

HOUSE OF BUSINESS

THE MAGAZINE FOR THE NEW HOME HEADQUARTERS



OCTOBER 2000

Entrepreneur
and young mom
Laura Kall runs
her worldwide
organization
from her home

www.houseofbusinessdirect.com

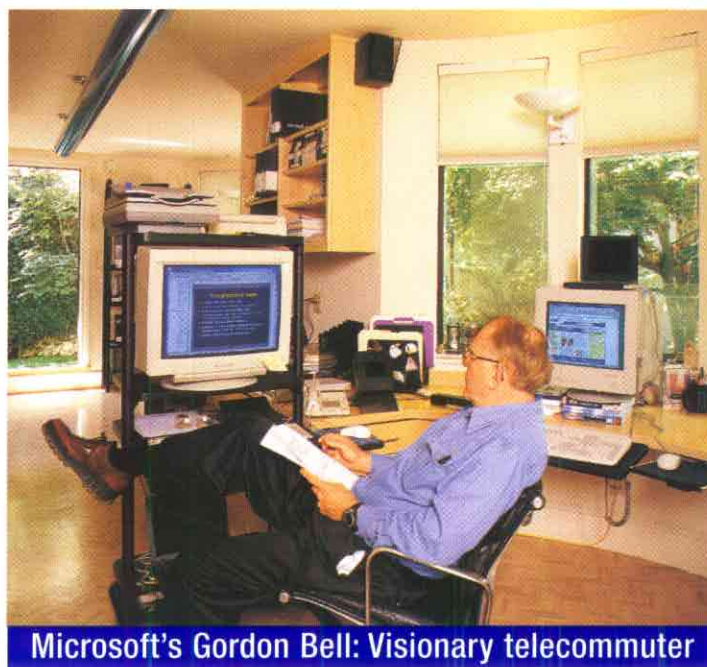
JOIN TODAY'S REVOLUTION

Success at Home

Vision + Technology = Prosperity



Watching business expand



Microsoft's Gordon Bell: Visionary telecommuter



Hitting \$800,000 in sales

Also in This Issue

PRE-PAID LEGAL: Hot company. Lightning growth

CONNECTED: One entrepreneur's networking secrets

NEW PRODUCTS: Great tools for your home office

U.S.A. \$4.99 Canada \$6.99



Display until October 31, 2000



Most of the artifacts in Bell's personal collection — including the comptometer (far right) and the model loom (above center) — are "pre-computing." Many of his other pieces are now in The Computer Museum History Center in Mountain View, Calif.

Burroughs Portable

Addag

Being There

Gordon C. Bell has a whole new vision for telecommuting. In fact, the eminent computer pioneer's greatest legacy may someday lie in the work he is doing now, on what he calls telepresence. His current passion is both social and technical, and one where he's setting a personal example.

Bell has been a major force in the computer industry since the 1970s, creating computers that brought his employer billions of dollars and made him independently wealthy. He made his mark at Digital Equipment Corporation where he was the architect of a line of super-minicomputers — the machines that displaced the large mainframes then indispensable to big business. The minicomputer era he helped usher in then gave way to the age of desktops, first known as microcomputers.

Bell was an obvious choice when Microsoft began seeking the right mix of brilliant thinkers for its Bay Area Research Center in San Francisco.

At Microsoft, which he says he joined in 1995 "to continue to be a part of the next paradigm shift," Bell has been



Bell and colleagues at the dining room table. Painter Harold Cohen created the colorful work on the wall, using his computer program Aaron.

While Being Here

particularly interested in the boundary between the computer and communications devices such as the telephone — and devices not yet invented.

A true telecommuter, he travels worldwide and often works out of his three homes in the Bay area. For his home office, Bell thinks in terms of telepresence, which he defines as "being there while being here" or "being there without having to be there."

He can work just as easily at one of his homes as he can from the company offices in San Francisco, thanks to his principal computing machine — a portable with a 6 gigabyte hard drive that docks with a large monitor, keyboard, and mouse in each of the locales.

"My main machine is at work and is always on and con-

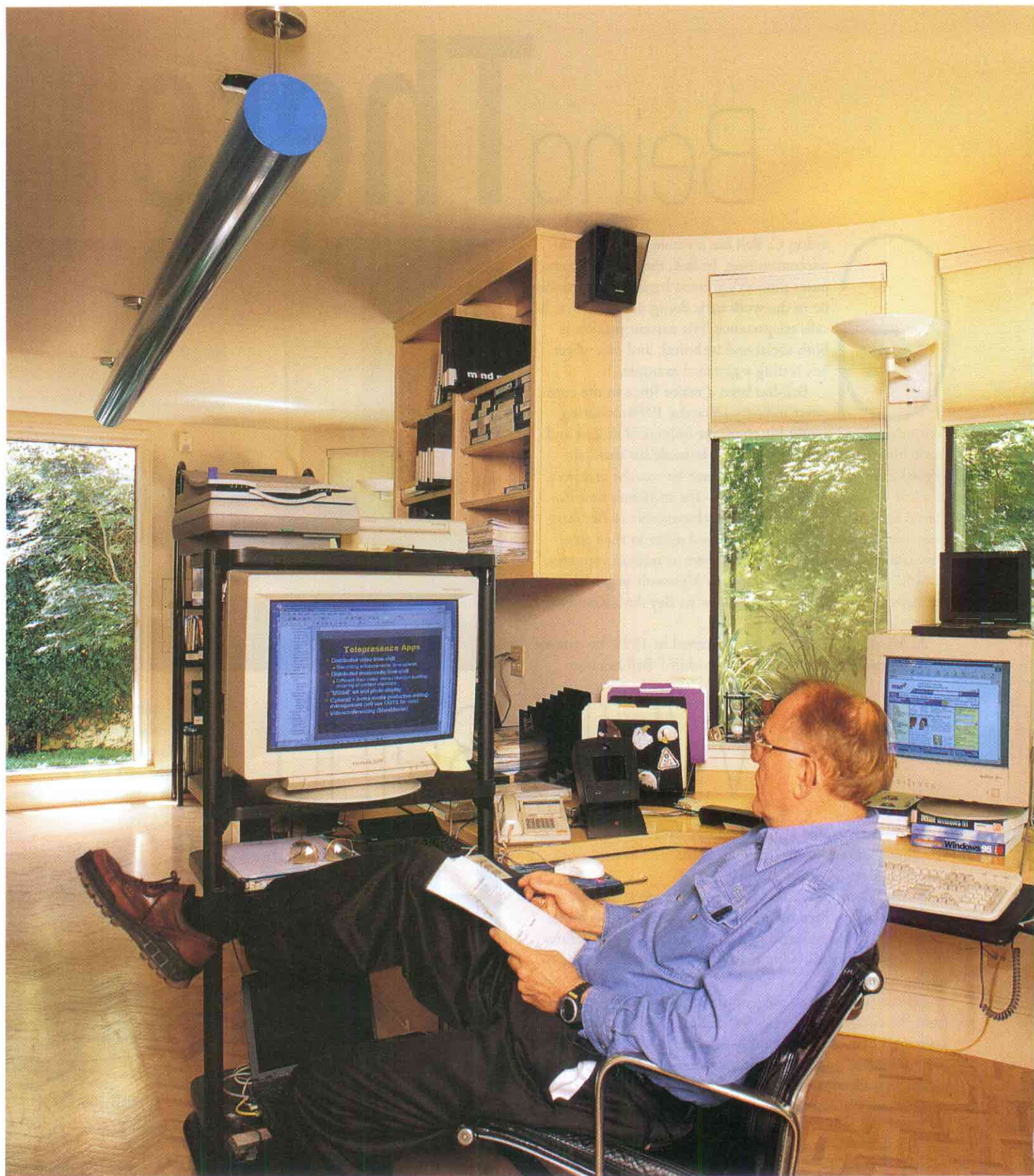
Computer pioneer **Gordon C. Bell** preaches telepresence

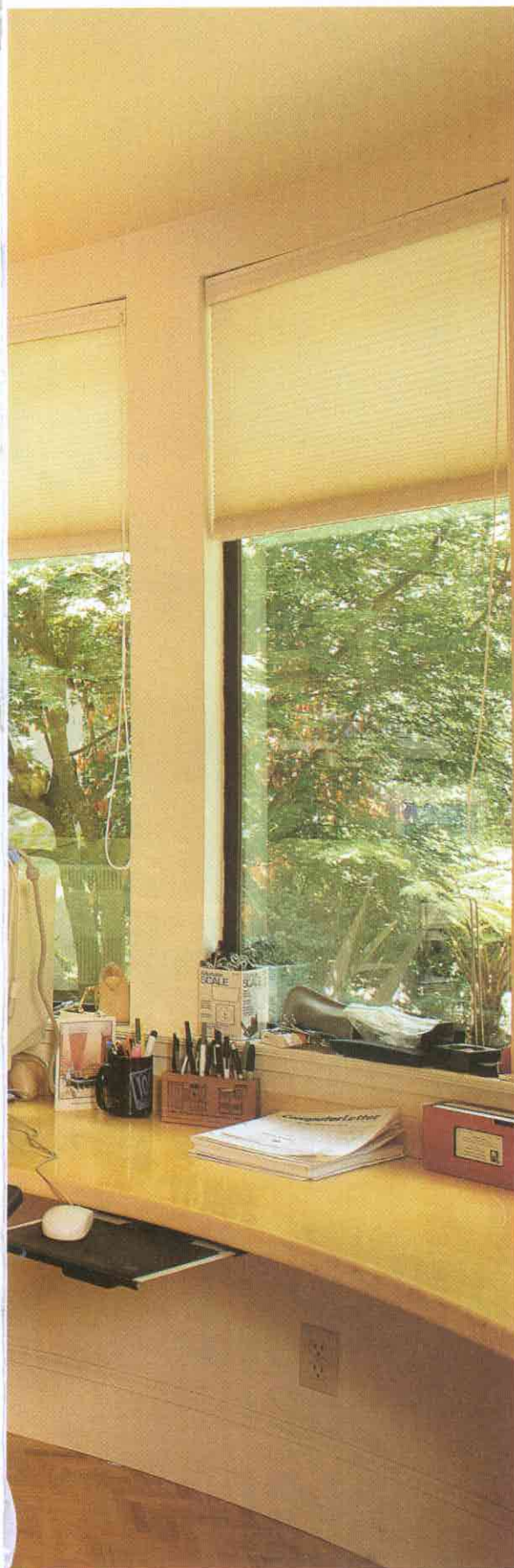
— and practices it. He **works seamlessly** from his three

homes and his commercial office at Microsoft Research.

By **Steven S. Ross**

Photographs by **Kenneth Rice**





nected to the Microsoft net," he explains. "But my portable has a small subset, and I have three docking stations at the three houses that I live in. One of my homes has DSL, another cable, and the third has just a normal phone line. For the last five years, I've had as many as five computers running NT and Windows. Now I'm down to two computers and I love it. I'm perhaps unique in that."

"I have three docking stations at the three houses that I live in."

In a field where genius is usually preceded by the word young, 66-year-old Bell "pumps out ideas as well as anybody," said Nathan Myhrvold, formerly Microsoft's chief technology officer. "He's not sitting around pining for the good old days when men were men. He's more apt to be looking forward 10 years."

When he recruited Bell, Myhrvold has said, he particularly valued the sense of history Bell represented. "One thing that is very valuable in computing — but very rare — is having some sense of the past," noted Myhrvold.

Bell doesn't just have a sense of the past when it comes to computers — he has surrounded himself with their history. "Gordon actually started collecting components of computers when he was writing *Computer Structures* (McGraw-Hill, 1970) with Allen Newell," says his wife, Gwen. "Then when he went to DEC, he started a museum inside the company and many of the more significant items were given to the museum."

The Bells were co-founders of The Computer Museum in Boston, and Gordon

"Telepresence" is the key word in Bell's home office vocabulary. A portable computer that docks with a large monitor, keyboard, and mouse at each of his three homes allows him to work just as easily from home as he can from the Microsoft Research facilities. Other devices include the videophone beside Bell's telephone.

Bell is a founding member of The Computer Museum History Center in Mountain View, Calif., where many of their artifacts were moved after the Boston museum closed.

Why collect computer relics? Because they're "the result of the brightest, most imaginative minds today," says Gwen Bell.

The artifacts that remain in Bell's private collection, he says, are mostly pre-comput-

ing. "There are a variety of early calculators, including a replica of one of the earliest by Pascal. These actually go up to include some modern ones — the H-P calculator watch, for example. Analog stuff includes slide rules and some navigation devices like sectors."

Other pieces on display in his home include an adding machine in which the black and white keys had a different touch; a comptometer — the first mechanical adding machine; a module used in the Early Warning Defense System; and a salesman's model of the Jacquard weaving loom. The loom used cards to create the pattern in the material it was producing — believed to be the inspiration behind using punched cards for data in early computers.

One of the most stunning pieces of furniture Bell owns is a couch with pillows needlepointed by Gwen in a complex pattern of maroons, blues, and pinks. It's the diagram of a chip for the first silicon retina, the brainchild of scientist Carver Mead.

Bell also has a collection of art, although he asserts that he is "not really a collector."

"I only get things that I can relate to," he says. "For one reason or another, we have personal relationships with the painters. So when we see the paintings, they evoke remembrances."

One work hanging in the living room was chosen "because of its sort of mathematical quality," says Bell. The painter, Gyorgy Kepes, was in architectural design at MIT and "was a friend of my adviser," says Gwen Bell.

They also have three pieces by Harold Cohen, all computer-related. "The very large, bright piece over the dining room

table is called On Gauguin's Beach. It was drawn by Aaron, Harold's program that he has been working on for about 20 years," notes Bell. "He colored it. Over the fireplace is one Harold did that was a Polaroid photographic copy of a Gauguin that was made using a VAX computer [the machine fathered by Bell] to do the color matching. And in the hallway is a print that Harold did with his painting machine."

In place of our notion of home office, he *likes* the Japanese term **COMOHO**.

One painting without a personal connection, says Bell, is a Marc Chagall he found in a small shop in Breckinridge, Colo., where the Bells had a ski house. "It was affordable and there — never have I had that experience again," he jokes.

When he discusses his home office, Bell turns serious. He prefers to use the term COMOHO — a Japanese notation for Commercial, Mobile, and Home Office.

"This says a lot about what our computing environments need to be," he states. "I think it captures the issues of all of the environments many of us have to operate in — and the implied problems as well."

He's a great advocate of Internet telephony at

much higher bandwidths into the home — even over normal telephone lines. And he pushed for Microsoft to include an Internet videophone with every copy of Windows 95 — in effect, making the nation's phone system part of the operating system.

Bell notes that existing copper wiring into almost all American homes can support bandwidths of 6 to 25 Mbps. (megabytes per second) — enough to transmit full-screen video.

He blames what he calls the monopolistic phone companies for refusal to provide such service cheaply, if at all. Even DSL operates at speeds about 1/30 of what could

be the norm, he estimates. But once we all get "up to speed," there are additional problems to be addressed as well before we truly live and work "telepresently" in a COMOHO world.

"Audio is one problem, eye-tracking is another," Bell notes. "The system has to be able to support responding to your gaze — either live and in real time or using 'avatars,' which literally means computerized actors.

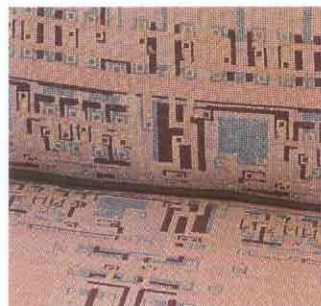
We are trying to run some experiments to see whether people prefer [interacting with] real people or computer images of people — or cartoon figures [on the screen]."

Another big barrier is social. "Even though more than half the companies say they support telecommuting, only a small number really practice it," Bell notes. "Managers either don't trust their subordinates, or the subordinates feel isolated."

The latter is something Bell can relate to. "What I first missed as a teleworker was not being able to attend seminars, corporate meetings, and small meetings," he recalls. "Solving that problem seemed easy — and it is one of the most important ways to work on keeping the remote workforce involved. There are telemeetings [as in PowerPoint conferencing], telelearning when you attend seminars. Bill [Gates] has video on demand for everything from product announcements to explaining our position with the Department of Justice. Collaboration is a challenge for the teleworkforce because ideally you'd like to be there and for now the technology gives you crappy speech, no way to maintain eye contact, and many other limitations."

Successful telepresentation is possible, Bell notes. "I have been to several large-scale conferences [400 or so participants] in large rooms that have two to three video projectors," he says. "No one sees the one-foot-

Gwen Bell needlepointed the couch pillows in the living room, copying the pattern from the layout of Cal Tech scientist Carver Mead's first artificial retina chip (1985).



Close-up of the pattern in the couch pillows.





"You have to be **connected** all of the time. **DSL** lets me be

high talking head of the speaker. They all watch the projected four- to six-foot image of the talking head and/or slides."

Bell concedes that it "takes a few bucks, some energy, and it's not trivial to get the cameras and lighting set up right. Also, the IT [information technology] folks are worried that the 300 Kbps. [kilobytes per second] will harm their nets, or in some cases,

tion for COMOHO, followed by telepresence, with the tacit assumption that many knowledge workers use the Web as their library. You also need the bandwidth, of course — reasonably high bandwidth. One of my early discoveries was that you had to be connected all of the time. I had an ISDN line with an always-on dial-in from the start and that was just fine. Now a DSL lets me

bandwidth for incoming data is higher than for outgoing; hence the 'A' for 'asymmetric'] at 128 to 1,500 Kbps. Cable is a shared medium, and I am not sure that it is going to be the long-term winner, but for now it is the forcing function.

HOB: Forcing function?

GB: The threat from cable forced phone companies to provide DSL.

HOB: What would be the ideal now? Or, to put it another way, what should our readers do now to bring bandwidth into their home offices?

GB: Either DSL or cable modems . . . whatever you can get. I had been using my ISDN with the "always-on" dial-in to our local office until about 14 months ago. And I use and love DSL. It allows me to be in my commercial office while being in my home office. In a hotel, I dial in at anywhere from 7 Kbps. (from a hotel in Washington, D.C., recently) to 56 Kbps. Last week in Beijing, I connected at 26 Kbps. Interestingly, unless I'm at a hotel, I usually dial in at 50 Kbps. from my apartment where I have only POTS [plain old telephone service]. This speed is fine for many tele-apps! In fact, I am connected at this speed right now and listening to WQXR [online from New York City] because there are no classical, non-commercial stations in the San Francisco area. Even though WQXR isn't exactly commercial free, at least its music is a lot better.

HOB: Are hotels missing a bet, failing to provide fast and cheap connections to guests?

GB: Many hotels are providing Ethernet for their rooms. One conference group I am part of — TTI/Vanguard — provides Ethernet at every seat. There are usually about 150 attendees at the lecture-style, interactive sessions.

HOB: With regard to DSL, savvy home office users are worried about the always-on connection and fixed IP [Internet Protocol] address, both of which are already being exploited by hackers to attack home computers. They don't have a virus expert or security expert on hand 24 hours



Kepes' painting, chosen by the Bells for its mathematical qualities, hangs above a display of instruments including a Curta calculator, used for racing, cylindrical and circular slide rules, and drawing tools.

their nets aren't up to it. This amount of information flowing to a few users could, under some circumstances, disrupt the flow to other users," he explains.

"But for sheer payoff, being able to get the message out, to give product presentations and seminars, and to provide tele-education to everyone is probably the best investment that an organization can make. This is also a bit like the first days of e-mail. It took a long time to get it because you couldn't make a business case."

E-mail, adds Bell, is "the killer applica-

tion for COMOHO, followed by telepresence, with the tacit assumption that many knowledge workers use the Web as their library. You also need the bandwidth, of course — reasonably high bandwidth. One of my early discoveries was that you had to be connected all of the time. I had an ISDN line with an always-on dial-in from the start and that was just fine. Now a DSL lets me

Bell has decided opinions on bandwidth — and staying connected in general — which he shared with HOUSE OF BUSINESS writer Steven S. Ross. It was a telecommuter's exchange of e-mails as Bell was on the road and Ross was in Eastern Europe.

HOB: What kind of bandwidth would you reasonably expect to see for home offices in the next few years?

GB: DSL — actually ADSL [because the

in my commerical office while being in my home office."

a day, of course. What might Microsoft and bandwidth providers or others do to help?

GB: You clearly don't want open sharing when you're at home. I note that in the conference environment I spoke of above, it is possible to look out on the network and get at some of my fellow attendees' machines.

HOB: Are some phone companies better than others in providing bandwidth? Or is "better" so short of the mark it isn't worth discussing?

GB: As far as being better, the only thing that makes a difference is whether there is competition!!! The [San Francisco] Bay area is pretty aggressive about bandwidth.

HOB: Is there a role for the federal government in pushing this?

GB: I don't see one . . . except to fix the !@#%&^&* lack of a standard bandwidth/spectrum allocation process so that we can get first-rate mobile services.

HOB: Is there a role for state governments?

GB: They have traditionally been part of the problem because of their involvement in setting rates. This remains until competitors can be set up and state-regulated phone monopolies go away.

HOB: What about mobile services?

GB: The sleeper in all of this may be 3G — the world standard that will start to appear in Japan in Q4 2001 and Europe in 2003 — that operates at speeds up to 2 Mbps. Edge, or 2.5G, is starting to appear with speeds up to 384 Kbps. These also go under the names of GPRS, for General Packet Radio Service. They are always-on connections and have built on the worldwide GSM [Global Systems for Mobile] standard. The U.S. mobile service is a disgrace and the one area where we significantly lag behind the rest of the world.

HOB: How important will mobile service be, particularly in the home office part of COMOHO?

GB: I believe the mobile web will be bigger than the World Wide Web within five years. As such it's an important factor in being able to work telepresently. I've been invest-

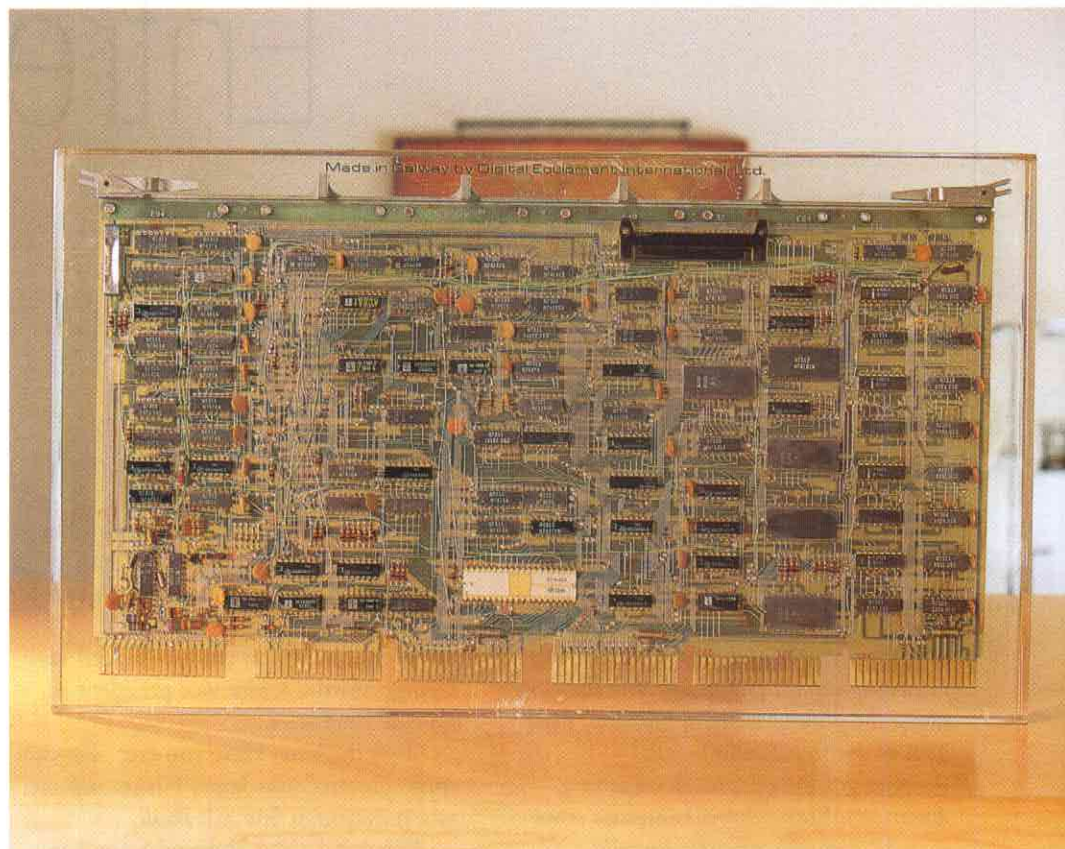
ing in the wireless web and am very bullish about it. But I'm worried about the lack of standards in the United States. I'm also concerned about the WAP [Wireless Application Protocol] standard for mobile phones, instead of the Internet's standard, IP.

HOB: Explain your vision for mobile phone use.

want — newspapers, movies, and so forth.

HOB: AT&T announced a wireless solution to your "last mile" problem of getting bandwidth that last step, from the central switching offices to the home. But after the announcement a few years ago, nothing happened.

GB: I think all the telcos are busy trying not



Technological artifact as art: A module from Digital Equipment Corp.'s PDP-11/70 computer, circa 1976.

GB: Basically the mobile web has to be like the Internet, with the ability to connect to multiple sites simultaneously.

HOB: What about piggybacking on satellite bandwidth?

GB: I don't see that as being the way, except in very limited situations. The traditional landline companies — phone companies and cable — can create bandwidth cheaply enough to undersell satellites if they choose. Also, it doesn't scale. The only way it works is by caching. And I'm not sure I want to set up a cache to deal with content I might

to lose DSL to independent providers or to cable. By 2003, DSL should win out over cable, too.

Bell's interests go beyond computers and bandwidth and telepresence, of course. His hobbies include biking — with annual tours of France; scuba diving, and skiing. He enjoys fishing — providing there is "catching" — in Ketchikan, Alaska. But most of all his active mind belies the common notion that computing is a young man's game. "Good ideas come from everywhere," he says. □