

"(B) by means of a telecommunications device knowingly -

"(i) makes, creates, or solicits, and

"(ii) initiates the transmission of, any comment, request, suggestion, proposal, image, or other communication which is obscene or indecent knowing that the recipient of the communication is under 18 years of age regardless of whether the maker of such communication placed the call or initiated the communication;

"(C) makes a telephone call or utilizes a telecommunications device, whether or not conversation or communication ensues, without disclosing his identity and with intent to annoy, abuse, threaten, or harass any person at the called number or who receives the communication;

"(D) makes or causes the telephone of another repeatedly or continuously to ring, with intent to harass a person at the called number; or

"(E) makes repeated telephone calls or repeatedly initiates communication with a telecommunications device, during which conversation or communication ensues, solely to harass any person at the called number or who receives the communication;

"(2) knowingly permits a telecommunications facility under his control to be used for any activity prohibited by paragraph (1) with the intent that it be used for such activity,

shall be fined under title 18, United States Code, or imprisoned not more than two years, or both."; and

(2) by adding at the end the following new sub sections:

"(d) Whoever --

"(1) in interstate or foreign communications knowingly -

"(A) uses an interactive computer service to send to a specific person or persons under 18 years of age, or

"(B) uses any interactive computer service to display in a manner available to a person under 18 years of age,

any comment, request suggestion, proposal, image, or other

communication that, in context, depicts or describes, in terms patently offensive as measured by contemporary community standards, sexual or excretory activities or organs, regardless of whether the user of such service placed the call or initiated the communication; or

"(2) knowingly permits any telecommunications facility under such person's control to be used for an activity prohibited by paragraph (1) with the intent that it be used for such activity,

shall be fined under title 18, United States Code, or imprisoned not more than two years, or both.

Opponents of the CDA have asserted that the law is unconstitutionally vague and inhibitory of free speech, a position with which federal courts have agreed. A panel of three federal judges in Philadelphia granted a preliminary injunction against enforcement of the CDA in June of 1996, and a second panel in New York also enjoined the act. The Justice Department appealed the decisions, and the appeal is now pending with the Supreme Court, which has agreed to hear the case.

A New York Times report on the New York decision summarized:

The judges said that if it stood, the new law would restrict freedom of speech in this new forum, chilling constitutionally-protected speech between adults. The judges said that current technology does not allow most electronic publishers to ensure that children will be excluded from viewing indecent communications. Therefore, they wrote, the only way for adults to protect themselves from the possibility of being charged with a crime under the statute "would be to refrain from transmitting any indecent content," something that was "unquestionably" unconstitutional.¹⁷⁰

Authorities in China, Kuwait, and Singapore have sought to block access for their citizens to Internet sites with information (text, graphics, audio, video) deemed unacceptable on political or cultural grounds. The Kuwaitis, for example, are concerned about "material inducing sin . . . [or] breaching our belief and values . . ." ¹⁷¹ Internet users with some expertise can work around restrictions, making it doubtful that attempts to block access can succeed in the long run. Attempts to block the access of any local area within the United States to any part of the Internet would probably be doomed to instant failure. Residents of the most conservative rural township can access any site on the Net, just as can citizens of densely populated urban areas. This makes the question of "community standards" difficult, as the concept of community is changing before our eyes.

¹⁷⁰ Pamela Mendels, "Second Federal Panel Declares C.D.A. Unconstitutional," July 30, 1996, <http://www.nytimes.com/library/cyber/week/0730cda-ny.html>.

¹⁷¹ Reuters report, "Kuwaiti MP Seeks curbs on Internet," <http://www.sjmercury.com/whatsnew/-015201.htm>, posted August 28, 1996, 07:11.

Local authorities in other nations might have a better chance of prohibiting their citizens from posting disapproved material online, but even that may be very difficult to enforce. "Anonymizers" (e-mail remailing services that disguise the sender's identity) allow posting of messages anywhere that accepts anonymous messages (Usenet groups, for example), and those sites may then be accessed online. A citizen of The People's Republic of Dystopia could post an anti-regime message via anonymous remailing service on, say, alt.politics.dystopia.boo.hiss,¹⁷² and that message could then be viewed by other Dystopians with Usenet (newsgroup) access. The Dystopian authorities might have a law against such speech, but are unlikely to be able to enforce it in practice, certainly not before the fact.

The Center for Democracy and Technology, in cooperation with other organizations, has begun an effort it calls the World Internet Freedom Project, to "seek workable solutions to the increasingly aggressive efforts of foreign governments to regulate online communications."¹⁷³

Protecting Children from "Adult" Material

One of the most frequently expressed concerns about the Internet, and one of the sources of the Communications Decency Act, is the risk it poses of exposing children to sexually explicit and otherwise offensive material. An enormous amount of such material is available online especially in the "alt.sex" Usenet groups and sex-oriented Web sites. Some is freely available to anyone on the Net; some requires registration and even credit card information before access is provided. Much can be easily found in minutes (or less), sometimes in surprising ways.

For example, I searched for information on the child-protection software called "SurfWatch." Among the sites mentioning SurfWatch quickly found by the Altavista search engine were several explicit, hard-core adult sites and pages of links to such sites. One of them included numerous links to adult sites, most of which were Usenet groups readily available to anyone. Another was an adults-only site that required registration and credit card payment to access its contents beyond opening screens and descriptions. In short, even someone looking for software to protect against adult site availability can quickly be *led* to hundreds of adult sites--one need not even be looking for those sites.

Many (probably the vast majority of) adult-oriented Internet sites require payment to view or download files. This automatically tends to filter out underage Internet users, as a credit card or advance establishment of a prepaid account is required for access. This may change with the arrival of electronic cash--even children may be able to obtain digital cash

¹⁷² This, by the way, is pronounced "alt dot politics dot dystopia dot boo dot hiss." The period is usually pronounced "dot" when a Usenet group name, URL, or e-mail address is read aloud. And for those who wonder, "URL," meaning "universal (or uniform--take your pick) resource locator," is often pronounced *earl*.

¹⁷³ CDT "First Annual Report and 1996 Work in Progress, March 1996," http://www.cdt.org/publications/annuals/96_report.html#privacy_forum_act.

or smart cards as easily as they may now buy prepaid phone cards. Electronic cash could enable children to visit sites that would otherwise effectively be off-limits. Some sites do make use of a system for prior verification of the user's age, but there is no requirement that they do so.

Private enterprise is seeking to meet the need and desire for software to limit access to adult sites online, although it seems likely that other vendors or creative computer users will quickly follow with programs or methods to get around the protection systems.

Predatory Behavior

The presence of predators on the Internet has been documented repeatedly in the newspapers. For example, in August 1996 a young teenage girl was lured to California by a man she had met online. He persuaded her to steal her parents' credit card, buy a plane ticket, and fly to Sacramento. There he met her, took her home, and had sex with her. They were tracked down quickly and he has been charged with statutory rape. This is only one example among a number that have been reported in the press.

Pedophiles and child pornographers meet on the Internet, exchange files, track actual or potential victims, and plan assaults. In at least one case, child molestation sessions were telecast live via the Internet to distant sites.¹⁷⁴ The *New York Times* reported on an extensive computer database of thousands of children, maintained by an imprisoned child molester:

. . . [C]hildren appear [in the database] by name, age and location in dated entries that span six years and include personal details written as "latchkey kids," "speech difficulties," "cute" and "Little Ms. pageant winner." Those on the list range from babies 1 month old to children in their early teens, but most are girls between 3 and 12.¹⁷⁵

Records discovered by investigators in the case show extensive use of the Internet to exchange messages and images. California law prohibits the knowing transmission of child pornography by any means, including via computer hardware or software.¹⁷⁶

Predators have also taken advantage of adults online. There are cases (possibly many) of online acquaintances in proprietary network chat rooms (AOL, Prodigy, CompuServe) and on Internet Relay Chat leading to stalking and other forms of offensive behavior or worse. While such activities do not require network communications, Internet may be providing expanded horizons for sociopaths. It is not clear what preventive measures are

¹⁷⁴ "Police arrest man linked to child-porn ring," *San Jose Mercury News*, November 4, 1996, as posted on the *Mercury News* Web site.

¹⁷⁵ Nina Bernstein, "On Minnesota Prison Computer, Files to Make Parents Shiver," *New York Times*, November 18, 1996 (as posted on the *Times* Web site).

¹⁷⁶ Chapter 1080, Statutes of 1996 (AB 295, Baldwin); see §311.1 of the *Penal Code*.

available that would be more effective than a highly developed sense of caution on the part of those who chat online.

In one widely publicized and especially alarming case, a 35-year-old woman arranged online to meet a man with whom she had discussed explicit sexual fantasies in a sex-oriented chat room. The meeting resulted in the woman's torture and death, outcomes she apparently expected.¹⁷⁷ In another extreme case, a young woman was tortured and sexually abused by a man she met online and got together with in person for dinner and videos.¹⁷⁸ Other cases have involved men befriending women online, arranging to meet them, sometimes under the pretext of pursuing a long-term romantic relationship, and abusing or otherwise taking advantage of them, sometimes under false identities.¹⁷⁹ These situations are fostered both by the Internet's ability to disguise identities and the (often false) sense of intimacy that may develop through online conversations.

Digital Fraud and Vandalism

The ability to edit audio and video digital images permits fraud of a type previously impossible. Photographs, moving pictures, and sound clips can be altered and even created virtually out of whole cloth to present events that never happened, or at least never happened *that* way. This danger would be quite enough by itself, but is now amplified by the speed with which such images may be transmitted and retransmitted over the Internet. An entire speech or event could be fabricated and, in effect, broadcast to the world. How, then, are images to be authenticated? Or can they ever be? This is not entirely a new issue, but one made potentially much more urgent by the difficulty of detecting digital fraud and the immense power now available for disseminating images.

Not only may specific images or documents be altered, so may entire Web sites. In mid-August of 1996, a malicious hacker (often called a "cracker") invaded and altered the U.S. Department of Justice Web site. Among other things, the invader changed the logo to read "Department of Injustice," inserted a tirade against the Communications Decency Act, and added to the page a topless picture of a Jennifer Aniston ("Friends" star) lookalike. Justice quickly shut down the site for repairs. In September, a similar attack took place on a CIA Web site, although the site reportedly had no connection to secret CIA files or computers.

If an entire Web site could be so radically altered, an act easily discovered--in fact designed for that purpose--how many sites might have been subtly altered through a

¹⁷⁷ On this case, see, for example, Alex Dominguez, "Internet attracting sexual predators," *San Jose Mercury News*, October 21, 1996 (as posted on the *Mercury News* Web site).

¹⁷⁸ Rachel L. Swarns, "Student Accused of Assaulting Woman He Met in Online Chats," *New York Times* (online edition), December 8, 1996.

¹⁷⁹ I am aware of several such cases from online discussions, but those have to be considered apocryphal, as I do not have first-hand documentation, although I do consider the reports to be accurate. Nonetheless, there are sufficient reports online and in the media to suggest that such cases are not rare. I do know one individual (male) who was the victim of a comparable hoax by a married woman who posed online as divorced.

change in an embedded URL, alteration of a statistic, or modification of a written passage? Such subtle changes might go unnoticed until damage had accumulated over a long time.

Posting of fraudulent documents (doctored versions of published works, bogus reports, and so on) is well known on the Internet.¹⁸⁰ In a notorious recent incident, widely reported in the press, news correspondent Pierre Salinger announced that he had found evidence that an errant missile had brought down TWA Flight 800 in July of 1996. Salinger had been fooled by a long-discredited document that had circulated on the Internet. Salinger's claim was widely distributed before the fraudulent source of the document was learned.

Bogus Web sites sometimes appear, giving the impression of authority or official sponsorship. For example, a fake Bob Dole campaign site, www.dole96.org (in contrast to www.dole96.com, which was the genuine site), parodied the Republican presidential candidate, and in turn linked to other potentially misleading parody sites. Because search engines index sites on the basis of the words in them, anyone can create a misleading or outright fraudulent site, including words or phrases that will eventually draw visitors, attract links, and gradually spread rumor or innuendo about a selected target. Sky Dayton, founder of the ISP "Earthlink" was a victim of such a process, implying that Earthlink was controlled by the Church of Scientology, of which Dayton is a member.¹⁸¹

Viruses, Trojan Horses, and E-Mail Chain Letters

Malice on the Net also takes the form of viruses, Trojan horses, and fraudulent messages modeled on the chain letter.

A *computer virus* is a (usually, but not necessarily) destructive program that replicates and spreads from computer to computer. Computer viruses now number in the thousands, with new variations appearing daily, or so it seems. A battle is underway between creators of viruses and creators of virus-stopping programs, such as Norton Anti-Virus.

A *Trojan horse* is a destructive or annoying program disguised as a useful or benign piece of software. When executed, the program might destroy data, alter file contents, put an annoying message on the screen, or even erase an entire hard disk.

Recently a third variety of malice has taken the form of "*warnings*" about *non-existent viruses and Trojan horses*. These warnings spread in chain-letter fashion, passed along by well-meaning but credulous users of Internet and online services. The most notorious and widespread of these warnings pertains to the so-called "Good Times Virus." This is purported to be a "virus" originated on America Online and embedded in messages with subject line containing the phrase "Good Times." Once started on its way, this hoax was

¹⁸⁰ Also see the discussion of commercial fraud in Chapter 2, above.

¹⁸¹ Robert Wright, "The Cybersmear," *Time*, July 8, 1996, p. 46; the article is an excerpt from online magazine *Slate*.

passed around and around, often posted to newsgroups and e-mailed to lengthy lists of recipients. The only "virus" here is *the warning itself*, replicated endlessly around the Net, cropping up anew every few months and starting its rounds again.

A variation on this theme is the "Stevie and Amanda" e-mail message. This is a purported plea from school children Stevie and Amanda that the recipient reply to a specified address, and pass the request along to as many additional e-mail users as possible. The alleged Stevie and Amanda are said to be pursuing a school project and seeking to find out how many replies they can get within two weeks. However, as no date is given in the message, the "request" can circulate on and on forever, and has been seen to recur at intervals on the same discussion groups. There is no way of knowing how many credulous recipients have been duped by this scam or how many copies of the request have flooded Internet.

Another classic chain-letter hoax is a purported report of a woman who was grossly overcharged for a cookie recipe (the details vary, although Neiman-Marcus is often cited as the culprit) and who retaliated by posting the recipe online. The message is e-mailed with a request that the recipient pass it along to everyone he or she knows online. That one has been circulating in this fashion for years.

In general, a message's inclusion of a request that the recipient forward it to all of his or her online acquaintances and its posting to news groups and mailing lists should be considered a sign that it is a hoax.

Denial of Service Attacks and "Cancelbots"

In September of 1996, a "denial of service" attack on Public Access Networks Corporation (known as Panix), brought sudden attention to this destructive type of online assault and to the system flaw that permits it. A denial of service attack floods a Web site with requests for connection but cuts short the response and acknowledgment process, thus leaving a growing queue of requests on the server. The server is quickly overwhelmed and becomes unavailable. As the attacker can continue the attack (disguising the source), the site may be put out of service for hours or days.

Instructions for this type of attack were published in a periodical designed for computer hackers and others interested in the technology, and quickly were disseminated around the world. The Panix attack appears to have been a response to Panix's actions in stopping spammers from mailing to the company's subscribers, although similar attacks have been reported on other Web sites.¹⁸²

¹⁸² See, for example, Robert E. Calem, "New York's Panix Service Is Crippled by Hacker Attack," *New York Times* (online edition), September 14, 1996; Joshua Quittner, "Panix Attack," *Time*, September 30, 1996; Louise Kehoe, "Rash of hacker attacks worries Net users," *San Jose Mercury News*, September 18, 1996, as posted on the *Mercury News* Web site. According to Calem, the denial of service instructions were published in the Summer 1996 issue of the periodical *2600*.

There is no easy, reliable, or widely available method for stopping denial of service attacks, although Internet technical experts are working on solutions.

Another sort of online mischief is the “cancelbot,”¹⁸³ a program that seeks out and deletes specified messages on Usenet groups. Cancelbots have been launched from time to time to wipe out large numbers (a hundred thousand or more) of posted messages across the numerous servers on which copies are stored. The technology started out as a benign method for deletion of an erroneous or out-of-date message, and was adapted to allow its use essentially as a weapon against free speech on the Internet.

Policy Options

- **Protection of minors.** One of the foremost public concerns about the Internet is the potential threat it poses to children, especially in the areas of sexual exploitation (as defined in Section 11165.1. of the *Penal Code*) and exposure to obscene or harmful matter (as defined in Sections 311 and 313 of the *Penal Code*, respectively). The Legislature could strengthen protections for children using the Internet by explicitly extending prohibitions of lewd and lascivious acts against children to include comparable acts committed with minors in online chat rooms or by any similar means. Such a provision could be comparable to Section 288 of the *Penal Code*.
- **Safety instruction.** The best protection for children using the Internet is for them to know and use precautions that help to assure their safety and privacy. The Legislature could require the public schools to teach safety rules for online activity.
- **Protection of Internet data.** The Legislature could explicitly prohibit the unauthorized alteration of any Web site or document posted online. Such a prohibition could be comparable to Section 620 of the *Penal Code*, which prohibits the willful alteration of “the purport, effect, or meaning of a telegraphic or telephonic message to the injury of another.”
- **Prevention of online vandalism.** The Legislature could explicitly prohibit, and where appropriate increase penalties for, malicious online activities, including e-mail bombs, denial-of-service attacks, and knowing dissemination of viruses and Trojan horses. Such a prohibition could be comparable to the provisions of Section 594 of the *Penal Code*, prohibiting the defacement, damaging, or destruction of real or personal property.

¹⁸³ A “bot” (the name is derived from “robot”) is a piece of software designed to automate some task on the Internet. Some are quite useful, replying to inquiries posted to specialized IRC channels (chat rooms), for example. Others, including cancelbots, are annoying or destructive.

CHAPTER 6: IMPROVING ACCESS TO THE INTERNET

“One of the soundest rules I try to remember when making forecasts in the field of economics is that whatever is to happen is happening already.”
(Sylvia Porter, financial columnist)

If the Internet is really becoming a necessary part of daily lives, work, and education, then access to the Net is a public concern. This chapter looks at some of the barriers to access and some ways of easing or improving access.

What Gets in the Way of Access?

Cost

Even the least expensive home computer suitable for accessing Internet and the Web costs around \$1,000. Current systems typically sell for as much as \$2000 or more. Online services currently charge \$10 to \$30 per month, and access may also entail long-distance or local toll charges that can accumulate quickly. These are affordable expenses for the middle class, especially where they provide identifiable benefits (value in work, education, or entertainment). For the poor, however, those costs could prevent home access to Internet services.

Location

Rural areas have less access (or at least considerably more expensive access) to Internet services. They also have less access than urban areas to assistance in dealing with technical problems and to equipment and software.

Culture, Race, Ethnicity

The Internet is heavily oriented toward English. Those who are not comfortable with English will not be comfortable navigating the Web and will find comparatively little of use or interest. Culture, race, and ethnicity as such are otherwise largely irrelevant to access, as suggested by growth in Web sites featuring minority group interests. See, for example, the “Ethnic and Minority” section of the “Selected Internet Sites” in the appendix to this paper.

Gender

Until recently, the Internet was predominantly used by men. Women frequently reported harassment in news groups and Internet Relay Chat and were greatly outnumbered by men online. In the recent years, however, increasing computer expertise among women, the active marketing of America Online and other online services and those services’ addition of Internet access, and the expansion of the Worldwide Web have improved the environment and may have largely erased women’s disadvantages online.

Age

While age as such is not a barrier to use of computers or the Internet, older people are less likely than younger ones to be familiar with the technology, having not been raised with it and possibly having not been exposed to it at work. To some extent, age may be associated with reduced economic ability and incentive to use new technology, especially in the home. On the other hand, for older people internet access can facilitate finding information and other activities made more difficult by reluctance or inability to drive or other impediments. Further, older people, especially those who have retired, may have time for exploring the Internet that people with young children, full time jobs, or both may not.

Blindness

Reliance of Web-browsing software and of many Web sites on icons (graphic images) rather than text is a barrier to the vision-impaired. Text-to-speech software can read on-screen text aloud, enabling blind people to work with text-based screens. Icons, if not supplemented by well designed text, are an insurmountable barrier at this time. A report in the *Wall Street Journal* suggests that a breakthrough may be coming within a year, as Microsoft is putting resources into addressing the issue. In the meantime, many “speech-friendly” sites are available. Text-to-speech software can read the contents of these sites aloud over speakers attached to the computer, enabling blind users to navigate the sites and listen to articles, reports, and other materials. One Web site, called “Cathy’s Newsstand” provides links to many speech-friendly sites.¹⁸⁴

Easing Access to the Internet

Several developments have eased access to the Internet. These developments encompass changes in pricing, new types of access devices, and initiatives undertaken by government, nonprofit, and commercial organizations.¹⁸⁵

Low-Cost Internet Access Devices

WebTV, at \$329 (plus \$20 monthly charge for service plus \$69 for optional keyboard) could be a satisfactory substitute for a \$1,000 to \$2,000 PC for those who seek Internet access but not the other features and capacities of a modem-equipped PC. The Sega Saturn Net Link device, mentioned in Chapter 1, is another relatively low-cost alternative.

¹⁸⁴ Cathy’s Newsstand: <http://www2.cdepot.net/~mist/>.

¹⁸⁵ The Public Utilities Commission has adopted standards for “universal access” to telecommunications services, although the PUC’s definition of that term does not yet include Internet access. The Federal Communications Commission on November 8, 1996, issued a massive “recommended decision” regarding universal access (FCC 96J-3) that touches on Internet access, but that decision came too late for review for this paper, and in any event is subject to modification before it is adopted. A follow-up paper by the California Research Bureau will examine state and federal universal access requirements and proposals and their relevance to Internet services.

The entire package is available for around \$450 (excluding a TV set, needed for display), although some users may want to add options at extra cost, and Internet access service must be purchased.

Declining Fees for Access

Competition among Internet access providers is expected to reduce prices, possibly by an order of magnitude. A report in the *San Jose Mercury News* cited a prediction that Internet access would in time be “a \$2 add-on to your phone or cable bill.”¹⁸⁶ Whether that is so or not, anecdotal evidence seems to indicate that to make Internet access broadly attractive in the U.S., it will have to be priced at or below about \$15 per month. The pool of people willing to pay significantly more (for personal use, at least) may have been largely exhausted.

America Online has gone to a flat-rate pricing scheme, \$19.95 per month for unlimited time. Until that change, effective in December 1996, AOL charged \$2.95 per hour once the “free” time included with the regular monthly fee was exhausted.¹⁸⁷ The day the AOL flat rate took effect, the service saw unprecedented usage levels that led to slowing of service, inability to access the service, and disconnections, suggesting that there is a ready market for the new pricing scheme. As of January 1997, heavy use of the system still made access difficult.

The Microsoft Network is available, with limited hours of use, for as little as \$4.95 per month. AT&T’s Worldnet offers a comparably inexpensive low-use option.

If combined with a lifeline phone rate or economy basic cable rate, a small additional fee for Internet access could easily be affordable for even for people on very limited incomes. Whether such a low, flat-rate system will in fact come become common is disputed. MCI’s director of Internet marketing describes flat-rate systems as “a very unhealthy model for the longevity of the Internet,” as the revenues generated by the flat rate cannot keep up with costs of providing service.¹⁸⁸ This, however, appears to be a question that the market will decide and currently is deciding in favor of flat-rate pricing.

¹⁸⁶ Brett Glass, chairman of a Laramie, WY, non-profit ISP, quoted in Jody Mardesich, “Fee changes for online services may thin out ISPs,” *San Jose Mercury News* (online edition), October 9, 1996.

¹⁸⁷ Until that change, AOL had two plans. One allowed five “free” hours for a \$9.95 monthly fee, and the other allowed 20 “free” hours for a \$19.95 monthly fee. In each case, additional hours were \$2.95 each. Under the first plan, one hour per day of access in a 30 day month would cost a total of \$83.70 for the month; under the second plan, that usage would cost a total of \$49.45. Flat-rate ISP services, typically at less than \$20 per month, are actively competing with AOL and similarly priced providers, and can be expected to continue to do so as content available free on the Web continues to improve and expand.

¹⁸⁸ David Bowermaster, “Flat-rate fees may bite the dust,” posted at www.msnbc.com, October 11, 1996.

Public and Nonprofit Access Providers

Just as public libraries make books, periodicals, and other printed information resources available to the public, libraries and other organizations may provide public access to Internet resources. For example, LINCT, the Learning and Information Network for Community Telecomputing,

. . . is a not-for-profit coalition of socially-concerned organizations--working with affiliated businesses and local governments, libraries, schools, and social services--to help communities achieve universal, equitable access to integrated, community-wide electronic information and learning services . . . LINCT helps communities to recycle used business computers to poverty-level and low-income families and seniors who may earn them by learning how to use them through training provided by volunteer computer-literates at local community centers and/or libraries and schools.¹⁸⁹

LINCT has been active in New York City, upstate New York, and seven other states.

Increasing numbers of library sites offer public access to the Internet. The *New York Times*, in August 1996, described access available at the Brooklyn Public Library, the Queens Borough Public Library, and other public libraries in New York. Microsoft Corporation, in partnership with the American Library Association, has helped to fund library Internet access through a program called "Libraries Online!"

Of more direct interest to California, the California State Library, through its InFoPeople Project, has assisted local libraries in connecting to and making use of the Internet. The purpose of the project is "To encourage the development of public access to the Internet at public library sites throughout the State of California." Over 180 libraries are participating in the project, which offers equipment, training, and Internet connect time:

In each library, a lead staff member and community partner are responsible for experimenting with a variety of public uses of the Internet, training others, sharing their experiences with each other and other libraries, and making recommendations for long-term Internet access and use.

The project is funded by the Federal Library Services and Construction Act, administered in California by the California State Librarian.¹⁹⁰

¹⁸⁹ From post at <http://www.IntNet.net./pub/COMMUNITY/LINCT.community.resources>, dated October 5, 1994, and accessed September 9, 1996. As of September 9, 1996, additional information on LINCT could be found at <http://www.the-hermes.net/~shoshona/Welcome.html>.

¹⁹⁰ From <http://www.lib.berkeley.edu:8000/project.html>.

Libraries for the Future has described the program this way:

Involving a diverse group of libraries, including the Alpine County Library in Markleeville as well as the Watts Branch of the Los Angeles Public Library System, InFoPeople has taken a unique approach toward equipping libraries with resources to connect to the Internet. Unlike other statewide programs that focus on wide area networks to link libraries together and then to the Internet, InFoPeople opted instead to provide the resources for individual libraries to directly establish their own independent Internet connections.¹⁹¹

The Seaside Public Library, one of the participating local libraries, describes its InFoPeople role:

Our project has been the model for the 180-some libraries that have received computers under the InFoPeople grant. Our trainers have conducted public demonstrations and presentations to numerous groups and are currently involved in many Internet projects.

The program has received visitors from many areas of the State, has hosted the State Librarian, was visited by representatives of Blacksburg Electronic Village (Virginia), has made guest appearances on radio and TV programs, and is looking forward to hosting the annual meeting of Pac Bell's State-wide Education First Advisory Board in February. If it sounds like we are proud of what this library has accomplished, it's because WE ARE!¹⁹²

Corporate Initiatives

Corporate initiatives are helping to make advanced telecommunications and Internet access services available to schools and nonprofit organizations.

For example, Pacific Bell, in 1993, created "CalREN, a \$25 million program to stimulate the development of new applications for high-speed data communications services." PacBell conducted a competition to designate projects under CalREN, ultimately funding an array of projects centered in the San Francisco and Monterey Bay areas and in the greater Los Angeles area.. According to a PacBell spokesman, "The CalREN project submission cycle ended in March, 1994. No further project solicitation efforts are currently planned."¹⁹³

¹⁹¹ From description of InFoPeople at Libraries for the Future site, <http://www.lff.org/technology/-infopeo3.html>.

¹⁹² From report posted at <http://bbs.ci.seaside.ca.us/sealib/reemailq.htm>.

¹⁹³ Information from e-mail message from Jeff Griffin, September 6, 1996, supplemented by examination of online list of projects.

The following illustrate the types of projects funded by CalREN:¹⁹⁴

Sharing Medical Expertise: Many community hospitals lack expertise in special fields like neurosurgery. In northern California, Sutter Solano Medical Center teams with John Muir Medical Center and local neurosurgeons in a referral network that gives Sutter Solano electronic access to specialists. In emergencies -- stroke, aneurysm, brain tumor, or spinal injury -- a Sutter Solano physician can transmit a patient's medical scan to an on-call specialist in another location and collaborate on a quick, accurate diagnosis.

Electronic Field Trips: Educational institutions, scientific research institutes, government agencies, and businesses in the Monterey area are working together to give students of all ages the opportunity to study local ecosystems close-up -- without leaving their classrooms. The project uses Pacific Bell's high-speed data services to offer interactive, electronic "field trips" to the Monterey Bay Aquarium and local research labs.

Online Citizenship: In Alameda County, the public library, city police, sheriff's department, and other local agencies use Pacific Bell high-speed services to connect their community. Law enforcement agencies around the county have access to a central database of current warrants and crime analysis information. Local citizens can use public electronic kiosks to conduct business related to city or local government.

The California Web Project (CalWeb) is an effort to help schools establish home pages and to present their own projects on those pages. CalWeb is funded in part by Pacific Bell's Education First Initiative, the Pacific Telesis Foundation, and various other corporate, organizational, and individual sponsors. Projects have included, among others:¹⁹⁵

- Shafer Park School, Hayward: Attractions and Points of Interest around Hayward, California
- El Dorado High School, Placerville: The Grizzly Flat Project, to help local residents analyze and renovate the local water system and develop a recreation plan
- Bass Lake Elementary School, Madera County: Business in Bass Lake.
- Victoria Elementary School, Costa Mesa: California Mission Project
- Poway High School, Poway (San Diego County): Cleaning Up Rattlesnake Creek.

¹⁹⁴ From list posted at the Pacific Telesis site: <http://www.pactel.com/voices/sss/sss-sol3.html>.

¹⁹⁵ Selected from among 37 projects listed at <http://al.gsn.org/calweb> as of October 29, 1996.

Pacific Bell describes the Education First initiative (which helped to fund CalWeb) this way:

In 1994, Pacific Bell launched "Education First," a \$100 million project aimed at providing technology resources to the 9,000 California schools and libraries in the company's service territory. The goal of Education First is to help schools establish the telecommunications infrastructure -- ISDN lines, hardware and software -- needed to access the Internet and/or participate in videoconferencing with other sites and to help develop the skills to effectively exploit the value of interactive data and video applications . . . ISDN divides a single telephone line into three digital channels, enabling rich educational exchanges through simultaneous transmission of voice, data, faxes, images and video.¹⁹⁶

Although these examples are specific to particular schools, organizations, or agencies, and are not designed for improvement of general Internet access, they do illustrate the role of corporate and individual initiative in spreading, refining, and applying the technology.

Policy Options

- **Accessibility for people with vision impairments.** Software and hardware are increasingly enabling persons with vision impairment to use the Internet, but graphics-laden Web sites may be difficult or impossible for such systems to handle. In view of the obligation to make public services and resources available to the entire public, the Legislature could require state and local government Web sites and other government-sponsored, public Internet resources to use best practices to facilitate accessibility to people with impaired vision and, as changing technology may make appropriate, to persons with other disabilities affecting their use of the Internet.
- **Public access.** As government information and services increasingly are placed online, it is important that there be widely available access to these services. For demonstration and evaluation purposes, the Legislature could consider a pilot project to test public Internet-access terminals in libraries and other appropriate places, in order to determine the costs and benefits of a system of such terminals and to evaluate potential funding methods and sources, including public, private, and commercial.
- **Rural and low-income access.** The Internet offers the potential for rural and low-income areas to have access to distant resources that might otherwise be unavailable. However, those areas must first be able to afford access and must have the necessary infrastructure of telephone lines, Internet service provider points of presence, and technical support. To encourage the timely meeting of these needs, the Legislature

¹⁹⁶ Condensed from summary posted at <http://www.kn.pacbell.com/edfirst/>. To put the \$100 million figure in context, in 1995 the Pacific Telesis Group had total sales of \$9.042 billion and net income of \$1.048 billion.

could direct the Public Utilities Commission to prepare a plan for universal access to Internet services by a specified date.¹⁹⁷

¹⁹⁷ The issue of extension of local exchange carrier universal service obligations to encompass Internet access is to be considered in a follow-up paper.

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California Legislative Counsel. "A Guide for Accessing California Legislative Information on the Internet." Posted at <http://www.leginfo.ca.gov>. Explains the legislative process and ways of obtaining California legislative information online.

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In addition to the sources listed above, this paper has drawn from numerous newspaper and magazine articles (print and online), reports, commentaries, and conversations online and off.

GLOSSARY

This glossary defines selected terms used in this paper or likely to be encountered by persons learning about the Internet. There are many, many more terms. The reader is referred especially to the following for a more complete list and more thorough definitions:

- Morse, David, ed. *Cyber Dictionary: Your Guide to the Wired World*. Santa Monica, California: Knowledge Exchange, 1996.
- Shnier, Mitchell. *Dictionary of PC Hardware and Data Communications Terms*. Sebastapol, California: O'Reilly & Associates, 1996.

ARCHIE. A program that allows searching of Internet sites to find files with specified keywords. Veronica, Jughead, and WAIS (wide-area information service) perform similar functions.

ASCII. American Standard Code for Information Interchange. Computer representation of plain text, in contrast to *binary*, which is the format used for executable programs and other files that are not pure text.

BACKBONE. High-capacity communication line connecting networks. All networks connected to the same backbone are thereby connected to each other, and then indirectly connected to networks connected to *those* networks.

BROWSER. A computer program designed to enable a user to view (browse among) Web sites. Prominent browsers include Netscape Navigator, Microsoft Internet Explorer, and Mosaic.

CLIENT. A computer that asks for information or services from another computer. The latter is a server.

CRACKER. A malicious or intrusive hacker.

CYBERSPACE. The world of online information and communication.

FIREWALL. A computer, with associated software, that protects an organization's computer files from unauthorized intrusion and from attacks by outsiders via communications lines. The firewall stands between the organization's internal system and the Internet.

FTP (FILE TRANSFER PROTOCOL). An Internet protocol that allows data files to be copied from one connected computer to another.

HACKER. An expert computer enthusiast; a person who enjoys programming, figuring out how programs and systems work, and experimenting with computers. Often now used in the sense of “cracker,” implying malice, although the term was not originally so intended.

HIT. A visit to a site on the Internet. Advertisers like to keep count of hits to their sites in order to evaluate their effectiveness.

HOST. A computer connected to the Internet that is addressable by other connected computers and that makes data or services available on the Internet.

HYPERLINK. A reference, embedded in a document, to another document on the Internet (or to another place in the same document). A hyperlink enables the user to retrieve the referenced document or to jump to the specified location by clicking the mouse on the hyperlink. The existence and role of hyperlinks have led to the description of the Worldwide Web as a single library of linked documents distributed across the entire Internet.

INFORMATION SUPERHIGHWAY. The global information infrastructure. The term was coined before the Internet rocketed to such prominence, propelled by the Worldwide Web. Some users now virtually equate the Internet and the “Information Superhighway,” as the former increasingly takes on the attributes envisioned for the former. Others, however, including Microsoft CEO Bill Gates, view the real Information Superhighway as having not yet arrived and as being something far beyond the current Internet.

INTERNET. Global network of computer networks that enables exchange of electronic mail and other types of data among all connected computers.

INTRANET. An internal corporate analog to the Internet. Intranets may be connected to the Internet via a firewall to help provide security and privacy for internal files. An intranet may use the same type of browser software and other applications as the Worldwide Web, easing use and learning for employees and helping to integrate internal and external documents and applications.

ISP (INTERNET SERVICE PROVIDER). A company that provides a connection (direct or dial-up) to the Internet. ISPs include large, national companies, such as AT&T, and numerous small local operations, as well as regional and value-added systems.

I-WAY. Another term for “Information Superhighway.”

JAVA. A programming language used to enhance Web pages. Java is a product of Sun Microsystems. The language is somewhat comparable to the C and C++ programming languages, but less complicated. It allows animation and interactive features.

LOG ON (or LOGON) ID. The user's account name. For example, Joe Smith might have the log on ID *jsmith*, or *smith.joe*, or *joe.smith*, or even *programmerJoe*, depending on the system and what it permits. Log on IDs are used in conjunction with passwords to enable the user to access his or her account.

MODEM. Modulator-demodulator, a device for converting analog to digital signals, and vice versa, to mediate between a digital computer and analog (voice-grade) communications lines. The modem is the device that enables a PC to communicate with other computers over telephone lines. One modem turns the ones and zeros that computers understand into sounds that can travel over phone lines, and then another modem reverses the process at the other end of the path.

NETIQUETTE. Short for "net etiquette," unofficial but widely recognized rules of proper behavior on the Internet.

NETSCAPE. A prominent (as of this writing, also the leading) Web browser, a program that enables the Internet user to view Web pages and to move easily from one Web site to another, print pages, download files, and so on.

NEWSGROUP. A special interest discussion group on the Internet. Users may read messages and post them to the group. There are thousands of newsgroups, covering all conceivable topics, and some inconceivable ones.

ONLINE. Carried out via the Internet or other computer data telecommunications link (posted online, online conversation, and so on). Also appears as "on line" and "on-line." For consistency and because it appears now to be the preferred usage, this paper makes one word of the term: *online*, except where quoting others' different usage.

PASSWORD. The confidential string of numbers, letters, and symbols associated with a specific user's account and log on ID designed to prevent unauthorized access to the account. For example, *jsmith's* password might be *44SCVt*34m*. Passwords are comparable to the personal identification numbers (PINs) associated with automatic teller cards, but may be more varied, as they can include upper and lower case letters, numbers, and certain symbols.

SERVER. A computer that provides information or services to client systems. A network may have many servers, for example a mail server, a file server, and a database server, among others, and of course may have many clients. On the Internet, servers house commercial, educational, and governmental sites providing information and services to clients.

SITE. A place in cyberspace. For example, Intel has a site featuring information on its products and services, www.intel.com. A "website" is a site on the Worldwide Web. The more general term "site" also encompasses Internet sites that are not part of its graphically oriented Web aspect.

SLIP and PPP are Serial Line Interface Protocol and Point-to-Point Protocol, respectively. Both are methods for transmitting data from a PC to the Internet via a modem.

TELNET. Short for *telephone network*, a method for connecting to a different computer on the Internet. For example, jsmith might log on to his personal account on one system, and telnet to his office account on his company's system even if the latter were thousands of miles away. He could then use the remote account while using a local communications connection.

TROJAN HORSE. A destructive program disguised as a known or useful one. Trojan horses, like viruses, may be acquired unknowingly over the Internet or other network connection or transmitted on floppy disks. ASCII text files cannot carry a Trojan horse because text files are not executed (not run as a program).

URL. Universal (or Uniform) Resource Locator, the address of a Web site. URLs take the form *http://www.goodsite.com*, for example. The first part (*http*, in this example, for "hypertext transfer protocol") indicates the type of resource.

USENET. "User network," the system of newsgroups on the Internet. Usenet was actually established before the Internet, running on its predecessor systems.

VERONICA. A system for searching files on the Internet.

VIRUS. A (usually) destructive program designed to propagate itself from one computer to another secretly. Some viruses are triggered by the date (set to run on, for example, Columbus Day), some are triggered by user actions (as, for example, the 100th time the user has used the "DIR" command on an MS-DOS system since the virus program appeared on the system), and some activate themselves at the first opportunity. Viruses cannot be carried in ASCII text files, but there are variants that can be carried in Microsoft Word documents.

WEB BROWSER. A computer program that enables the Internet user to view Web pages and to move easily from one Web site to another, print pages, download files, and so on.

WORLDWIDE WEB. The graphics-oriented part of the Internet.

SELECTED INTERNET SITES

“There are some enterprises in which a careful disorderliness is the true method.” (Herman Melville, *Moby Dick*, Chapter 82)

Below is a sampling of resources, selected to illustrate the range of sites already established on the Net (predominantly on the Worldwide Web) and to provide starting points for exploration.

Inclusion of a site here only means that it is interesting and illustrative or has been useful in research, and is not necessarily an endorsement nor a determination that it is the best of its kind (although some of them may well *be* the best of their kind). Nor does exclusion of a site indicate that it is not worthwhile. The selection here does show conclusively that there is information of real value on the Internet and that it is easy to find.

Sites and URLs change, so some of those listed here may be out of date.

Books

- *Amazon Bookstore*, <http://www.amazon.com>, is an online bookstore with an extensive searchable catalog and offering e-mail notification of new listings on subjects the user specifies. The notification service is a small, simple example of a software agent on the Web.
- *Wiretap Online Library*, <http://wiretap.spies.com>, provides a large selection of public domain books, articles, and technical information in many areas. Many classics are available at this site. Navigating the site takes a little getting-used-to, although it looks much easier to navigate as a Web site than it did when it was an ftp site.

Education

The following sites pertain to education, educational resources, or educational institutions. Many of the sites listed in other sections would be useful to students and teachers, however, and some are designed specifically for educational purposes.

- *CHEERS, the California Higher Education Educational Resources System*, a site developed by the California Research Bureau, offers extensive links on and related to higher education. As of this writing, the URL for CHEERS is temporarily: <http://home.sprynet.com:80/sprynet/kknutsen>. It is to be transferred to the Library's Web server.
- *Distance Education Resources*, <http://www.uwex.edu/disted/resources.html>, offers links and information.

- *College and University Home Pages*, <http://www.mit.edu:8001/people/cdemello/univ.html>.
- *A Teacher's Guide to the U.S. Department of Education*, <http://www.ed.gov/pubs/TeachersGuide/>, is part of the Department of Education site.
- *California Schools with Web Servers*, <http://www.slocs.k12.ca.us/calpage.htm>.
- *Alphabetical listing of all resources mentioned by the Internet Education Clearinghouse*, <http://www.unl.edu/websat/alpha.html>, offers an extensive and widely varied set of links.

Ethnic and Minority

- *Afrocentric Guide to the WWW*, <http://www.netlinks.net/Netlinks/AFRO.HTML>.
- *Asian-American Resources*, <http://www.mit.edu:8001/afs/athena.mit.edu/user/i/r/irie/www/aar.html>, provides numerous links, both commercial and non-commercial.
- *Chicano!: Related World Wide Web Sites - Resources for Students*, <http://www.pbs.org/chicano/weblink1.html>. This site suggests grade levels for the links ("Grades 3 and up," "Grades 9 and up," etc.), making it especially useful for teachers. This is a doorway to diverse resources.
- *Ethnic and Minority Studies, MIT Libraries*, provides scores of links, many of which in turn provide further links: <http://nimrod.mit.edu/depts/humanities/subjects/Ethnic.html>.
- *Hispanic Heritage*, <http://www.clark.net/pub/jgbustam/heritage.html>, offers a wide range of links.
- *Index of Native American Resources on the Internet*, <http://hanksville.phast.umass.edu/misc/NAresources.html>, provides links covering many topics.
- *Judaism and Jewish Resources*, <http://shamash.org/trb/judaism.html>, is a diverse resource.

Government Links (Federal, State, and Local)

The sites listed below should facilitate access to virtually any government site on the Internet, directly or indirectly. Any of them provides an excellent starting point.

- *State Search*, <http://www.state.ky.us/nasire/>, "is a service of the National Association of State Information Resource Executives and is designed to serve as a topical clearinghouse to state government information on the Internet."
- *Villanova University Law School*, <http://www.law.vill.edu/Fed-Agency/fedwebloc.html>, provides numerous links.
- *Fed World*, <http://www.fedworld.gov/>, is an official front door to federal sites.
- *California Home Page*, <http://www.ca.gov>, is the official front door to California government information.
- *California State Senate home page*, <http://www.senate.ca.gov>, provides access to California legislative information and links to other governmental sites.
- *Thomas* (Library of Congress), <http://thomas.loc.gov>, gives access to Congressional documents and a starting place for other federal research.
- *State and Local Government on the Net*, <http://www.piperinfo.com/piper/state/states.-html>, is an excellent starting point for finding links in all states. (Note that the hyphen is not part of the URL.)
- *The White House Home Page*, <http://www.whitehouse.gov/WH/Welcome.html>, gives access to press releases, executive orders, and much more White House-related information, as well as links to further federal resources, such as archives of the United States Information Agency (USIA).

Internet Policy and Technology Organizations

- *The Internet Society (ISOC)*, <http://ftp.isoc.org/>.
- *InterNIC Registration Services*, <http://rs.internic.net/rs-internic.html>.
- *The North American Network Operators Group (NANOG)*, <http://nic.merit.edu/routing.arbiter/NANOG/>.
- *Computer Emergency Response Teams (CERT) Coordination Center (Carnegie Mellon University)*, <http://www.cert.org/>.
- *Internet Architecture Board (formerly Internet Activities Board), IAB*, <http://www.iab.org/iab/iab.html>.
- *The World Wide Web Consortium, W3C*, <http://www.w3.org/pub/WWW/>.

Law and Law Enforcement

- *Criminal Justice Resources on the Web*, <http://www.fsu.edu/~crimdo/cj.html>, includes 28 pages of links dealing with every aspect of law, law enforcement, justice, legal issues, media sources, and more.
- *General Legal Resources on the Internet*, <http://www.law.georgetown.edu/-lc/internic/glr.html> (the hyphen is not part of the URL), provides links to law libraries, search engines, cyberspace law resources, intellectual-property-related resources, trademark information, and other law-related sites and information.
- *The U.S. House of Representatives Internet Law Library*, <http://law.house.gov>, gives access to federal law and regulations.

News

In addition to the sample of general news sources listed below (most selected because of the familiarity of their print versions, especially in California), the Web has many sites for information on specialized topics, especially technology-related.

- *Los Angeles Times*, <http://www.latimes.com>.
- *MSNBC*, a Microsoft-NBC collaboration, <http://www.msnbc.com>.
- *Nando Times*, an online news service, <http://www.nando.net>.
- *New York Times*, <http://www.nytimes.com>. This site includes “Cybertimes,” a useful compendium of news and opinion related to the Internet. This site requires the user to register, but there is no charge for access.
- *Sacramento Bee*, <http://www.sacbee.com>.
- *San Francisco Chronicle* and *San Francisco Examiner*, <http://www.sfgate.com>.
- *San Jose Mercury-News*, <http://www.sjmercury.com>.
- *Cathy's Newsstand (Blind and Visually Impaired)*, <http://www2.cdepot.net/~mist/>, offers links to “speech-friendly” periodical sites, as well as information on Internet for people with sight impairments. This is also a useful list for people without impaired vision.

Also see CHEERS (listed under “Education,” above) for links to many other newspapers and news sources.

Reference

- *Electric Library*, <http://www.elibrary.com>, a commercial site (monthly fee) offering full text of 150 newspapers, 800 magazines, thousands of (mostly public domain) books, encyclopedia, radio and television transcripts, and photo archives.
- *The Argus Clearinghouse*, <http://www.clearinghouse.net/>, calls itself “The Premier Internet Research Library. It describes its mission as being “a central access point for value-added topical guides which identify, describe, and evaluate Internet-based information resources . . . to facilitate intellectual access to information resources on the Internet.” (Quoted from its Mission & Philosophy page.)
- *The World-Wide Web Virtual Library: Subject Catalogue*, <http://www.w3.org/pub/DataSources/bySubject/Overview.html>, gives a starting point for almost any Web-based research.

Religion and Culture

- *Western Religions Links*, <http://weber.u.washington.edu/d36/madin/CRELIG2.HTML>, provides an enormous number and range of links to sites for history and culture as well as religions *per se*. Many of the sites in turn provide further links.
- World Cultures Internet Resources, <http://www.wsu.edu:8080/~dee/InternetResources.html>, provides links to many historical and cultural sites, Eastern and Western alike.
- Classics at Oxford, <http://units.ox.ac.uk/departments/classics/>, emphasizes the Western classics.
- Classics and Mediterranean Archaeology Home Page, <http://rome.classics.lsa.umich.edu/welcome.html>, is another very rich site oriented to history and classics

Science

- *Scientific American*, <http://www.sciam.com>, provides selections from current and back issues.
- *Science* (publication of the American Association for the Advancement of Science), <http://www.sciencemag.org>, includes current and back issues, searchable by keyword, author, and other means. Articles often have extensive links to other resources.
- *The WWW Virtual Library*, <http://www.w3.org/pub/DataSources/bySubject/-Overview.html> (the hyphen is *not* part of the URL) provides links to sites covering many areas of science.

- *EurekAlert!*, <http://www.eurekaalert.org/>, is “a comprehensive news server for up-to-date research in science, medicine, and engineering.” It is a product of the American Association for the Advancement of Science, with assistance from Stanford University and Duke University.

Search Engines

There are many search engines on the Web, and appear online regularly, including “meta-search engines” that coordinate searches through multiple search engines (see, for example, <http://www.search.com>). Many library sites include links to search engines. A few well-known search engines are:

- *Altavista*, <http://www.altavista.digital.com>.
- *Lycos*, <http://www.lycos.com>.
- *Yahoo!*, <http://www.yahoo.com>. (The exclamation mark is part of the name, not my editorial endorsement.)
- *Web Crawler*, <http://www.webcrawler.com>.

Telecommunications and Telecommunications Policy

- *Pacific Bell Network*, <http://www.pacbell.com/>.
- *Telecommunications Information Resources on the Internet*, maintained by Jeff MacKie-Mason and Juan Riveros, <http://www.spp.umich.edu/telecom/telecom-info.html> (the hyphen is part of the URL). “This document contains references to information sources relating to the technical, economic, public policy, and social aspects of telecommunications. All forms of telecommunication, including, voice, data, video, wired, wireless, cable TV, and satellite, are included.” This is the Grand Central Station of telecommunications sites.
- *Other Telecommunications Policy Issue Sites*, <http://bell.com/sites.html>.