June 15, 2002

Competition Is Heating Up for Control of .org Domain

By JOHN MARKOFF

SAN FRANCISCO, June 14 — An intense, largely behind-the-scenes competition is under way for the right to manage the global database that keeps track of Internet addresses of noncommercial organizations.

Although the business of registering Internet names has begun to shrink this year, as many as eight or nine bids are expected at a meeting this month in Bucharest, Romania, when the group that oversees Internet addresses will decide who should manage the list of names that end in .org.

The decision will shift the .org domain from VeriSign Inc., which currently manages the list of 2.7 million organizations. The company struck a deal with the oversight organization, the Internet Corporation for Assigned Names and Numbers, or Icann, last year that extended VeriSign's control over .com and .net addresses in exchange for giving up the .org designation. VeriSign, based in Mountain View, Calif., also promised to contribute $5 million to assist in the transition.

Although the management of .org was once intended to go to a nonprofit organization, the competition has more recently attracted some profit-minded businesses.

In addition, the competition is likely to become much more visible with the entry on Monday of two iconoclastic Internet pioneers who say that many of the entrants have served as shields for large businesses that are hoping to help themselves to what some analysts estimate will be a $10-million-a-year business.

One of those pioneers, Carl Malamud, has previously forced the government to make Securities and Exchange Commission financial data available freely over the Internet. His partner, Paul Vixie, has been a longtime Internet software developer and a determined opponent of unsolicited commercial e-mail, known as spam. The two said they intended to run the .org registry on a nonprofit basis.

Mr. Malamud and Mr. Vixie say their plan differs from those of other competitors because they intend to place the database software needed to operate the .org name system in the public domain.

"Is this a public trust or a public trough?" Mr. Malamud asked.

James Love, director of the Consumer Project on Technology, a Washington lobbying group, says the competition has drawn commercial bidders that have associated themselves with a nonprofit organization to improve the appearance in front of the Icann review committee.

But Icann's supporters respond that the organization has created a process

that will select the group that will best manage the database.

"Icann is trying hard to make sure this isn't a gold rush," said Esther Dyson, chairwoman of EDventure Holdings and a former chairwoman of Icann.

One of the first partnerships to announce a planned bid is Poptel, the British manager of the new .coop domain, and AusRegistry, the operator of the Australian .au country domain. The two companies are calling their partnership Unity Registry.

Another bid is being planned by Global Name Registry, a British company that was recently awarded the .name domain, in conjunction with the International Red Cross, according to several people close to the company's plans.

In a similar fashion, Afilias Global Registry Services, which was recently awarded the .info domain, is planning to submit a bid in conjunction with the Internet Society, the nonprofit organization that oversees the Internet standards group, the Internet Engineering Taskforce.

There has also been speculation among a number of people involved in the bidding process that even though VeriSign originally struck a deal to release the .org domain, it is planning a bid of its own.

Icann's request for proposals has emphasized both diversifying control over the approved domains as well as a complex proposal process to qualify the bidders.

"The board wants a stable well-functioning .org registry," said Miriam Sapiro, founder of Summit Strategies International, a Washington company specializing in Internet policy and international issues. "It doesn't want to take a risk and jeopardize the domain names of 2.7 million organizations."

Mr. Malamud, who heads the Internet Multicasting Society, an organization in Stewarts Point, Calif., that develops open source Internet software, and Mr. Vixie, who founded the Internet Software Consortium, a group in Redwood City, Calif., that develops open source versions of crucial Internet infrastructure software, said they planned to place the complex software used to manage domain names in the public domain as open source, freely available to any organization.

They say that would have the twin effect of making it simpler for Icann to diversify control of the domains as well as making it easier to create new ones. The issue is a hotly debated one that the organization, which was created under a contract with the United States Commerce Department, is struggling with.

"This shouldn't be a dot-com opportunity," Mr. Malamud said. "There has been a lot of smoke and mirrors, but what we need is actually a public utility that is well managed in the public interest."

Internet pathfinder leading battle against barriers to innovation

By Dan Gillmor
Mercury News Technology Columnist

Want some face time with Internet pioneers Vint Cerf and David Farber? Carl Malamud has a raffle he'd like you to enter.

You don't have to send money, actually. I hope you will. Because if you do, you'll be supporting some worthwhile public-service projects.

You'll also be joining the battle to curb some technological choke holds. These barriers to innovation tend to enrich a few large companies at the expense of everyone else.

The raffle is a fundraising gimmick, Malamud cheerfully notes. The beneficiaries are several extremely worthwhile projects he and his wife, Rebecca, have created as part of their Internet Multicasting Service (IMS).

The non-profit IMS (**http://not.invisible**

.net) has been a path breaker for years. Its mission, says Malamud, has essentially been to ``build new services for the Internet,'' services that combine the public interest and activism.

Working on a relative shoestring, he launched early Internet radio programs. Later, he was the prime mover behind the invaluable ``Edgar'' project to post online corporate filings at the Securities and Exchange Commission. Later came a patent database.

In the works is something called the NetTopBox, a project that could go around one of the worst choke points in modern technology. It's going to be an on-screen media guide, like the scrolling grids you find on your cable or satellite TV.

You might think that a grid like this is an obvious idea. But it's been patented by a company called Gemstar-TV Guide International, another example of a patent system run wild. Gemstar has thrown lawyers at anyone daring to challenge its current choke hold.

The NetTopBox would be much more interesting and useful than the on-screen grids we see today, in part because it's aimed at more than just television. It would incorporate databases, messaging and a variety of other technologies aimed at a collaborative and universal guide to various kinds of media, only one of which is television. Importantly, it would be built on non-proprietary, open standards -- to be the base for innovation, not ceiling on top of it.

Malamud says the project is precisely the kind of thing that fits the IMS mandate. It's useful for people, and involves ``extremely important policy issues and business issues.''

The IMS work comes in a rich tradition. The free software and open-source software movements are built on openness as well. While their main target is Microsoft, they are more fundamentally aimed at creating and maintaining an open platform for new work.

Mitch Kapor, founder of Lotus Development, a pioneer in the spreadsheet market, is funding a nascent project that could have a major impact. He recently created the Open Source Applications Foundation, pulling together a team of programmers to develop a software platform combining messaging, calendar, contacts and collaboration.

The idea, says Kapor, is to ``increase people's options to a number greater than one'' for such

software. The ``one'' he's talking about, of course, is Microsoft's Outlook, the highly proprietary software that so many companies use as part of the Office suite of programs.

What Malamud, Kapor and others are doing is essential. If they succeed, they'll make technology much more useful and affordable for larger numbers of people. And the impact from that could be huge.

Dan Gillmor's column appears each Sunday, Wednesday and Saturday. Visit Dan's online column, eJournal (www.dangillmor.com). E-mail dgillmor@sjmercury.com; phone (408) 920-5016; fax (408) 920-5917.

BUSINESS

NEW INTERACTIVE MEDIA GUIDE IS IN THE WORKS; ; OPEN PROGRAMMING GUIDE IS INTERNET PIONEER'S NEWEST VENTURE. IT WOULD OFFER SEVERAL SERVICES

By Frank Bajak, Associated Press

01/20/2002

Information inundation being what it is these days, culling what's valuable from media listings - TV and radio programs, news bulletins, movies, music -is a daunting, time-consuming chore.

What we all need is an interactive media guide that's updated constantly and tailored to our individual tastes and needs - not just by media companies but also by the people we trust most.

And that's not all. This guide should alert us immediately to something vital, like a news flash. Let it also be a conduit, like instant messaging, that allows people we specify to reach us in real time.

Creating the foundation for such a service is the latest project of one of the Internet's most innovative provocateurs, Carl Malamud , and a team of programming heavyweights who previously helped write the Internet's traffic laws, set the speed limits, even design the vehicles.

Malamud has converted the endeavor, dubbed NetTopBox, into a nonprofit venture.

"We really call it a public works project," Malamud said. "It is no different from building a public park or a railroad or dam."

Except, of course, that it would be at once everywhere and nowhere. And no one would own it. Many different media companies would feed it.

At least, that's the idea.

Author, programmer and agitator, Malamud has long worked on trying to ensure that grassy public parks coexist on the Internet beside its crass commercial strips.

When the World Wide Web was in diapers, Malamud was already producing the Internet's first talk-radio program. Long before RealAudio, he was webcasting National Press Club speeches.

In 1994, Malamud made available online the full text of corporate filings to the Security and Exchange Commission. Later, he added large databases of other key federal agencies.

Malamud 's nonprofit Internet Multicasting Service crowned those shoestring efforts in 1998 by pressuring the government to place its patent database on the Internet.

"Carl has an amazing track record of accomplishing what he sets out to do," said Tom Kalil, a former technology adviser to former President Bill Clinton.

Malamud , 42, and his Web designer wife, Rebecca, co-founder and equal partner in NetTopBox, originally launched it as a startup that attracted $1 million in private capital. But when the investment climate soured last year, they and their partners decided the Internet Multicasting Service would purchase the venture.

A year ago, the Malamuds moved from New York City to a log home on the northern California coast to begin putting together the software infrastructure - or protocols - and raise an infant son.

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Seeking sponsors

Their team is now seeking sponsors, courting media companies and seeing potential allies in network news divisions in particular.

Rod Prince, executive producer at NBC Weekend Nightly News for seven years until his December retirement, met with NetTopBox officials last year and liked the idea.

"If in fact the flexibility, the immediacy and the ease of use can be demonstrated, I think all the content providers would be to happy to go with them," Prince said.

Among reasons for taking NetTopBox nonprofit, one loomed large: The interactive programming guide world is currently dominated by TV Guide brand owner Gemstar, which vigorously defends its patents.

Although Malamud says he's not competing with Gemstar, he reckons he could be in for an eventual legal tussle. Gemstar officials would not comment, saying they have not seen a product.

Driving NetTopBox are objections to the current closed, proprietary systems that portion out programming information. Malamud complains that the market is "ossifying because there's not enough small innovative players."

Now that set-top boxes are becoming Internet-enabled and computing more decentralized, there's no reason they can't allow viewers to communicate with one another through core software that is in the public domain, just like the code underlying the rest of the Internet, Malamud argues.

With NetTopBox, the program guide would know what gadgets you have, your interests and your willingness to share preferences.

So if your haute cuisine pal across town wants to alert you a particular cooking show, and you happen to be in front of the TV, it's a simple matter of a click or two. If network TV is pre-empting scheduled shows for a bulletin, and you're away from the television, you could be alerted through your cell phone.

Malamud 's team is developing the underlying technology, using approaches such as those employed by the Google search engine for page rankings and by Amazon.com for predicting customer preferences.

Media companies - and databases such as CDDB, which catalogues music CDs -would then help contribute the listings and content.

Malamud estimates the project will cost $3.5 million over two years.

NetTopBox may never catch on. Malamud readily acknowledges the risk of opting for an ambitious "proof of concept" rather than attempting to create a niche business in collaborative media.

The programming required to create an open interactive programming guide "shouldn't be hard in and of itself," said Fred Baker, chairman of the Internet Engineering Task Force from 1996-2001.

"What will probably be hard is getting that information given to him (Malamud) in real time without getting a money feed going back to those who are providing it," he said.

"Of course, he's pretty good at making those things happen," Baker added. "If there's a wheeler-dealer, it's Carl."

PHOTO: Associated Press Carl Malamud and his wife, Rebecca, holding 9-month-old Nate, work on Internet project in their California log cabin.

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December 24, 2001, Monday

BUSINESS/FINANCIAL DESK

A Cybernaut Plans Software for Navigating TV

By JOHN SCHWARTZ (NYT) 1224 words

One of the online world's more persistent innovators is trying to make television as easy to use as the Internet.

The sentence is not backward. Carl Malamud, who has helped expand the cyberspace roles of institutions like Congress and the Patent and Trademark Office, argues that today's television listings make it a chore to find interesting programs. And he says that the computer technologies that help people navigate the information riches of the World Wide Web should be brought to bear on the tube.

He aims to do that through a nonprofit software project, NetTopBox, whose name is a play on the term set-top box -- the appliance that currently brings cable television into the home. Elements of NetTopBox are to begin appearing the next few months, Mr. Malamud said. In its current form, the software looks a little like a program guide that can be found on any cable service, but with greater depth.

Users would reach the NetTopBox service initially via the World Wide Web, but eventually through digital set-top cable boxes and even hand-held organizers, according to Mr. Malamud, who predicted users would be able to search for programs, read minireviews from other viewers or add their own, and sort lists of available programs to suit their interests.

The reviews by other users could also contain links to other programming and resources so that fans of the actor Tim Curry, for example, could compare notes on his work in ''The Three Musketeers'' and ''The Rocky Horror Picture Show,'' and view clips from more his more obscure works, like the 1974 BBC production ''Schmoedipus.'' The service could also be used as a guide to DVD's, CD's and other media, Mr. Malamud said.

In some ways, the project also resembles Web sites like epinions.com, which collects user recommendations on a variety of products, and the Internet Movie Database, which provides encyclopedic information on films. The project could include instant message and chat services, as well, so that fans could discuss shows in progress, la the fictional armchair reviewers in the cable show ''Mystery Science Theater 3000.''

''Our job will be to turn all these pieces into a useful net-top box,'' Mr. Malamud said.

The programming is open source, which is to say that all of the details of the software design will be published so that others can contribute to it and augment it with their own new features. Program information would be provided by the producers themselves in a format set by Mr. Malamud's team for easy reading and searching using the NetTopBox protocols.

Mr. Malamud and his partners in the project worry that they might find themselves in conflict with the company that currently dominates the market for electronic programming guides, Gemstar-TV Guide International. That company has vigorously used litigation to protect its patents on electronic programming guides. Gemstar is currently suing Echostar Communications, Scientific-Atlanta and

Pioneer, for example, accusing them of violating its patents. Its competitors, for their part, argue that Gemstar uses its patents to restrict competition and has squelched innovation in the process.

Mr. Malamud is bracing for a fight with Gemstar but says he hopes it does not come to that. ''We don't believe we infringe their patents at all,'' he said. The chief difference between what the electronic program guide company does and what he is doing, he says, is that Gemstar has its own proprietary system, while he is trying to build a set of software rules, or protocols, that anyone can add to or use. And he, too, has been filing patents on his own work in developing the project.

Representatives of Gemstar did not respond to interview requests by phone and e-mail.

Mr. Malamud, 42, has made a varied career of taking on pioneering projects and big adversaries. He has developed a number of nonprofit projects, including Internet Talk Radio, the first online station, in 1993.

He is probably best known for his campaign in the early 90's to persuade the United States government to publish public records on the Internet -- sometimes, in the face of opposition from government officials and from industries that profit from selling those records. But by going ahead and posting the entire text of all Securities and Exchange Commission documents and much of the patent office database, he spurred public demand for those records, which then pushed the agencies to make the documents available free online.

This time around, he has pulled together a group of co-workers and advisers with long track records in Internet innovation. His partner is his wife, Rebecca Malamud, a prize-winning Web site designer. Other workers and advisers involved with the project include Marshall Rose, who created the computing standard used by millions of people to send and receive e-mail messages -- the Post Office Protocol, or P.O.P. Another is Vinton Cerf, one of the chief architects of the Internet. And the venture capitalist William Randolph Hearst III is providing support.

The NetTopBox effort got its start in Invisible Worlds, a company that Mr. Malamud founded in 1998 to create ''maps'' to help Internet surfers navigate the wilds of online data. That company failed a year ago, and since then, Mr. Malamud has taken some of the software that was developed for the project and applied it to creating the first maps of media material like television programs. The work is being done under the aegis of the nonprofit organization that Mr. Malamud created to run his Internet Multicasting service. The organization has raised nearly $1 million from investors to finance the programming stage.

His advisers express admiration for Mr. Malamud's vision and tenacity. ''Often, he succeeds at what I think his primary goal should be, which is to change the world,'' said Paul Vixie, the creator of Bind, one of the programs that underlies the Internet. ''It's going to clear the field for real innovation to take place'' in organizing myriad streams of information coming into people's lives, he said, adding that The public can only benefit.

He applauded Mr. Malamud's willingness to go up against Gemstar. ''I don't like it when people do warfare with patents,'' Mr. Vixie said.

Another adviser to the company, the computer scientist David J. Farber, said that as were many people, he was frustrated with the limited indexing and program search abilities of today's electronic program guides. ''I don't watch much TV, but I want to watch what I want to watch,'' he said.

''Marshall and Carl are both prone to try to shake things up if there's something they don't like,'' he said. ''Carl and Marshall are just abrasive enough to pull it off.''

THE WALL STREET JOURNAL.

**Engineer Group Is Backing New Protocol
To Handle Large Blocks of Data on Web**
By David Bank

A group of Internet engineers who pioneered key network technologies are backing a new protocol they say will make it easier to handle and transport large storehouses of data on the Web.

Unlike some of the early building blocks of the Internet, which emerged from university labs or informal collaborations, the newly proposed standard, known as the Blocks protocol, has been developed by a San Francisco start-up company with venture-capital backing. The company, Invisible Worlds Inc., says it will make the nonproprietary protocol freely available in the hopes it becomes an Internet standard, along the lines of HTTP (hypertext transfer protocol), the system used to link and call up Web pages.

"We believe we've solved a broad class of problems in the area known as `metadata,' or information about information," said Carl Malamud , chief executive of Invisible Worlds, who is set to release the specifications today. "It allows for a much smarter Internet."

To demonstrate the utility of the new protocol, Invisible Worlds plans to make available more than 75 trillion bytes, or 75 terabytes, of U.S. government data, including databases on copyrights, trademarks and patents, to show how the new technique makes it easier to slice and dice information. Already, the company is offering three terabytes of data from the Securities and Exchange Commission's Edgar database of financial filings.

By using another protocol called XML, or extensible markup language, Invisible Worlds makes it possible to annotate and link data more easily. For example, a search of the patent database will disclose links to SEC documents that discuss pending patent litigation, Mr. Malamud said.

Mr. Malamud said the Blocks protocol will enable the transport of XML information, in much the same way that HTTP enables the transport of HTML, the basic language for creating Web pages. He said the new protocol will specify the ways such metadata tags are exchanged between servers and personal-computer software, and the way other software companies can add services for, say, cell phones.

"The Web allows the interchange of pages. We allow the interchange of metadata," Mr. Malamud said. "It's another layer of service added to the Internet."

The protocol has the backing of some storied names in Internet lore, including Tim Berners-Lee, the "father of the Web" and director of the World Wide Web consortium, a coordinating body housed at the Massachussetts Institute of Technology. Also on the Blocks protocol advisory board is David Clark, senior research scientist at the Laboratory for Computer Science at MIT who played a key role in the early development of the Internet's protocol; Steve Deering, an engineer at Cisco Systems Inc. who developed Internet multicasting and the next generation of the Internet protocol; and Paul Mockapetris, inventor of the domain name system. The protocol is to be presented at the March meeting of the Internet Engineering Task Force, a standards-setting body.

Mr. Mockapetris said Blocks could make it easier to build distributed applications, such

as the domain name system or the Internet itself. "The costs to build these systems are enormous, so we see few of them become ubiquitous," he said in an e-mail exchange. "But now we have the Web and XML, which together with Blocks may become enough to start a new revolution -- all of a sudden, it may become practical to build distributed applications for less than millions and billions of dollars."

Invisible Worlds has received a total of $15 million in financing from Reuters Greenhouse Fund, a unit of Reuters PLC in London; Softbank Venture Capital in Mountain View; and El Dorado Ventures in Menlo Park, Calif.

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THE WALL STREET JOURNAL.

Technology Journal
Under the Radar

Making a Map of the Internet Universe
By David Bank

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The Wall Street Journal
Page B8
(Copyright (c) 1999, Dow Jones & Company, Inc.)

If Yahoo! Inc. is a Yellow Pages for the Internet, Carl Malamud wants to create its Rand McNally.

To Mr. Malamud , founder of Invisible Worlds Inc., the World Wide Web is as vast and bewildering as most of the physical world was to medieval man. Users have little understanding of the highways and networks that shape information flow, and even less insight into the relationships among pieces of information stored around the globe.

What they need, Mr. Malamud believes, are maps to understand context and see connections, giving the user a sort of three-dimensional overview of the information infrustructure. It's an abstract idea, but the tiny start-up plans to prove the concept with the same nuts-and-bolts data that first made Mr. Malamud a bit of a celebrity on the Internet.

In 1994, as head of the nonprofit Internet Multicasting Service in Washington,D.C., Mr. Malamud put the entire text of Securities and Exchange Commission filings on the Internet. The effort led the government to make the documents freely available, opening a database dubbed Edgar -- for Electronic Data Gathering Analysis and Retrieval System -- to widespread use.

Hooking up with another Internet pioneer named Marshall Rose, Mr. Malamud is again diving into the 40 gigabytes of SEC filings to build a bigger, smarter database. Invisible Worlds, based in Redwood City, Calif., exploits a new technology called XML, or extensible markup language, to apply identification tags to individual pieces of information.

These hidden markers identify the key attributes of data. For example, some Web-based shopping services use XML tags for attributes such as "model," "price" and "features" to be able to display comparisons of products available from multiple electronic merchants.

Invisible Worlds has developed software that automatically parses information such as the SEC data with XML tags, a process Mr. Malamud calls "skulking." Once in that form, users could search Edgar for, say, all annual reports from financial-services companies, and ask to see only the balance sheets from each firm. Such searches within multiple documents are nearly impossible on the Web.

Instead of a text search, users also could ask to see results presented in the form of a map showing connections between various financial tables.

"There's lots more you can do with this data and I'm going to prove it," Mr. Malamud says.

The massive XML database, to be made available next month, is just a start. With $500,000 in funding from Softbank Technology Ventures, a unit of Japan's Softbank Corp., the company hopes to create other searchable maps using Mr. Malmud's metaphors: "Net space," representing the physical infrastructure of the Internet, such as network routers and fiber-optic trunk lines; "People space," a kind of super phone book that relates names with phone numbers, home pages, favorite books, and any

other link individuals deem important; and "Geo space," customized maps of real-world objects. Mr. Malamud expects people will manually annotate maps with their own tags to augment the work of the automated skulker software.

Besides creating maps itself, Invisible Worlds is developing the underlying technical protocols and tools so others can create their own maps.

"The ultimate vision is a big enough set of spaces that have been mapped that we become one of those fundamental utilities on the Net, like Yahoo," he says.

Another way to think about the project is as an effort to give future Web browsers "up" buttons in addition to today's "forward" and "back" controls.

"When you wander around on the Web, you would like to be able to get above it and look around," says David Clark, a senior research scientist at the Lab for Computer Science at the Massachusetts Institute of Technology and the chairman of Invisible World's advisory board. "Your browser should be able to go up or down. When you say, "up," you get the map."

Mr. Rose, Malamud 's partner, is credited with such early Internet innovations as the Post Office Protocol that is central to most electronic-mail programs. Like Mr. Malamud , Mr. Rose is a veteran of the Internet's early days, when such basic network infrastructure was developed by ad hoc collaboration among academics and other researchers. Mr. Malamud was unsuccessful, however, in three years of trying to raise money for the Internet Atlas through the nonprofit Internet Multicasting Service before adopting the for-profit approach.

"More innovation is occurring in startups and corporate research labs than ever because there's capital available for people to build things that have future use," Mr. Rose says.

Mr. Malamud has been seeking inspiration from everything from the cosmographic maps of Southeast Asia to the "songlines" of Australian aborigines. He is particularly fond of a story by the Argentine writer Jorge Luis Borges, who once wrote of an empire in which cartography reached such perfection that "the College of Cartographers evolved a Map of the Empire that was the same scale as the Empire and that coincided with it point for point."

"The real power is when you are making your own personal map, you can cut and paste other spaces into the one you are building," Mr. Malamud says. "These `spaces' are just ways of defining the existing world."

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Private Entrepreneurship for the Public Good

by David Morris
Institute for Local Self-Reliance

June 30, 1998

"He is no different from (CBS founder) Bill Paley or Edward R. Murrow in creating the new cyberspace model," said Eric Schmidt, chief technology officer at Sun Microsystems Inc. "He sees himself as an information entrepreneur and a change agent."

If you believe Schmidt is talking about Bill Gates, please turn in your modem. The object of Sun Microsystem's admiration is the far less well-known but far more innovative Carl Malamud, a 39 year old Visiting Professor at the Massachusetts Institute of Technology Media Lab who just a few days ago added yet another victory to his already impressive record of using private entrepreneurialism for the public good.

Malamud came to the internet just as it was converting from text to images, from a small network of military and academic researchers to the mass communications medium we now call the world wide web. In 1993, he established the Washington, D.C.-based non-profit, Internet Multicasting Service(IMS). As David Bank wrote in 1995 in the Denver Post, Malamud "has a vision of an electronic community that includes more than shopping malls and movies. He is trying to construct public places in the electronic world--free concerts, public libraries, open government." Says Malamud, "there needs to be a public space on the Internet..."

One of Malamud's first initiatives was to persuade the government to make public information truly public. Washington spends billions of dollars gathering data but has been remarkably reluctant to allow its citizens free access to that information. Thus citizens have to pay twice: once to gather the data and a second time to access it, usually from private companies.

In the mid 1980s the Securities Exchange Commission(SEC) spent almost $80 million to create the electronic EDGAR data base, which contains corporate annual reports, proxy statements and other filings made by nearly 75 percent of the nation's public companies. In 1993, Malamud asked the SEC to post that data on the web. It refused, partially at the urging of a private information industry that was earning a reported $250 million a year for selling repackaged EDGAR data.

In true entrepreneurial fashion, Malamud ran up a $40,000 debt on his credit card, solicited other contributions and purchased the EDGAR data. In January 1994, over the vigorous objections of the SEC and other government agencies, IMS began to post the full text of SEC documents, several years of patents, the Congressional Record and other public documents on a web site appropriately named www.town.hall.org.

Malamud announced that he would provide the service for 18 months, giving the public a taste of truly accessible public information. Then he would shut it down and urge users to demand that their government assume that responsibility. Eighteen months later almost 20,000 people were using the IMS web site each day. The SEC blinked. Commission Chairman Arthur Levitt Jr. announced, "I think it's enormously impressive that so many members of the public found this service useful. Because of this, I raised this issue to highest priority at the Commission." In October 1995, the SEC began to offer its corporate data free. Today the site receives more than 500,000 visits a day.

But the Patent and Trademark Office(PTO) still refused to provide free public access to its public data. This May, after five years of frustration, Malamud issued a challenge. By July 1st, if the PTO still refused to provide that service, IMS would purchase the entire Patent and Trademark database and make it publicly available on the web. Then at the end of the year, "I'll pull the plug out from the users and give them Al Gore's e-mail address."

Bruce Lehman, the Commissioner of the Patent and Trademark Office defiantly responded, "What Malamud wants us to do is permit people to download the entire database. If he can do that we'd be out all $ 20 million we now receive in fees. Why would anyone want paper?"

Malamud insisted that the federal government should not view itself so narrowly. The PTO is not a private corporation seeking to maximize its revenue but is a public corporation whose goal should be to promote the common good. To Malamud, the common good required public access. Making the entire patent database available to any college student with 100 gigabytes of disk storage capacity would touch off an explosion of scientific creativity.

A few days ago, a week before Malamud's deadline, the PTO gave in. The agency announced that, beginning in August it would post trademark data to the web and beginning early next year, all patent data. Malamud generously announced that he was "thrilled".

An entrepreneur for the public good. In the age of Bill Gates, I find Carl Malamud delightfully refreshing.

Pioneer Press

David Morris is vice-president of the Institute for Local Self-Reliance His columns regularly appear in the St. Paul Pioneer Press

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ILSR Home Page | The Carbohydrate Economy | Waste To Wealth | The New Rules Project | David Morris Columns | Sustainable Minnesota | ILSR Publications List |Other Links |Comments

ILSR on the Web at http://www.ilsr.org

Financial
NETWORKINGS
Ideas Whose Time for Free Access Has Come
John Schwartz

If the World Wide Web could be felt and not just merely surfed, you'd be feeling a very big rumble in August. That's when technicians will begin connecting one of the largest single databases ever offered on the Web. It's the official record of the U.S. Patent and Trademark Office (PTO).

How big a deal is this? Bruce A. Lehman, commissioner of patents and trademarks, put it to me this way: "This database is the record of technology at this moment in time."

If some unimaginable holocaust were to zap the United States, he said, survivors could pull the PTO's backup tapes out of the Pennsylvania salt mine where they're stored and "entirely reproduce all of the technology of the 20th century." And now, he continued, "we are putting the entire library of the technology of our time on the Web, available with a few keystrokes."

If you're not impressed yet, you just might need to have another cup of coffee.

But before we say more about this new stuff, let's build up to it by discussing some very old stuff.

You might think this is a nation built of laws, or of power, or of money. But it's also a nation of ideas. This whole country, as Abraham Lincoln said at Gettysburg, was invented because of a "proposition": the once-crazy notion "that all men are created equal." To ensure the survival of the marketplace of ideas that helped them create the structure of the new government, the Founding Fathers made freedom of speech the Constitution's first amendment.

Just as important, they enshrined within that Constitution the notion of protection for ideas that might make people money through a system of patents and copyrights. There it is, right there in Article 1, Section 8: Congress shall have the power "to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

Jefferson, Franklin and many other prominent Americans present at the birth of the republic were scientists and inventors on the side. They knew the power -- and profit -- that can come from an idea. But like all of the great notions at the core of our nation, the system of patents and copyrights they envisioned was a delicate balancing act: On the one hand, the person who comes up with ideas deserves a degree of protection. On the other, those ideas become infinitely more powerful when shared and built upon.

All right. Now let's click forward a couple of hundred years and many millions of patents later. I was sitting at my desk when the phone bleated its electronic tone. I picked it up and heard the unmistakably impish voice of Carl Malamud, one of the Internet's more provocative guys.

Malamud believes that government information belongs to all the people and ought to be freely available on the Web. He is on one side of a long-standing tug of war with companies that profit by packaging government information and reselling it to businesses and consumers.

Through his Internet Multicasting Service, he has had a hand in pushing an incredible amount of such information into the ether, most notably filings with the Securities and Exchange Commission, the Federal Election Commission and the Government Printing Office. He's often helped force those government agencies to take over and improve the online operations. So whenever Carl calls, I figure I'm in for a pretty interesting

ride.

This time he had his sights set on patents, one of the biggest kahunas out there. They've long been available by mail and at one of 70 national patent libraries, but he was agitating to get them online. He was calling me to say he was fed up with waiting. After Malamud made his frustration known through the New York Times, a Washington-area Internet entrepreneur anonymously ponied up $500,000 and told Malamud that he should just do what big business does and buy the patent information himself -- and then give it away.

Malamud started working round the clock and began quietly telling journalists that his bare-bones patent Web site would open its virtual doors on July Fourth.

Then last Thursday, Commissioner Lehman made his announcement. First will come trademark text libraries, in August, followed by trademark images and patent text in November. Patent images will begin appearing in March 1999. The full text of the 2 million patents dating back to 1976, along with trademarks from the 1800s onward, will be online, Lehman said, joining 20 years of patent abstracts and full AIDS-related patent databases that his office already makes available online.

That will be the start, the patent office says. The grand aspiration: that one day every single patent going all the way back to the beginning will be online.

The new databases will be searchable by key word -- a crucial feature that Malamud had no plans to provide since he assumed others would jump in to fashion innovative tools for exploring the trove. "For the first time in history," Lehman told me, "patent info will really satisfy the intent of the Constitution." Anyone with access to the Web will be able to share the wealth of the world's creative genius; "Now just-ordinary people will be able to have that information at their fingertips."

Those who currently profit by reselling patent data still will be able to do so, Lehman predicts, by finding ways to help users draw needles of usable information out of that vast haystack of data.

Malamud is withdrawing his Web patent effort, and he praises the Clinton administration for making this treasure available to us all. "It's a good thing," he said when we talked. "The intellectual property market is going to change because of this."

Lehman denies that Malamud's campaign figured in what the PTO will now do. Putting the database on the Web site, he notes, has been in the works for some time and is a key element of both Vice President Gore's "Reinventing Government" initiative and Commerce Secretary William M. Daley's efforts to boost electronic commerce.

But before launching the site, the PTO had to first ensure that its patent reviewers had access to the full database, Lehman said, and then a separate system for the general public had to be developed to ensure security. These things always take longer than activists would like. "Like everyone, he wanted it yesterday," Lehman said of Malamud with a sigh.

However it happened, I'm just overjoyed that this vast data tsunami is going to hit the Net. I think about people like my pal Scott Campbell, a New York inventor who drives down to Washington a few times a year to do patent research, who now will be able to do much of that work from his home.

I think of high school students who might someday be inspired by examining online the images of Thomas Edison's patent application for the first phonograph. I'm wondering what ideas will be sparked by their searches.

And I know that somewhere, the Founders are smiling.

Schwartz can be reached at schwartj@twp.com

Places to Go

The U.S. Patent and Trademark Office can be found at http://www.uspto.gov/. You can read Lehman's announcement of the online patent initiative at http://www.uspto.gov/

web/offices/com/speeches/aba9806.htm.

The New York Times
www.nytimes.com

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June 25, 1998, Thursday

U.S. to Release Patent Data On a World Wide Web Site

By JOHN MARKOFF

In a new plan for making Government information freely available over the Internet, the Clinton Administration will announce today that it will make the full data base of the nation's patents since 1976 and trademark text and images starting from the late 1800's available on the World Wide Web beginning in August.

The project, which will create the largest Government data base on the Internet, is to be announced by Bruce A. Lehman, Assistant Secretary of Commerce and Commissioner of Patents and Trademarks, in a speech to the American Bar Association's section on intellectual property law in Williamsburg, Va.

The decision to make the data base freely available is a result of a fierce debate that has gone on for years between public interest advocates who argue that Government information should routinely be made available on the Internet and companies that purchase the data from Government agencies to resell.

Indeed, the Clinton Administration's action came less than a week before a deadline imposed by Carl Malamud, an independent Internet pioneer, who in May said he planned to purchase the data from the Patent and Trademark Office and make it publicly available if the Government failed to act.

After imposing the deadline in a letter to Vice President Al Gore Jr. and the Commerce Secretary, William M. Daley, Mr. Malamud said that he had received an anonymous donation to support his project and that he was developing his own system of patent and trademark records.

Mr. Lehman, however, said that his agency had already made a commitment to Mr. Gore to make the data base available as part of the Vice President's ''reinventing government'' program.

Mr. Malamud said today that he had decided to shelve his plans.

''Our site was a backup in case the Administration refused to budge,'' he said. ''We very pleased with the outcome of this five-year struggle. The American public gets the data they deserve, and the Clinton Administration has shown real responsiveness by reversing its earlier policy.''

In January 1994, Mr. Malamud's group, the nonprofit Internet Multicasting Service, posted the full text of filings made by corporations to the Securities and Exchange Commission and several years of the patent data base over the objections of the S.E.C. and the Patent and Trademark Office. His organization later added data bases from the General Services Administration, the Federal Election Commission, the Federal Reserve Board and the Government Printing Office.

In a telephone interview, Mr. Lehman said that it had long been his intention to make both data bases available on the Internet but that he needed first to meet a range of technical and policy criteria.

''Creating a 1.3-terabyte searchable data base is a big technical feat,'' he said. A terabyte is one trillion characters of information, equivalent to about a million copies of ''Moby Dick.''

First, he said, such a system requires tight security provisions to isolate it from the Patent and Trademark Office's internal computer network. In addition, he said, his agency had to perform an economic analysis on how

the decision would affect both the Patent and Trademark Office and the information industry.

''We have no interest in competing with the private sector,'' he said, adding that his agency's analysis had shown that the private-sector offers added value beyond the patent and trademark documents.

The new data bases will be available at the Patent and Trademark Office's Web site beginning in August, when trademark text will go on line. Trademark images and patent text will follow in November. Patent images linked to the text of the patents will be made available by March 1999, he said.

The data base of more than two million patents will be searchable by key word, as will more than 800,000 registered trademarks and 300,000 pending trademarks. The entire data base will be made up of 21 million documents.

Currently the Patent and Trademark Office makes abstracts of patents available, a system that is already providing users with more than three million pages of patent material a month.

The Patent and Trademark Office received 237,045 patent applications in the most recent fiscal year -- a 14.9 percent annual increase -- and approved about 114,000 patents. Trademark applications grew by 11.8 percent, to 224,355.

The new data base on the World Wide Web is a significant step forward, Mr. Lehman said, adding that his plan calls for completely automating the nation's patent system by 2003.

Organizations mentioned in this article:
Patent and Trademark Office

Related Terms:
Inventions and Patents; Freedom of Information; Computers and Information Systems; Internet and World Wide Web; Trademarks and Trade Names

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May 4, 1998, Monday

U.S. Is Urged to Offer More Data on Line

By JOHN MARKOFF

An Internet pioneer who put data from the Securities and Exchange Commission on line four years ago at no cost to computer users is now challenging the Federal Government to make the nation's patent and trademark data base freely available. He is threatening to undertake the project himself as a guerrilla effort to make the data publicly accessible if the Government fails to respond.

The challenge was in a letter sent last week to Vice President Al Gore and Commerce Secretary William M. Daley by Carl Malamud, president of the Internet Multicasting Service, a nonprofit organization that has undertaken a variety of Internet publishing efforts.

Mr. Malamud's crusade throws new light on a continuing dispute between those who advocate widely distributing Government data bases that are created at taxpayer expense and the thriving private information industry that remarkets and resells the information to business customers and libraries.

The rise of the Internet as a ubiquitous channel for distributing digital information cheaply is adding new pressures from public information advocates who contend that the expense needed to make Government data available to citizens has fallen significantly. They also say that the Clinton Administration has been slow to act on the 1995 Paperwork Reduction Act, which mandates that the Government make information available electronically.

In January 1994, Mr. Malamud posted on the Internet the full text of S.E.C. documents and several years of the patent data base over the objections of the S.E.C. and the Patent Office. His organization later added data bases from the General Services Administration, the Federal Election Commission, the Federal Reserve Board and the Government Printing Office as well as provided audio feeds from the floor of the House and Senate.

The Internet Multicasting Service ran the S.E.C. and patent and trademark data bases for 18 months before running short on money. At that point the S.E.C. agreed to take over and provide the corporate financial data itself. The Web site now receives more than 500,000 visits daily, downloads about 15 to 20 gigabytes of data a day and has recently upgraded to a high-speed data line.

''The outcome with the Patent and Trademark Office was not as successful,'' Mr. Malamud wrote in his letter. The agency, he said, refused to change its position.

Officials at the Patent and Trademark Office responded that the agency was in a difficult position because it is self-financed and that making raw patent data available for wholesale public downloading would jeopardize the agency's existence.

Bruce Lehman, the Commissioner of the Patent and Trademark Office, said in a telephone interview that he did not have a philosophical quarrel with the idea of making patent information more publicly available. He said his agency had begun making some of its information available on its Web site. For example, it is now possible to retrieve the first page of any patent filed in the last 20 years and then request a paper copy of the entire patent document.

''We'd do this tomorrow if we had the funding,'' Mr. Lehman said. ''What Mr. Malamud wants us to do is permit people to download the entire data base.

''If he can do that we'd be out all $20 million we now receive in fees,'' he said. ''Why would anyone want

stomach keeping the ambitious enterprise afloat on his credit cards. Of course, he had raised some $3 million in private and public money to get IMS off the ground in the first place, so you get the feeling he could raise more.

On another level, it comes down to personality: Malamud is more of a creator than a maintainer. Sifting through 500 messages a day and dealing all the problems of a going concern isn't nearly as much fun as coming up with a wild idea and seeing it make its debut. "I'm an architect," he says. But he was a frontier architect, designing the edifice and taking a hand in raising it too.

Which brings us to the other, more important reason he wants to quit: The Internet has been catching up with him. Those frontier towns are becoming modern cities -- and fast.

"Now there are craftsmen out there who know their tools much better than I do," Malamud says. Internet "radio stations" abound, and other ideas Malamud pioneered have become commonplace as well. The SEC now distributes much of its information free over the Net, in no small part because of Malamud's carping and harping. The Internet, he says, "has grown up and gone mainstream, which is good."

So he's taking a two-year appointment as a visiting scientist at the Massachusetts Institute of Technology's Media Lab, going off to recharge his batteries and to find the future again. He has rented famed physicist Enrico Fermi's old house -- sort of a return to Malamud's roots, as his physicist father raised Carl around the Fermi National Accelerator Laboratory outside Chicago. He is already planning new mischief: "Fermi's refrigerator is in the basement -- let's see if we can hack that, get it on-line somehow."

Take care, Carl. Thanks for all the cool stuff you showed us. I'm sure we'll be hearing from you again.

John Schwartz 's e-mail address is schwartj@twp.com

PLACES TO GO

You can visit the Internet 1996 World Exposition at http://park.org/. To see what's left of the Internet Multicasting Service and other Malamud sites, aim your browser at http://www.town.hall.org. And if you're in a Christmas mood, Santa's still awaiting your letters at http://www.town.hall.org/santa.

Return to Headlines

THE WALL STREET JOURNAL EUROPE.

**U.S. SEC to Take Over Venture
Offering Internet Access to Filings**
By Mark H. Anderson And Jared Sandberg

WASHINGTON -- The U.S. Securities and Exchange Commission, in a fundamental policy shift, has decided to take over an expiring nonprofit project that offers free Internet access to corporate filings made with the agency.

The move means millions of corporate filings, including regular financial reports and stock and bond registrations, will continue to be available, 24 hours after they are filed, to anyone with a computer and modem. The SEC plans to offer its service beginning Oct. 1, the day after the two-year-old nonprofit venture ends.

"I'm delighted," said Carl Malamud, president of the Internet Multicasting Service , which operated the project with New York University. "This is a textbook example of what happens when industry, government and public-interest groups all work together to solve problems for the taxpayer."

For weeks, Mr. Malamud has been lobbying the SEC to offer filings from its own "page" on the Internet's World Wide Web. He said his service has proven quite popular, as more than 3.2 million corporate documents have been retrieved by users.

"Taxpayers and shareholders have already paid to compile this information -- they should not have to pay again," SEC Chairman Arthur Levitt said Sunday in announcing the initiative at a speech before a National Association of Investors Corp. convention in Nashville, Tennessee.

The SEC traditionally has made corporate documents available to the public primarily through a large reference room at its headquarters in Washington. The agency greatly eased access to the filings a couple of years ago when it began requiring companies to file electronically rather than on paper. Private companies developed high-priced corporate databases that Wall Street firms and others pay to access. But low-cost access for small investors through the Internet Multicasting Service had to be funded through a grant from the National Science Foundation and others.

When rumblings began a couple weeks ago that the free Internet service would end soon, Mr. Levitt said keeping the project going was a "highest priority" for the SEC. Several private firms then came forward to offer various "free" plans to fill the impending gap.

However, Mr. Levitt said all of the offers "would in some way limit the amount of information available or else attach too many commercial strings." For instance, one private-sector offer allowed free access for only 10 minutes and another allowed users to look at the information free but made them pay to download it to a computer, said SEC Chief of Staff Michael Schlein.

The SEC will package the corporate filings with its separate Internet service that offers access to agency policy initiatives and announcements, Mr. Schlein said. The service will replicate many aspects of the nonprofit venture. SEC officials plan to work on improvements, although they said it was too soon to know what might be changed. A new World Wide Web address will be announced in September.

Newsweek

The Man With Ideas

Internet: The Robert Moses of cyberspace plans a 1996 world's fair

By KATIE HAFNER

THREE YEARS AGO, CARL MALAMUD, an economist, writer and computer consultant, traveled around the world three times. In six months, he went to 56 cities and visited resident techies in each. Malamud saw that pieces of Marshall McLuhan's vision of a global village were actually falling into place. When he returned, he resolved to help make the circle complete. A conspicuous, unstoppable force in the Internet community, Malamud is organizing perhaps the most ambitious undertaking on the Internet to date: a 1996 world exposition modeled on world's fairs of the past, with 100 participating countries. Funded by corporate sponsors and expected to cost about $10 million to set up, with another $10 million in donations of equipment, the fair will blend the physical and virtual worlds. The main entrance to the fair will be called Central Park-a huge World Wide Web site residing on eight computers spread around the world. The Central Park computers will be linked by a global, ultra-high-speed electronic railroad. In addition, each participating country will have its own electronic theme pavilion. Throughout the year actual events, such as Peter Gabriel's World of Music, Arts and Dance concert tour next summer, will be broadcast over the Internet as part of the fair.

If anyone can pall this off, it's Malamud. At 36, he is the idea man of cyberspace. Malamud is perhaps best known among Internet coguoscenti for popularizing audio on the Net. In 1993 he ran up $40,000 in debt on his credit cards to buy sound equipment and began producing weekly interviews with computer experts. He called the program "Geek of the Week." People could download interviews from the Internet, store them on their computers and listen to them later.

Malamud's broadcasts were a hit, with more than 100,000 listeners the first year. But they were data-intensive, which made them easily accessible only to people with very high-speed connections to the Net. Even using a relatively fast modem, it could take two hours to download a half-hour interview. Now, with applications such as RealAudio, a new audio format that makes listening to audio on the Internet nearly instantaneous, audio on the Net is finally reaching the masses.

"Geek of the Week" grew into Internet Multicasting Service, a not-for-profit "cyberstation." Malamud oversees a staff of six from an office above a Chinese restaurant on Capitol Hill in Washington, D.C. He gets his funding and donations of equipment from corporations such as Sun MCI Communications and disc manufacturer Quantum Corp. His annual budget is about $1 million, and he estimates that there are about about 250,000 regular listeners.

An intense workaholic, he is driven by a desire to create public spaces on the Inter-net as it grows increasingly commercial. He could just as easily start a commercial venture, but the prospect doesn't particularly interest him. "I couldn't do what I'm doing in a commercial company," Malamud insists. "I'm not beholden to investors or venture capitalists and I don't have to make a profit, which means I can do new things."

Malamud's peers in the computer industry generally speak glowingly of him. Some are puzzled by his lack of interest in making money. But everyone seems to be in awe of his creativity. "You never know what he's going to think of next," says Stephen Wolff, an engineer at Cisco Systems, Inc. 'And like a lot of people who have terrific, huge-scale ideas, Carl's not always the easiest person to deal with."

Malamud inherited his technical bent from his parents - his father is a high-energy physicist, his mother a physiologist. He got his start in computers when, as a doctoral candidate in economics at Indiana University in 1982, he complained constantly to university officials about the computers. "Finally they said, 'If you're so damn smart why don't you come work here?'" he recalls. So he dropped out of the program and helped design the university's computer network. Malamud's site on the World Wide Web (http: town.hall.org) contains more than 300 hours of audio. Visitors can listen to Robert Frost reading from his poetry, check in on a National Press Club luncheon or hear a recording of the recent United Nations 50th-anniversary celebration.

On top of the intensive planning for the world expo, Malamud has been engaged in a wrangle with the Securities and Exchange Commission over the SEC's federally mandated Electronic Data Gathering, Analysis and Retrieval system, or EDGAR. The database contains financial information on publicly traded companies. With a grant from the National Science Foundation, last year Malamud put the database on the Net, making it accessible free of charge to anyone with a computer and modem. He's going to drop the project in October but hopes the SEC will keep the data in the public domain.

The world's fair will be Malamud's most daring project. Once it's over, he plans to dissolve Internet Multicasting Service, taking the assets and distributing them to different organizations on the Internet. With that, he hopes to create cyberstations similar to his, scattered around the world. Once Internet Multicasting has disappeared, Malamud says, he plans to return to writing books and consulting. But those who know Malamud aren't inclined to believe him. "That might last about three months," says one friend. Then he'll have another idea.

Design the `global village' at World Net expo   18 Mar 95

IN the 19th century, world fairs like the Great Exhibition at the Crystal Palace in London's Hyde Park introduced millions of people to the latest marvels of science and technology such as electric lighting and power. In Las Vegas at the end of this month, a group of computer network pioneers will announce their version of a world fair - the Internet 1996 World Exposition. The challenge for exhibitors at this fair will be to create cyberspace attractions that show visitors what the Internet can do for them.

A major difference between this and previous events is that the Internet expo will not be located at a single site, but in several cities around the world. Visitors to the fair, which will run throughout 1996, will have access to powerful computers, connected to the other key sites by highspeed lines that can carry huge amounts of multimedia data. In addition to the people physically visiting the exhibition, any of the Internet's 30 million users in 150 countries will be able to tap into the event as "virtual visitors".

Core sites have already been confirmed in several cities, including Washington (at the National Press Club and the Kennedy Center), Tokyo (Keio University) and Amsterdam (the Dutch institute for high-energy physics).

As at previous world fairs, the Internet expo will feature "pavilions" containing exhibits on particular themes. The difference is that the Internet expo pavilions will be accessible from all over the world. For example, the Global Schoolhouse Pavilion will enable schoolchildren to access multimedia data, such as online programs on the performing arts from the Kennedy Center, or digitised videos of fish from the Tokyo Aquarium.

The Reinventing Government Pavilion will house huge US government databases of patent, trademark and financial information, which will be available online to any visitor. Other expo attractions will include the Future of Media Pavilion, which will demonstrate the potential of the Internet as an alternative to conventional broadcasting media, and the Small Business Pavilion, at which smaller firms will demonstrate their cyberwares.

The pavilions will make extensive use of existing Internet resources, explains one of the fair's principal organisers, Carl Malamud of Internet Multicasting Service, a non-profit making organisation based in Washington. "We're not starting from scratch," he says. Other members of the organising committee include Vinton Cerf, president of the Internet Society, Eric Schmidt, chief technical officer of Sun Microsystems, and Marshall Rose, principal scientist at First Virtual, an Internet bank.

The idea for the expo, Malamud says, sprang from the realisation that in trying to promote the development of computer networking, engineers, corporations and governments were pulling in different directions. "We figured that if we could harness all three together," he says, "then we would be able to get some synergy." Thanks largely to donations and the efforts of volunteers, Malamud expects that the cost of putting on the expo will be surprisingly small: "In the millions, rather than the tens of millions of dollars," he says.

The proposal has already attracted considerable support in several countries, notably the US, where the idea for the expo originated. Vice- President Al Gore has described the expo as "an innovative, grassroots approach to demonstrating the power and potential of the emerging global information infrastructure.

"The [Clinton] administration is committed to working with companies, institutions, and community leaders from around the world to make this initiative a success," he said.

Several American high-technology firms have already pledged cash, equipment and resources such as programmers' time. They include disc drive maker Quantum, which is donating a terabyte of storage space - equivalent to a million floppy discs. Computer manufacturer Sun Microsystems is also offering equipment, and long-distance telecommunications carrier MCI will provide the high-speed "T3" dedicated lines. These will be needed to shunt massive amounts of data between core expo sites in the US, Asia and Europe at 45 megabits per second.

In Japan, corporate sponsors include Sony, NTT and NiftyServe, Japan's largest online

service provider. Each will contribute at least $100 000 or the equivalent in equipment or working hours.

Organisations in three other countries - the Netherlands, Thailand and Britain - are already planning to participate.

The world fairs of the last century all left memorable legacies. These included Crystal Palace (London, 1851) and the Eiffel Tower (Paris, 1889). The legacy of the 1996 expo, according to Malamud, will be an Internet that is impossible to ignore. The plan is to accumulate enough publicly accessible data on the Internet in the form of online amenities like museums and libraries to ensure that other networks run by private companies will have to connect to it. "It's an opportunity to design the global village," says Malamud.

BOB JOHNSTONE
From **New Scientist magazine**, vol 145 issue 1969, 18/03/1995, page 19

Article 156 of 200
STYLE
A World's Fair For Modem Times; Expo Planner Wants User-Friendly Future
John Schwartz

03/15/1995
The Washington Post
FINAL
Page B01
(Copyright 1995)

Carl Malamud paces the cramped, computer-filled rooms of his Capitol Hill offices, spieling into the telephone with an earnestness bordering on desperation, his usual tone. He has the vice president's office on the phone, and he's pitching the future.

It's not like Al Gore generally needs much selling on this score. But Malamud is trying to create something broader, deeper and more resonant than merely building the information (yawn) infrastructure. He employs even juicier metaphors than the vice president does when he's on a roll. To Malamud, this is not about wires or bytes or cyber-hype. It is about wonder: an ever more rare and precious commodity.

Malamud is talking about nothing less than helping to build the social structure of the future. He thinks the way to do it is by reviving the idea of the world's fairs -- to create the Internet 1996 World Exposition, a year-long event that would be held on the Internet and viewed at sites around the world. He will officially announce the fair later this month at an industry convention in Las Vegas.

It's a wild idea, part throwback and part futuristic. Expositions like London's Universal Exposition (which left behind the Crystal Palace) and Chicago's Columbian Exposition helped introduce past generations to railroads, electric lighting and radio, thus setting the stage for the new industrial economy. Malamud and his cohorts from high-tech's elite want to create something that will "usher in the information economy." A new fair, if done well, would find ways to dazzle millions of people with the technologies that are already changing their lives.

Within a few days, word comes back from Gore's office: He's on board, bringing the Clinton administration's endorsement with him. "The Internet 1996 World Exposition is an innovative, grass roots approach to demonstrating the power and potential of the emerging Global Information Infrastructure," Gore says in a statement. "The Administration is committed to working with companies, institutions and community leaders from around the world to make this initiative a success."

Gore joins William Hearst III, Rep. Edward J. Markey (D-Mass.), Internet pioneer Vinton Cerf, and the heads of high-tech companies around the world in pledging support and cooperation to Malamud's crusade.

To understand why the elfin Malamud has persuaded so many business and government leaders to back his almost quixotic quest, you have to get one point: There are a lot of people out there who are nostalgic for the future. If you look back at the unbridled optimism of those early exhibitions, you see a belief that science and technology would change the world for the better.

"They were celebrations of technology and society, and they generated tremendous enthusiasm for technology and the future," says Yale University computer science professor David Gelernter, author of an up coming book on the 1939 World's Fair.

In the intervening years, we've seen plenty of the darker side of technology: weapons of mass destruction, accidentally deadly pharmaceuticals, environmental decay. The cast of thinking changed, and our forebears came to seem quaint in their naive belief in a happy future.

But what if they weren't naive? What if they were on the right track, and we've just been slapped around so much by setbacks in our time that we have lost sight of what the future could be? What if, in fact, it's not the future that we should fear, but the wrong future?

Take the Internet. In these salad days, it is still vibrant, useful and cool, with a diversity of expression and ideas that occasionally causes trouble but is always bracing. Such a technology has the clear potential to educate, entertain and enrich people around the world. But, like any emerging technology, it could go down the wrong path, its oddities ironed out and its excesses censored until it becomes something uniform, expensive and cold. You know, like cable TV.

What the new romantics seem to fear most of all is that the excitement that's now there will die. Visionaries might hope for an Internet bursting with boutique businesses, but we could end up with Wal-Mart; the cyberspace equivalent of a funky neighborhood delicatessen could be transmuted into a soulless Shoney's. "The future is your friend," Malamud says. "We think by doing this stuff, it's going to be a better place."

Trying to usher in the right future is the challenge, and that's where wonder comes in. It can't come from a speechwriter's PC. It comes from giving people a whiff of something awesome.

Malamud will promote the world's fair on-line in a series of files that he will publish later this month on the Internet's World Wide Web. In the current draft, he starts out by stating that the global Internet "will become a fundamental building block for business in the 21st century, just as important as the telephone and telegraph were for business at the dawn of the 20th century." But there's a problem: "We are building a global village, but are doing so in a haphazard fashion without any sense of community or shared purpose . . . "

"The Internet 1996 World Exposition will be our opportunity to build a public park for the global village, a place that emphasizes what a community looks like in an information age. . . . People do not move to cities without parks, schools, libraries and other public facilities. If we want people to move to the global village, if we wish to see the birth of an information economy based on the Internet, we need to provide people with a view of that world."

The fair would draw together some of the most interesting projects currently on the Net, including the Global Schoolhouse (which links students for research projects worldwide) and the Kennedy Center's new "Arts Edge" (which puts arts education resources on-line). Malamud hopes to spur the world's engineers to come up with new "pavilions" scattered around the world that would allow visitors to, say, take a multimedia tour of Tokyo or sample new kinds of on-line media. The major pavilions would be connected by a super-fast computer backbone that would survive the one-year exhibition -- an "Internet Railroad," to use yet another Malamudian metaphor.

Big talk from a guy whose offices can be found atop the Young Chow Chinese restaurant on Capitol Hill and in even smaller quarters at the National Press Club. But Malamud has always thought big -- and, more often than not, he delivers. Presidential telecommunications adviser Tom Kalil, Gore's designated smart guy on tech issues, said, "You have to look at the track record of the folks who are putting this together."

Malamud, a writer and computer consultant, started acting on his vision of the future fueled by a mixture of personal credit cards and chutzpah. He founded a nonprofit group, the Internet Multicasting Service , wheedling and wrangling volunteers and corporate contributions. He has created programs that consistently test the limits of what computer networks can do, including a radiolike system for broadcasting many channels of news and information directly over the Internet. (One interview feature is dubbed "geek of the week.")

Malamud also has a mania for putting government information on-line. He recently started broadcasting a live sound feed from the floor of the House and Senate to the Internet. Much more than C-SPAN on a PC, this system allows users to tune in whenever they like to hear a particular speech: rhetoric on demand. Malamud's operation has also worked with the government to make vast quantities of information from the Securities and Exchange Commission and the U.S. Patent Office available free to anyone with a computer and a modem.

Each has been a huge, exhausting project. But they seem puny compared to the challenge of organizing the exposition. Malamud says he will spend the rest of the year working on it, and has talked top engineers from high-tech corporations into taking sabbaticals to work with him on a volunteer basis.

They too want a shot at getting the future right, this time.

THE WALL STREET JOURNAL.

**On-Line Internet Expo Will Promote
Cyberspace to the Whole Wired World**
By Jared Sandberg

NEW YORK -- A consortium of corporate sponsors and high-tech hotshots plans to stage a 1996 world's fair in cyberspace.

The Internet 1996 World Exposition will be a global initiative to introduce the Internet to those who don't already know about it, just as prior world's fairs flaunted railroads, electrical power and the Ferris wheel.

But this world's fair will be entirely virtual, played out in cyberspace on host computers and accessible only by desktop computers linked to the Internet , the global web of computer networks.

This global gathering will start on computer systems in the U.S., Japan, England, the Netherlands and Thailand. The exposition, which will be announced on March 29th, will run throughout 1996. "It's the first world's fair that's located in the world, not in one city," said Carl Malamud , one of the exhibition's organizers and president of the Internet Multicasting Service, a Washington, D.C. nonprofit firm that specializes in putting the Internet to unconventional uses. "We're building a public park for the global village," he said.

For those who aren't wired, computer links to the exposition will be available at selected public libraries and museums, the organizers said.

Backed by corporate sponsors that include MCI Communications Corp., Sun Microsystems Inc., and Quantum Corp., the fair will feature a number of virtual "pavilions." A "Reinventing Government Pavilion" will include a database of all U.S. patents, trademarks and Securities and Exchange Commission filings. The "Global Schoolhouse Pavilion" will feature live video broadcasts from Washington's Kennedy Center and cameos of swimming fish at the Tokyo Aquarium.

Other electronic displays will address small-business use of the Internet and a "Town Hall" feature that will broadcast monthly video sessions from the National Press Club in Washington. Another pavilion, ToasterNet, will broadcast the winners of technology-invention contests at trade shows sponsored by Japan's Softbank Corp.

The various data will amount to more than a "terabyte" of storage space, the equivalent of one million floppy disks, according to a spokeswoman for Quantum, which is donating the computer storage. Those computers will be connected by high-speed fiber-optic connections -- dubbed the " Internet railroad" -- that can send 30 floppy disks of data per second from country to country.

The effort is the brainchild of Internet architect Vinton Cerf and Mr. Malamud , who has been pioneering the use of the Internet for radio shows and video broadcasts for roughly two years. His radio show, called "Geek of the Week," features recorded interviews that Internet users can download to their computers.

SPECIAL REPORT
The Frontier of Broadcasting Radio Programs Are Going On-Line
Wendy M. Grossman

Radio owners used to boast about all the exotic places whose broadcasts they could receive. Some radio hams - and some satellite dish owners - still do. Now Internet users can get in on the game: equipped with a couple of public-domain software packages and a sufficiently hefty Internet connection, you can listen in live to the proceedings from the House of Representatives courtesy of the Internet Multicasting Service or sample the eclectic mix of music favored by North Carolina-based student radio station WXYC.

If you really want to confuse people, tell them you've been watching radio - Santa Cruz-based KSCO sends out "Radio You Can See" by transmitting a picture every few seconds from a video camera positioned in the studio.

The Internet Multicasting Service and WXYC are two of the three main broadcasting initiatives on the net. The third is the Internet Underground Music Archive, which stores material from some 400 bands playing anything from folk to "Japanese experimental noise." The Rolling Stones were the first band to broadcast a live concert in cyberspace last November, but the archive beat them by a week with an independent band broadcasting from a studio.

Several types of technology make Internet broadcasting possible. WXYC depends on a piece of software developed at Cornell University and designed for videoconferencing called CU-SeeMe and a series of reflector sites that users can log onto around the net. IUMA and the Internet Multicasting Service use an experimental layer of the Internet called the Multicasting Backbone, or Mbone for live broadcasting of audio and video. To receive this directly, your Internet service provider has to be hooked into this layer. Almost anyone who's got a lot of patience can listen to programs or music from these services' archives; you can download these over the Web or via FTP and play them back offline. Just remember to check your disk space before you start: broadcast-quality sound takes up 30 megabytes per hour.

There are a lot of hours. The Internet Multicasting Service is broadcasting five channels around the clock. Most of it is rebroadcasting existing feeds over the net - everything from the House of Representatives, everything from the Senate, World Radio Network, the National Press Club luncheons, Monitor Radio, and Harper Audio's selections of readings.

It does produce a few of its own shows, however, including its flagship program, "Geek of the Week." This is a series of interviews conducted by the service's founder and president, Carl Malamud, with technology experts of interest to the net community, folks like Scott O. Bradner, a multiple area director of the Internet Engineering Steering Group.

"When you think Geek, think Sun," says Mr. Malamud, referring to Sun Microsystems, the service's first sponsor. It has others now, including O'Reilly & Associates, MCI, and the National Science Foundation; the service is listener and sponsor-supported, along the lines of public radio. Mr. Malamud figures that the service has 150,000 to 200,000 listeners, but the material may be copied many times and is piped all around the world at a tiny fraction of the cost of traditional broadcasting.

"With $100,000 and three months," says Mr. Malamud, "we put together a service that from day one reached 30 countries." Eventually, he says, the service will be able to do audio-on-demand. Someone in Japan could log onto the system's server and search by subject or date to access a specific congressman's speech. That is something traditional broadcasting has never been able to offer.

Initiatives like this, though, raise questions for those who have traditionally regulated broadcasting.

A spokesman for the Department of National Heritage, the overseer of broadcasting in Britain, says that the current review of the 1989 Broadcasting Directive that covered television without frontiers, which at the time meant simply satellite and cable services, is having to cope with these technological advances. On the one hand, Britain is arguing that "a limited form of consumer protection may be helpful" (read: control over content that may be banned under existing national laws covering broadcast media); on the other, it's opposed to quotas, which would be easily circumvented by such direct-access services anyway.

For some, though, it's a chance to counter the last decade's steady concentration of the mass media into the hands of a few conglomerates.

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WENDY M. GROSSMAN is a journalist based in London who specializes in computer topics.

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FINANCIAL
Battle Brews Over Fees for SEC Report; Group Believes Public Should Have Free Access
Robert Thomason

01/09/1995
The Washington Post
FINAL
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(Copyright 1995)

An article in last Monday's Washington Business misidentified a Fairfax company that is helping clients file electronic information to the Securities and Exchange Commission's Edgar database. The company is CBT Design Group. (Published 1/14/95)

Need electronic data about the quarterly revenue of a publicly traded company? Traditionally you've had to buy the information. Now, the government database that contains it is being tapped by on-line activists who, for the time being at least, are managing to distribute it for free.

It's all perfectly legal. With government and private funding, the Washington-based Internet Multicasting Service is buying raw financial data that companies file to the Securities and Exchange Commission's "Edgar" database, then putting it on the Internet computer network, where it can be retrieved by people worldwide.

The service has fueled a debate in many government agencies as cost-conscious Republicans come to power and electronic technology advances: Should agencies put on-line for free myriad information that they generate daily, or should they charge for it and save taxpayers some serious money?

Pioneers of the information highway say the public deserves free, or at least very inexpensive, access to the SEC's huge Edgar system, which stands for Electronic Data Gathering, Analysis and Retrieval. It contains reports that publicly traded companies are required to file with the SEC.

But the SEC is resisting, choosing instead to sell the data to computer services companies that repackage it and sell it on to the public. The SEC is required to fund itself, officials point out, and revenue from these sales is a big help.

The Internet Multicasting Service , a small nonprofit organization developing new uses of the Internet, began its SEC work in January 1993 with a grant from the National Science Foundation. That grant expires this year, so the service is lining up private help. So far, money or in-kind help has been pledged by Massachusetts Institute of Technology and New York University, Sun Microsystems Inc., MCI Communications Corp., RR Donnelley & Sons Co. and Time Inc.

Carl Malamud, president of Internet Multicasting, has called the coalition the Information Highway Beautification Fund.

Although he is celebrating the successful fund-raising effort, he still believes that the government should cover the cost of disseminating information that citizens have helped to generate by paying their taxes.

Internet Multicasting and its ally in this effort, Taxpayer Assets Project, are heartened by recent Republican moves to expand on-line access to government information. But they have not received commitments from GOP lawmakers about free public access to Edgar.

"The role of the SEC is to provide information to the market," Malamud said.

As the federal government expands its presence in electronic media, putting the data on the Internet for free would be an excellent way to pursue the SEC's goal, he said. He estimated that an Internet operation would require about $100,000 to start up and would need two employees to maintain.

But the SEC, which experienced years of delays and more than $20 million in cost

overruns to launch the Edgar project in the first place, is loathe to embark on new ventures when experienced and well-known companies pay well for the opportunity to do it.

David Copenhafer, who directs Edgar for the SEC, says the agency has neither the technical expertise nor the legal mandate to supply financial information in the sophisticated ways demanded by many computer users. The SEC collects raw data, but the data service companies don't typically resell it that way; they "add value" by breaking it down into meaningful units.

"There will be hundreds of different products making use of the Edgar data to meet a tremendous spectrum of needs," Copenhafer said.

The database industry can meet these needs through their many technologies, he said, while the SEC cannot pretend to meet these needs with a single Internet database.

The information already is becoming available through a variety of computer media.

Several companies are loading SEC data on CD-ROM discs. Moody's Investor Service Inc. is offering CD-ROMs of Edgar data at $995. Another company, Edgar Express Corp. of Florida, provides filings on a CD-ROM, but charges $4 for the password necessary to access the data in a single file in it.

In addition, the SEC is working with the Government Printing Office, which will produce a CD-ROM of Edgar data. And a local firm, DBT Design of Fairfax, is training companies to file to the new system.

Dayton, Ohio-based Lexis-Nexis is the prime SEC contractor that disseminates on-line data. The firm sells instantaneous feeds of SEC filings at a regulated annual prices of $183,000 or $138,000, depending on the speed of transmission used. It also provides, each day, computer tapes of the previous day's filings for $78,000 per year. The information is also available on Lexis-Nexis.

Sharon O'Donoghue, director of corporate legal markets for Lexis-Nexis, predicted that inexpensive Internet access to raw SEC data would not cut into Lexis-Nexis's business.

Most business customers do not want entire SEC documents, which are now available on the Internet and can be more than 100 pages long, O'Donoghue said.

Instead, she said, they want highly specific information about companies that would enhance their particular investment strategies. And some need it in a matter of seconds, or else the information is useless, she added.

In development since 1983, Edgar is scheduled to include filings from all of the 15,000 public companies this summer. The SEC operates the system in offices in Springfield, where it receives the data from the filing companies, compiles it and ships it electronically.

To access Internet Multicasting's Edgar data, Internet subscribers can use the gopher function to reach gopher.town.hall.org, the ftp function to reach ftp.town.hall.org, or the World Wide Web to reach www.town.hall.org. Information can also be obtained through electronic mail by sending a message to mail@town.hall.org, with the word help as the text of the message.

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San Jose Mercury News (CA)

AGENT CHANGE CARL MALAMUD HAS MADE THE NONPROFIT INTERNET MULTICASTING SERVICE THE FIRST ROUND-THE-CLOCK 'CYBERSTATION' ON THE INTERNET

DAVID BANK, Mercury News Staff Writer

WHEN Rep. Newt Gingrich took over as Speaker of the House on Wednesday, Carl Malamud helped carry Gingrich's message to the people.

More precisely, to 12 people.

That was the size of the audience when Malamud's Internet Multicasting Service launched gavel-to-gavel coverage of floor debate in the House of Representatives and the Senate over the worldwide Internet computer network.

Malamud's audience was limited because the live audio transmission requires high-capacity communication lines that are not yet available to most home computer users.

But like all of Malamud's efforts, the Congressional Memory Project is a pilot for something bigger, much bigger.

Congress itself is making texts of bills and speeches available through Thomas, its new site on the Internet. Malamud is going a step further, serving up live and pre-recorded audio files.

The Internet Multicasting Service has become the first round-the-clock "cyberstation" on the Internet, with channels for music, international programming and public affairs in addition to the proceedings of the House and Senate.

Malamud is taking technologies developed in research labs and putting them to popular use to show the Internet's potential once homes are equipped with affordable, high-speed lines.

To awaken people to the changes he sees ahead, Malamud sometimes inserts short audio clips into on-line sessions with his favorite slogan: "Adapt or die!"

"He is no different from (CBS founder) Bill Paley or Edward R. Murrow in creating the new cyberspace model," said Eric Schmidt, chief technology officer at Sun Microsystems Inc., which has supported many of Malamud's projects. "He sees himself as an information entrepreneur and a change agent."

Unlike other entrepreneurs, however, Malamud, 35, is not looking to cash in on the Internet's explosive growth. He ran up more than $40,000 in credit card debt to establish the Internet Multicasting Service as a non-profit corporation in 1993 and says he has turned away offers of millions of dollars from venture capital investors. He pays himself $6,000 per month.

Non-profit status, he said, lets him move quickly on projects, cut deals with both government agencies and private corporations, and, most importantly, pursue his interests without worrying about turning a profit.

"The fun work is before there's money in it, because it's never been done," he said. "If I wanted to make money, I'd go work for a computer company. I felt I had a vision of what the system ought to look like that I felt others didn't share."

Malamud's vision is of an electronic community -- cyberspace -- that includes more than shopping malls and movies-on-demand and virtual rooms for idle gossip. The Internet Multicasting Service is trying to construct public spaces in the electronic world -- free concerts, public libraries, open government.

Malamud constructs those sites from his cramped offices in the National Press Club building in Washington D.C., which is jammed with Sun workstations, routers from Cisco Systems Inc., audio sound boards and huge computer servers that store billions of bits of data. He's well-wired, with a high-speed T-1 line directly to the Internet. Networking wizards from around the world drop by to help; Malamud has commitments for the coming year of three days of volunteer time from a dozen top-flight researchers.

"Carl has spent two or three years doing something that nobody else has been crazy enough to do and that is to cajole lots of equipment and money out of these corporations," said Simon Hackett, who spends two-thirds of his time running his networking company in Adelaide, Australia, and the rest roving the world having fun, particularly with Malamud.

Equipment donated

Companies like Sun, MCI, O'Reilly & Associates and the publishing giant R.R. Donnelley & Sons Co., have each put up at least $100,000 in cash and even more in donated equipment and services. Last year, Malamud raised about $650,000. This year, he figures he'll collect more than $900,000.

The companies hand over the money in return for access to his ideas, his research findings and a piece of the publicity he generates with "cheap stunts" that demonstrate the Internet's versatility.

"He thinks in such weird terms," said Lance Boxer, vice president for data services for MCI, which is making a major push into the Internet market. "It's the kind of out-of-the-box thinking MCI needs right now.

"He's got ideas about how to take this thing called Internet, which was not a profitable business, and make it into something we could sell."

Resources helpful

The resources allow Malamud to quickly put many of his endless supply of ideas into practice. For him, engineering glitches and bureaucratic obstacles are simply different forms of problems to be solved.

When he found out that the Securities and Exchange Commission was paying a private information company to maintain its electronic data base and then paying again to use the data base, he offered to solve the problem for a fraction of the cost. That led to a two-year experimental project, funded by the National Science Foundation to make the Edgar data base available over the Internet.

That put him in competition with private information providers like Mead Data Central, which holds the government contract for the information.

"On Edgar, it's unlikely it would have happened without him," said Jamie Love, director of the Taxpayer Assets Project, a Ralph Nader spin-off focused on securing public access to government information sources. "He's done more than anybody in the executive branch to prove the value of government information." The next project of Malamud's "Information Highway Beautification Fund" was to be the huge data base from the U.S. Patent and Trademark Office. But the effort recently ran into resistance from patent commissioners who again fear free distribution will undercut those companies who sell the information for a fee. That attitude brings only a sneer from Malamud.

"They are more worried about their sweetheart relationships with government contractors than they are with their public duty," he said. "They feel our activities threaten their friends. I call that improper, at best."

Launches alternative

He launched an alternative "telephone company" that uses the Internet to send faxes around the world, virtually for free. The idea came to him when he realized a telephone number could be expressed as an e-mail address. That makes it possible to send fax messages as electronic mail, which incur no long-distance charges. When the message reaches a computer near its destination, the computer makes a local call to the receiving fax machine.

At Christmas, Malamud produced the first live karaoke performance of Handel's "Messiah," sending the annual Kennedy Center performance over the Internet with sing-along lyrics highlighted in red.

"He's making the technology do things we never expected," said Steve Deering, the researcher at Xerox's Palo Alto Research Center who developed the protocols for multicasting -- a way to send audio and video over the Internet -- as a tool for researchers.

"We don't have the imagination to go make these things happen, or the drive," Deering said. "He does. He doesn't consider anything to be too much of a hassle."

Bred to solve problems

Malamud was bred to solve science problems. His father was a founding scientist at Fermi Lab, the advanced particle physics laboratory at the University of Chicago, and his mother holds a doctorate in invertebrate physiology.

But he hasn't been able to shake his lifelong obsession with public policy. At 17, he managed a losing campaign for a Democratic state senate candidate in a Republican stronghold in a nearby Illinois suburb.

His computer knowledge is self-taught. As a Ph.D. candidate at Indiana University, he was supposed to be teaching undergraduate economics. But he complained so much about the campus computer center that a system operator told him to put up or shut up.

Consulting background

A decade of consulting for large computer companies and government agencies such as the Federal Reserve and the Pentagon taught him that simple access to information can change the course of technological development. The success of the Internet, he discovered, could be traced to something as simple as free on-line access to the technical standards for the protocols. Rival standards withered because college students in computer labs could not get at the tightly held and expensive documentation.

That led to his other efforts to free other caches of government information and make them available through commonly used Internet features such as e-mail, file transfer protocols (FTP) -- which allows users to get files, such as shareware from remote locations -- and the World Wide Web.

But mostly he tries to have fun (his definition: an all-night effort to wire up a network for a trade show demonstration, for example) and stir up trouble. He once persuaded a publisher to give him $45,000 to go around the world three times in six months exploring the still-nascent Internet.

Indeed, his current multicasting efforts grew out of his desire to start a magazine to tweak the sensibilities of the computer industry and tout the potential of the Internet. But he found it would cost millions of dollars to publish and he feared being beholden to advertisers.

"Then the idea came. Let's use the Net," he said.

That led to "Geek of the Week," a weekly half-hour interview that computer users were able to download and play back on their own machines. The point was partly to distribute the information and partly to understand the new distribution technology itself.

Radio show on Internet

The reaction at the time was, "What, a radio show on the Internet?" Two years later, the show has become a station that carries weekly luncheons from the National Press Club, programming from National Public Radio, a 24-hour music channel and now, the House and the Senate.

It's still a work in progress. For example, users will be able to recall snippets of legislative action by electronically searching the text of the Congressional Record for the desired subject and then ordering the audio files of the proceedings -- a kind of Congress-on-demand that C-SPAN is not able to offer.

"This method of communicating with people is going to be major media," Malamud said. "Eventually, we're going to have audiences of millions of people. This will be an important part of people's lives."
IF YOU'RE INTERESTED

To reach the Internet Multicasting Service, point your World Wide Web browser to http://town.hall.org. For information about the Congressional Memory Project, use http://town.hall.org/radio/. If you don't have access to the Web, send e-mail to inforadio.com, which will generate an automatic response to frequently asked questions. Thomas, the new congressional information service on the Internet, can be reached at http://thomas.loc.gov.

MULTICASTING BECOMES A HIT BY DISTRIBUTING ROLLING STONES CONCERT

DAVID BANK, Mercury News Staff Writer

FIRST came e-mail, then the World Wide Web.

Next up is multicasting, which really will make the Net rock and roll.

It was the 20-minute Rolling Stones concert over the Internet's multicast backbone, or Mbone, that brought widespread attention to it last November.

"Now a lot of people are trying to figure out how to get their hands on it and turn it commercial," said Stephan Fitch, president of Thinking Pictures, the New Jersey company that produced the Stones event.

Multicasting is a method for distributing live programming over the Internet. The programming can take many forms: video, audio, text or "whiteboards" -- in essence electronic chalkboards that any number of users at different sites can scribble to simultaneously. Unlike traditional television or telephone service, multicasting connects groups with groups. Every viewer also can be a transmitter.

Multicasting generally requires high-capacity network connections that are still mostly found only in corporate or university settings. But the increasing home use of integrated services digital network, or ISDN, lines and the prospect of on-line access via cable means that multicasting may soon become a popular medium.

Because digital video and audio data consists of millions of bits of information per second, the developers of multicasting have established a reservation system for events -- such as the Stones concert -- to avoid overloading the Mbone. The growth in the number of smaller networks connected to the Mbone is doubling every seven months, a faster growth rate than the Internet itself.

"It's still an experimental service," said Steve Deering, the researcher at Xerox's Palo Alto Research Center who developed the original Mbone protocols. "We're explicitly preventing its growth. If we stopped jumping on it, it would take off."
NEWSMAKER PROFILE

CARL MALAMUD

(box) Age: 35

(box) Education: Masters of Business Administration, Indiana University

(box) Founder: Internet Multicasting Service, Washington, D.D.

(box) Past Experience: Computer consultant for government agencies,

including the Federal Reserve and the Pentagon

(box) Other: author of five books

Illustration: Photo

PHOTO: KAREN T. BORCHERS -- MERCURY NEWS

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'NET'S NEW RULE FOR HOLIDAY: DON'T SPAM THE BIG GUY

REID KANALEY, Knight-Ridder New Service

There was a desperate tone to the typed message that went out on the Internet from the e-mail address "north.pole.org" over the weekend:

"Please don't spam Santa Claus!"
It seems Santa joined the millions going on line this year - and immediately became the target of an avalanche of electronic junk mail - "spam" in the lingo of cyberspace - including thousands of self- multiplying computer notes known as "mail bombs."

The big guy was not amused.

"On behalf of Mr. Claus and the Elves, I'd like to say that mail bombs to Santa will result in immediate removal of your name from the 'good' list and a transfer to the 'bad' list," said the message by self-proclaimed "Elfmaster" Carl Malamud, president of Internet Multicasting Service.

He said Monday he was sifting through at least 100,000 bum messages, making it extremely difficult for Santa to answer more important messages.

Those more important messages, about 10,000 so far, come from genuine children, Malamud said, many using school computers. (Each message gets one of several computer-generated responses.)

Malamud said the Santa spam apparently stems from an Internet rumor that someone had pledged 10 cents to charity for each message to Malamud's Santa - which would be nice if it were true, which it is not.

But there's also some outright naughtiness afoot.

"We found a few computer science students" who decided to bury Santa alive in bogus e-mail, Malamud said, including at least one "mail bomb." "There were 6,500 messages from one guy."

Santa was indignant. "You have responsibilities you have to live up to (on the Internet)" said Malamud. "One of them is: Don't spam Santa - such a heinous crime."

SCIENCE: COMPUTERS
Superhighway Routed Through Capitol Hill; Network Plans to Deliver Sound Bites as Bytes
John Schwartz

You read about it, but you missed the broadcast on C-SPAN. You want to hear Sen. Alfonse M. D'Amato (R-N.Y.) singing "E-I-E-I-O" on the Senate floor.

Today, you'll just have to wait for some news program to dredge up the clip for the next D'Amato profile.

But before long, if Carl Malamud has his way, you'll be able to suck that sound bite - or anything that happens on the floor of either chamber - into your computer directly from the Internet, and play it back whenever you like. You'll also be able to grab related materials - from photos to charts to reports - stored elsewhere on the Internet and linked to the segment you requested.

A Cyberspace Station

Malamud is very well connected, though not in the typical Washington sense of the word. He maintains a super-high-speed link to the Internet, the global network of computer networks, and has used those connections to put the first radio station in cyberspace on the air.

For more than a year, Malamud, 35, and a handful of part-time enthusiasts have been broadcasting two to three hours of digital programming daily via his Internet Multicasting Service (IMS). Technofans with sufficiently speedy Internet connections - and the right sound hardware and software - can tap into a weekly live audio feed for news and information about public affairs, science and technology. (Malamud named one of the features, a weekly interview, "Geek of the Week.") Most listeners, with less zippy on-line links, "download" bits of the programming into their computers for later listening.

Gavel-to-Gavel Coverage

Last week, Malamud announced a new venture that plans to take the Internet Radio concept even further: the appearance sometime next year of gavel-to-gavel audio coverage of the workings of the House and Senate via computer.

Why would anyone devote his life to turning the Internet, a key part of the high-tech future, into radio, a symbol of the static-filled past? And why would anyone want to use all of the awesome technology humming around us for a version of C-SPAN - without pictures, yet?

Because it's harder than it sounds. Although electronic text messages blink across the country in mere nano-moments, sound is a data hog. Translating sound into the 1s and 0s that can be interpreted by computers requires 30 megabytes of storage space for every digitally recorded hour - a chunk of the capacity of many home computers. Any semblance of a live broadcast also requires an Internet connection that shuttles data at rates of 64,000 bits per second - several times faster than most mainstream modems for personal computers can handle. Downloading programs at lower speeds for later listening can take hours of precious connect time.

Listening at the Office

Nonetheless, Malamud maintains that his programming reaches more than 100,000 people in 30 countries. Many fans listen in at their offices, because high-speed Internet links and internal computer networks are becoming de rigueur for businesses that send

and receive large amounts of information on-line. "We're not CNN, but we're a lot younger than CNN," Malamud said.

Computer systems of the sort Malamud has in mind promise to bring new capabilities that conventional radio and television can't touch. Today's TV networks give you programs when they choose to broadcast them. But computer communications allow users to grab the broadcast at their convenience, or search and play back a specific portion of a broadcast that interests them.

In the planned project, congressional speeches will take a circuitous path to the Internet. Sounds recorded at the House and Senate galleries will be beamed to IMS's Capitol Hill studio. After turning the sound into a digital data stream, IMS will shoot it over a high-speed line to studios at the National Press Building, where the information will simultaneously be stored on a massive set of hard disk drives and go out live over the Internet feed.

An Archive Service

The Internet Multicasting Service (for general information, send an Internet message to info@radio.com) won't just be broadcasting government proceedings live, though.

With its immense data storage systems - donated, like much of the computer equipment, by workstation mavens Sun Microsystems - the nonprofit IMS plans to archive the year's proceedings for delivery to anyone who has a hankering to listen to, say, what House Minority Whip Newt Gingrich (R-Ga.) talked about last Tuesday on the floor.

`Speaker Recognition'

One of the hottest aspects of the "Congressional Memory Project," however, is the software Malamud is planning to use to search the vast data archive. Most users will simply order up sound bytes by time and date. IMS plans to create a rough index of proceedings based on the Congressional Record, which is also available on-line.

Going a step further, Malamud hopes to implement still-experimental "speaker recognition" software that detects and stores the idiosyncratic patterns of sound in people's voices. Once those telltale characteristics are determined, a large audio database can be searched for matching patterns. Thus users of the archive could simply request any member's speeches on a certain date.

Because such software isn't a proven commodity yet, "we're not depending on speaker recognition as a magic bullet," Malamud said.

Here's how the Congressional Memory Project is expected to work in practice: You're sitting at your computer (or, at least, the next computer on your wish list) and navigate your way to IMS using graphical "browsing" software such as Mosaic. Your screen fills with a page of information that contains text describing the service and several on-screen icons. To hear House proceedings live, click one icon. To hear the Senate, click another. Another icon will lead to the archive. Some of the text will be highlighted: Clicking on it will activate links to other material, which might include text of bills under debate, government reports and other documents, as well as pictures and illustrations stored on computers around the globe.

Plans for Expansion

Along with the new channels of government coverage, Malamud has plans to expand his existing Internet Radio programming, having signed agreements with Monitor Radio, Radio France International and other providers. Malamud is also working with the Kennedy Center to broadcast the center's educational programs, lectures and performances for youth.

Not all of Malamud's ventures are multimedia. The EDGAR text database of filings to the Securities and Exchange Commission by thousands of companies is available free via the Internet thanks to the Internet Multicasting Service , the New York University Stern School of Business and grants from the National Science Foundation. Malamud has also put patent materials on-line.

By working out the kinks of sending and receiving multimedia programming, Malamud believes he is showing the way for future information superhighway services such as interactive television. "The cable companies and telcos {telephone companies} think 500 channels means home shopping and video on demand. I think we're what the face of those 500 channels will look like," Malamud said.

CYBERSTATION GOES ON THE AIR IN SHOW-BIZ FASHION

DAVID BANK, Mercury News Staff Writer

The audio feeds are coming in from as far away as Australia and from as close as the rock band jamming in the ballroom of the Hilton Hotel. And they are all going out as bits of data over the global Internet computer network in the first show-biz spectacular for a new broadcast medium.

The four-day radio show that began Tuesday featured a live rock 'n' roll performance, a spinning Internet slot machine, a computer-controlled toaster and interviews with celebrities of the digital world, along with a running commentary by John Gage, Sun Microsystems Inc.'s chief scientist.
"It's broadcast in the broadest sense," Gage said, standing between two prefabricated octagonal pods that housed the bank of computers that make up the production studio. "We're sending worldwide through pathways that none of us know."

The experiment, which can reach millions worldwide, is neither radio nor television, but an attempt to use the power of computer networks to provide a new type of live interactive programming. For now, it's accessible only to those with high-speed data connections and powerful workstation computers.

The broadcasting station, dubbed a "cyberstation," was commissioned to kick off the huge Networld+Interop convention of computer network professionals that begins today.

But the creator of the cyberstation, veteran Internet innovator Carl Malamud, points out that television programming, too, originally was available only to a select few. But there would have been no incentive to buy television sets unless there was programming to receive. Those who became successful programmers, he said, were the visionaries who saw the potential of the new medium.

Cable companies, telephone companies and modem manufacturers are all rushing to provide high-speed connections to home computer users, and the speed of microprocessors is multiplying while prices fall.

"A year from now, when this becomes available to consumers, someone has to know how to be a cyberstation," Malamud said.

Malamud's not-for-profit Internet Multicasting Service in Washington has been broadcasting two channels of Internet radio for about a year, transmitting live speeches from the National Press Club and producing Geek of the Week interviews with industry figures.

Last year, the organization launched an alternative telephone company that uses the Internet to send faxes around the world, virtually free. The messages are sent as electronic mail, which incur no long-distance charges, until they reach a relay computer near their destination. That computer then sends the message to the receiving fax machine.

All of the efforts are intended to demonstrate the value of a general purpose information infrastructure, such as the Internet, Malamud said. In contrast, a cable television system is used almost exclusively to carry television programming.

Malamud said it is crucial that government policy-makers and corporate leaders heed the lessons of the Internet, which can be made to do whatever innovative hackers can make it do because there are a set of agreed-upon protocols.

"People can do things we never thought of before," he said. "That's crucial. We've got to have that."

Malamud is trying to squeeze as many new novelties as he can in the four days the cyberstation will operate. There will be a live broadcast by Secretary of Commerce Ron Brown and an interview with Ralph Nader. National Public Radio will broadcast its "TechNation" show from the studio. Malamud received permission from music publishers to broadcast music from compact discs over the 'net.

Computer users with access to Mosaic, the software for browsing the Internet's World Wide Web, will be able to click the lever on the Internet Slot Machine. The prize for getting three red icons together: a $1,000 Internet tutorial.

"Our goal is to see how much data we can put on the 'net at once," Malamud said. "The answer is: a lot."
IF YOU'RE INTERESTED

The cyberstation will broadcast from Networld+Interop from 7 a.m. to 6:30 p.m. today and Thursday and from 7 a.m. to 4 p.m. Friday. For information, send e- mail to hype-requestmedia.org . On the World Wide Web, type http:// www.media.org . The anonymous ftp address is ftp.media.org (use your user name as the password).

The Internet Multicasting Service : Ted Turner, watch out! (Carl Malamud brings long-distance fax services and on-demand radio shows to the Internet) (includes related articles on how to fax and on the MBONE Internet Multicast Backbone)

So far, our experimenters have focused on e-mail: Safe-Tcl uses mail to carry active messages and Active Mail turns mail into a way of setting up real-time collaboration sessions. This project, the Internet Multicasting Service , goes beyond e-mail into faxes, broadcasting, multimedia, publishing, document retrieval and more.

Carl Nalamud likes to question assumptions and try things that others might not think of trying. He's also in synch with the Internet culture and is a strong proponent of broad information dissemination. These traits have led Malamud to run some of the most fascinating Internet experiments so far, including radio broadcasts, faxes that bypass the long-distance phone networks and a massive letters-to-Santa project last Christmas. The experiments are actually seeds: Most of them take on lives of their own and grow. Some are practical; some are frivolous. All of them illustrate aspects of the Internet's architecture and culture that deserve further investigation.

ACCESS FOR EVERYONE

The most straightforward of Malamud's missions is to make governmental and other public information easily accessible to the public. This has not been simple, and not Just for technological reasons. Until recently, for example. most US government agencies viewed that information as an asset to be sold to wholesalers such as Mead Data Central, which process and republish the information at substantial cost to consumers. It may have been inertia, too. Other public organizations were reluctant to publish information outside of their normal, limited-distribution channels.

Halamud recently convinced the Geneva-based International Telecommunications Union (ITU) to let him reformat and openly publish standards-committee documents that were otherwise bulky, expensive and hard to get. [5] Unfortunately, when ITU officials understood that their documents were available to millions of people, they got nervous and withdrew their support -- and documents. However, ITU staff has itself taken steps to publish some of the documents electronically since then.

Malamud has had better luck with various US government agencies, including the Securities and Exchange Commission, the US Patent Office, the Federal Elections Commission and the Federal Reserve Board. The NSF recently announced that the SEC is putting its information up for public access; [6] others are in the works (of course, the FCC, which is in the middle of all these communications issues, lags a bit behind). Malamud's intent is not to compete with the private information wholesalers such as Mead, but to open access and allow multiple organizations to tailor the information for their constituencies. Nevertheless, his activities will force these companies to change, probably toward higher levels of added value.

FAX DOCUMENTS LONG DISTANCE -- CHEAP!

Frustrated with the high cost of long-distance faxes and looking for a way to bring e-mail and fax users closer together, Malamud and Marshall Rose (page 5) have created a system that could potentially offer low-cost global faxing via the Internet. The premise is simple: Use e-mail to get within a local call of the destination fax machine, then switch to conventional fax technology to complete the last leg of the Journey. The recipient gets the same message. The sender saves money and gets a confirmation e-mail that the fax was delivered. Note that this is low-cost partly because Internet access is still subsidized.

One of the insights that led to this system, which Malamud and Rose call tpc.int, [7] is that we don't expect faxes to get to their destination immediately, yet we use the phone system, which knows only how to set up an expensive, real-time circuit between two terminal devices, to transmit them. Allowing for some latency in the link allows us to use infrastructures and methods that are far cheaper than the solutions offered by the phone system, which was designed for conversations that require synchronous circuits.

Malamud has estimated the cost of running an Internet fax cell relative to sending faxes via the long-distance phone system, assuming the I'll-carry-yours-if-you'll-carry-mine ethic of messaging and news on the Internet. In volume (to amortize the cost of running a tpc.int site), he calculates short tpc.int faxes to cost between 5 and 10 cents each, versus 50 cents and above for conventional long-distance faxes. And tpc.int is distance-insensitive: A fax to Australia costs the same as a fax to Silicon Valley. Cell operators may also be able to recoup their costs by selling advertising space on the cover sheets of the faxes they deliver.

How it works

Tpc.int operates as a global cooperative of remote print servers. Volunteers operate cells of different sizes, ranging from regions (Australia) or local calling areas to enterprises (University of Michigan) and even personal accounts. The cells often map to area codes or local-area prefixes. A personal cell can be inside a regional one; the Internet's naming scheme will give preference to the more specific (best matched) one. Prospective operators publish their cells by sending e-mail to Arlington Hewes. Tpc.int has a procedure for bringing new cells on-line.

Malamud and Rose launched tpc.int in July 1993. Now it has coverage in the San Francisco Bay area (including Silicon Valley), New York, Boston, Washington DC and individual sites such as the University of Michigan. Abroad, Australia has been Joined by Japan, Portugal, Germany, England and the Netherlands. All told, about 245 areas are on-line today, and many thousands of faxes have been sent. Faxes sent to numbers not yet covered will return to the sender with a "service unavailable" message; IMS monitors these requests to see where it should solicit coverage.

Participating cell operators can refuse service to an originator (to stop abusers), but must agree to deliver to any destination number within their announced cell boundaries. Cell operators can also adjust their cell boundaries, which allows them to back off their commitment if traffic gets too heavy. Others might step in to fill coverage gaps. In this way, cells could subdivide organically and without centralized control, while still offering good coverage.

To operate a cell, you need an addressable Internet node, fax system hardware and spooling software, the tpc.int software, which is publicly available -- and your boss's consent, of course. You're expected to meet accounting and reporting requirements, which help assure a consistent grade of service. A requirement that cell operators not monitor the fax traffic they process helps assure, but certainly doesn't guarantee, confidentiality.

DESKTOP BROADCASTING: THIS IS INTERNET TALK RADIO

Malamud does his work from a small, non-profit agency called the Internet Multicasting Service in a rented office in the National Press Building in Washington, DC. This nondescript office is the home of the first cyberstation on the Internet, where Malamud started broadcasting a digitized radio show last April.

Entertainment and communications conglomerates looking to sell video-on-demand should look at Malamud's set-up: Audio-on-demand is already here! Malamud estimates that 100,000 people from over 30 countries have listened to some of his 50-plus shows. The service is funded by corporate donors in return for publicity and easy access to information about IMS projects.8

The Internet Multicasting Service works much like radio, which Malamud considers both a familiar starting point and a springboard for experimentation. It runs two "radio" channels. Internet Talk Radio covers science and technology, and includes Malamud's Geck of the Week interviews of important members of the technical community such as Rose himself, Brewster Kahle and L. Stuart Vance. Internet Town Hall is a public-affairs channel, and has included broadcasts of National Press Club luncheon speakers such as the Dalai Lama, Janet Reno, Steven King, Yassir Arafat, F.W. DeKlerk and Vice President Al Gore. (In exchange for broadcasting rights and a control booth in the Club, Malamud provides access to the Internet, does monthly seminars for journalists and donated some equipment.)

IMS now also syndicates and rebroadcasts (digitally, of course) several shows from public radio and tv, including the audio portion of the tv show Computer Chronicles, and the radio shows Soundbytes, TechNation, Soundprint and a multi-part series on the history of the phone. During a live broadand multicast of Ira Flatow's Talk of the Nation, Malamud solicited audience questions over the Internet -- and got more than 500.

All things considered

For a slightly more commercial angle, Malamud has struck a deal with HarperCollins to broadcast 4- to 1O-minute audio excerpts of famous people reciting their own works, under the name HarperAudio. HarperCollins hopes people will want to order the full tapes.

Malamud is interested in video but is leery of the stress it puts on the Internet (he was not involved in the David Blair movie that was broadcast on the Internet last year called Wax or the Discovery of Television Among the Bees). Malamud is working to let people select the time between when events occur and when they hear about them -- from real-time to on-demand. He also wants to demonstrate that desktop broadcasting is easy and encourage others to follow suit.

Malamud, who started his career as an economist, spent many years building networks and databases for large institutions such as the Federal Reserve Bank, Indiana University and the Lawrence Livermore Laboratories. He also consulted to computer companies and wrote several technical books, plus a technologist's travel guide called Exploring the Internet: A Technical Travelogue. The book is the story of his three trips around the world in six months to visit Internet and policy-making luminaries, some famous, some not. To finance it, he talked Dan Lynch, president of the Interop Company, into covering his expenses in exchange for some publicity on the book cover and a discount to give the books to Interop conference attendees.

Where do I tune my SparcStation?

The multicast bears a more technical explanation. To listen to it, your best option is to be on or near the MBONE -- the volunteer, virtual multimedia backbone formed by powerful Internet nodes linked with high-bandwidth connections and running multicast software (see box). Or you can download the compressed audio files (audiophiles?) and play them at your own leisure. (An hour of compressed audio fills roughly 30 megabytes of disk space.) That means, of course, that you can pause, rewind or otherwise alter the experience to suit your schedule and pleasure;. Playing the files doesn't require special software, and the Internet Multicasting Service allows unrestricted copying of the material it creates.

The Internet radio broadcasts are really just large data files, so people have done creative things with them. One company spools them into its voicemail system, where employees can listen on their phones. Several radio stations have downloaded the files and retransmitted them as traditional radio shows. Some people make their own books on tape: They put the files on their PowerBooks and play them on their commute home.

"We like to think we compete with CNN."

-- Carl Malamud, Internet Multicasting Service

ACTIVE-SAFE-MULTICAST-MAIL-BYPASS?

These creative ideas for access to the digital radio files are characteristic of the broader potential for creating hybrid creatures from the media and applications that exist on the Internet and elsewhere. Interestingly, the fact that getting a full Internet connection is difficult is actually one of the Internet's virtues. The effort involved assures that participants can reach each other (because they have unique addresses) and that they can recognize and respond to various protocols and data streams.

In contrast, the phone company has much broader coverage, but simpler functions (i.e., dialtone) that have proven difficult to move beyond. And it doesn't help that the phone-system blueprint .for an advanced intelligent network is internally focused: It defines how switching gear exchanges information and requests services, but doesn't include equipment that is outside the phone system, such as your home phone -- or even your PBX (see Release 1.0, 11-93).

On the Internet, anyone (even a dog) can operate the equivalent of a central-office switch, given enough money and commitment. More importantly, the full power of the Internet's distributed intelligence is available to every participating workstation. The experiments described in this issue are using and expanding that intelligence; other

people will almost certainly take elements they have built and use them in unexpected ways.

Here is one example. Ehud Shapiro's Active Hail uses messages to invoke synchronous data sessions, which blurs the boundary between a phone call and e-mail: Active Hail messages look a lot like smart phone calls -- just without the audio link. Imagine Active Hail sessions that use the MBONE's multimedia capabilities to offer in-band phone service, instead of parallel phone calls. Or imagine a multicast that includes smart Safe-Tcl messages that can call any script-compatible PC application. These are the sorts of efforts that will help us reframe and redesign the communications infrastructure and will lead to new kinds of value for end-users.

How do I do it?

To send a tpc.int fax, you compose a normal e-mail message and encode the destination number and addressee in the destination Internet address. Here is an example:

All tpc.int fax addresses start with "remote-printer" (this opens the door for future services that address pagers and voicemail, for example). Embedded slashes print as carriage returns. Notice the destination fax number is in international format, starting with the country code (but without the international access code, such as "011" for calls abroad from the US). The "iddd" invokes some software that Malamud and Rose wrote called the international direct dialing designator, which flips the phone number (to harmonize it with the Internet addressing scheme, which places more general entities to the right). Although these addresses seem complex, they are simple to automate with a macro or front-end.

What's the MBONE?

A series of Internet node operators have collaborated to create the Internet Multicast Backbone, also known as the MBONE. Eventually, multicasting will be built into routers (software exists that turns a Proteon router into a multicast node), but today the MBONE consists mostly of SparcStations, DECstations, VAXes and SGI workstations in a mixed mesh and star topology running multicast IP routing software called mrouted (about 900 subnets participate at various times). Sites that want to Join the MBONE communicate with local nodes and agree on how to route the traffic.

The multicast is more like radio than an e-mail broadcast in that it has no complete list of destinations. Instead, an interested site can tune in to the data stream and participants can listen or watch, as the case may be, without being on a specific destination list. The Internet Engineering Task Force is currently working on a draft proposal for the Real-time Transport Protocol (RTP), which will offer better control for multicasting, but not guaranteed quality of service or resource-reservation capabilities.

The MBONE machines aren't all directly connected. They communicate by "tunneling" through standard (unicast) routers (they make their packets look normal to intervening routers and reconstitute them at the far end of a hop). Packets from streams that are time-sensitive, such as live audio, are assigned time-to-live (TTL) values, which cause the packets to self-destruct if they haven't arrived at their destination quickly enough. That feature helps alleviate some of the congestion of sending real-time multimedia over the Internet, though many problems remain.

[5] Malamud made most of the ITU's 18,000-page Blue Book available via FTP and e-mail. This included important packet-switching, modem and telecommunications (ISDN and SS7) standards.

[6] Mead's EDGAR Dissemination Service currently publishes the SEC reports, which include corporate annual reports, 10-Ks and merger filings. The NSF recently announced a grant to New York University and the Internet Multicasting Service which makes the SEC's EDGAR system available to the Internet free of charge. Initial access will be via the Internet file transfer protocol (FTP] and e-mail; over the next few months, IMS will add World Wide Web, Gopher and WAIS (see Release 1.0, 1-94).

[7] The "tpc" stands for The Phone Company, from the movie The President's Analyst, in which James Coburn becomes the psychoanalyst to the president of the US. The Phone Company plays a pivotal role in the movie's denouement, which involves world domination under the masterful eye of TPO's president, Arlington Hewes. In a delightful ironic touch, tpc.int, the coordination point for the Internet fax service, is registered under Arlington Hewes' name; he also answers all messages sent to . The "int" part of tpc.int means that the service is international in scope.

[8] Sun Microsystems and publisher O'Reilly & Associates underwrote the initial multicasts and are still sponsors. They were joined 57 MFS Datanet and UUNET Technologies, which provided a 10 Mbps Internet connection, and most recently by the Interop Company, HarperCollins and Persoft. Malamud wants to cultivate a symbiotic relationship with his sponsors similar to that between the cable tv industry and CNN in its early days.

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MOUNTAIN VIEW, CALIF. Two researchers last week started an experiment in remote printing over the Internet in order to test the integration of electronic-mail and facsimile traffic.

Marshall Rose, principal at Dover Beach Consulting Inc., based here, and Carl Malamud, president of Internet Multicasting Service , a Washington-based non-profit organization, are spearheading the experiment.

Normally, fax transmissions are handled through a telecommunications infrastructure. Rose said the team's goal is to gauge how well the Internet works for fax delivery. Internet users will be able to communicate with non-E-mail users, who are reachable only by fax.

"Fax is widely viewed as an add-on to the telephony network," Rose said. "E-mail people view the world as digital. That we can provide fax access over an E-mail network shows how similar they really are."

To send Internet faxes, a user needs a computer on the Internet, a fax modem and phone line, fax-spooling software and "glue" software that connects the mail system to the PC-based fax system, which routes mail messages through the fax spooler and fax card.

Rose and Malamud are setting up calling areas on the Internet that reflect different participating sites in various locations. Sites are registered on the Internet as places that provide fax access to a "cell," which is a collection of phone numbers where Internet users can send faxes. Fax transmission service typically is provided for free by participating sites.

There are four different kinds of cell sites. An enterprise site can be a large university or business, which accepts faxes in one place and uses its own computing facility to deliver the fax. An enterprise multinational cell could register phone numbers to corresponding countries where Internet users reside.

Another variety is a neighborhood site, where someone provides access to any fax machine in its local calling area. Regional cells are large neighborhood sites, and are sometimes covered by private networks that use their own network to reach fax modems in their area. At a personal site, someone provides access to one fax machine.

Rose said he is looking for new participants. "We are signing up sites to provide access to neighborhood enterprise cells," Rose said. Currently, the service is available in all of Australia, Washington, D.C., most of the Silicon Valley area in California, parts of Riverside, Calif., and all of the University of Michigan, according to a document circulated by the researchers.

The Yankee Group, a Boston consulting firm, said the total market for value-added-network electronic-mail transmissions was $436 million in 1992, and is expected to grow to $614 million in 1993 and $848 million in 1994. The company did not specify what percentage of those revenues is from fax traffic.

More information on this experiment can be retrieved by sending an E-mail request over the Internet to TPC-FAQ@TOWN.HALL.ORG.

Kelly Thompson gets screamed at a lot on the job. In e-mails and on the phone, she's been called an "uppity chick," a "snippy little thing" and worse. The organization she works for has been described as an "onslaught from Satan."

Thompson, 34, gets this abuse because as a professional spam fighter, she has to call e-mail marketers -- or their Internet service providers -- and warn them that they are about to be practically kicked off the Internet for sending unwanted junk mail, or "spam." This usually does not go over well.

But the name calling doesn't faze her because she believes that she is on the right side of a battle between good and evil, between innocent Internet users and the spammers who clog their networks with unwanted commercial messages. She works for the Mail Abuse Prevention System, a Redwood City not-for-profit organization that is at the center of a war over the world's e-mail boxes.

Marketers want the right to use e-mail as freely as they use the postal service, but spam opponents argue that e-mail advertising should be controlled, not only because it's annoying, but because it costs the recipients money. When Internet users pay ISPs for Internet service, part of what they're paying for is the delivery of all that e-mail; the higher the mail volume, the higher the costs.

In the absence of a strong national law against spam -- Congress is discussing several limited bills now, but none of them would completely criminalize spam -- MAPS has become a de facto inbox avenger. It is applauded in that role by ISPs, which bear the brunt of spam's costs, and many other spam haters.

But the group is not universally loved. In fact, MAPS has been involved in five lawsuits with different companies that object to being labeled spammers by MAPS. So far, none of those cases has resulted in a ruling against the organization, but three are still in court. And recently MAPS' tactics have been criticized by a coalition of groups that support free speech online, including the American Civil Liberties Union. To those groups, any impediment to the free exchange of information online -- even in the name of spam prevention -- is a problem.

THE BLACK HOLE LIST

MAPS (spam spelled backward) fights junk mail by maintaining the "realtime black hole list," a directory of known spammers. It makes the list available for free -- it also has a faster, paid- subscription version -- to Internet service providers and companies that, in turn, use it to block the marketers' access to their networks. The list is also used by some big companies that sell bandwidth to many ISPs. The result is that blacklisted companies find themselves cut off from a large portion of the Internet. Their e- mail bounces back from as much as 40 percent of recipients, according to MAPS' estimates. The Web sites of those listed also become unavailable to many users.

That's too much power for a self-appointed group to wield, critics complain. A common cry in the lawsuits is that businesses on the blacklist lose money because they are cut off from so many Internet users. Jozsef Nemeth, owner of a small New Hampshire firm called Black Ice Software, estimates that his company has lost about $200,000 as a result of getting listed by MAPS. He has had to suspend e-mail marketing during an ongoing court battle with MAPS.

"We were paying thousands of dollars a month for banner ads in legally binding contracts and they were blocking our Web site," said Nemeth, who is demanding $500,000 damages from MAPS. MAPS says Black Ice sent information about its software products to people who didn't want it. But Nemeth said his company only sent information to customers who had signed up to receive it.

For the record, MAPS points out that it doesn't block any Internet traffic -- the ISPs that use its list do all the blocking. MAPS simply publishes a list of problem Internet addresses, which it considers a service similar to Consumer Reports' product reviews.

SPAMMERS SELECTED CAREFULLY

Any Internet user can bring a spammer to MAPS' attention, but the group investigates each complaint before adding a spammer to the list. First, a MAPS employee verifies that a piece of e-mail fits the group's definition of spam, which is any message that the recipient has not agreed in advance to receive. Then, MAPS calls the ISP that the spam came from, or the company responsible for the unsolicited e- mail, and asks them to stop the practice. Since most ISPs actively fight spam on their own networks, they often immediately boot the offender from their networks.

Only if attempts to stop the problem fail is a new name added to the list. And as soon as the offender promises to stop spamming, they can be removed.

But some marketers complain that MAPS' definition of spam sets the bar too high. According to MAPS, anyone who wants to advertise via e-mail must go through a process referred to as "double opt in." This is how it works: If a dog owner signs up to receive e-mail notifications of dog food sales at the local pet shop, the store must first e-mail that customer and ask if they're sure they want to be on the list. Only if the customer confirms that he really, truly wants to know about kibble discounts can the pet shop proceed to e-mail the customer. According to MAPS, companies that don't go through this process are spammers -- even if they're mailing people who willingly signed up for information.

"We would lose a substantial amount of our current list because people simply do not reconfirm," said Clark Stone, a San Jose attorney who is representing Black Ice, the small software firm that's in court with MAPS now. "That would be a financial disaster for the company."

Yesmail.com, a Chicago e-mail marketing firm, sued when MAPS threatened to put it on the spam list if it didn't adopt the double- opt in process. But eventually, Yesmail agreed out of court to do it MAPS' way.

LIST GOES TOO FAR

Others critics complain that MAPS carries its mission too far. It sometimes blacklists not just individual spammers but entire ISPs that it feels aren't adequately preventing their customers from spamming. Companies that sell bulk e-mail software used by spammers are also on the list, and so are ISPs that provide Web sites to such companies.

When an ISP gets listed, all its customers can end up getting blocked. Thousands of innocent people get lumped in with advertisers trying to foist their messages on the public.

That happened to Bennett Haselton, whose Web site ended up on the list because Media3 Technologies, the company that provides his Web site, also hosts some companies that sell mailing lists and software used by spammers. After failing to resolve the issue, MAPS added a block of Internet addresses hosted by Media3 to the blacklist. One of the approximately 250 Internet addresses listed was Haselton's.

Haselton, who happens to run an organization opposed to Internet censorship, was outraged to find his Internet communications hampered even though he had never sent spam. In his case, MAPS' list was being used by Abovenet, a huge bandwidth provider that sells Internet connections to Media3 Technologies and other service providers.

Haselton said the problem with MAPS is bigger than his Web site getting blocked. He thinks MAPS, and ISPs that use it, are censoring the Internet and keeping it secret from the average user. He recently got together with other advocates of free speech online -- including the American Civil Liberties Union -- and released a statement to the press criticizing the practice, which he calls stealth blocking.

SEPARATION OF INTERESTS

MAPS has even been accused of using spam fighting as a cover for its own business interests. Andrew Brunner, a Pennsylvania businessman who sells bulk e-mail software, set up the Web site www.combat.org to publicize his belief that MAPS co-founder and Internet pioneer **Paul** is using MAPS to monopolize the online marketing industry himself.

Vixie and MAPS co-founder Dave Rand have final approval over all the listings that go on MAPS' black hole list, and they both are paying the organization's legal fees.

Vixie, president of Paix.net, a company that helps ISPs cooperate on traffic-flow issues, says he keeps his interest in fighting spam separate from his career. Until recently, he served as chief technical officer of Abovenet, the backbone service provider that used MAPS' list to block Media3. Abovenet was co-founded by Rand, but according to Vixie, there are no business ties between MAPS and Abovenet.

MAPS responds to all this criticism with one central belief: The owners of computer networks -- from huge ISPs to small home networks - - have the right to accept or refuse any e-mail traffic they want. For Thompson, a personal experience drove this point home and launched her on her spam-fighting career. It happened in 1995, when she was running the computer network of a professional society in Maryland.

"We had a spammer who sent a huge catalog to every employee. It crashed my server every time I brought it up for three or four days," Thompson recalled.

"That server was our property," she said, still smarting at the affront. "They didn't have the right to deprive us of the use of that server."

Since then, she has taken her occupational hazards in stride. In fact, she recently thumbed her nose at one detractor by registering a new address on the Web: www.uppitychick.com.

---CANNING SPAM AT HOME

Despite MAPS' efforts, most people are bothered by unwanted junk e- mail every day. Here are a couple ways to fight it.

Report spammers

Mail Abuse Prevention System www.mailabuse.org/rbl/notifyfaq.html

Spam Recycling Center www.chooseyourmail.com/SpamInstructions.cfm

Filter your mail

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The New York Times

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February 10, 2000, Thursday

BUSINESS/FINANCIAL DESK

Spread of Attacks on Web Sites Is Slowing Traffic on the Internet

By MATT RICHTEL with JOEL BRINKLEY (NYT) 1299 words

As anonymous assaults on major Web sites continued yesterday, computer vandals crippled a large online brokerage operation and a media site. The Justice Department pledged to find those responsible, but computer experts questioned whether any defenses could easily be deployed against the attacks.

On the third day of what increasingly appeared to be a well-planned and tightly coordinated siege by a single individual or group, the impact of the attacks deepened. In addition to damaging commerce at the sites that have become targets, the attacks slowed traffic in some portions of the Internet.

In Washington, Attorney General Janet Reno, while pledging a vigorous pursuit of those responsible, also acknowledged that the attackers had covered their electronic tracks well and remained unknown to authorities.

Concerned e-commerce companies across the Net, many of whose publicly traded shares dropped in value yesterday as investors tried to understand the implications, began taking measures to protect their Web sites from becoming targets.

Even so, computer security experts said the complex, anonymous nature of the attacks made them difficult to trace or stop.

Indeed, security experts said that the attacks appear to have been weeks or months in the planning, since they required clandestinely loading software onto dozens, if not hundreds, of computers around the Internet.

When those programs were activated this week, the host computers were transformed into platforms for starting the attacks. In almost all cases, experts said, the owners of the computers never knew -- and still may not know -- that their machines had become cogs in the attack machinery.

''We tend to believe there are thousands of these tools out there waiting for the launch button to be pushed,'' said David M. Remnitz, chief executive of IFsec L.L.C., a information security company in New York. Suggesting that the attackers already had the infrastructure in place for the attacks to continue indefinitely, he added, ''I don't see any reason why they would stop.''

Ms. Reno said that the F.B.I. had opened a criminal investigation, but she and bureau officials acknowledged that they had no strong leads and had heard no credible claims of responsibility.

''At this time, we are not aware of the motives behind these attacks,'' the attorney general said, ''but they appear to be intended to interfere with and to disrupt legitimate electronic commerce.''

Keynote Systems, a company that measures the reliability and performance of Web sites, reported yesterday that during the attacks, it took eight seconds to call up a typical Web site's home page, nearly twice the time required the last two weeks.

Government and computer industry officials also continued to acknowledge yesterday that they could not be certain that the same group or individual was behind all the attacks, but they said the nature of the assaults seemed too similar to be coincidental.

What began with an attack on the popular Yahoo portal site on Monday spread yesterday to Zdnet.com, a media site, and E*Trade, one of the largest online brokerage houses.

And at least one other major site appears to have been a target. Although CNet, the Internet media company, declined to comment yesterday, its network service provider reported detecting an attack on the company's sites Tuesday afternoon but said it had managed to prevent any crippling effect on users.

Patrick DiChiro, a spokesman for E*Trade in Menlo Park, Calif., said that the company planned to deal ''one on one'' with customers who contend that they had lost money by not being able to gain access to the site to place trades.

Mr. DiChiro said that after the assaults Monday on Yahoo and Tuesday on Buy.com, a retail site, and eBay.com, an auction site, E*Trade began discussing what steps it might take to defend its site against a similar attack. Though he said unnamed measures were taken, the company was unable to prevent the attack, which hit at 5 a.m. Pacific Standard Time and slowed access to the site for about three hours, according to Keynote Systems.

The company did have several contingency plans in place, including directing customers who called E*Trade to an alternate Web site.

One reason it is difficult to defend against such an attack is that finding and cutting off the responsible parties requires a cooperative, concerted effort between the affected Web site and its network service provider -- the company that connects the site's own computers to the Internet.

Paul Vixie, senior vice president of Internet services for AboveNet, a network service provider whose clients include eBay and CNet, said the attackers appeared to have installed widely available software that, when secretly planted on other people's computers, flood a target site with instructions to perform meaningless tasks.

Mr. Vixie said that AboveNet was hit with as much as 800 megabits of ''spurious traffic'' a second, a level that could cost $400,000 a month to transport if it continued.

''It would cost us $400,000 a month just because some teenager with a $300 Linux box doesn't like one of our customers,'' Mr. Vixie said. ''It makes us a little testy.''

An earlier incarnation of this type of attack emerged two years ago, but new illicit software has circulated that makes such an attack easier to start and more difficult to defend against. The attacks themselves have intensified in the last nine months, striking not just the well-publicized major sites, but also smaller sites.

CERT, a federally financed computer security organization based at Carnegie Mellon University in Pittsburgh, along with private computer security companies have released numerous warnings in recent months describing the attacks and suggesting ways to combat them.

Ron Dick, chief of the F.B.I.'s computer investigations and operations section, acknowledged that tools for this type of attack, known as a distributed denial of service attack, are so readily available on the Web that ''a 15-year-old could use them to launch these attacks.''

''It doesn't take a great deal of sophistication,'' Mr. Dick said. ''In a relatively short period of time an unsophisticated intruder or unsophisticated computer user can take advantage of not only the U.S. government, but also e-commerce.''

Under Federal law, purposely disrupting computer networks is a felony punishable for first-time offenders with a term of as much as five years in prison and a $250,000 fine, plus assessment of damages.

But Mr. Dick repeatedly said the F.B.I. had no hope of solving the crime without ''help from the entire community'' -- primarily meaning the various Internet service providers, or I.S.P.'s, whose servers were used to pass the data from the attacker to the victims.

''We are working with the F.B.I. to track the source of the attacks,'' Mr. Vixie said, echoing similar statements from officials at Yahoo and eBay.

Mr. Vixie said there were several steps sites could take to protect themselves. Those include increasing their capacity to handle traffic; using operating systems that can sift out malicious traffic; and installing new security patches that prevent sites from being commandeered to begin attacks.

But he added: ''This level of alertness is not sustainable. We are hoping that there will be a technological or legal solution so we can go back to building our network rather than defending against attacks.''

For their part, AboveNet and other Internet service providers have begun filtering out suspicious traffic. But that approach, they said, must be continuously adjusted as attackers change their means of assault.

Correction: February 26, 2000, Saturday A chart in Business Day on Feb. 10 with an article about attacks against several Web sites referred imprecisely to the durations of the interruptions. Keynote Systems, a company that measures Internet performance, supplied data ranging from the point of less than 5 percent availability to the point of at least 80 percent availability. The sites were not necessarily blocked altogether during the periods shown, and some say their disruptions were shorter than indicated. The sites and the times they observed were Amazon, 1 hour 7 minutes; Buy.com, 3 hours 10 minutes; E*Trade, 1 hour; Yahoo, 3 hours 10 minutes; ZDNet, 2 hours 32 minutes.

The chart also misstated the day of the attack against Buy.com. It was Feb. 8, not Feb. 7.

Securing the domain name system
Diane Davidowicz;⁰⁄₁₉ Vixie

A DNS security protocol is being developed to test whether requested Internet addresses come from intended sources and contain authentic data.

In the olden days-about a decade and a half ago-research scientists, university professors, and officers at the U.S. Department of Defense openly used the Internet to share information. The system worked because it was composed of a small, networked community whose members trusted each other.

How quickly things change. Today's Internet community is enormous, and not every member of that community is trustworthy. The presence of mischievous or malicious users has created the need for security. However, security was not a design goal of the DNS, one of the Internet's key infrastructures. As a result, DNS is an insecure protocol.

The DNS is a hierarchical database containing records that describe the name, ip address, and other information about hosts. The database resides in DNS servers that connect to the Internet and private intranets. Simply put, the DNS furnishes a name-to-address directory service for network applications that need to locate specific servers. For example, every time an e-mail message is sent or a Web page is accessed, there must be a DNS name.

The problem is that there is no way to know that a DNS response comes from an authentic source or contains authentic data. With a little bit of work, even a preteen intruder can infect a DNS server with bad data that Web clients will not be able to distinguish from good data. This is especially troubling because the DNS is often used as an implicit authentication system.

For example, when a user points a browser at www.examiner.com (the Web site of a San Francisco newspaper), the user expects the resulting Web page to belong to that newspaper. However, the DNS protocol doesn't contain any mechanism to prove that the Web page is authentic (that is, that it belongs to the expected newspaper company).

While it's possible that the user will get the San Francisco Examiner's Web page while hoping for the Examiner from his or her own city, there's a far more dangerous possibility afoot: The user might be connecting to a Web page that doesn't belong to any newspaper, but rather to some malicious third party that has deliberately corrupted the DNS so as to direct unsuspecting consumers to a Web server that satirizes the real newspaper, or one which deliberately misstates editorial policy or even misreports facts in libelous ways.

Every industry has its own bogeyman in this closet-just imagine what your most ruthless competitor could do to your bottom line if it could take control of your Web server's subscriber base, even if only for a day. Inaccurate and intentionally misleading data can cause a user to experience a denial of service or to connect to a site of questionable nature. To solve these problems, the IETF is working to add security extensions, known as Domain Name System Security (DNSSEC), to the DNS protocol.

FROM SRI-NIC TO DNS

Before DNS, every new host had to be added to a central repository at the Stanford Research Institute's Network Information Center (SRI-NIC), which was responsible for maintaining such information for the Internet until the early 1990s. The SRI-NIC then published this file, which was retrieved by massive file copying to all hosts on the Advanced Research Projects Agency Network (ARPANET). This system worked while the Internet only had a small number of hosts, but as the Internet grew, the system proved unwieldy.

Another problem that plagued this method of managing host names was its flat structure. Every host name that registered with the SRI-Nic had to be unique. For example, no two hosts anywhere on the Internet at that time could both be called www. Thus the SRI-NIC gave way to the DNS.

One of the most important contributions of the DNS to the Internet is its ability to map uniquely identifiable host names into ip addresses on a worldwide scale. This is known as forward mapping. Some other capabilities of the DNS include reverse mapping (that is, ip address to host name resolution), mail exchange information (identifying a mail exchanger for a given host or domain), and canonical naming (host name aliasing).

The DNS holds this information in Resource Records (RRS). There is one RR type for each different type of information the DNS contains. Some examples Of RR types include the A record that identifies an ip address for a given DNS name, the NS record that identifies a name server for a given domain name, and the mx record that identifies a mail exchanger for a given DNS name.

The hierarchical ordering of the DNS provides host name uniqueness. The DNS hierarchy takes the form of an inverted tree. As the tree is traversed from leaf to root, a Fully Qualified Domain Name (FQDN) is formed. In DNS, every FQDN is unique. A host name query results in the tree being traversed from root to leaf in order to find the corresponding ip address belonging to the host name. A similar tree also exists for reverse mappings, where an ip address query results in a similar tree traversal in order to find the host name, or FQDN, belonging to the ip address.

At the top level of the inverted tree is the root of the DNS. The root is commonly referred to as "." (pronounced "dot") and is the last character found in an FQDN. The first level under the root is divided into large groupings, such as organization (org), commercial (com), educational (edu), and so on. The level following this typically represents a specific organization or company found directly underneath the org, edu, and com domains. Examples are isc.org or vix.com. Both Isc" and "vix" are also known as domain names.

This pattern of subdividing domain names lets a host name be uniquely identified under the domain (and possibly subdomains) to which it belongs. This lets DNS host names and addresses be managed (added, deleted, or changed) by local administrators. The ability of the DNS to subdelegate and locally manage host names provides enormous flexibility and scalability.

Another area in which the DNS improved upon its flat-structured predecessor is the robustness in the availability of the information contained in each domain, or zone. (Though zones and domains are actually a little different, for the purposes of this article, you can consider a zone to be synonymous with a domain.)

Each zone has one primary, or master, server where changes to the information within the zone are made. In addition to the primary server are secondary, or slave, servers. Each zone can have more than one secondary server. These secondary servers are responsible for checking the primary server for updates; if an update is detected, the secondary servers transfer the zone's data. This is known as a zone transfer.

Every zone has a serial number that is adjusted when updates are made to that zone on the primary server. This adjustment lets the secondary servers easily detect when an update has occurred. The ability to have more than one copy of a zone provides a rudimentary form of load distribution and makes the data highly available.

DNS SECURITY VULNERABILITIES

Conversely, this highly efficient design also opens numerous security holes. For instance, when a remote system connects to the application, the application takes the ip address and queries for the DNS name. If the returned DNS name is what the application expects, access is granted.

However, with minimal effort, a malicious user can grab a small ip address space and register a DNS server for the reverse mapping of these ip addresses (see Figure 1, page 94). There is nothing to prevent an administrator for a given IP address space from mapping an IP address back to an FQDN for which he/she is not the authority. This administrator can then map an ip address to a host name, which the application is configured to trust. Therefore, when the application receives a connection from a system that it should not trust, but whose ip address maps back to a FQDN it does trust, the application unwittingly gives access to that system.

Some of the more common applications that once did this have been redesigned to make sure the DNS host name resolves back to the same IP address, but there are still applications that don't take this extra step. Older versions of Rlogin, RSH, Network File System (NFS), X Windows, and HTTP may still be vulnerable to this form of attack.

The DNS is also vulnerable to a system compromise. An intruder can gain unauthorized access through any network service (Telnet, FTP, and so on) on a DNS server and then proceed to alter the DNS database for his or her purposes. Again, the DNS protocol is helpless because it can't provide data authentication. (For information on making DNS servers more secure, see "Securing DNS Servers Without DNSSEC," page 94.)

CRYPTOGRAPHIC SIGNATURES

As a result of the limitations of the DNS protocol, the IETF has convened the DNSSEC Working Group (DNSSEC WG) to address the fundamental lack of security by adding DNSSEc extensions to the existing protocol. The Berkeley Internet Name Daemon (BIND) 8.2 includes some of the DNSSEC functionality.

The goals Of DNSSEc are to provide both authentication and integrity to the information contained within the DNS (see Figure 2, page 96). DNSSEC can accomplish both goals through cryptography.

DNSSEC primarily relies on public key technology to create cryptographic signatures on information contained within the DNS. Cryptographic signatures provide integrity by computing a cryptographic hash (that is, a strong checksum) of the data and then protecting that hash value from tampering by encrypting it. The private key of the private/public key pair is used to encrypt the hash, then the general public can use the public key to decrypt it. If this decrpted hash value matches the hash value the recipient just computed, then the data has integrity.

The cryptographic signature and the public key used for verification of a signature are retrieved through queries and responses, just like any other piece of information within the DNS.

The authentication is implicit to a cryptographic signature whenever the decrypted hash values and the computed hash values match: Only the holder of the private key could have encrypted it, since the public key decrypted a valid hash value. Therefore, it is paramount to any system deploying public key technology that the private key be protected from compromise. RFC 2541 from the DNSSEC WG addresses this issue.

NEW RESOURCE RECORDS

DNSSEC uses cryptographic signatures on DNS zone data, dynamic updates, and transactions. It also uses cryptographic signatures to prove the nonexistence Of DNS data. DNSSEC incorporates three new RRS- the KEY RR, the SIG RR, and the NXT RR-to provide all this functionality.

The KEY RR holds the public key belonging to the domain name specified within the KEY RR. This is not a public key certificate. A mechanism to provide public key certificate lookup capabilities has been provided by DNSSEC WG, but not for the purpose of securing DNS data. It was simply provided as an added bonus in which the DNS can be used to query public key certificates of anything that can be represented by a domain name. The CERT RR provides this capability.

The SIG RR primarily contains the cryptographic signature, expiration date of the signature, and the identity of the DNS data to which the cryptographic signature belongs. The NXT RR provides the ability to assert (through the use of cryptography) that an RR for a given DNS name does not exist. Thus, the nonexistence of a given RR can be proven with authentication and integrity.

Another aspect of DNSSEC is the Transaction Signature (TSIG). TSIG differs from the other aspects Of DNSSEC in that it uses secret key cryptography rather than public keys. We will examine TSIG later.

What the DNSSEC protocol doesn't provide is privacy or access control. This is important to distinguish from actual implementations, which may or may not choose to include a mechanism for privacy and access control. The reason why both privacy and access control have been omitted is that the information contained with the original DNS protocol is designed to be public data. With the advent of firewalls, concern about information leakage of system names and locations, and denial-of-service (DOS) attacks, there is an increasing desire to have both privacy and access control. This demand is being reflected in the implementation Of DNS.

For example, the BIND implementation provided access control to prevent unauthorized systems from performing zone transfers. This has also been extended to prevent certain systems from querying servers. To date, privacy has been partially achieved by using firewalls and having what is known as a Split DNS configuration, in which the internal DNS information is difficult to access from the external Internet.

The Internet Software Consortium (isc, www.isc.org), a nonprofit corporation dedicated to open-source implementations of core Internet protocols, is adding two security mechanisms to make the DNS server "DNSSEC aware." The first measures the authenticity of data in the system by verifying that the data in question has been cryptographically signed by the administrator of the site that it purports to come from.

However, as with most solutions in computer science, this method simply moves the security problem to a different corner, raising the question, "How do we know that it was signed by who we think it had to be signed by?" In public key cryptography, a private key generates signatures, and a public key verifies them. DNSSEC uses the DNS itself to propagate each site's public keys, and so the key you need for verification is available via the same marvelously insecure protocol as the data you're trying to verify. It seems to be a circular problem, but it's not. One way you can verify the public key before using it to verify a response is to look at the signature on the public key itself The parent site should sign every public key; so in our earlier example, the verification (public) key for examiner.com would have to be signed by the administrator of com. However, before you can verify corn's signature on examiner.com, you need to know the public (verification) keys for com itself, and these will in turn have to be signed by the parent of com (the aforementioned DNS root, sometimes called dot).

To be sure that the public (verification) keys for dot are legitimate, they need to be contained on a file on your computer that was acquired by some secure means (like a CD-ROM) from a trusted party, such as your computer's manufacturer. Since dot is the ultimate parent of all domain names, there need be only one public key for the whole DNS.

The second security mechanism isc is adding to the DNS determines whether a protocol message has come from a trusted source. This is a subtle but important distinction: Instead of the security mechanism checking the authenticity of the data, it checks the authenticity of the data's sender.

Virtually all DNS data is consumed via caches, rather than directly from primary or secondary servers. These caches are DNS servers but are not the primary or secondary server to which the data belongs, and they can even lack any permanent data of their own-everything they know, they learn because some client asked them a question, and they had to go find the answer. One common trick employed by hackers is to flood a client with responses during the precise interval when the client is known to be expecting a reply from its local caching server. The client can't tell a real reply from a bogus one, and whichever one arrives first will simply be used.

A client needs to trust that its local server is doing the verification work, and then it needs to trust that the answer it receives actually came from that local caching server, rather than from some intruding third party.

TRANSACTION SIGNATURES

This method of security is called a TSIG because it involves mixing the message with a private key. What's different from full DNSSEC is that the same key is used for both signature generation and signature verification (so it's all private), and this shared private key (also called a "shared secret") is only shared between hosts on the same LAN or (at most) on the same campus. It is thus much simpler to use TSIGS than full DNSSEC.

A TSIG is particularly useful in the case Of DNS UPDATE transactions. Most DNS transactions are queries concerned with discovering data that exists. A DNS UPDATE transaction makes changes to a sites DNS data. DNS UPDATE is described in RFC 2136, but for our purposes it suffices to say that it has no inherent security of its own.

Because the DNS UPDATE is usually carried over UDP, and Since UDP is completely spoofable, it follows that there is no way for a server to know that a given DNS UPDATE request is permitted by local site policy. If, on the other hand, an UPDATE client shares a secret with the site's DNS server and uses this secret to generate a signature on the request, then the UPDATE server can use the same secret to verify that signature and determine that the requester has the proper permissions.

DNSSEC DOWNSIDES

Signing and verifying DNS data obviously creates additional overhead that will affect network and server performance. Signatures are not small; often they dwarf the size of the data they cover. This will increase the load that the DNS places on the Internet backbone and many nonbackbone links. Generating and verifying Signatures takes a lot of cpu time. In some cases, a uniprocesSOT DNS server will have to be replaced by a multiprocessor DNSSEC server. Signatures and keys may take Lip as much as lo times the amount of disk space and RAM than the data they accompany. Databases and management systems will all have to be scaled up to cope with the added volume.

There are also less direct costs to implementing DNSSEC. The software is quite large and complex compared to older DNS-Only soft-are, and a lot of this software is quite new and will require realworld operational testing. DNSSEC has not been simulated on the massive scale of the Internet and may yet hold some surprises (which could lead to an overhaul).

The bottom line is that deploying DNSSEC is almost as dangerous as not deploying it. The prudent choice would be to wait one or two years after the DNSSEC RFC is promoted to draft standard status.

As of December 1999, only ISC'S BIND 8.2 fully implements TSIG and partially implements DNSSEC. Other vendors (including Microsoft) are implementing various forms Of TSIG for future releases. ISC'S BIND 9.0, scheduled for public release in the first quarter Of 2000, Will have a full implementation Of DNSSEC.

A WORK IN PROGRESS

Some operational aspects Of DNSSEc are still being worked out, such as exactly how the coin administrators will sign public keys. A new protocol addressing this may be forthcoming. Its also necessary to support more than one public/private key pair in simultaneous use during a rollover period, but how this will work has yet to be determined. If a private key is ever compromised and needs to be withdrawn, there's absolutely no facility at present for making subsequent verifiers aware of the bad key.

Finally there's the security of the dot private key. This key will literally be the key to worldwide Internet commerce, but the administration of the dot servers is currently in flux.

Should the United States continue to administer this worldwide commerce enabler? If it's turned over to a nonprofit industry trade association like the Internet Corporation for Assigned Names and Numbers (ICANN), can such an entity ensure that every government's goals and policies are taken into account? Do we need to turn it all over to the United Nations? Could the United Nations wield that much authority? Could anyone? Worldwide deployment of DNSSEC won't happen before dot is signed, which in turn will not happen until the administration of dot is settled.

It's true that DNSSEC is still a work in progress. However, any organization that relies on the Internet should consider DNSSEC a critical component of its security infrastructure because the DNS protocol is still vulnerable to malicious misuse. Only DNSSEC, through its strong cryptographic techniques, will provide authentication and integrity to all aspects Of DNS in one package.

Resources

The IETF's Domain Name System Security Working Group (DNSSEC WG) home page is www.geocities.com/compsec101/.

The Internet Software Consortium (ISC) is a nonprofit corporation dedicated to creating, maintaining, and publishing open source implementations of core Internet protocols. The ISC home page is www.isc.org.

The Collaborative Advanced Interagency Research Network (CAIRN) is a test bed network funded primarily by the Defense Advanced Research Projects Agency (DARPA). CAIRN has DNSSEC information at www.cairn.net/DNSSEC/index.html.

Diane Davidowicz works at the National Oceanic and Atmospheric Administration. She can be reached at compsec101@ yahoo.com. **Paul** is the president and founder of the Internet Software Consortium (isc) and the architect of ISCS BIND. He can be reached at paul@isc.org.

Securing DNS Servers Without DNSSEC Whether you take advantage of the partial DNS Security (DNSSEC) implementation in BIND 8.2 or wait until the security extensions are standardized, there are still some prudent security measures you should take to protect DNS information until a full implementation is available.

The server that runs your DNS software must be well secured. All of the network applications running on the server, including DNS software, should be the latest release and patch level.

When evaluating a server's ability to safely house the DNS, keep in mind that every network application the DNS server runs is a potential vehicle for intrusion.

To reduce your risk, run only those network applications that are necessary on the server. From there, restrict access to those services and, for applications where authentication is needed, provide strong authentication. With the advent of automated scanning tools, DNS servers exposed to the Internet are under a constant barrage of probing and attempted intrusion. Since DNS servers must respond to public queries, there is almost no way around this exposure.

However, you can minimize this exposure with a split DNS model. In a split DNS model, one DNS server with minimal DNS information is placed on the public side of the network, while a second server is placed on the private side. This second server is only accessible from the internal network and contains all the DNS information of the internal network.

Be aware that internal servers are subject to attacks from insiders, and thus should be given the same level of protection as external DNS servers.

A DNS administrator can utilize a message digest (such as MD5 checksums) to detect data tampering, in case an intruder gains entry onto the server.

Advanced Search

The New York Times

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December 14, 1998, Monday

BUSINESS/FINANCIAL DESK

Crusader Thwarts Invaders of the E-Mailbox

By MATT RICHTEL (Biography) 1185 words

REDWOOD CITY, Calif., Dec. 13 -- If David Farber is noteworthy for the number of people who want to be included on his influential E-mail list, Paul Vixie is famous -- some would say notorious -- for publishing an on-line list that companies desperately want to avoid being on.

Mr. Vixie is the creator and keeper of the Realtime Blackhole List, a frequently updated list of Internet service providers and Web-hosting companies that he concludes are being used to send unsolicited bulk E-mail, or spam.

Inclusion on the list is not merely embarrassing, but can be costly. Hundreds of Internet companies, universities and other organizations around the world, following Mr. Vixie's advice, automatically refuse to deliver messages originating from an Internet service that has been, to use the industry patois, black-holed.

When Mr. Vixie puts a provider of Internet services on the Blackhole list, the organization will find that not just its spam but also its regular E-mail is blocked from reaching many computer users. Mr. Vixie estimates that 25 percent of the addresses on the Internet would become unreachable to those listed.

Those services that have been blackholed at various times include well-known companies like America Online, Microsoft Network, ICG Communications' Netcom On-Live Services and Earthlink Network.

Time spent in Vixie purgatory may be only a few minutes or can stretch out into weeks, depending on how quickly the labeled offender takes anti-spam measures. Last June, the Microsoft Network spent three-and-a-half days on the list after Mr. Vixie concluded the company's E-mail servers were being used as a launching pad for spam.

Mr. Vixie acknowledges that his tactics may seem harsh, because other messages get blocked along with the spam. But he believes the severity of the consequences provides the best way to get the attention of offending providers, or I.S.P.'s.

''I got E-mail from some mother who could no longer send E-mail to her son in college,'' Mr. Vixie said. ''But either I cause a lot of uncertainty for people until their I.S.P. becomes a model network, or the spammers win, and you and I, and that mother, would have hundreds of messages coming in every day.''

His goals may seem admirable. But Mr. Vixie, a 35-year Internet consultant without so much as a high school diploma, is generating increasing controversy because of his virtually unparalleled degree of power to control Internet traffic.

In fact, some critics accuse Mr. Vixie of being arbitrary and capricious. ''He's McCarthy reborn,'' said Alan R. Bechtold, owner of BBS Press Service Inc., an Internet service provider in Topeka, Kan., that spent several days on the list last month. ''He's arrogant,'' Mr. Bechtold said. ''He believes in his cause, but he's totally blind to the damage he does.''

Mr. Bechtold said his company, which operates Web server computers on which other people maintain their own Web pages, was blackholed because it once provided space for a Web page to a businessman who used spam to advertise his own electronic-commerce business.

But Mr. Bechtold said he had not carried the businessman's site since last July, and that the businessman was using a different service to send the spam when Mr. Vixie added BBS to the Blackhole list.

Mr. Vixie acknowledged that he had not verified whether the businessman was still operating from BBS when he added the company to the list.

In his defense, Mr. Vixie's supporters say that in the unregulated world of the Internet, he is tackling a problem that legislation and technology have not been able to resolve.

The Realtime Blackhole List works ''because people trust Paul to make ethical, intelligent decisions about who goes on and who stays off,'' said John Mozena, co-founder and vice president of the Coalition Against Unsolicited Commercial E-mail, an anti-spam lobbying and trade group. ''If there is a consensus leader among the anti-spammers,'' Mr. Mozena said. ''it would be Paul.''

Mr. Vixie works in this Silicon Valley city, using an office lighted by little more than his computer screens and shared only with Elroy, his Labrador retriever and German shepherd mix. He says he adds a provider to his list if he determines its network is the originating source of spam and if it does not

move quickly enough to stop once he issues a warning.

He says he promptly removes a company from the Blackhole list when it has proved to him that its E-mail servers -- the powerful computers that send, receive and distribute electronic messages -- are no longer being used to send or relay unsolicited bulk E-mail.

Supporting himself through consulting work and charging nothing to maintain his Blackhole list, Mr. Vixie toils to serve Internet service providers, universities and others that operate E-mail servers and are desperate to stop the flow of spam. The unsolicited E-mail clogs computer systems, consumes processing power and annoys customers. And usually only the largest Internet companies can afford to track down and fight spammers effectively on their own.

Many smaller service providers subscribe to Mr. Vixie's list and then program their own E-mail servers to retrieve and carry out his recommendations on which Internet providers to block.

Mr. Vixie said that the average stay on the Realtime Blackhole List was no more than a few days and that on a typical day, he would add five networks to the list and remove two or three. Very infrequently, if ever, he said, would a subscriber to his list wind up being blackholed, because the subscribers are companies or organizations that tend to be as anxious to avoid spam as he is.

Four volunteers working at separate locations help Mr. Vixie sift through potential spam, which they have received directly from spammers or which Internet users have forwarded to the organization's Web site (http://maps.vix.com/rbl). The team then tries to track down the origin of the spam and send a warning to the company that operates the originating mail server.

Mr. Vixie recently demanded, for example, that Earthlink, a large Southern California Internet service with 815,000 users, revamp its system to guard more effectively against being used by spammers, according to Steve Dougherty, Earthlink's director of Internet operations. Mr. Dougherty said Earthlink had already been planning to install such safeguards.

He found Mr. Vixie to be terse and inflexible in his demands. And in the end, Mr. Dougherty said, there was little choice but to accede.

''We accelerated our schedule,'' Mr. Dougherty said. ''He wields that kind of power. He's a guy who can drop 30 percent of our traffic.''

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April 13, 1998, Monday

BUSINESS/FINANCIAL DESK

Software Designers Share the Code

By JOHN MARKOFF (NYT) 857 words

SAN FRANCISCO, April 12 -- What is the best way to improve the quality of software in the $50 billion software industry? Give it away.

Or so say more than a dozen of the nation's best-known software designers, who met last week to promote the idea of freely sharing the underlying code -- known as source code -- for both popular and arcane software.

Such sharing, which recalls the ''freeware'' spirit of the original Internet, could result in better software by giving any programmer the opportunity to modify, add to or otherwise improve existing programs, the group said.

Subversive as the idea may sound in the age of stock options and I.P.O.'s, proponents say the point is not to do away with commercial, for-profit selling of software. Instead, the group simply wants to foster more alternatives to the industry-dominant programs created by giants like the Microsoft Corporation and the Oracle Corporation.

''There's a fantasy that open source code and capitalism are contradictory; that is false,'' said Eric Allman, a member of the group and creator of Sendmail, a free program that routes and delivers the majority of the Internet's electronic mail.

Until recently Mr. Allman maintained Sendmail as a hobby, while he worked at a variety of programming jobs. But last month, he co-founded Sendmail Inc. to create a commercial version of the program, for which customers would receive technical support. At the same time, the company will continue to maintain a free version of the software.

Freeware sentiment seems to be in the air these days. The group's first meeting, last Tuesday evening, came a week after the Netscape Communications Corporation announced that it was making the source code to its Communicator Internet browser freely available to programmers who wished to modify it or add features. Source code is the original programmer's instructions, before the instructions are read by a program called a compiler or an interpreter and converted into a form that can be used by a computer.

Netscape executives have said that they are hoping to tap into a ground swell of creativity by the programming community to help the popular program become even more widely adopted and enable the software to evolve in ways that Microsoft's team of in-house programmers might not be able to match with their browser, called Explorer.

To compete with Netscape, Microsoft back in 1996 decided to give away the Explorer browser for free. Then last year Microsoft decided to add the browser at no extra charge to the Windows 95 operating system, prompting an antitrust inquiry by the Justice Department. In neither case, though, did Microsoft publicly release the original source code for Explorer.

For Netscape, whatever the competing alternatives to Communicator that might result from releasing the source code, the company itself would conceivably benefit by having its program serve as the industry standard.

Netscape's goals are similar to those of the ad hoc group of programmers who met last Tuesday: speeding up software innovation by making it a community affair.

''This is a second force in the computer industry,'' said Tim O'Reilly, the meeting's organizer and president of O'Reilly & Associates, a Sebastopol, Calif., publisher of computer software guidebooks. ''The open source model is an engine for innovation.''

The programmers contend that the economic forces that favored Microsoft's market model of selling software in shrink-wrapped packages has been altered by the Internet. The free distribution of software over the network will increasingly favor those who want to freely share their software, they said.

Mr. O'Reilly said that much of the software that is integral to the Internet was written by the programmers who attended the meeting. ''This is the Internet's dream team,'' he said.

Besides Mr. Allman, the group included Linus Torvalds, creator of Linux, a popular free version of the Unix operating system; Phil Zimmermann, creator of Pretty Good Privacy, an encryption program widely used in both freeware and commercial forms; Larry Wall, creator of Perl, a language used widely by Internet web sites; Brian Behlendor, a software developer who maintains and updates Apache, the Internet's most popular software for Web server computers; Paul Vixie; creator of Bind, the program that translates numeric Internet addresses into names, and John K. Ousterhout,

developer of Tcl/Tk, a popular language for special projects and tying together disparate programs.

Sendmail and Apache are examples of free programs that dominate markets in which commercial competitors lag badly. In both cases, the free programs were able to quickly establish a foothold because of the ease of distribution via the Internet and were of such high quality that it has been impossible for commercial products to dislodge them.

BUSINESS
FREEWARE PIONEERS / Vixie's Bind Made Names for Web
Jamie Beckett, Chronicle Staff Writer

04/09/1998
The San Francisco Chronicle
FINAL
D3
(Copyright 1998)

NAME: **Paul ⅛**

FREEWARE CREATED: Bind

WHAT IT DOES: Bind is a program that translates words into numbers so that Web addresses can be words instead of a string of numbers

FREEWARE WEB SITE: www.isc.org

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Anyone who has ever called up a Web site just by typing in its name can thank a high school dropout named **Paul ⅛**

For the past 10 years, Vixie has been rewriting and maintaining Bind, freeware that translates words into numbers. Bind makes it possible to type in www.sfgate.com instead of the string of numbers that really represent the Web address.

He's only 34 but he's been programming for 22 years, since he was 12.

"There were no computers at my school. I used to cut school and go to City College of San Francisco, where they had a Honeywell system," Vixie recalls.

A friend's father taught him about programming. He got involved, he recalls, because "it was a cool thing to do, like ham radio or cars."

When Vixie's school told him he'd have to repeat 11th grade, he quit and got a job as a programmer at a consulting firm. Nobody asked how old he was, and he didn't say.

"I was a standard teenager. I wasn't trying to create a brave, new world. I just wanted to get out of school," he says.

Bind, or Berkeley Internet Name Domain, has its roots in the Internet's first domain name system written by Paul Mockapetris, who was working on a U.S. government contract. Bind was created by some University of California at Berkeley graduate students, also on a government contract, to expand the domain name system to handle more hosts.

Vixie was a Bind user and, when the federal money ran out in 1988, he stepped in. He was working as a programmer for Digital Equipment Corp. in Palo Alto, and upgrading and maintaining Bind became part of his job responsibilities.

At the time, Bind was "a piece of junk," recalls Vixie. "There's no way to candy coat that. It didn't work very well."

He's since rewritten about half of Bind's code, and many people consider him to be Bind's true father.

Vixie left Digital in 1993. Since Bind is available for free, it doesn't pay the mortgage on his house in La Honda (San Mateo County) or support his family, although he sometimes gets contract work making changes or adding features to Bind. He makes his living consulting and running a Redwood City company that makes computers for Internet service providers.

Many people know Vixie though because of his work with the anti- spam movement. He hates spam (the junk mail of the Internet). It's not that he expects the Internet to be pure. He believes people have the right to publish whatever they want. What he objects to is how spammers force all of us to spend time looking at their messages.

"I put an awful lot of effort into making the Internet possible," he says. "I'm angry to see the results of my work abused in this way."

PHOTO; Caption: **Paul ⅛**/ BRANT WARD/THE CHRONICLE