

EXHIBIT 4

SUPERHIGHWAY ROUTED THROUGH CAPITOL HILL

By John Schwartz

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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 nanoseconds, 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.

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