly important force in politics, giving voice to critics of government corruption and dissident groups such as Falun Gong.

Enormous social and spatial inequalities typify the Chinese internet (Song 2008; Guo and Chen 2011). As in many developing countries, Chinese internet users are disproportionately male (55 %) and unmarried (58 %), and include numerous students and those with above-average incomes. Two-thirds of China's netizens earn 6,000 yuan or more per year, well above the national average. Because internet access is relatively expensive in China, many low wage workers find the internet simply unaffordable, even at internet cafes. In 2005, China had more than 110,000 internet cafes, which employed 1 million people: of their users, 70 % were between ages 18 and 30, 90 % were male, half held a university degree, and the most common usage was to play computer games. Users tend to be heavily concentrated in urban areas, particularly along the prosperous eastern third of the country. Thus, whereas 50 % of Beijing's residents log in, as do 50 % of Guangdong, only 3.8 % of the population of rural Guizhou does so. One-fifth of China's netizens live in either Beijing or Shanghai. Whereas 700 million Chinese live in rural areas, they form only 27 % of the country's netizens. As elsewhere,

this urban–rural digital divide largely reflects the government’s emphasis on urban areas as motors of economic growth and the unwillingness of China’s ISPs to invest in lower-income, and often lower-density, rural areas.

The Japanese internet included roughly 101 million users in 2011, with a penetration rate of 80 %. Unlike China, but similar to the U.S. and Europe, the bulk of Japanese access the web via personal computers at home; as a result, internet cafes are less common. As with other Asian countries, Japan has invested heavily in broadband applications: internet access speeds are 30 times faster than in the U.S., and considerably cheaper, which have greatly facilitated cable television and the government’s efforts to promote e-commerce and telecommuting (Harden 2007). Moreover, Japan has seen its mobile internet usage surge to the world’s highest rate, which has surpassed the use of landlines (Ishii 2004). Despite these investments, Japan, too, exhibits a digital divide, with a disproportionate concentration of users in the greater Tokyo-Yokohama and Osaka metropolitan areas. The blogosphere is exceptionally popular in Japan: 80 % of the country’s netizens visit a blog once a month or so.

South Korea, among the world’s most hard wired countries, has a remarkably well developed internet infrastructure. (In contrast, in North Korea the internet is all but forbidden, with the exception of a handful of government officials). With 40 million users in 2011, South Korea has a penetration rate of 82.7 %, the highest in Asia (and higher than the U.S.). Seoul, the country’s primate city, captures a large proportion of the country’s internet users (Hwang 2004), and its netizens deploy the web to a wider range of purposes than do those outside of the capital. To mitigate the country’s digital divide, the Korean government established a series of “information model villages” or e-villages. Many Koreans enjoy one of the 20,000 “PC bangs,” local slang for internet cafes; computer gaming is enormously popular (Schiesel 2006), and games such as *Starcraft* have become a national obsession, with professional players. Korean *Starcraft* champions such as Lim Yo-Hwan or Hong Jin-Ho are national celebrities. The Korean government initiated and supports the Korean Games Development and Promotion Institute, an agency charged with encouraging and facilitating the gaming industry as a key strategic industry within that country.

2.4.6 Southeast Asia

Southeast Asia exhibits enormous contrasts in internet use, ranging from hyper-connected Singapore to Myanmar, in which 0.2 % are logged in. With highly uneven rates of economic and population growth, as well as different national policies toward internet adoption, this region exhibits some of the most marked contrasts in internet use in the world. While all countries there experience digital divides, their governments have consistently sought to address the issue through a variety of policies with varying degrees of success (Tipton 2002; Evers and Gerke 2004).

Singapore, in which 77 % of the population has internet access, is one of Asia's best-connected countries, with connectivity levels rivaling those in North America and Western Europe, which is perhaps no surprise given the long commitment to telecommunications made by Singapore's government (Corey 1991). Singapore has aggressively positioned itself as a regional, and increasingly, global center of telecommunications and information services. In this vein, Singapore Telecommunications initiated a series of high speed fiber linkages with India in 2001, Bangladesh in 2002, and Thailand and Indonesia in 2003. Today, 90 % of the island enjoys high-speed broadband connections. Affluence and widespread internet access have created a critical mass of web users, who routinely apply the internet to banking and shopping. The Singaporean state retains tight control over the island's internet content, with some of the region's strictest censorship.

In Thailand, with 18 million users (24.7 %) in 2011, the by-now familiar pattern of a bifurcation between cosmopolitan, internet-savvy youth clustered in the primate city and less connected people in rural areas is prominent. Thus, while 68 % of the population lives in rural areas, only 16 % of Thai netizens do so. Facebook is particularly popular here, and has been used in protests against the ruling monarchy.

Malaysia's digital divide largely reflects the pronounced differences between the country's peninsular portion and the poorer provinces of Borneo. Socially, the country's elderly and Indian population was the least likely to be connected. The government's proactive policy, Vision 2020, which seeks to catapult the state into a knowledge-based economy by that year, has had significant impacts in encouraging Malays to participate in cyberspace, including incentive programs such as "One Home, One PC" and a systematic roll-out plan to facilitate broadband adoption (Nair et al. 2010). The Malaysian government's Multimedia Super Corridor (MSC) has integrated information technology at the core of its Vision 2020 Master Plan (Mohan et al. 2004), and generated 17,000 jobs, of which 80 % were knowledge-intensive. Part of this effort includes the Multimedia University in Cyberjaya, owned by the privatized Telekom Malaysia which has established collaborative linkages with 37 companies and 29 universities around the world.

Indonesia's internet straddles more than 17,000 islands, an environment more economically conducive to satellites, with low marginal costs, than fiber optics. With 55 million users (22 %) in 2011, the country forms one of the world's larger pools of netizens. Indonesia was the world's first developing nation to use satellites for domestic connectivity, launched several generations of its Palapa ("Unity") satellites to provide internet services to all 27 provinces; PalapaNet recently began to sell services to neighboring ASEAN countries as well. The government has spent tens of millions of dollars, including foreign aid, to promote broadband connectivity in 72,000 rural villages (Jumaat 2010). With low PC ownership, many users rely on one of the country's 2,000 cybercafes, or *warung internet* (often abbreviated to *warnet*) which are overwhelmingly clustered in cities all over Java (Furuholt and Kristiansen 2005). *Warnet* have become increasingly important foci of social and political transformation (Lim 2003).

Although it lags behind its more economically developed neighbors, the internet has diffused rapidly in Vietnam as well (Lam et al. 2004). Its 30 million users represent one-third of the country, and are predominantly clustered in Ho Chi Minh City and Hanoi (Moi 2009). As with most totalitarian countries, the government severely censors the Vietnamese net. Invoking dependency theory, Surborg (2009) argues that in the context of Vietnam's *doi moi* reforms, the internet represents the intrusion of the global capitalist ruling class into the country.

Finally, the Philippines, with almost 30 million netizens (29 %), also exhibits a pronounced digital divide with, of course, Manila at the core. Despite this discrepancy, cyberspace is becoming woven into Filipino society in multiple ways. Filipinos are particularly fond of text messaging, and have the highest per capita rate of use in the world. The slow diffusion of the internet there has led to the adoption of distance-learning courses to the advantage of outlying rural islands.

2.4.7 South Asia

The world's third largest national group of internet users—121 million people in 2011—are found in India, a mere 10 % of the population. However, the Indian internet is expanding rapidly, particularly among the growing middle class accustomed to cyberspace. Between 2000 and 2011, 116 million new users (96 % of the country's netizens) came on-line, a growth rate of almost 34 % annually. The halting deregulation of the Indian telecommunications sector, a hidebound bureaucracy, and insufficient investment in rural electrification have kept this growth from being even higher, however.

Despite its reputation for a booming economy centered on software and information technology, centered on cities such as Bangalore that are by far the best connected places in the country, in reality access to the Indian internet is very uneven (Keniston and Kumar 2004). The Indian digital divide is dominated by its sharp urban–rural contrasts: thus, while 12 % of urban Indians logged on in 2008, only 1.2 % of those in rural areas do so (Singh 2010). In large cities, users can take advantage of the 12,200 cybercafes present in 2005 (Rao 2005). Outside of cities, major obstacles include poverty, illiteracy, gender discrimination, and the lack of a well developed telephone system. Nonetheless, with the gradual diffusion of the internet to the country's innumerable villages, in which 70 % of the population lives, many farmers are using cyberspace to obtain real-time information about crop prices, access health care information, and access land ownership records (Devraj 2002; Cecchini and Scott 2003; James 2004). India's digital divide is also characterized by sharp gender inequalities, with women comprising only 17 % of the country's netizens (Dhawan 2012). Lower caste Indians, especially the *dalits*, or untouchables, face the most difficult obstacles accessing cyberspace (Thirumal and Tartakov 2011). The government has initiated programs to address these discrepancies by promoting wireless internet usage, community-owned intranets, and satellite services (Rao 2005).

Outside of India, South Asia contains much smaller pools of users in Pakistan (29 million users, or 15 % penetration) and Bangladesh (5 million users, or 3.5 %). In both countries, patriarchal barriers and gender roles firmly limit women's access to cyberspace. Despite the Pakistani government's rhetoric about closing the country's digital divide, enhancing human capital, promoting exports, and attracting foreign information technology investment, very little has been done in practice. Karachi and Islamabad remain the best-connected points in the country, termini of international fiber optic cables. Rural Pakistanis, however, live in an endemic state of information poverty (Ameen and Gorman 2009). While internet use has grown rapidly (59 % annually), the infrastructure has had difficulty in keeping up with the surge in demand. A few government-sponsored telemedicine clinics operate in rural areas, and some universities have established distance-learning programs (Mujahid 2002). Bangladesh fares even worse, with a very low telephone density, high illiteracy, acute shortages of computer skills, and virtually no broadband, problems compounded by the relative lack of Bengali content on the web.

2.4.8 Arab World

Roughly 320 million Arabs comprise about 5 % of the world's population. With an average Internet penetration rate of 25 % in 2011, or 79 million users, the Arab world lags behind the world average, particularly industrialized regions. There exist to date remarkably few systematic attempts to understand the Arab world's internet geography (see Warf and Vincent 2007). Understanding the nature and impacts of the internet in the Arab world is made difficult in part by the widespread Orientalist misconceptions about Arabic culture and society found in the West: like all societies in the age of intense and rapid globalization, Arab societies are complex mixtures of the traditional, the modern, and the postmodern (Fandy 1999). Considerable diversity may be found among Arab states in terms of internet usage. Typically, Arab states with the best-developed internet systems are those that have diversified their economies from petroleum, have competitive telecommunications markets, relatively equalized gender roles, numerous cybercafes, and high rates of wireless phone usage.

In 2011, roughly 79 million people in Arab countries (including non-Arabs, e.g., Berbers and foreign nationals) logged on. In absolute terms, the largest numbers were found in Egypt, by far the most populous Arab country, which had 21.7 million users, Morocco (15.6 million), and Saudi Arabia (11.4 million). Penetration rates were highest in the Persian/Arabian Gulf states, particularly the UAE and Qatar, which, with 69 %, rivaled the rates found in many countries of Europe. Like many Gulf states, the UAE has a large immigrant population from South and Southeast Asia; Privacy International (www.privacyinternational.org)

estimates that 60 % of that country's users are Asian. Among the seven emirates that constitute the UAE, Dubai and Abu Dhabi have taken the lead in facilitating internet growth (Kalathil and Boas 2003). More impoverished Arab countries, in contrast, exhibited much lower rates, ranging as low as 9 % in Sudan and 4 % in Iraq.

Because personal computer ownership rates are relatively low in the Arab world, and because ISP access charges are often high, most Arab internet users rely upon internet cafes for access rather than individual ISP accounts (Wheeler 2004). Their popularity varies among Arab countries. Jordan made the *Guinness Book of World Records* for the largest local concentration of internet cafes anywhere: more than 200 are clustered on a single street in Irbid (Wheeler 2006). Cafes are also popular in Algeria and Morocco, which have more than 3,000 and 2,120 of them, respectively. Cafes are particularly important for those who lack dial-up access at home, and as Wheeler (2004) notes, they constitute "informal communities, where users come and go, activities are not measured and monitored, where the effects of internet use are difficult to assess." Users spend an average of 12 h per week on-line, often in chat rooms. An important alternative to cybercafes is publicly-funded internet community access points such as Tunisia's Publinet centers and Jordan's Knowledge Stations (Wheeler 2006).

2.4.9 Sub-Saharan Africa

The global space of flows and "information highway" seem to have largely bypassed the African continent. By virtually any measure, the region remains the least connected in the world, the bottom-most tier of the global digital divide. Whereas 32 % of the world's people used the internet at the end of 2011, in sub-Saharan Africa the average internet penetration rate was only 11 %; home to 850 million people, 12 % of the world, Africa has less than 5 % of its internet users. Hobbled by widespread poverty, economic stagnation, illiteracy, an inadequate telecommunications infrastructure, often unreliable electrical systems, lack of technical skills, and frequently indifferent governments, Africa was late to join the digital revolution, and the internet is still relatively uncommon on the continent. However, despite these obstacles, cyberspace on the continent is still growing by leaps and bounds. Like other information technologies, the internet has diffused unevenly across the African continent (Wilson and Wong 2003; Oyelaran-Oyeyinka and Lal 2005), simultaneously reflecting and transforming long-standing regional inequalities. Thus, South Africa has long been the most prominent member of Africa's information revolution. Throughout Africa, great social and spatial inequalities in internet access exist within each country: telephones tend to be concentrated in urban areas, where companies derive economies of scale in service provision, although in many African countries the bulk of the population lives in rural ones. In South Africa, for example, only 8 % of the country's internet

users are blacks, although they comprise 79 % of the total population (Brown and Licker 2003).

African internet cafés are commonly found in commercial districts frequented by (typically young) tourists, students, and business executives; exhibit ownership structures ranging from sole proprietorships to international chains; and charge access prices that vary widely among and within countries (Mutula 2003; Esharenana et al. 2003). Because many cafés derive a substantial share of their profits from non-Africans, their fees are often too high to make them accessible to low income people. Based on observations of cybercafés in Uganda, Mwesige (2003) argues that because they are affordable only to the relatively well-off, they may be accentuating, not decreasing, the digital divide within countries. However, as the prices of internet connectivity have fallen, cybercafés are sprouting up in some African slums as well, and are most Africans' primary means of access. Some African governments have promoted the growth of cybercafés in slums, such as South African's Universal Service Agency efforts in the Khayaletsha slum near Cape Town (Mancebo 2003). In addition to for-profit cybercafés, many non-profit and non-governmental organizations have established networks of neighborhood telecenters (Mayanja 2003), which have played catalytic roles in community development. Ghana, for example, has a well-developed system (Falch 2004). In Tanzania, state-subsidized telecenters have complicated the geographies of inclusion and exclusion that normally arise from market forces (Mercer 2006).

2.4.10 Latin America and the Caribbean

At the close of 2011, 234 million people in Latin America and the Caribbean used the internet. The region exhibits a mean penetration rate of 40 %, higher than the world average but considerably lower than the economically developed world. Penetration rates varied considerably, with the highest consistently found in the Caribbean, the wealthiest and best-connected region. In many respects, the most well-connected parts of the greater Latin American region lay in the Caribbean, including Puerto Rico but also places such as Antigua (with a rate penetration greater than that of the U.S.), Barbados, and St. Lucia. In the 2000–2011 period, more than 6.3 million Caribeños joined the global on-line community. Outside of the Caribbean, Argentina leads Latin American penetration rates (with 67 %); closely following are Chile (59.4 %), Uruguay (56 %), and Colombia (55.9 %). Conversely, countries with the lowest penetration rates tend to be poor, including the hemisphere's lowest, in Nicaragua (11.7 %), as well as Honduras (13.1 %), and Cuba (15.4 %). Long marginalized ethnic minorities and impoverished residents of rural areas or urban barrios are unlikely to have access to the internet or benefit much from its usage. For example, Friedman (2005, p. 12) quotes the director of a network of rural women who notes "peasant women do not use computers and many do not know that this technology exists." The lines of digital inclusion and exclusion are therefore often drawn on the same boundaries that

divide class, gender, ethnicity, and political and economic power. Nonetheless, fuelled by falling prices of computer hardware and software, growing computer literacy (especially among the young), and slowly, if unevenly, rising incomes, Latin American internet usage grew explosively between 2000 and 2011. The region as a whole witnessed a growth rate in users of 32 %, which was considerably slower than states in Africa and Central Asia.

Many Latin Americans rely on internet cafes, which tend to be clustered in commercial districts frequented by tourists, exhibit a range of ownership from sole proprietorships to chains such as PapayaNet, and have access charges that vary widely among and within countries (Rao 1999). In countries with growing middle classes, however, home-based internet access is more likely. In addition to for-profit cybercafés, many non-profit and non-governmental organizations have established networks of telecenters, which have played catalytic roles in community development in many areas (Hunt 2001). For example, Somos@telecentros, a network of telecenters, allows diverse groups to share experiences and collaborate in the acquisition of information resources.

Within the world of Latin American broadband, local wireless applications have gained ground quickly, generally among commercial establishments. For example, the title of the “world’s first WiFi-linked e-payments network” is claimed by The Mall of San Marino in Guayaquil, Ecuador (Burger 2004). Because wireless internet access is generally confined to a few “hotspots” such as coffee houses or airports, most users must utilize a landline in order to access cyberspace. Thus, whereas 15 % of Americans use the wireless internet, in Brazil, only 2.6 % do so, and Brazil leads the region in this respect (Nielson Mobile 2008). However, as wireless technologies proliferate, and as have surged well ahead of landlines, Latin America may enjoy the potential to leapfrog old technologies (Davison et al. 2000).

2.5 Conclusions

Contrary to the hyperbole that continues to swarm around the internet, multiplying even faster than do viruses and webpages, cyberspace reflects all of the inequalities and social divisions that permeate the non-virtual world. Far from constituting some mythologized world of unfettered individualism, as some advocates portrayed it, cyberspace in fact is thoroughly shot through with relations of class, gender, ethnicity, and other social categories. Theorizations of the digital divide must of necessity take these dimensions into account to avoid the overly optimistic, technologically-determinist, and often conservative perspectives that deny their ongoing existence and significance to understanding the internet. When viewed in social terms, the virtual and real worlds are mutually constitutive: discrepancies in access to the internet both mirror and constitute inequalities in the world outside of cyberspace.

It is important to emphasize the dramatic growth of the internet, which the world over is expanding by leaps and bounds. Growth rates vary, of course, and tend to be highest in countries with small populations of netizens in 2000. In 11 years, 1.3 billion new netizens were brought on-line, or 120 million (8.5 %) annually. Overall, the internet is growing more rapidly in the developing world than in the economically advanced one, in which saturation levels have been effectively reached. In some African states, growth rates are explosive. Such observations mean that any statistics on internet use will soon be out of date. They also imply that while the digital divide remains a pressing issue, it is gradually ameliorating among and within countries.

Contextualizing the internet—embedding it in economic, political, and cultural relations—inevitably means comprehending it in spatial terms. There is no one, unified network, but a loose assemblage of different networks. Many factors combine to produce the uneven spatiality of the internet, including differences in income, literacy, demographic composition (notably age), gender relations, telecommunications policies, and government censorship, generating a geography of cyberspace that is inescapably multiscalar in nature. As this chapter has demonstrated, for example, the digital divide varies markedly in severity, causes, and outcomes in different countries. Moreover, the internet helps to produce the spatial unevenness that it simultaneously reflects: in some countries, it has democratized discourse, empowered marginalized groups, and spurred economic growth; in others, it has reinforced existing hierarchies of wealth and power, notably patriarchal ones, by producing enormous information asymmetries. Such considerations should lead us to be wary of viewing the internet in teleological terms, as some omnipotent force inevitably destined to emancipate humanity. Rather, its consequences are contingent, ever-changing, and locally-specific. Such a perspective is necessary as a sobering antidote to the overly optimistic, technologically determinist utopianism that pervades much popular wisdom about this topic.

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