

How the New Telecommunications Will Change the Way We Live

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Since 1984, the fateful year of divestiture, the historic trickle of new telecommunications products and services has swelled to a flood. Today, telephone companies are rapidly upgrading networks and implementing software platforms that will reduce the time required to introduce new services from more than two years to less than six months. The flood shows every sign of increasing in the next decade.

Naturally, all this newness will cause a certain amount of „future shock.“ For many people, however, the new products and services will offer great benefits. This article identifies a few such products and services and describes how they are likely to affect the way we live. Let's take a look at a day in the life of Jane Toogood.

7:00 a.m.: Breakfast and Black Ice

It's a raw February morning, and a cold rain has turned to sleet in the Denver region. Jane Toogood, a lawyer, is making breakfast in her cozy Victorian house, which is up in the mountains about forty miles from her job. Jane heads a team of six lawyers and paralegals working on an important environmental suit to block a new landfill project. Her commute to work takes her along treacherous mountain roads, which are often glazed with „black ice“ when there is freezing rain in the valley.

On this particular morning, as Jane fixes breakfast for her two daughters, she is dreading the drive to the younger child's day-care facility, the older child's school, and then her own office. Between cereal and toast, Jane picks up the phone and uses her Intelligent Highway Code Number to input her three destinations. As she had feared, there is snow and black ice all along her route. There have already been a number of serious accidents, and traffic is backed up on several stretches. The Intelligent Highway Information System (IHIS) estimates how long Jane's trip could take – three and one-half hours – and informs her that there are no reasonable alternative routes. Jane returns to her toast and considers her options...

The Intelligent Highway Information System

The IHIS concept comprises a family of products and services involving both vehicles and highways. It is designed to help people make informed decisions on how and when to travel most efficiently. The system disseminates information on road and traffic conditions and alternative routes. In addition, it measures traffic volume and uses the data to manage traffic signals. IHIS also includes collision avoidance systems, in which sensors determine the distance between a vehicle and another object and control the vehicle's speed and direction to avoid collisions and maximize traffic flow.

IHIS works by combining a number of telecommunications and computer products and services. People can access the information from their homes, as Jane Toogood did, or from their vehicles, via strategically located roadside status boards or on-board video display terminals.

The benefits of IHIS are manifest. The ability to select routes based on traffic information will help people save time and money (including both fuel costs and wear and tear on their cars) while reducing pollution from unnecessary fuel consumption. Collision avoidance systems save lives, reduce insurance costs, and manage traffic flow efficiently.

But these systems come with a significant price tag. The U.S. Federal Highway Administration expects that IHIS research and development budgets in the United States alone will total \$1.4 billion by 2010. Research projects, cosponsored by governments and the auto industry, are currently under way in Europe, Japan, and the United States.

The U.S. highway system was established as a means of economic „pump priming“ after the Depression. It is conceivable that current economic conditions could prompt the federal government to initiate IHIS projects toward the same end. However, these systems will require the participation and cooperation of public and private interests. Private corporations are not likely to commit major expenditures to vehicle-based systems until they see a significant commitment on the part of the government to investment in the highway infrastructure.

8:00 a.m.: Vikings and *le Francais*

Jane decides to work at home today on a progress report she has been putting together. She already has the disk, and someone from her office can fax her work-notes file.

But what about the kids? No problem...The fourteen-year-old is reading Beowulf as an English class project and has brought home a Beowulf disc that she can play in her CD-I (compact disc-interactive) machine. The CD-I technology will give her a vivid, interactive, full-motion video learning experience – and the highest-

quality audio – in a single compact unit. Jane can then supplement the disc with material supplied by phone line (history of the Viking civilization, pictures of runes, other reading possibilities) from the reference section of the local public library. Later in the afternoon, the library ‘will supply a series of French-language video programs. Jane calls the school to explain her daughter’s absence and calls the library to set up the various programs she wants to tap into.

Quality Education for All

Jane is using technology to receive at home the lesson her teenager could have heard in person at school. But, there is a much broader and more important application for the electronic distribution of educational programs. It is no secret that the quality of education is not equal for all. Whether the cause is local socioeconomic conditions, lack of resources in rural/remote areas, financial constraints on communities, or the fact that some locations are more attractive to first-rate teachers than others, the entire public does not have equal access to high-quality education.

By general consensus, education is the most critical element for the future success of society. It has been suggested that advances in technology (such as the proliferation of TV) have in some ways been detrimental to education. We are suggesting that technology can be extremely beneficial to educational systems.

An experiment currently under way in the Mississippi school system allows students to learn interactively with the help of a computer system, laser discs, and statewide videoconferencing. This system gives students in remote locations the benefits of seeing, hearing, and learning from highly qualified teachers. It allows teachers who specialize in particular subjects to share expertise with a broad base of students simultaneously. The expert teachers are assisted by local teachers and aides who are colocated with the students in remote schools. The local instructors answer some questions on their own and refer others to the centrally located experts. Everyone benefits from the system. The newly introduced CD-I system will supplement this capability.

8:10 a.m.: Friends From the Garden

Jane’s five-year-old was supposed to be learning about fruits and vegetables today in kindergarten. The lesson („Friends from the Garden“) is available from the school’s Central Electronic Distribution System (CEDS) and can be transmitted via cable to Jane’s house on demand. So Jane consults her „stack“ of video catalogs: lists of programs available on demand from the school and from a neighborhood video store. She picks out six hours’ worth of programs with a break for lunch: three one-hour lessons, each followed by an hour of entertainment (cartoons and a children’s movie). It’s a simple matter to dial the calls and punch in her choice, the schedule, and her credit card number.

Interactive Video

Most people currently use their television sets to watch various kinds of entertainment products: regular over-the-air broadcasting, cable programming („basic“ and „pay“ channels and, occasionally, pay-per-view), and rented or purchased videotapes. Except for videotapes, program scheduling is fixed by the service provider. The viewer cannot choose when to watch a given program or movie unless he or she programs the VCR to record it and then plays it back at a selected time (an act that has proven too complicated for the majority of VCR owners). The ability to meet users’ needs perfectly is thus constrained by:

- The networks’ need to attract large audiences at the same time in order to „rent“ air time profitably to advertisers
- Current limitations of cable channel capacity („shelf space“ in the parlance of the cable industry), which preclude offering a truly multiple set of programs at varying times
- The inconvenience of renting videotapes, which requires trips to a store for both pick-up and return

The solution to these „structural“ problems lies just ahead in the golden age of fiber optics. A combination of video compression technology and fiber optics will cost-effectively enhance channel capacity by an enormous amount, permitting very wide program offerings virtually on demand. Similarly it will be possible for the local video store, the library and the school system to establish almost-direct fiber optic links to homes in the community.

Interactive video is normally considered in the context of entertainment programming: motion pictures, TV programs, or video games. In the long run, however, special-interest and educationally oriented material, including the „self help“ category, will offer substantial incremental revenues for service providers, as illustrated by the Jane Toogood story.

The result? People will be able to choose from a very wide and deep list of options offered by a wide variety of special-interest and educational sources at cost-effective prices.

9:00-12:00 a.m.: Faxes and Fast Food

Jane calls her office to have some files faxed to her. She also alerts the „intelligent network“ to have office calls routed to her home and sets a different ring tone so that she can recognize them and answer as if she is in her office. Clients won't even know she is working at home.

Jane then settles in to work. Her phone rings frequently, but she has subscribed to a call screening service, which tells her who is calling. During the next three hours she takes calls from her college alumni association (asking for money), from her best friend, from two clients, and from a lawyer representing the opposition in her environmental suit. She diverts calls from a market research firm, a sales representative from a credit card company, and a legal publisher. These go to her voice mailbox so that she can respond at a more convenient time.

At midday, Jane knows she needs to arrange lunch. She looks forward to taking a break with her daughters, and she wants to serve them something hot and nourishing, but she doesn't want to spend a long time cooking. So she calls the national 800 number of a vegetarian fast food chain („Sprouts-R-Us“). The call is automatically routed to the restaurant nearest Jane's house, which takes the order and promises to deliver the food within half an hour.

Power to the People

Telephone companies are upgrading networks and implementing software platforms that will enable individual subscribers to customize their telephone service on an ad hoc basis. The infrastructure is already partially in place, and services are beginning to take advantage of these new systems.

For example, the „single-number service“ Jane used to order lunch enables a nationwide company to establish brand recognition in local areas by using a single telephone number and automatically routing the call to the nearest company location. Other services that are commonly available today, such as call waiting, can be enhanced to interrupt ongoing conversations only for calls from specified numbers, eliminating interruptions from unwanted callers.

Applications of the new „intelligent network“ are almost limitless. The most important benefit to the general public is that the network will put more control in the hands of an individual subscriber. Each person can specify, for a given period, which incoming calls should be allowed to ring through and which calls should be diverted to a messaging system. Jane has instructed the system to distinguish between business and personal calls.

Variations of this service could allow subscribers to control the interruption of meals by solicitors for products or charities.

These capabilities will allow us to view the phone system differently. Although we understand the great benefits of the ability to communicate with anyone, anywhere in the world, at any time, we frequently view the telephone as a nuisance. Why does it always ring when the movie comes to a climax or when the family has just sat down to dinner? Currently, our only options are to answer or not to answer. Systems under development will let people choose when they want to talk and to whom they want to talk. Such systems will minimize „nuisance“ time and maximize the efficiency and convenience of the service.

Administration of these services will be highly sophisticated. Telephone companies are now establishing systems that will allow service representatives to create and modify customized service packages for each subscriber. Research and development to enable individual subscribers to initiate their own services and modify services themselves is already under way. Obviously much work will be required to develop systems that can be easily understood and managed by subscribers and that do not disturb the integrity of the public switched network.

The key to subscriber interface will probably come with speech recognition systems similar to the one used by the HAL computer in the movie *2001: A Space Odyssey*. Speech recognition systems are currently available but limited. Either they are speaker-dependent (i.e., they work only with specified voices) or they have limited vocabularies. The value of these systems will be enhanced significantly when they can respond to voice commands by individual subscribers. It will be much easier for a subscriber to tell the system verbally to change the service package than to learn a complex set of touchtone commands generated by a telephone set.

11:40 a.m.: Fielding Questions

While Jane is waiting for the food delivery, she decides to „do“ one of her panel tests. Jane is a member of three consumer panels: Consolidated Packaged Foods, High Quality History Books, and Better Food Magazine. Each of the panels requires her to take a 20-minute testing poll once a month. Today, in an interactive videophone conversation about packaged foods, Jane fields questions about her preferences for a variety of new products, packaging options, and pricing levels. In return, she will receive a lot of discount coupons and sample products. But most important (from her point of view), she finds out about new products before they come on the market and feels she has provided personal input in „shaping“ what these products and services will be.

The sponsors of the panel, an ad agency and two manufacturers, really appreciate the input they receive from Jane and her fellow panelists. They even videotape the conversations over the videophone for later analysis, so they can understand the nuances more fully than simple „yes“ or „no“, answers.

Interactive Market Testing

The world of consumer pre-testing is now part science and part art form – an imperfect amalgam of quantitative and qualitative methodologies that is not consistently predictive of consumer behavior. The various inconveniences, high costs, and lengthy time spans required by current techniques – focus panels, individual interviews (door-to-door, mall intercepts), and telephone sampling – make consumer market research a slow, painful, and expensive process for most packaged goods companies and independent research firms.

In the early 1980s, Warner-Amex Cable in Columbus, Ohio, used a pioneering interactive system called Qube to poll a large number of viewers/subscribers simultaneously and cost-effectively. The activity, which used a two-way cable system with a complicated subscriber box, allowed for some interesting experimentation in audience feedback. For example, when consumers were asked to select a future magazine cover from several choices, the one they picked (featuring John Wayne) sold an unusually high number of copies at newsstands. Viewers also provided feedback on political issues (and candidates) in a debate. A local semi-professional football game was halted periodically to allow viewers to choose offensive plays and defensive formations for the home team to try out.

Fiber optic systems will be owned and managed by current cable operators and/or by telephone companies. When such systems become fully operative, there will be ample space to allow interactive market testing. The interactive subscriber boxes needed to register viewers' responses will be only slightly more complex than „people meters“ now used by major polling services to measure audience viewing.

For packaged goods companies and independent research firms, there are clear benefits to being able to poll several thousand consumers (or several tens of thousands) simultaneously, particularly with an incremental visual component to assist in the explanation and analysis. But why should consumers wish to take the time to contribute such input? In our view, the feeling of being „on line“ and the sense of having an impact on new products and services, combined with some small (perhaps nonmonetary) compensation package, should ensure abundant and enthusiastic consumer participation.

Conclusion

Does all this sound like a combination of *Star Wars, 2001*, and the benign parts of *The Terminator*? Or does it sound like a realistic version of the shape of things to come – a series of audio, video, and communications technologies and services that will irrevocably change the way we live – for better or worse?

The fact is that virtually all the technologies described are up and running today. Whether we embrace them with open arms or wish that Jane Toogood would turn off the TV, disconnect the phone, and read her children a story (or bake them some cookies), the direction of technological progress is clear. The only questions that remain are social and economic ones. If we don't want these technologies for ourselves, we can probably postpone them for a while by voting with our wallets. But we need to understand that Jane Toogood's daughters – and all of the next generation – will almost certainly be fully „telecom literate.“

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