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# TIME

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## First Nation in Cyberspace

By Philip Elmer-Dewitt

Back in the mid-1960s, at the height of the cold war, the Department of Defense faced a tough question: How could orders be issued to the armed forces if the U.S. were ravaged by a nuclear assault? The communication hubs in place at the time -- the telephone switching offices and the radio and TV broadcast stations -- were not only vulnerable to attack, they would also probably be the first to go. The Pentagon needed a military command-and-control system that would continue to operate even if most of the phone lines were in tatters and the switches had melted down.

In 1964 a researcher at the Rand Corp. named Paul Baran came up with a bizarre solution to this Strangelovian puzzle. He designed a computer- communications network that had no hub, no central switching station, no governing authority, and that assumed that the links connecting any city to any other were totally unreliable. Baran's system was the antithesis of the orderly, efficient phone network; it was more like an electronic post office designed by a madman. In Baran's scheme, each message was cut into tiny strips and stuffed into electronic envelopes, called packets, each marked with the address of the sender and the intended receiver. The packets were then released like so much confetti into the web of interconnected computers, where they were tossed back and forth over high-speed wires in the general direction of their destination and reassembled when they finally got there. If any packets were missing or mangled (and it was assumed that some would be), it was no big deal; they were simply re-sent.

Baran's packet-switching network, as it came to be called, might have been a minor footnote in cold war history were it not for one contingency: it took root in the computers that began showing up in universities and government ^ research laboratories in the late 1960s and early 1970s and became, by a path as circuitous as one taken by those wayward packets, the technological underpinning of the Internet.

The Internet, for those who haven't been hanging out in cyberspace, reading the business pages or following Doonesbury, is the mother of all computer networks -- an anarchistic electronic freeway that has spread uncontrollably and now circles the globe. It is at once the shining archetype and the nightmare vision of the information highway that the Clinton Administration has been touting and that the telephone and cable-TV companies are racing to build. Much of what Bell Atlantic and Time

Warner are planning to sell -- interactivity, two-way communications, multimedia info on demand - - the Internet already provides for free. And because of its cold war roots, the Internet has one quality that makes it a formidable competitor: you couldn't destroy it if you tried.

Nobody owns the Internet, and no single organization controls its use. In the mid-1980s the National Science Foundation built the high-speed, long- distance data lines that form Internet's U.S. backbone. But the major costs of running the network are shared in a cooperative arrangement by its primary users: universities, national labs, high-tech corporations and foreign governments. Two years ago, the NSF lifted restrictions against commercial use of the Internet, and in September the White House announced a plan to make it the starting point for an even grander concept called the National Information Infrastructure.

Suddenly the Internet is the place to be. College students are queuing up outside computing centers to get online. Executives are ordering new business cards that show off their Internet addresses. Millions of people around the world are logging on to tap into libraries, call up satellite weather photos, download free computer programs and participate in discussion groups with everyone from lawyers to physicists to sadomasochists. Even the President and Vice President have their own Internet accounts (although they aren't very good at answering their mail). "It's the Internet boom," says network activist Mitch Kapor, who thinks the true sign that popular interest has reached critical mass came this summer when the New Yorker printed a cartoon showing two computer-savvy canines with the caption, "On the Internet, nobody knows you're a dog."

But the Internet is not ready for prime time. There are no TV Guides to sort % through the 5,000 discussion groups or the 2,500 electronic newsletters or the tens of thousands of computers with files to share. Instead of feeling surrounded by information, first-timers ("newbies" in the jargon of the Net) are likely to find themselves adrift in a borderless sea. Old-timers say the first wave of dizziness doesn't last long. "It's like driving a car with a clutch," says Thomas Lunzer, a network designer at SRI International, a California consulting firm. "Once you figure it out, you can drive all over the place."

But you must learn new languages (like UNIX), new forms of address (like president [whitehouse.gov](http://whitehouse.gov) and new ways of expressing feeling (like those ubiquitous sideways smiley faces), and you must master a whole set of rules for how to behave, called netiquette. Rule No. 1: Don't ask dumb questions. In fact, don't ask any questions at all before you've read the FAQ (frequently asked questions) files. Otherwise you risk annoying a few hundred thousand people who may either yell at you (IN ALL CAPS!) or, worse still, ignore you.

All that is starting to change, however, as successive waves of netters demand, and eventually get,

more user-friendly tools for navigating the Internet. In fact, anyone with a desktop computer and a modem connecting it to a phone line can now find ways into and around the network. "The Internet isn't just computer scientists talking to one another anymore," says Glee Willis, the engineering librarian at the University of Nevada at Reno and one of nearly 20,000 (mostly female) academic librarians who have joined the Internet in the past five years. "It's a family place. It's a place for perverts. It's everything rolled into one."

As traffic swells, the Internet is beginning to suffer the problems of any heavily traveled highway, including vandalism, break-ins and traffic jams. "It's like an amusement park that's so successful that there are long waits for the most popular rides," says David Farber, a professor of information science at the University of Pennsylvania and one of the network's original architects. And while most users wait patiently for the access and information they need, rogue hackers use stolen passwords to roam the network, exploring forbidden computers and reading other people's mail.

How big is the Internet? Part of its mystique is that nobody knows for sure. The only fact that can be measured precisely is the number of computers directly connected to it by high-speed links -- a figure that is updated periodically by sending a computer program crawling around like a Roto-Router, tallying the number of connections (last count: roughly 2 million). But that figure does not include military computers that for security reasons are invisible to other users, or the hundreds of people who may share a single Internet host. Nor does it include millions more who dial into the Internet through the growing number of commercial gateways, such as Panix and Netcom, which offer indirect telephone access for \$10 to \$20 a month. When all these users are taken into account, the total number of people around the world who can get into the Internet one way or another may be 20 million. "It's a large country," says Farber of the Internet population. "We ought to apply to the U.N. as the first nation in cyberspace."

That nation is about to get even bigger as the major commercial computer networks -- Prodigy, CompuServe, America Online, GEnie and Delphi Internet Service -- begin to dismantle the walls that have separated their private operations from the public Internet. The success of the Internet is a matter of frustration to the owners of the commercial networks, who have tried all sorts of marketing tricks and still count fewer than 5 million subscribers among them. Most commercial networks now allow electronic mail to pass between their services and the Internet. Delphi, which was purchased by Rupert Murdoch's News Corp. in September, began providing its customers full Internet access last summer. America Online (which publishes an electronic version of Time) is scheduled to begin offering limited Internet services later this month.

People who use these new entry points into the Net may be in for a shock. Unlike the family-oriented commercial services, which censor messages they find offensive, the Internet imposes no

restrictions. Anybody can start a discussion on any topic and say anything. There have been sporadic attempts by local network managers to crack down on the raunchier discussion groups, but as Internet pioneer John Gilmore puts it, "The Net interprets censorship as damage and routes around it."

The casual visitor to the newsgroups on the Usenet (a bulletin-board system that began as a competitor to the Internet but has been largely subsumed by it) will discover discussion groups labeled, according to the Net's idiosyncratic cataloging system, alt.sex.masturbation, alt.sex.bondage and alt.sex.fetish.feet. On Internet Relay Chat, a global 24-hour-a-day message board, one can stumble upon imaginary orgies played out with one-line typed commands ("Now I'm taking off your shirt . . ."). In alt.binaries.pictures.erotica, a user can peek at snapshots that would make a sailor blush.

But those who focus on the Internet's sexual content risk missing the point. For every sexually oriented discussion group there are hundreds on tamer and often more substantial topics ranging from bungee jumping to particle physics. Last week Virginia college student Chris Glover responded to a distressed message from a suicidal undergraduate in Denver. After two hours of messages back and forth, Glover was able to pinpoint the woman's location and call for help.

With all this variety, Internet users are unimpressed by television's promise of a 500-channel future. The Internet already delivers 10,000 channels, and the only obstacle that prevents it from carrying live TV pictures is the bandwidth (or carrying capacity) of the data lines. Some video clips - - and at least one full-length video movie -- are already available on the network. And last spring, writer Carl Malamud began using the Internet to distribute a weekly "radio" interview show called Geek of the Week. Malamud is undeterred by the fact that it takes a computer about an hour over a high-speed modem to capture the 30 minutes of sound that a \$10 radio can pick up instantly for free. But bandwidth capacity has nowhere to go but up, says Malamud, and its cost will only go down.

The Internet, however, will have to go through some radical changes before it can join the world of commerce. Subsidized for so long by the Federal Government, its culture is not geared to normal business activities. It does not take kindly to unsolicited advertisements; use electronic mail to promote your product and you are likely to be inundated with hate mail directed not only at you personally but also at your supervisor, your suppliers and your customers as well. "It's a perfect Marxist state, where almost nobody does any business," says Farber. "But at some point that will have to change."

The change has already begun. NSF's contribution now represents about 10% of the total cost of the

network, and the agency is scheduled to start phasing out its support next April, removing at the same time what few restrictions still remain against commercial activity. According to Tim O'Reilly, president of O'Reilly & Associates, a publisher experimenting with advertiser-supported ^ Internet magazines, the system could evolve in one of two ways: either entrepreneurs will manage to set up shop on a free-market version of the Internet, or some consortium will take the whole thing over and turn it into a giant CompuServe. "That's an outcome," O'Reilly says, "that would effectively destroy the Internet as we know it."

As the traffic builds and the billboards go up, some Internet veterans are mourning the old electronic freeway. "I feel kind of sad about it," says Denise Caruso, editorial director of Friday Holdings, a publisher specializing in new media. "It was such a dynamic, pulsing thing. I wonder whether we shouldn't have left it alone." Others see the period of uncertainty ahead as a rare opportunity for citizens to shape their own technological destiny. "We need . . . a firm idea of the kind of media environment we would like to see in the future," warns Howard Rheingold in his new book, *The Virtual Community*. While it may be difficult for communities as diverse as those on the Internet to set their own agenda, it seems increasingly likely that if they don't, someone else will do it for them.

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