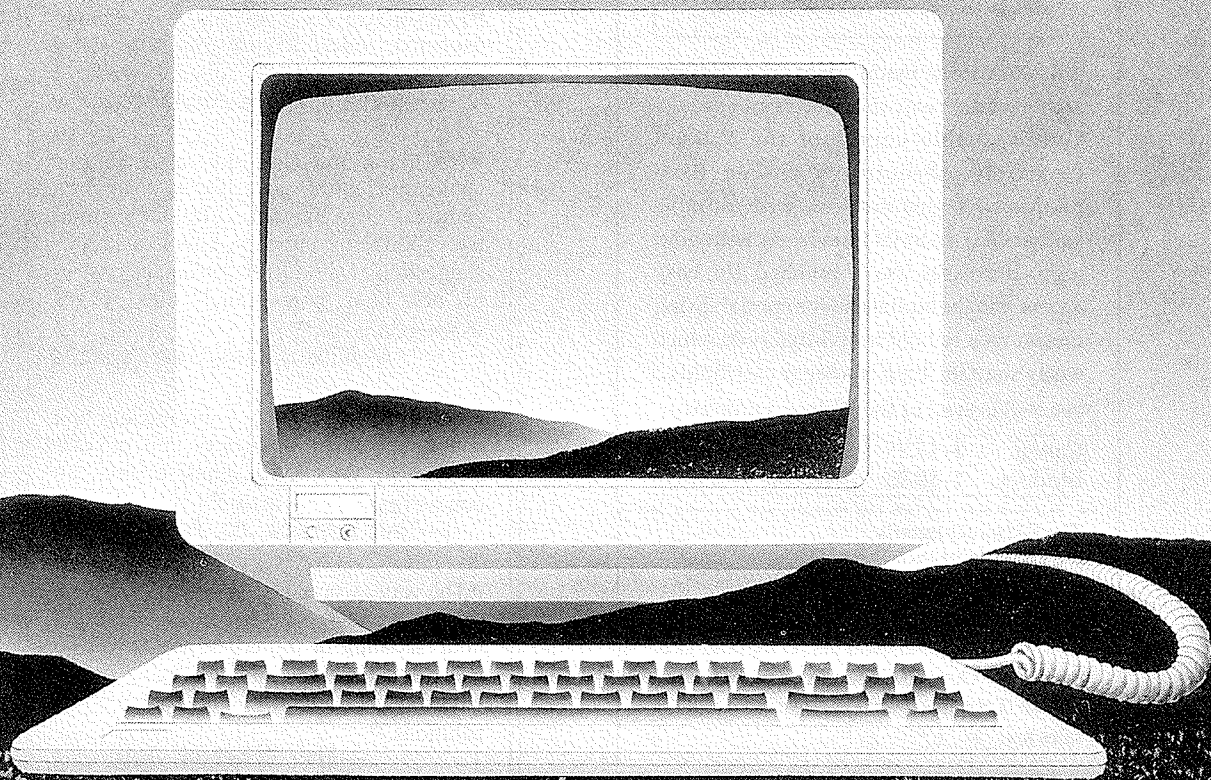


# WIRED FOR WHAT?



*The race is on to build the information superhighway. From "players" in business, government, and other realms comes promising talk of empowering individuals and launching a new age of digital democracy. From critics come warnings that the highway may only expand the empire of television, creating a "vaster wasteland" of 500 channels. Stepping back from the hubbub, our contributors ask what Americans might want from the information superhighway, what can be learned from recent experience with today's Internet, and what the history of other media suggests about the information highway of the future.*

# IN SEARCH OF THE CYBERMARKET

BY DOUGLAS GOMERY

**T**hat crashing noise you keep hearing in the distance is the sound of Big Deals collapsing on top of Big Hype about the information superhighway. Last fall, regional telephone company Bell Atlantic and cable giant Tele-Communications Incorporated (TCI) announced their \$15 billion marriage, the largest corporate merger in history, and promised us all the moon and the stars—a new era of faster and better communication, international interactive bridges, more high-tech jobs, and an information-fueled economic expansion lasting into the next century. This was only the biggest and fanciest of a string of shotgun weddings that were announced as corporations scrambled to get in on the imminent arrival of the superhighway. The deals included a \$4.9

billion union of Southwestern Bell and the Cox Enterprises cable company, and a \$12.6 billion American Telephone and Telegraph takeover of McCaw Cellular Communications.

The hype approached the dimensions of hysteria. Several months before the Bell Atlantic-TCI merger was announced, John H. Gibbons, a science adviser to President Bill Clinton, declared, "Information highways will revolutionize the way Americans work, learn, shop, and live." Alan Kessler, head of 3Com Corporation, predicted that the infohighway "will collapse time and space, erase cultural boundaries and move continents and people closer together." In January, Vice President Al Gore promised that the National Information Infrastructure, as he calls it, will "educate, promote democracy, and save lives."

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Now many of the deals have come undone, the fragility of the dreams—and especially the economics—underscored by the fact that the big Bell Atlantic-TCI deal was wrecked in part by federal regulators' decision to trim cable TV rates slightly. Some sort of information superhighway will certainly be built, skeptical dismissals of the "superhighway" notwithstanding. But it now seems clear that a certain modesty about our expectations for when it will be built and what it will accomplish is in order.

**A** generation ago, futurists heralded the coming of cable TV in terms very similar to those being heard today. In 1971, the foundation-backed Sloan Commission on Cable Communications predicted: "Cable technology, in concert with other allied technologies, seems to promise a communications revolution. . . . The potential of cable television in the service of formal education—that is, as part of the school and higher educational system from kindergarten onwards—has been universally acclaimed." Our metaphors are as old as our hype. In 1972, writer Ralph Lee Smith published a book called *The Wired Nation*, arguing that the United States should use cable TV as an "electronic communications highway." By the 1980s, Smith was predicting that Americans would be learning at home, corresponding by electronic mail (E-mail), and scanning far-off libraries in search of information.

Cable TV has arrived, but it is not very close to what was imagined or hoped for. A tiny minority of Americans are now doing the sorts of things that Smith and others talked about, but not through cable TV. Smith's wired nation is basically a one-way televised street, with plenty of mass entertainment, some new information, and little in the way of formal pedagogy. The big networks still dominate. Despite a few success stories (CNN and

C-SPAN), there has been no flowering of "serious" TV programming. All-opera and all-ballet cable channels have come and gone, and the state of public-access TV, which was supposed to have given us a new electronic commonwealth, is summed up by *Wayne's World*, the fictional public-access show hosted by two teenage heavy-metal music freaks in the hit film of the same name. Perhaps the biggest surprise on cable is the success of QVC and other home-shopping networks, which ring up \$3 billion in annual sales. After 20 years, cable TV is a lot less like an information superhighway than an entertainment supermarket, or, if the highway metaphor must be maintained, the traffic-clogged road down by the local mall.

The lesson ought to be plain: Technology alone does not a communications revolution make. Economics trumps technology every time. People must be offered things they want at prices they are willing to pay, and in the information arena, as in other realms of human life, people tend to want things that are not supposed to be good for them. Many of the futurists who see a new day dawning are going to be disappointed by what they find at dawn's early light. The notion that people who spend dozens of hours watching sitcoms every week and never read a newspaper will somehow be transformed into Renaissance men and women by the availability of new information services in the home seems overly hopeful, to say the least.

**A**t the same time, to make at least a few dreams come true, it is important to lay down in the near future a general political and regulatory framework for the new system. The choices range from a more or less laissez-faire approach, favored by many in industry, to something like the regulated monopoly model that governed the nation's telephone system until

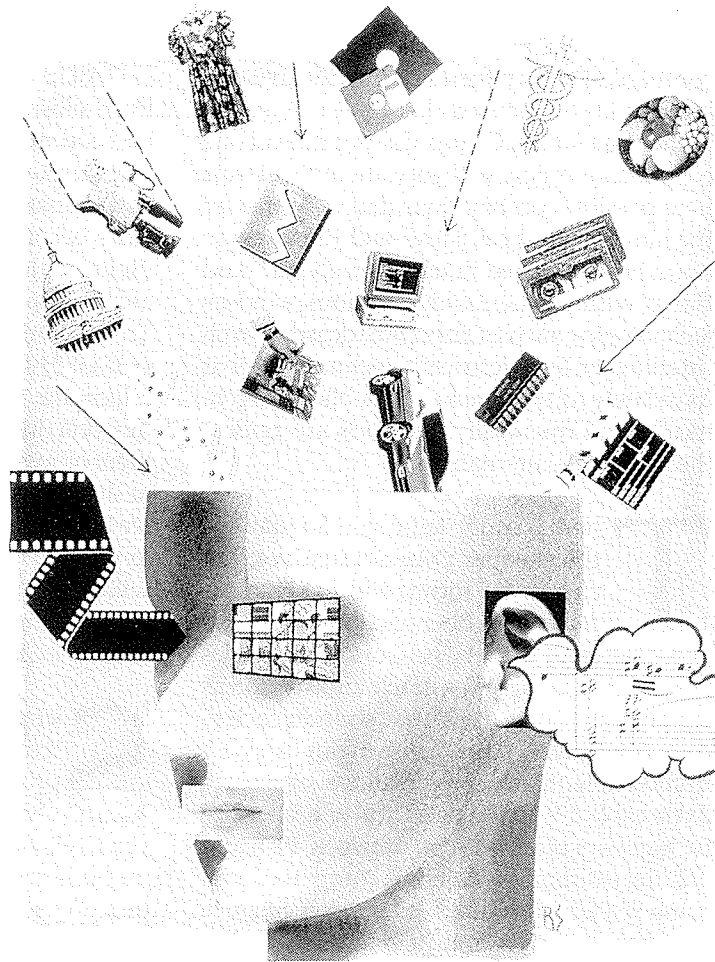
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the breakup of the Bell system in 1984. The first possibility would likely get the infohighway built somewhat more quickly; the second would give regulators a stronger voice on such matters as ensuring access for all. All of the competing bills now actively under consideration in Washington represent efforts to strike some sort of middle ground between these extremes. Uncertainty over what the federal government will do is one of the big imponderables forcing a readjustment of corporate timetables.

The technological force driving many of today's developments is *convergence*. Television, movies, radio, newspapers, books, and data have all in the past been composed in different media—on paper or film or magnetic tape. Today, however, all can be reduced to a single form of "information," the common language of the computer's binary code, an endless string of ones and zeroes. No longer is it necessary (technically at least) to print a newspaper on paper or to distribute a movie on film. Everything can be reduced to the same simple form and transmitted directly to—and in some cases from—consumers by wire, or, for that matter, on floppy disc or compact disk. And if film, print, and music are similar forms of "information," then the traditional divisions among industries that produce them begin to make less sense. This partly accounts for the frenzy of business mergers and ventures. "Our vision is: all forms of information, any place, any time," Michael Braun, an IBM executive, told the *Washington Post*.

The technology needed to reduce sound,



*The human appetite for information seems boundless. Yet the share of regular book readers in the population, 25 percent, hasn't changed since 1930.*

pictures, and words to a common form of information already exists and is being rapidly improved. The real economic, political, and technological question is how best to deliver all this information to Americans in their homes. What makes the delivery question so confusing is that some very basic questions have yet to be settled. Will there be one "wire" to the average household or two—one from a telephone company, another from a cable TV company? What kinds of wires will they be? Fiber-optic cables can carry massive amounts of information, but wiring the nation with fiber optics would be very expensive. Since technologies exist to get more out of both the coaxial cable already strung by cable TV com-

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panies and the copper wires run by phone companies, it may turn out that the average household will have no fiber-optic connection in the near future. Or one fiber-optic and one copper connection. In theory, there are at least nine possible combinations that may answer the simple question, How will the average household be wired in the years ahead? And this is without mentioning various wireless technologies, such as direct broadcasting from satellites or by microwave technology, that have lately received reams of publicity. (Technically and financially, the odds are against these wireless alternatives.)

**T**here is much to be said for some of the cheaper wire alternatives, but clearly the future will not have arrived until fiber connects all homes and businesses with the network. Fiber carries at least 150,000 times as much information as copper wire. Forty fiber-optic strands, each as thin as a human hair, together can carry 1.3 million telephone conversations or nearly 2,000 cable TV channels. (Parts of a fiber-optic highway already exist. Between 1985 and '92, for example, telephone companies laid some 95,000 miles of cable between cities, in new communities, and in a variety of other places.) Only with the wide bandwidth of fiber optics will the system reach its full potential to carry vast quantities of complex information.

The basic device serving consumers at home will almost certainly be some sort of hybrid telecomputer that marries a computer processor and a television screen. It will display wide-screen images, easily accommodating all of Hollywood's CinemaScope-like images without lopping off the sides. Since sound and pictures will be recorded in digital code rather than as analog magnetic waves, as they are today, they will be crisp, clear, and distortion-free. A CD-ROM component will allow consumers to store and later retrieve data, from train timetables to family photographs. The telecomputer will have a keyboard, but its interactive heart will be a semi-

conductor chip.

All of this will be enormously expensive. Even allowing for the fact that competition can be counted on to drive down costs, telecomputers of the sort described here will cost thousands of dollars each. When they finally become widely available, for example, digital high-definition television (HDTV) sets are likely to cost in the neighborhood of \$5,000. To wire the nation with fiber-optic cable, add at least \$1,000 per household, or a cool \$100 billion for the whole country. That is not to mention the cost of wiring businesses, government offices, and nonprofit institutions. Sums of this size serve as reminders that, much as we like to think of the infohighway as the centerpiece of a "postindustrial" era, building it will be a very old-fashioned capital-intensive undertaking. It will take a long time, and it will be very expensive.

**S**ince, unlike the actual highway system, the infohighway is being built by private industry rather than government (and is likely to remain a private venture), the question of how to ensure access for all is central. The Clinton administration provides a somewhat contradictory answer. Vice President Gore told the *Wall Street Journal*: "As the National Information Infrastructure develops, President Clinton and I believe strongly that we must choose competition and protect it against both suffocating regulation on the one hand and unfettered monopolies on the other. . . . President Clinton and I are committed to making the benefits of the communications revolution available to all Americans across all sectors of society. It is a priority for this administration that every classroom, library, hospital, and clinic be connected to the National Information Infrastructure by the year 2000."

Clinton and Gore envision corporations developing the information superhighway with modest government encouragement and regulatory nudging. The administration anticipates a bimodal world. On one side, cable TV companies will begin to offer voice and data

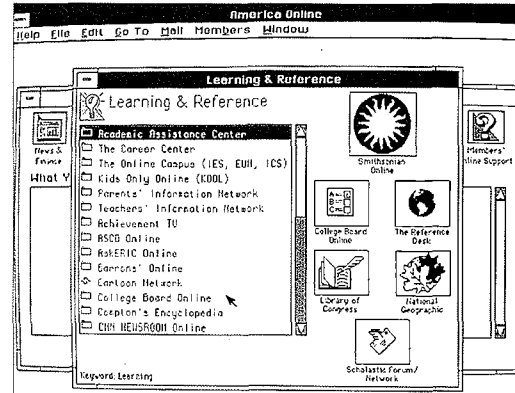


High hopes: One highly touted infohighway service of the future is video conferencing for business and families. Limited online conferences are already possible. At left, a meeting on the Internet using an ordinary Macintosh computer and CLI-See Me software developed at Cornell University. Below, a menu of choices available to customers of America Online.

services. On the other side will be the Baby Bells (the seven regional telephone companies) and long-distance carriers such as MCI and AT&T, which will begin to offer entertainment services. There will be two (probably fiber-optic) wires into homes and businesses, provided by competing companies.

Clinton and Gore want the best of both worlds: the advantages of competition and those of monopoly. They call for a classic cross-subsidy, similar to what the Bell system provided in the days before its breakup. Money will be transferred from well-off users to underwrite services for nonprofit institutions and poor people. In this very spirit, Bell Atlantic has already announced that it will give 26,000 public schools free access to the information superhighway, paid for by profits it will make from mainstream users. But Bell Atlantic's free wire does have a catch: It will run only to the schoolhouse door. Local school systems will still be responsible for wiring inside the building, buying necessary equipment, and providing training, not inconsequential expenses in this age when poorer school districts are unable to afford new library books.

Finally, Gore insists on a "switched" system. Today's telephone system is a switched network: It allows one user to connect directly with any other user. By contrast, traditional cable TV systems are nonswitched: The same message goes to everyone who tunes in. For financial reasons, some cable providers prefer a future highway with limited two-way com-



munication capabilities. Their experience as providers of mass entertainment rather than communications further impels them toward that option. The telephone companies and infohighway enthusiasts favor a switched system. The Electronic Frontier Foundation, a self-styled public-interest group founded by software multimillionaire Mitchell Kapor, points out that a nonswitched system restricts access because there must be a fixed number of channels. With a switched network, "anyone with content to distribute—whether to one, 100, or 100,000 users—can do so without the permission or advance approval of the carrier." Such a system is essential to Kapor's "Jeffersonian vision" of the electronic future, in which every American is a potential creator (of videos, software, political tracts, etc.) and every home is a de facto broadcast studio. The unanswered question, however, is whether there will be enough demand for such active uses of the new technology to justify universal service of this kind. The Jeffersonian road could, alas, lead us to a gold-plated version of today's public-access TV.

Once all the wires and other hardware are in place, what will they bring to America's homes, schools, and offices? And who will pay



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for it? These are questions that, apart from a number of agreeable generalities, have not been widely examined. If you build it, they will come, seems to be the attitude of Gore and many of his fellow enthusiasts. One formulation of Say's Law, a controversial hypothesis of 18th-century economics, holds that supply creates its own demand. But Say probably could not have imagined a market already overwired with 80 or so cable channels per household and about to move up to hundreds of channels. Research shows that as things stand now most cable viewers simply tune out the vast majority of their choices and repeatedly view only five or six channels. (Another item from the annals of survey research that does not augur well for a high-tech future is the finding that more than half of all VCR owners have not even managed to program the time on their machines, apparently preferring to stare at an eternally flashing "12:00.")

**W**hat will Americans want from their wired world? One embarrassing truth is that plain old TV programming will almost certainly be a mainstay during the early days of the highway, and possibly for quite a long time. Only one entirely new service seems obvious to all: video on demand. It is easier to order up movies from the comfort of one's couch than to hop in the car and drive to a video store, where inevitably every copy of the latest Arnold Schwarzenegger epic has already been signed out. The video rental trade is now a \$12 billion business, and the high-tech info entrepreneurs are intent on capturing a slice of the humble home-video pie. Time Warner's chief executive officer Gerald M. Levin is blunt: "People clearly want [these movies] and they are already paying for them now. All we need is a fraction of that demand."

Some other possibilities for interactive systems include home shopping, video conferencing, education at home, town meetings, video games, and home banking. Some of these are bound to fail. Michael Noll, dean of the University of Southern California's

Annenberg School of Communication, observes: "[Home banking] has gone through generations of failure and failure and failure. Until we invent a home terminal that dispenses cash, home banking won't get far, except for people who want to do extra work." When *Wired* magazine asked four experts to predict when interactive TV would be widely available, two said never. (The other two said the turn of the century or later.) Yet entrepreneurs will certainly invent entirely new and as yet unimaginable kinds of products. For example, Carol Peters, one of Silicon Valley's most respected computer designers, has formed DaVinci Time and Space to develop an interactive video network for children. Blending the lure of a Disneyland-style electronic theme park with the pedagogy of *Sesame Street*, DaVinci Time and Space seeks to go beyond video on demand to provide a computerized "space" in which kids can play games, watch videos, or simply hang out online. Since someone has to pay, the plan is to sell advertising and provide the service free. In that respect, DaVinci Time and Space is like old-fashioned TV; interactivity is what makes it radically new.

Leaving aside such experiments, the basic economic principle best suited to an understanding of the technofuture is simple (and uninspiring) enough: the substitution effect. If one technology is currently being used, can an interactive on-line video version do a better job? Can catalogs now printed on paper and delivered by the U.S. mail be displaced by interactive TV sales that allow customers to enter an electronic showroom? Economic logic says that business elicited by printed catalogs will go down as sales generated by TV technology increase. The big players already recognize this. The substitution effect target list, when added up, is staggering. In 1993, shopping (\$160 billion), telecommunications (\$150 billion), information services (\$35 billion), and entertainment (\$28 billion) totaled well over a quarter-trillion dollars. Yet "obvious" substitutions do not always work and experiments frequently backfire. In suburban Denver,

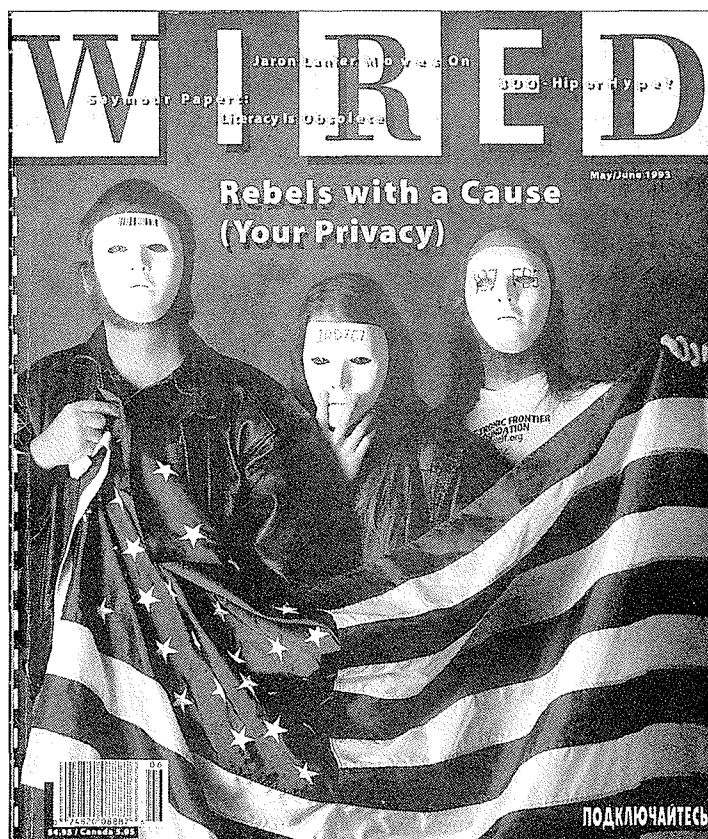
where TCI is running a market test offering its customers movies on demand, it has found that customers like the service, but also that those who sign up simply cancel HBO and the Movie Channel, making the experiment essentially a wash for the company.

Some futurists see the germ of the 21st century in today's nascent "on-line" services, such as America Online, Prodigy, and CompuServe. Pay a membership fee and dial up one of these services using a modem attached to your personal computer, and you can catch up on the news, check your mutual fund investments, and chat with like-minded folks on bulletin boards devoted to such specialized topics as your hometown hockey team, office etiquette, opera, or nuclear proliferation. But so far the services have attracted only a specialized clientele of affluent, highly educated, gadget-oriented users. The total subscriber base of these three top on-line services stands at less than three million, smaller than the subscriber base of *Newsweek*. At America Online, the hottest of the services, the largest number of pioneers actually traveling in cyberspace at any one time is only about 8,000.

One sticking point is money. After a burst of key-strokes, sticker shock sobers up even the selected sample of on-line users, and thereafter those who remain on-line—the dropout rate is high—rarely again exceed their minimum monthly charge of \$10–\$15. It would cost hundreds of dollars per month to make full use of these services. And even at these prices, providers are not having an easy time

making a go of it. Prodigy, jointly owned by Sears and IBM, has failed to turn a profit in six years.

To see what consumers want, telephone, cable, and other technology companies are testing other combinations of services in a variety of places around the United States and Canada. Experiment after experiment so far has proved inconclusive at best. In June 1993, Bell Atlantic began offering movies on demand over existing telephone lines to a selected set of employee-customers in a suburb of Washington, D.C., with plans to extend the test to two New Jersey sites. Results will be coming from other tests in Seattle, Omaha, Denver, Salt Lake City, West Hartford, and various sites in California and Ontario throughout 1994 and '95. The biggest experi-



Defining the First Amendment in cyberspace is becoming increasingly difficult and controversial. In the future, on-line communications will be encrypted. The issue: Should the government be given the keys to the code?



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ment is scheduled to commence at the end of 1994 with Time Warner's trial offering to 4,000 Orlando, Florida, consumers of the world's first true "full-service network": switched, digitized, fiber-optic, multimedia, and interactive. The lucky few will be able to see any movie they want at any time, view all current and any new TV services, shop, play video games, telecommute, and read E-mail.

Interactivity is the heart of this million-dollar experiment. "Our new electronic superhighway will change the way people use television," declared Time Warner's Gerald M. Levin when he announced the plan in January 1993. "By having the consumer access unlimited services, the Full Service Network will render irrelevant the notion of sequential channels on a TV set." In other words, out go NBC, CBS, ABC, and Fox, and in comes Time Warner.

Yet all has not gone well. For the moment Levin has quietly placed his full-service network test on hold; his two major software and converter suppliers cannot meet the deadline. It is one thing to display the power of 500 or so channels in a laboratory, quite another to make the future work in 4,000 homes. William Weiss, the chief executive officer of Ameritech, one of the regional Bell telephone companies, deserves a prize for realistic punditry for telling the trade publication *Electronic Media*, "There are about five quantum steps between the prototype and what the customer will eventually pay for its use."

Apart from the commercial on-line systems and the experiments by Time Warner and other corporations, there are two other models that in interesting ways mark out some future possibilities for the information superhighway.

**T**o see true popular interactivity of the kind envisioned by some futurists actually working today—albeit in a crude, simplistic way—one must turn to, of all places, France. The Minitel system links 6.5 million French households, using a simple video screen and keyboard combination that allows users to play chess, scan lists

for bargain vacations, and chat with new friends by means of typed messages. When Minitel was introduced 10 years ago, teenagers made it a fad. The yellow pages became passé; it was more fun to type in the requested name and see the phone number appear magically on the screen. Punching in "3615 arts" provides newspaperlike lists of the latest movies. To order a pizza, a hip French teen no longer calls, but types "Zapizza."

Minitel works with an unassuming little box and a relatively primitive computer system. The device costs about \$4 per month to rent from the national telephone company and is attached to the copper-wire (not fiber) French telephone system. This is a highway based on early-1980s technology. An American telephone company, US West, is conducting tests in San Jose and Minneapolis of a version of Minitel that links parents and schools. Minitel has the great virtue of being practical and workable, but its decade-old technology is a severe limitation.

A better-known model is the Internet. "The future will look and work like the Internet today," Vice President Gore declared recently. Started during the 1960s by the Pentagon for scientists in universities and other research institutions, the Internet has expanded rapidly in recent years. It has gone beyond the exchange of scientific studies and academic data to become a vast international network whose users enjoy such things as E-mail, data bases, and specialized bulletin boards and lists where Chaucer scholars, foot fetishists, rock 'n' roll junkies, and particle physicists can converse in text. At least 15 million people in more than 100 countries are hooked up—there is no central authority, and the system's unofficial demographers have lost count.

There is much to admire about the Internet. It promotes diversity; it is truly interactive; it encourages commentary by one and all. But the Internet will not work as a mass medium in the future. There is no revenue stream (it is underwritten by the federal government, universities, and other institutions), and it requires too much time and expertise to

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learn and use. Indeed, in the next few years there will be a struggle for the soul of the Internet as advertisers seek to use its reach to send messages to its millions of users.

**T**he future will not look like America Online, Minitel, or Internet. If the information superhighway is to be for all, then it cannot (and should not) be limited by price, technological crudity, or scientific configuration. The new infohighway ought to be as advanced as possible and available to all who might like to use it. But here is the central contradiction: Cost of access will be high if corporate combatants expect to rake in millions of dollars in fees. But such access fees will limit use and growth. Michael Schrage, a columnist for the *Los Angeles Times*, calculated the real cost of the new technoworld by adding up a mock monthly bill for the wired consumer of the future. His "United Multimedia's First Consolidated Monthly Statement" for two dozen on-line connections, setups, entertainment and news services, home-shopping purchases, and assorted extras came to \$2,467.48—a bit of exaggeration that makes an important point. The fear that the information superhighway may be only for the well-to-do, even if every household in America is wired, is not entirely unrealistic.

Building the infohighway is the most immediate challenge, and the phone and cable companies are justified in complaining that it is difficult to figure out how to invest when no rules and regulations are in place. Congress has moved very slowly. The Energy and Commerce Committee of the U.S. House of Representatives has approved two sweeping telecommunications bills that allow cable and telephone companies to compete on a limited

basis. The House Judiciary Committee has approved a conflicting version of permissible bimodal competition. Fights on the House floor, actions by the Senate, compromises, the signature of the president, and reviews by the courts await.

In the meantime, new regulatory schemes continue to be floated to satisfy the major corporate players (who desire deregulation) or consumer advocates (who call for regulations requiring universal access and affordable rates). Some sort of requirement for universal access probably will be written into law, but legislating a requirement is one thing and devising definitions of terms such as "universal" and the regulations to implement them is another. Accustomed to free access to information—television, radio, public libraries—we are perplexed by the prospect of pay-as-you-go information.

With significant technical, economic, and regulatory impediments to overcome, our multimedia future will remain unsettled for some time to come. When there is risk involved, conservative corporate America treads ever so carefully and ever so slowly. Alexander Graham Bell invented the telephone in the 1870s, but as late as 1940 most Americans did not have a phone at home and the vast majority had never made a single

long-distance call. Everything about the information superhighway will continue to be the subject of vigorous debate. Hype and hysteria will continue, as will mergers and megadeals. But because of the uncertainties that remain, it will be a long time before somebody peddling access to the information future knocks on your front door and makes an offer you cannot refuse.

