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The Information Superhighway

Information Highway. Infobahn. I-Way. Electronic Superhighway. Data Highway. Digital Highway. You can call it whatever you want, but it's still the same. What used to be a little dirt road, the "Information Superhighway" has grown into a million-lane freeway, with on and off-ramps leading to and from our homes. The "I-Way" is slowly infiltrating every aspect of our daily lives. From "distance learning" to "telecommuting". From "interactive television" to the Internet itself.

The most tangible part of the "I-way" has got to be the Internet. The Internet had its beginnings in the Department of Defense. In 1969, the Department of Defense began working on a computer network that could be considered indestructible. The main idea of their network was that they didn't want it to be centralized in one location. This would cost too much money, to install such supercomputers, and would be too vulnerable to attack. To avoid those problems, the DOD linked "four computers housed at the University of Utah, the University of California of at Santa Barbara, the University of California at Los Angeles and the Stanford Research Institute International" ("Getting Wired"). By linking the four universities' computers, they lessened the threat of destruction. If one of the centers were destroyed, information could be rerouted through the remaining centers. This technique was proven to be effective during the Gulf War. The Iraqi's networks used the same basic technology as used by the Internet, which made it very difficult for the U.S. Military to disable (Levine Baroudi 12). This system of networked computers became known as the ARPANET (Advanced Research Projects Agency Network).

But in order for this network to function effectively, there needed to be a common way of sending and receiving information. In 1972, the Transmission Control Protocol/Internet Protocol was developed ("Getting Wired"). The Transmission Control Protocol (TCP) takes the data that is going to be sent and compresses it into small packets. The Internet Protocol (IP) decides where the packets are to go. This allows any computer using TCP/IP to speak to any other computer, as long as they both use IP. An interesting feature of IP is that all computers using it are considered equal in all ways, no one computer works faster than another. And the IP is still in use today.

The ARPANET was very popular with universities around the country. So popular that the DOD was having difficulties keeping up with all of the demand. In order to help lighten the load, the ARPANET was split into two parts. One part, called the MILNET, was reserved for military sites, only. The other part, still called the ARPANET, was open for all nonmilitary sites. The two networks were still connected by IP so that people could still communicate between the two (Levine Baroudi 12).

During the 1980's, there was an explosion of smaller, self-standing, networks. There was such a large number of networks that some of them began to merge together to become larger, more powerful networks. This was a simple task because most all of the networks across the country were using the popular Internet Protocol to communicate. In the late 1980's, the National Science Foundation (NSF) created their own network called the NSFNET. The interesting feature of the NSFNET was that it linked five supercomputer centers and gave academic researchers the access to high powered computers, that were originally limited to the military ("Internet"). Once the supercomputers were networked together, the NSF connected the universities to the nearest regional supercomputer. Then the NSFNET started to attract businesses as well. The NSFNET attracted so many people that, in 1991, the ARPANET was forced to shut down. But everything wasn't perfect for the NSFNET. The supercomputers that were the basis of the network were either breaking down or were too expensive to keep up. But

by this time NSFNET had become so established that it could continue without its original purpose. Many large commercial Internet networks have grown up within the Internet, some run by large companies such as IBM. As of right now, the NSFNET is "being wound down, and its traffic taken over by commercial networks" (Levine Baroudi 13)

The Internet is basically used for four things: "transferring files (using FTP, or file transfer protocol), logging on to remote systems (telnet), exchanging electronic mail (e-mail), and group discussions on Usenet (User's Network) newsgroups" (Goldsborough 289-290). Transferring files is simply that, copying a file on another computer. The file is usually compressed so that the amount of time it takes to send the file is shortened.

Usually most file transfers involve telnet. "Telnet"ting involves connecting your computer to a remote host computer. Since all computers on the Internet are considered equal, you can connect to any computer anywhere. The only difference in connecting to a computer down the hall and to one in New Zealand is the time it takes to send and receive information. Electronic mail is the process of electronically sending and receiving letters. And since the post office is continuing to raise the cost of mailing a letter, e-mail is beginning to look better and better as an alternative to the postal service. Another benefit of e-mail, besides cost, is the speed at which the letters are sent. In some instances e-mail can almost instantaneously be sent, depending on the distance that the letter has to cover. Usenet newsgroups are electronic "bulletin boards", devoted to a specific topic, where anyone can post a letter discussing the subject. There are millions of newsgroups out there covering almost any topic imaginable. With these four basic functions, millions of people around the world communicate on the Internet.

The Internet is only one "on-ramp" to the "I-way". There are many others ways in which people may soon be using the I-way. Probably one of the first things brought into our lives, from the I-way, will be interactive TV, as predicted by John C. Malone, president and CEO of Tele-Communications Inc. (TCI).

"The first information superhighway services will be the broad-based ones - video on demand. You'll be able to see any movie, any TV show, any documentary, any how-to, any news segment when you want to see it" (Goldsborough 131).

Interactive computer CD-ROMs are just the beginning of the interactive entertainment movement. Interactive movies on CD-ROM allow the user to be a part of the story. You get to select what choices the lead character should or should not make. To make it more realistic, they include full-motion video and stereo sound. Interactive CD-ROMs are about as close as the average person can get to virtual reality, without the high cost.

CD-ROM is the tip of the iceberg for interactive entertainment. Television will play a major part in interactive entertainment. With video-on-demand, viewers will be able to select whatever TV show, or movie, they want to watch, whenever they want to watch it. They will also be able to select interactive movies, which will be far more realistic than the interactive movies on CD-ROM. Bell Atlantic, which serves parts of the Midwest and New England, will begin to wire the houses in its area for interactive television in 1995. By 2000, they expect to have more than two-thirds of the total homes in its service area wired for interactive TV (Goldsborough 135). They are working on the technology to be able to send compressed video, data, and voice signals, at the same time, over an everyday phone line. Most other interactive services require the use of fiber-optics, rather than standard phone lines. TCI is planning on having more than "250 cities, towns, and counties", across the country with fiber optic cable, by the end of 1996. This will provide "'multiplexed' movies, enhanced shop-at-home service, telecommuting, and interactive educational programs" (Goldsborough 137).

Another facet of the I-Way is located in the workplace. Telecommuting, working from home, is becoming "a bona fide trend" (Goldsborough 24). The idea of being able to

work from home, set your own hours, and not having to drive on the crowded, fume-filled, highways, makes telecommuting very attractive for most business people. Around 4.5 million people telecommuted to work in 1993, a rise of 15% from 1992, according to BIS Strategic Decisions. BIS predicts that almost 7 million people will telecommute by the year 1996 (Goldsborough 24). One thing that could help those telecommuters is the idea of computers with the capability of voice-recognition. With voice-recognition, many everyday commands are made easier to use. If you wanted to print a paper, you would just say "Print" into a microphone. The computer would then recognize your voice and execute the command. As it is now, the technology has quite a ways to go, but the future looks good.

For those business people who don't telecommute, the I-Way even has some possibilities that could help make their jobs a little easier. Personal Digital Assistants, such as Apple Computer's Newton, help business people electronically keep track of their important information. Another piece of technology that has yet to make a major impact on society is the idea of personal communicators. That may sound like something out of an episode of *Star Trek*, but a company in Canada, called Bell-Northern Research, is working on such technology. Their new product, called the Orbiter, will allow people to place cellular calls just by speaking the name of the person they want to call. It will also come with a pen and touch-sensitive screen. According to Link Resources, a market research firm, personal communicators should grow at a rate of about 50% annually through 1998 (Goldsborough 41).

The Internet will also play a major role in the workplace. As NetResults, an Internet provider puts it:

"a 24-hour selling platform that places your company's information on the global Internet for easy access by your customers and potential customers" (Goldsborough 46).

If a company were to put an ad, in some shape or form, on the Internet, it could be seen by millions of people across the globe. Companies such as Lincoln Mercury and Lufthansa have already started having ads put onto the Internet, and many others are considering the idea.

One concept that is being used by both telecommuters and those working at the office is e-mail. E-mail allows nearly instant communications between telecommuters and the workplace. It also gives those workers at the office a better way to communicate their ideas and feelings with their supervisors or bosses. A low-level employee could e-mail his suggestions to the president of the company, and have them seriously considered, without worrying about their status on the "corporate ladder".

The I-Way is also making its way into the schools. With concepts such as distance learning and the influx of new multimedia technology, the classroom is starting to keep up with the changing technology.

One of the major concepts coming from the I-Way is distance learning. Distance learning would give students the ability to get supplementary materials, even possibly from home. At California Polytechnic University, students can call up tutorials, demonstrations, and full-motion video lectures, but only in the classrooms. But they are trying to provide those services in the residence halls and even at off-campus homes. They are also working on "video mailboxes" that would let students and teachers communicate anytime by sending videos over the network. At the Ohio State University, students are able to send their homework electronically, from on or off campus. The assignments can then be electronically returned. They are also working on "virtual study groups", that would link students from anywhere on campus. OSU is also has plans in the works for digitally storing videotapes of lectures that students could look at after class to review (Goldsborough 67).

These concepts may sound like dreams, which most may be. The cost of such technology is great, and many universities are already having a hard time trying to find

money for other programs. So don't expect to see too many of these projects popping up all over the country. And there is even less of a chance for this technology to make it in to local schools. Only 12% of classrooms in K-12 have a telephone and only 4% have access to modems. Also there's an average of only one computer per classroom, and many of those computers are badly outdated. So many schools don't have the money to provide all of this technology for all of their students. Some schools are looking towards private donations from companies and businesses. Pacific Bell has made a commitment to provide all California schools, colleges, and universities with the necessary connections to the I-way. Right now they are promising to provide computer communications and videoconferencing by the end of 1996 (Goldsborough 76).

Many commercial on-line services are starting to gear some of their features towards school-age children. America On-line's "The Scholastic Network" provides students with information resources, help with their homework, and on-line discussions with other students. The Scholastic Network's information resources include the Library of Congress, the Smithsonian Institute, the CNN Newsroom, and *National Geographic On-line*. On Prodigy, there is a feature called Homework Helper. It is "an electronic library specifically for kids." The interesting thing about the Homework Helper is that children can type in any question they have, in standard English. The library has the ability to recognize the ability level of the student, and will provide an answer in a way that they would understand. Homework Helper also has over 35 publications and news services, such as *TIME*, *Forbes*, *USA Today*, *Los Angeles Times*, Newsbytes News Journal, Journal Graphics, and Reuters (Goldsborough 71).

There is also a service available on the Internet that is similar to Homework Helper. The Global Network Navigator can provide information on any subject that you can think of. It uses an Internet tool called the World Wide Web, which links related information from any computer on the Internet.

Another offshoot of the I-way, that could be helpful to students in the future, is Project Gutenberg. Project Gutenberg, being worked on at Illinois Benedictine College, is based on digitizing 10,000 of the most-used books by the year 2001. Already they have some books digitized and available to be read, such as *Alice in Wonderland*, and *Moby Dick* to the *CIA World Fact Book* and *Roget's Thesaurus*. There are other products, dealing with literary works, the most notable the Library of the Future. It contains such religious works as the King James Bible, the Koran, the Egyptian book of the Dead, and the Bhagavad Gita. It also has many political works such as the Magna Carta, the Declaration of Independence, the Federalist Papers, and the U.S. Constitution. It also has memorable literary works such as *The Canterbury Tales*, *Paradise Lost*, *The Scarlet Letter*, *Wuthering Heights*, *Frankenstein*, *Dracula*, *The Brothers Karamazov*, and *The Grapes of Wrath*, as well as works by Shakespeare, Sherlock Holmes, and Edgar Allan Poe. Microsoft's Art Gallery, on the other hand, has the complete holdings of London's National Gallery. Besides being able to just look at the paintings, people can see demonstrations of artistic styles, explanations of artist's symbolism, and they can even add their own touches to any of the paintings.

The I-way will also change the way we relax, and enjoy ourselves. Many areas of entertainment, from newspapers to interactive television are going to be affected by new technology in the years to come.

The way we receive the news of the day could possibly be changing thanks to the I-way. Commercial on-line services already offer up to the minute news on everything from business to sports. Prodigy offers a service called Journalist, to its subscribers. Journalist is a program that can connect itself to the Prodigy network and download the top news stories, according to your specifications. You can specify when you want it to get the news and you can specify which areas of news you want to see. Once Journalist receives the information, it even puts it in the form of a regular newspaper, complete with your own personalized title. CompuServe users can make use of the Executive News

Service, which gives you access to news stories from Associated Press, United Press International, and the *Washington Post*. You pick a topic and CompuServe sorts through all of its stories and finds the ones that apply to your topic.

There are also news services available on the Internet. ClariNet, for example, provides articles from Associated Press, United Press International, Reuters, and columnists Mike Royko, Miss Manners, and Dave Barry, at no cost, besides the cost to get on the Internet itself. Another news provider is the Electronic Newstand, which offers articles from recent and back issues of many popular magazines. There are also on-line magazines that are strictly electronically based. Some of them can be a bit on the bizarre side, such as *Cult of the Dead Cow* and *Holy Temple of Mass Consumption*, but others are more mainstream, *Privacy Forum Digest*, for example (Goldsborough 89).

Many strictly paper-based publications are beginning to notice the trend, and are starting to put versions of their publications on-line. The *San Francisco Chronicle-Examiner* and the *St. Louis Post-Dispatch* already have their own personal on-line services dedicated to their publications. America Online has many different newspapers on-line, such as *USA Today*, and *The New York Times*. America Online also offers many magazines as well, such as, *Time*, *Saturday Review*, and *National Geographic* (Goldsborough 92). To the publisher, one of the major benefits of on-line newspapers is the speed at which the news stories can be put on-line. Instead of having to print out the paper, and then have it delivered, they can just type up the story and put it directly on-line.

Another possible way in which we will receive our news in the future, will be from CD-ROM based newspapers. There is already one CD paper out today, from Newsweek Interactive. For a fee of \$99.95 a year, they send you a new CD every three months. You can either go through the disk and check out whatever news stories you are interested in, or you can watch a "newscast" where a narrator describes each story. Either way, all of the stories are complemented by video and sound. The disk also includes text

of the past three months' issues on the disk, selected stories from the *Washington Post*, and audio clips from the "Newsweek On Air" radio show (Goldsborough 95). Although the disks contain all of that information, they haven't done very well because of the fact that they are only put out every three months.

Another interesting feature of the I-Way, will be communications. With the I-Way, we will be able to have conversations with people across the globe, either by electronic mail or real-time conversations. Many of the commercial on-line services, such as Prodigy and America Online, offer both e-mail and real-time conversations. Prodigy, for example, has a feature called Chat. You have a list of different types of virtual "rooms" that you can choose to enter, organized by categories, such as, General, Interest Groups, Sports, Kids and Teens, etc. When you find a room that interests you, you just click on it and you're in the room. Once in the room, you see everyone's responses on your screen, seconds after they have typed it. Some of the rooms can hold up to 25 people, but Chat also has "auditoriums", where special guests answer questions from up to 500 people. One of the most attractive features of Chat is the fact that when you're on it, you're anonymous. You have no identity, except for whatever you make up. This feature allows many shy people to get into discussions with complete strangers, something they probably couldn't have been able to do in person. Relationships can even be started in real-time environments. Rush Limbaugh met his wife, when they started to talk on CompuServe (Goldsborough 120).

This is just the beginning of the advances in technology to come from the information superhighway. From entertainment, to education, it's slowly, but surely, making it's presence know. But in any event, the information superhighway will probably make its way into most every aspect of our daily lives in the future. Even though it may be full of "construction zones" today, hopefully our grandchildren's grandchildren will have complete access to the so-called "Information Superhighway."