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BBN Celebrates the 25th Anniversary of the ARPANET

On the weekend of September 10, BBN hosted a celebration to recognize the achievements and honor the group of people who envisioned and developed the ARPANET, the computer network that was the predecessor to the Internet. The celebration, called "The History of the Future: ARPANET, Internet ... and Beyond," comprised several events.

Among the activities were a press reception on Friday afternoon in the Copley Plaza Bar for members of the press, attended by a representative group of the "pioneers," who worked on the original ARPANET project and on the development of computer networks; a gathering at 6 p.m. in the Venetian Room of the Copley Plaza for a larger group of the people who developed computer networking; a BBN Open House at 150 CambridgePark Drive on Saturday, Sept. 10, with technology demonstrations, to which press and pioneers were invited; and a gala reception and dinner in the Grand Ballroom of the Copley Plaza on Saturday evening, attended by more than 350 people, including members of the press, pioneers, and others associated with computer networking around the world.

Friday Press Reception

At the Friday reception, BBN President and CEO George Conrades briefly described the ARPANET project and the purpose of the silver anniversary celebration. Steve Levy, chairman of BBN's board of directors, then introduced about 15 of the ARPANET founders to the press.

Among those introduced from BBN were **Frank Heart**, recently retired from the presidency of BBN Systems and Technologies Division, who was the principal investigator on the ARPANET project; **Ben Barker**, then a hardware engineer at BBN responsible for designing the hardware interfaces on the original IMP (Interface Message Processor), and for installing the first IMP at UCLA, and now a senior vice president and chief technology officer at BBN; and **Dave Walden**, then a member of the ARPANET team and one of the three computer programmers on the project to develop the IMP, and now a senior vice president at BBN. (Names of current and recent BBNers appear in bold in this article.)

Several of the pioneers and a few members of the press gave brief spontaneous talks at the Friday press reception, describing their impressions of the early days of networking and the importance of networking today. Other pioneers introduced included Bob Kahn,

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The "IMP guys" in 1969. Top row: Ben Barker. Second row (l to r): Truett Thach, Bill Bartell, Dave Walden, Jim Geisman, Bob Kahn, Frank Heart, Marty Thrope, Will Crowther, and Severo Ornstein.

Severo Ornstein, Truett Thach, and Martin Thrope, all of whom were in the original "IMP guys" photo, taken in 1969.

Kahn, a co-author of the TCP/IP protocol, was the founder and is now president of the Corporation for National Research Initiatives. Ornstein, who was responsible for the ARPANET network hardware component, was the founder and is now chairman of Computer Professionals for Social Responsibility. Truett Thach, who helped test and install the first IMPs, is now director of Quality and Manufacturing Engineering at ACC Systems in Santa Barbara, CA.

Roland Bryan, Vint Cerf, Steve Crocker, Doug Engelbart, Len Kleinrock, John Postel, Larry Roberts, Bob Taylor, and Barry Wessler were also introduced. Bryan, then a principal investigator at the University of Santa Barbara, CA, one of the original four nodes of the ARPANET, is now president and CEO of ACC Systems. Vint Cerf, a co-author of the TCP/IP protocol, is now senior vice president of data architecture at MCI Communications Corp. and president of the Internet Society.

Steve Crocker, responsible for the hardware and software connections of the first ARPANET computers, is now vice president of Trusted Information Systems. Doug Engelbart, an innovator in human/machine interaction who is credited with inventing the mouse, is now director of the Bootstrap Institute in Fremont, CA. Dr. Engelbart spoke on the Thursday before the weekend events in BBN's Guest Lecturer series.

Len Kleinrock, who developed the basic principles of network communications and was Principal Investigator for the ARPA project at UCLA, the site of the first ARPANET node, is now chairman of UCLA's Computer Science Department and chairman and CEO of Technology Transfer Institute. John Postel, a member of the ARPANET programming team at UCLA, is now associate director for networking at the University of Southern California. Larry Roberts, then Director of the Information Processing Techniques Office for ARPA and known as the man who made the ARPANET happen, is now president of ATM Systems, a division of Connectware, Inc. Bob Taylor, then Director of ARPA's computer research program and initiator of ARPANET research, is now director of Digital Equipment Corporation's Systems Research Center at Palo Alto, CA. Barry Wessler, part of the ARPA development team, was cofounder of Telenet Communications Corp. and NetExpress, and is now CEO of Plexys international in Herndon, VA.

Among others currently at BBN who were early contributors to networking technology are **Jerry Burchfiel, Will Crowther, Ken Pogran, Alex McKenzie, Tony Michel, Bob Thomas, and Ray Tomlinson**. Tomlinson developed the first electronic mail that could work across many computers in a network, and is now a Principal Scientist at BBN. A number of other BBNers who were involved with the ARPANET in its earliest years attended the 25th Anniversary events, as did many people working at ARPA at the time, or located at one of the original ARPANET sites, or who were at BBN at the time but then went elsewhere. (See photo of original ARPANET team in 1969 for some of the original "IMP guys"; see photo taken on Sept. 9, 1994 for a "recreation" of the original team photo.)

Some of the press who accepted invitations to the 25th anniversary celebration were from the *Boston Globe, Computer World, Global Network, Infoworld, PC Week, Network Computers, Newsbytes News, The New York Times,* and *Reuters,* among others.

Technology Day

BBN held a Technology Open House in connection with the celebration of 25 years of innovation in network communications, on Saturday, September 10 from 10 a.m to 2 p.m. at 150 CambridgePark Drive. They showed six presentations, and provided bus service from the Copley Plaza to the demo site. Brief descriptions of the demos follow:

- *Cornerstone Data Analysis Software* (BBN Software Products Corp.):

Cornerstone integrates the key functions required to perform exploratory data analysis in an easy-to-use "point and click" desktop application. Cornerstone was designed for a client/server computing environment, where a user working at a desktop computer or workstation can analyze data pulled from a database on another computer. The demo showed the use of Cornerstone to analyze network performance.

- *LightStream 2020—Perfect Vision for ATM Migration* (LightStream Corp.): The presentation discussed how to migrate to Asynchronous Transfer Mode (ATM) networks and provided an overview of the LightStream™ 2020 Enterprise Switch, an optionally fault-tolerant modular device. The switch offers sophisticated bandwith management and congestion avoidance features that enable customers to reduce their operating costs without compromising the quality of service.

- *BBN Internet Server—Bringing Internet Power to the Desktops of Students and Teachers* (Educational Technologies Dept., BBN Systems and Technologies Division): BBN is working with schools worldwide to incorporate internetworking as a constructive and creative tool for learning and teaching. The schools are supported by the BBN Internet Server™, a complete hardware and software package that is easy to manage from a desktop personal computer. Children and educators use traditional Internet services such as email and newer interactive and hypermedia services such as Gopher and World Wide Web in their projects. This demo included remote visits to students and teachers using the Internet Server.

- *BBN Speech Recognition Technology—Present and Future* (BBN Hark Systems Corp.): This demo highlighted the BBN Hark Systems Corporation's speaker-independent continuous speech technology. The presentation included demos of both current and future technology capabilities, focusing on projects for the financial and travel industries. The demo concluded with a glimpse at the world's first large-vocabulary, speaker independent, continuous speech dictation system.

- *Personal Internet Newspaper—Finding and Organizing Information on the Internet* (Distributed Systems Dept., BBN Systems and Technologies Division): The BBN Personal Internet Newspaper is designed to help people manage the flow of information available on the Internet from email, bulletin boards, and on-line databases. It helps users select what interests them from the sea of possibilities and organize the material into one unified, automatically generated digest. The demo showed how this is done within the open architecture of the World Wide Web, thus integrating and adding value to the collection of rapidly evolving tools for the Web that facilitate information creation, publication, discovery, and presentation.

- *BBN's Network Operations Center (NOC)* (BBN Internet Services Corp.): This demo showed how BBN's Network Operations Center proactively monitors, troubleshoots, and solves problems on the Internet, one of the most complex networking environments in existence today. The NOC provides services for business, educational, and research organizations that depend on the Internet for their work.

Saturday Dinner

At the dinner on Saturday, September 10, more than 350 people crowded into the bar next to the Copley Plaza grand ballroom for drinks and hors d'oeuvres and a chance to see old friends. Many of the pioneers had not seen each other for many years, Vint Cerf noted, although they have kept in touch through email. Then the guests, who had come from all over the United States and from many foreign countries, moved into the ornate gold-and-white ballroom for dinner.

United States Rep. Edward Markey gave a keynote speech of appreciation for the

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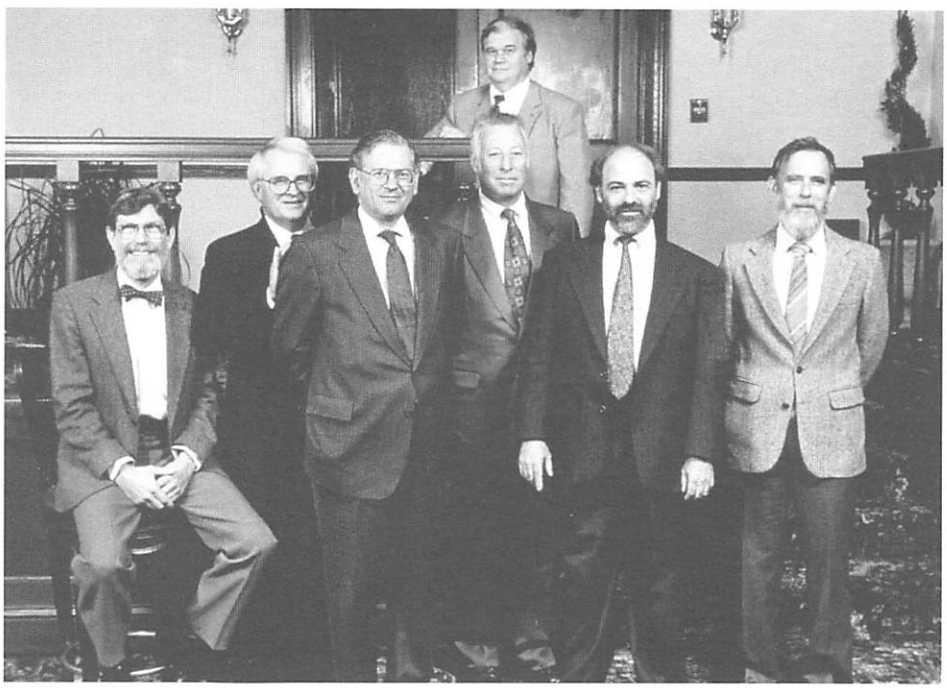

The "IMP guys" in 1994. Top row: Ben Barker. Second row (l to r): Truett Thach, Dave Walden, Bob Kahn, Frank Heart, Marty Thrope, and Severo Ornstein.

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computer pioneers. "I'm only an expert on the information highway in comparison to other congressmen," said Markey, "but look around you in this room. You'll see that it's filled with daunting genius." Governor Weld declared September 10, 1994 "Communications Networking Day," celebrating Massachusetts as a world leader in computing and networking.

Steve Levy read a letter of congratulation from President Bill Clinton, which said in part, "Bringing together visionary individuals from every area of society, the ARPANET project stands as a testament to the brilliant achievements that can result when the public and private sectors work together for the common good. As one of the millions of people around the world who stays in touch through the Internet, I extend gratitude and deep admiration to the pioneering scientists who have made computer networking a reality."

Video Presentation

Next, the audience saw a state-of-the-art video presentation featuring interviews with many of the pioneers. The presentation showed still photos of the founders at work 25 years ago, film footage of significant current events of the time, and videotaped interviews conducted with the ARPANET pioneers this year. The presentation provided a lively history of the growth of computer networks from the ARPANET to the Internet, concluding with interviews of a group of schoolchildren giving their views on using the Internet.

In their interviews, several kids said that they are much more interested in using the Internet than their parents, who prefer using the phone or watching TV, although they try to teach their parents how to use the new technology. One boy said he likes to use the Internet because it lets him talk to all his friends at once, instead of only one friend at a time. "Most people didn't even have computers 25 years ago," noted another student. "I would like to thank the founders of the ARPANET. Even to think of making a computer network then, they must have been geniuses." This video presentation will be shown in Newman Auditorium and copies are available in the BBN Library.

Awards and Speeches

Vint Cerf briefly reminisced about the pioneering days of networking, before he presented awards for their service to the Internet community to Bob Braden of USC Information Sciences Institute, and Lyman Chapin and Steve Kent of BBN. He also called his wife up to the podium and gave her a hug, because the day of the dinner was their 28th wedding anniversary. Then Steve Levy introduced Frank Heart, who walked to the podium to strains of the song, "You Gotta Have Heart," and gave a speech analyzing why the ARPANET project was so successful. (See the interview in this issue for some of the reasons.) ■

An Interview with Frank Heart

At the Systems and Technologies Division's New Year's Lunch on June 30, 1994, BBN President and CEO George Conrades announced that Frank Heart, President of Systems and Technologies and a senior vice president of the corporation, was retiring on July 31 after 28 years at BBN. Following is an interview Frank gave to the BBN Digest.

Q: What was your background before you came to BBN?

A: When I was a graduate student in engineering at MIT I worked on Whirlwind, which was a computer on campus there, in the late 40s, about 1949. When I first worked there, the machine had 32 registers, and you entered instructions and data in binary, via toggle switches, and the machine took up two very large rooms. I've been lucky, because very few people get to ride technology rockets, and I've had two chances. The first was being in at the very beginning of the computer era and getting to watch it become a major industry. And then I had a second crack, with the ARPANET.

Q: You mentioned that you had worked on the SAGE system at Lincoln Lab. What was SAGE, and when did you go to Lincoln Lab?

A: I'm also lucky because I never had to apply for a job in my life. When I was a graduate student working on Whirlwind, the Air Force had just asked MIT to build

a system to protect the country from air raids, and that air defense system was called SAGE. The air defense people stumbled on Whirlwind just when it needed to be stumbled on, and eventually most of the Whirlwind team was transferred to Lincoln Lab, a research lab of MIT supported by the government. After a while, my office moved from the campus to Lincoln Lab in Lexington, and I continued to work on the SAGE system.

Q: How did you come to BBN?

A: I went to a summer conference at Woods Hole which was being run by the director of Lincoln Lab, on "Intrex," which was a study of how to use technologies and computers to make a difference in how libraries work. At the conference I became friendly with Danny Bobrow from BBN, and I subsequently heard about a possible need at BBN for additional help with the Hospital Computer project. This project was started by Jordan Baruch, a very charismatic technologist who later became Assistant Director of the U.S. Dept. of Commerce. BBN tried to capitalize on this project by making an arrangement with G.E. to set up a company called Medinet, and as part of this plan, Jordan was to run Medinet for some period. So BBN needed help to run the Hospital Computer project. When I came to BBN it was being run by Paul Castleman, who looked twelve at the time. He probably wasn't twelve, but he looked twelve, and he had been left to cope with NIH, Mass General, and an assortment of strong-willed people both at these organizations and at BBN.

So BBN extracted me from Lincoln Lab to take over that part of BBN. With great trepidation I left Lincoln Lab after 15 years (I have lots of trouble making major life changes.) I came to BBN in December 1966, in time to help the Hospital project through its terminal illness.

The Hospital Computer project was quite important, even though it wasn't "successful," in my engineering sense. "Successful," to me, means something that gets out into the field and works for real users. The project never became a working system at Mass General, but it was a seedground and catalyst for many other projects around the country.

For the next year and a half (1967-1968) I worked on various projects along with the Hospital Computer project. Then, in mid-'68 the ARPANET project came on the horizon, and the contract was awarded to BBN on January 1, 1969. Recently, I found Hawley Rising's copy of the original RFP and proposal, with the names of the people involved in the proposal. And many of them are still involved with BBN. (Hawley, who helped run the proposal in the beginning, died earlier this year, not long after he retired from BBN). Severo Ornstein was in charge of hardware design, and Will Crowther and Dave Walden were in charge of software design. Dave is still here, and Will is at LightStream. Bob Kahn, who was another key member of the design team, eventually left to go to ARPA. But a lot of the original group stayed.

Q: So the ARPANET marked the beginning of networking?

A: The ARPANET was the first packet-switching network that was at all "real." In England, the National Physical Lab had a test network, and there were other computer-to-computer connections in existence. But the ARPANET was the clear rootstem of networking as we know it today. It was the first actually useful packet network. Labor Day of 1969 was the first installation of the ARPANET.

Q: Did we invent electronic mail at BBN?

A: Yes, Ray Tomlinson did, in the early 1970s. That is, we "invented" email in the networking sense. There were ways before then that you could leave messages for someone else within an individual computer. The distinction was that with our electronic mail you could work across a multiplicity of computers in a network.

Q: How did the ARPANET evolve into the Internet?

A: After seeing how the ARPANET worked, many groups around the world built networks and then began connecting them together. Then people worked on connecting them in an orderly way, and eventually the TCP/IP protocol suite and other protocol suites were developed, and BBN participated in the development of such interconnection protocols. And then, in recent years, network growth around the world exploded.

Q: What made the ARPANET project work so well?

A: There were many factors. At BBN we had a very small, very talented group; the hardware guys could program and the software people knew a lot about hardware. And the other groups around the country who participated in the network were the cream of the technological crop of the day.

Also, it was crucial that Larry Roberts, at ARPA, had cognizance of the activities both of the user groups and the network builders. There was a strong yet informal group at ARPA that directed the development activities.

It was also important that BBN placed great emphasis on reliability. That was one of our strengths, and has been all along. For example, the first IMP was ruggedized physically, and it had a watchdog timer to restart the machine if the program went wild, and the equipment was expected to run unattended, with no use of buttons or knobs locally. It was in a solid case that was hard to tamper with. This kind of thinking about reliability was partly a legacy of the project group from my prior experience at Whirlwind and Lincoln Lab, where Jay Forester was very insistent on the importance of reliability issues.

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Q: How about some of the other major activities at BBN? How did the company develop while you were here?

A: BBN started as a consulting organization. In a very real sense BBN hired people and told them to go make a living. What gets done here, or at least what used to get done here, was strongly a function of what good people *wanted* to do. For example, there was an Education group here, with Wally Feurzeig, when I arrived, and there's been one ever since. I encouraged people to do what they wanted to do, if they could make money at it (or at least not lose too much). It was kind of the "let the many flowers grow" philosophy. Therefore, we have an organization in which many people are working on a broad range of technologies. BBN is less focused than many organizations, and while there are negative attributes to lack of focus, there is also strength and resilience in diversity. We have also found that it is far easier to move from an existing activity to a new one that is "close" in some senses, rather than making a large jump to a wholly new area.

Also, BBN is mostly pretty careful about who it hires. It tries to hire quite good people. It has a strong group of employees, and we are fortunate to be located a bike ride away from Harvard and a bus-ride away from MIT. The turnover has been very low in the organizations I supervised. Many people are still here from the time of the ARPANET—McKenzie, Walden, Barker, Crowther—and many people who leave come back—sometimes after only a week!

Q: It sounds like there were lots of connections and interactions between between ARPA and BBN.

A: Well, as an example, BBN formed Telenet Corporation as a direct outgrowth of the ARPANET, and hired Larry Roberts from ARPA to run it. Maybe that's an element of "the military-industrial complex"!

Q: But ARPA wasn't so military, was it?

A: Well, it varies. Many parts of ARPA, and many people at BBN, have always been interested in trying to create dual-use systems, and under the Clinton administration dual use is much in vogue.

Q: What were some other major projects at BBN?

A: Well, there was Prophet, one of our longest running contracts. I was involved with that in its early years. RS/1® grew out of Prophet, and Software Products Corporation grew out of RS/1.

I also believe that BBN (and I) made a significant and rather unpublicized contribution with the Pluribus multiprocessor; BBN hasn't received the credit it deserves for this. It was built with the goal that it was necessary for the ARPANET, but Bob Kahn, then at ARPA, realized that it was an important technical advance with more generic applications than just this network application. We didn't get public acclaim for the multiprocessor revolution that is still taking place, but the Pluribus was a very important machine. Network monitoring and management has also been a major activity here.

Q: Can you describe the evolution of BBN's organization, from a single company to one with divisions and subsidiaries?

A: Well, I've managed to survive a surfeit of BBN reorganizations, centralizations, decentralizations, and recentralizations over the years, and I've continued to support good people and keep a strong R&D group. Conrades and Levy both like to quote me as saying that "in a real company the product sales support the R&D, but in this company the R&D supports the product activities." Of course it would be nicer if the company could send money in the other direction.

The chief way to keep the R&D part of the company healthy is to be able to continue to attract quality staff and funding for cutting-edge R&D. It's a circle: good people lead to good research funding, and good research funding leads to more good people being interested in working here. A lot of our success with funding agencies has been a function of the specific people we have working here. We are one of the few profit-seeking companies with ARPA support over the years.

Q: What's your feeling about BBN's future?

A: I'm going to hold on to my stock!

Q: Do you have any concluding remarks you'd like to make?

A: Throughout my career here, the place has been the people. BBN has been largely successful in selling its R&D because it has been successful in finding, retaining, stimulating, and supporting very high quality people. I've loved working with the people here, and I hope to be able to continue my relationship with them. ■

NEARNET Becomes Subsidiary of New BBN ISC

The following article describing NEARNET *is adapted in part from an article that appeared in the July/August 1994 issue of the* NSF Network News.

Following its August 1994 acquisition of the Bay Area Regional Research Network (BARRNET℠) from Stanford University, BBN has further secured its position as a leading provider of Internet services. The acquisition consolidates two of the nation's major Internet service providers: BBN's NEARNET℠ operation, which provides Internet access, integration, consulting, security, and training services for organizations in the Northeast, and BARRNET, the leading provider of such services in the San Francisco Bay Area.

BBN has created BBN Internet Services Corp. (BBN ISC) to operate the newly consolidated companies and aggressively expand their geographic coverage both within the United States and internationally. BBN ISC also plans to broaden the range of services it offers its customers. To maintain the strong local organizations that are responsive to customers' regional needs, BBN has created two regional subsidiaries: BBN BARRNET Inc. and BBN NEARNET Inc., each of which will have its own directors, officers, and staff. "This arrangement offers us the checks and balances we will need to think globally, but act locally," says BBN ISC president Dick Edmiston.

BBN ISC currently has an executive search under way for an experienced, marketing-oriented CEO, a position currently being filled by acting CEO Steve Levy. Meanwhile, the entire BBN ISC operation—including BBN NEARNET's Network Operation Center and staff—has moved into a new and expanded facility at 150 CambridgePark Drive.

A Brief History of NEARNET

NEARNET was created by Boston University, Harvard University, and the Massachusetts Institute of Technology (MIT) in 1989 to support the research and academic communities, to strengthen the regional competitiveness of New England, and to meet a growing need for fast, reliable information exchange. BBN has operated NEARNET since its inception.

In June of 1988, James Bruce, vice president for Information Systems at MIT; Stephen Hall, director of the Office of Information Technology at Harvard; and John Porter, Vice Provost for Information Technology at Boston University, began to discuss linking their three campus computer networks together. They were approached by Mark Pullen of the Defense Advanced Research Projects Agency (DARPA), who requested that the new network include Internet access for several local research and development sites that were losing their ARPANET connectivity because of the decommission of the ARPANET.

These companies included BBN, Digital Equipment Corporation (DEC), Encore, Lincoln Laboratories, MITRE, and Thinking Machines. During this time, many organizations losing their ARPANET access were migrating to the NSFNET, which was designed to provide access to supercomputer centers through regional computer networks. These national and local events formed the impetus for creating the New England Academic and Research Network (NEARNET).

NEARNET's Member Organizations

NEARNET currently provides Internet access in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. Its membership has diversified over its five-year history to include many of New England's universities, colleges, technology-based industries and Fortune 100 corporations, as well as government and private agencies. The Boston Globe has recently become a NEARNET member, as have organizations such as Hewlett-Packard, Ziff-Davis Publishing Company (through Ziff Information Services), and the law firm of Hale and Dorr.

In response to demand for mission-critical Internet services for businesses, BBN recently expanded NEARNET services to New York and northern New Jersey. The expansion into New York positions BBN to take advantage of the large financial ser-

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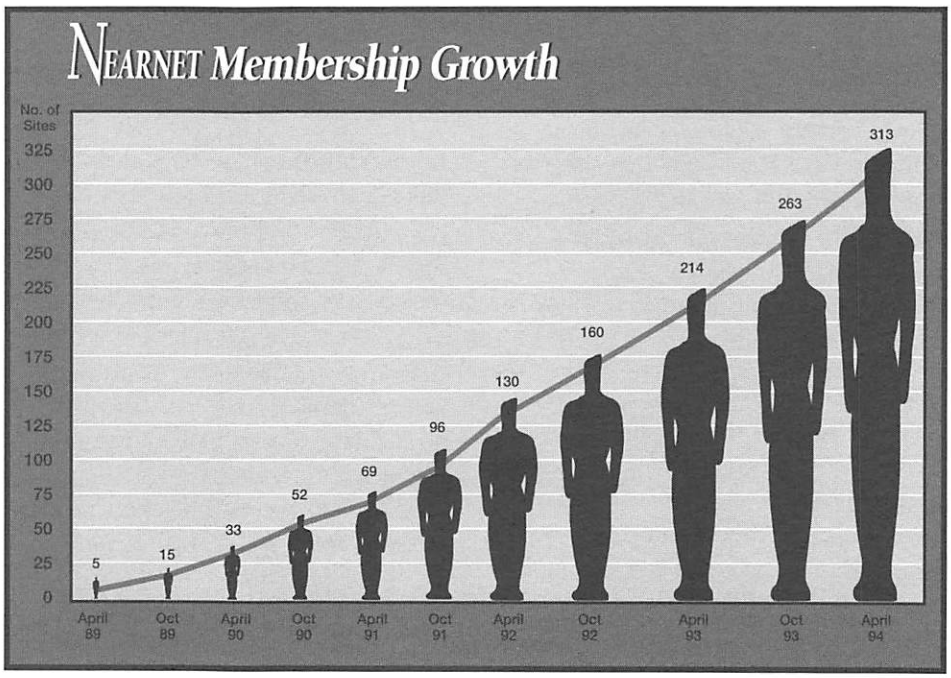

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vices sector and other opportunities there. NEARNET's member organizations currently include over one million people who account for approximately 20 percent of the total U.S. Internet backbone traffic.

Technical Support and Client Services

NEARNET offers its member organizations high-quality turnkey services to integrate the Internet into their enterprise-wide networks. NEARNET also provides ongoing user and technical support so that members can get the most from their Internet connection. NEARNET reaches organizations across New England, the New York metropolitan area, and northern New Jersey through established points-of-presence (POPs). NEARNET staff provides technical support, consulting, and user information services, and maintains a 24-hour-a-day, 7-day-a-week, state-of-the-art Networks Operations Center. Professional staff oversee the design, installation, operation, and performance of every NEARNET node.

NEARNET's Training and Seminars

Since NEARNET introduced its first user seminar in September 1989, thousands of participants have attended the annual user seminars, mini-seminars, and training seminars. The seminars have included speakers such as Mitch Kapor, founder and chairman of On Technology, Inc., co-founder and president of the Electronic Frontier Foundation, and founder of the Lotus Development Corporation, and Tracy LaQuey Parker, education development manager at Cisco Systems, Inc. and author of the bestseller, *The Internet Companion: A Beginners' Guide to Global Networking Internet Training*.

In response to the overwhelming requests from the Internet community for more Internet-specific training, BBN has created an Internet Training Group. In conjunction with the NEARNET staff, the Training Group has begun offering training courses to the general public. (To find out more about BBN's Internet Training Courses, please send email to: net-train@bbn.com or call 617-873-3282.)

NEARNET's K-12 Activities

An important part of NEARNET's mission is to provide Internet services for the kindergarten through twelfth grade (K-12) educational community. NEARNET currently allows its members to provide guest accounts to the K-12 community. This arrangement enables members working on K-12 projects in their communities or supporting K-12 organizations through partnership programs to provide access to the Internet. Furthermore, NEARNET has made arrangements with member university systems to have those members provide K-12 access for statewide projects. For example, the University of New Hampshire (UNH) allows K-12 teachers participating in the New Hampshire State project to access the Internet through UNH.

NEARNET also connects K-12 organizations directly. Several schools are currently connected to NEARNET as part of Phase One of the National Science Foundation's National School Network Testbed project. NEARNET donated communications equipment and created special membership arrangements, with reduced fees, for this project. NEARNET also provides network connection for schools as part of The Co-NECT School project, funded by the New American Schools Development Corporation, a nonprofit corporation established by American corporations and foundations to support innovative designs for American schools. ■

Affirmative Action at BBN

BBN is working actively on enhancing its affirmative action programs, encouraging diversity, and making more opportunities available for women and minorities at the company. The Human Resources staff want to keep people informed of BBN's current activities and efforts in this area.

Chris Lancione, the Human Resources Representative for the Corporate Services Division, prepares the affirmative action plan for BBN. She coordinates BBN's affirmative action efforts, and compiles and analyzes statistical data about applicant flow—whom we interview, hire, and promote. On the basis of this information BBN outlines its affirmative action plans for each upcoming year.

Chris explains that we have always done this kind of analysis to comply with federal requirements, but at the request of BBN President and CEO George Conrades, the company is making affirmative action a heightened priority. "Our overarching concern is to be sure that we are as diverse as we need to be, and to provide for the development of all our employees and ensure their ability to contribute to the company. We need to take action on several fronts, one of which is affirmative action," says Conrades.

Chris notes that we are working not just on recruitment of minorities and women, but also on leadership training and professional development for staff. "We are making an ongoing effort to give women and minorities the training they need to move into senior management and technical roles," she says. Three major areas of recent affirmative action activities at BBN have been in college relations, internships for high school and college students, and identifying appropriate leadership and professional development programs for BBN staff.

College Relations

In working to establish relations with colleges, BBN has sent representatives to recruit and to develop a presence at several of the historically black colleges,

including Hampton Institute, Howard University, Morehouse College, Morgan State College, and Spelman College.

One project that has grown out of the college relations effort is Tom Blackadar's work with Morehouse College, a predominantly black, all-male, four-year liberal arts college located in Atlanta, GA. Tom, who is manager of the Systems and Technologies Division's Hardware Development and Manufacturing Department, knew that Boeing Computer Corporation in Seattle had donated to Morehouse one of BBN's GP1000™ parallel processing computers, and he offered to set it up for them. In January 1994, the chairman of the computer science department at Morehouse told Tom they were ready to set up the GP1000.

After attending a BBN meeting at which Conrades emphasized the importance of making connections with minority colleges, Tom visited Morehouse to help them get their machine going. When he learned that the GP1000 will become one of their primary machines for teaching parallel processor programming, he offered to have BBN help Morehouse set up an educational consortium with about twenty other schools using these machines. BBN is now working on this project, as well as offering faculty training courses on parallel processing at Morehouse.

While at Morehouse, Tom learned that the college is committed to community involvement and to working with public schools. They expressed interest in talking with members of BBN's Educational Technologies Department about their K-12 educational activities.

BBN has also been invited to help Morehouse write grant proposals and to partner with them on some of their projects. BBN's training programs and their help with the computer and parallel computing consortium will contribute to the education of students who may eventually want to work at BBN, and their training may make them stronger candidates. In all these ways, the relationship may prove fruitful to both BBN and Morehouse.

Ginny Warn and Aqualyn Laury at work on a math resource guide.

Internships

In his discussions of affirmative action, Conrades has particularly stressed the importance of reaching people early and working with them until they are ready to join BBN. The company participated in several internship programs this summer. The Human Resources group worked with the Teen Work Program, sponsored by Just-a-Start Corporation, to bring in summer interns from Cambridge. Just-a-Start works with Cambridge Rindge and Latin School and others, supporting community programs and arranging for hiring minority summer intern students. This summer BBN hired ten interns, seven of whom are minorities.

Aqualyn Laury, a recent graduate of Spelman College, a predominantly black, all-female four-year liberal arts college in Atlanta, worked as an intern in the Educational Technologies Department this summer. Aqualyn learned about BBN from George Conrades, whom she met at a conference at Spelman. She majored in mathematics, and she discovered that he too had been a math major as an undergraduate. When she told him she was interested in applied math and was looking for opportunities in business, he mentioned several possible opportunities to explore on the east coast, including BBN.

Aqualyn took an internship working with Bruce Goldberg and Ginny Warn on the Co-NECT project. (Co-NECT is a project funded by the New American Schools Development Corporation, a nonprofit corporation founded by American corporations and foundations to support innovative designs for public schools.) This summer she worked on a math resource guide for teachers in the Co-NECT schools, and she has recently accepted a full-time position with the Co-NECT group.

Aqualyn, who comes from San Antonio, TX and had never been to the northeast before this summer, says, "the Education group at BBN is very nurturing. They're open and accepting of lots of different ideas." Of her educational experience at Spelman College, she comments, "There were so many black female role models. It provided a great support group." Aqualyn is interested in learning as much as she can at BBN.

Leadership and Management Training

Along with minority recruiting and student internships, BBN must address leadership training and leadership development, providing ways for its employees to grow and advance within the company. "We know we have to work on this issue," says Conrades. "It's important for BBN to be in balance with the larger society and reflective of it, and for us to work on developing everyone to their full potential. We must do this if we want to remain an attractive organization to potential employees as well as potential clients.

"We are fortunate to be able to turn to Lucie Fjeldstad, who was recently appointed to BBN's board of directors. We'll

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(continued from page 9)
benefit from her extensive marketing and business development experience in internetworking and multimedia-based applications, areas of great importance to BBN's future. We'll also benefit from her insight and guidance as we work on the issue of developing women and minorities to assume more senior positions."

As one step in this direction, Don Batsford of Human Resources is developing a program that will identify the training needs of BBN through one-on-one interviews, focus groups, and surveys. This will provide the basis for a training program designed to promote and value diversity within our workforce, offering the leadership tools for our employees to be successful as they grow with BBN. In addition, the training group will serve as consultants and advisors, researching and recommending appropriate courses and programs to meet specialized training requirements.

A New Way of Thinking

Steve Heinrich, Vice President of Human Resources and BBN's director of Equal Employment Opportunity programs, says, "Naturally things won't change overnight, but we've opened the doors to a new way of thinking at BBN. For example, we are now targeting a broader cross section of colleges to provide a greater number of highly qualified minority and female candidates."

"The commitment is now here to change the mix at BBN to reflect more accurately the society at large," Steve says. "We will be seeing additional emphasis placed on each manager's commitment to affirmative action for women and minorities. The changes will be gradual, but we are trying to build a foundation for something that will be self-sustaining." ■

Voice Commands for Traffic Information

You may be one of the ten thousand travelers a day who call 374-1234, SmartRoute Systems' SmarTraveler phone-in service for up-to-the-minute traffic information on your commuting route to or from work. If so, you'll be interested to know that BBN has added a new experimental feature to the system that eliminates the usual keypad interface for specifying your route. Now, thanks to an integration of the BBN Hark™ speech recognizer with the SmarTraveler audiotex system, you can speak your route and get real-time traveler information.

This is the first speech recognition application for any federally sponsored Intelligent Vehicle Highways Systems (IVHS) Operational Test. IVHS is sponsored by the Federal Highway Administration and is aimed at reducing congestion, reducing the environmental impact of highway vehicles, and increasing safety. IVHS is an emerging industry with projected sales in the public and private sectors of more than $200B over the next 15 years. More than half of that total is expected to be in areas related to Advanced Traveler Information Systems (ATIS), aimed specifically at reducing congestion. A key ATIS service is providing detailed traffic information on demand.

Teaming with Cambridge-based SmartRoute Systems, BBN's Sensor Systems Technologies (SST) and Human-Computer Collaborative Systems business units configured a phone access demonstration system based on BBN's Hark recognizer. Key BBN technical contributors include Greg Duckworth, Scott Carlson, Kristin Kupres, and Bruce Papazian. Said Jack Heine, SST Manager of Business Development, "Voice recognition as an alternative to telephone touch tones and kiosk keyboards has tremendous potential for IVHS traveler information systems. We needed a real-time demonstration we could access from everywhere in the country to get customers' attention, and the SmarTraveler system was a perfect opportunity."

To access the touch-tone version of SmarTraveler, users dial 374-1234 and follow instructions to use touchtones to get up-to-the-minute traffic information for a specific route. For example, they can press 2 followed by the star key to get traveler information for Route 2, the Fresh Pond Parkway, and Storrow Drive.

On a typical day, SmarTraveler fields 10,000 calls and has had as many as 18,000 calls on days with poor weather. Drawbacks to the current touchtone interface are that the number of routes that can be accessed must be limited, so that each route must cover a number of route sections, and that a driver must divert attention to the phone keypad to get information while en route.

The BBN speech recognizer prompts the user to speak a route request and will recognize a specific route section, such as "Fresh Pond Parkway," without requiring the driver to understand or access the higher level route architecture. Duckworth, the Systems Engineer for this project, sees this as a promising opportunity to interest cellular telephone companies, which now provide the SmarTraveler service to their customers, in supporting development of an expanded multi-line capability using multiple recognizers.

(continued on page 12)

Employee Anniversaries

The following list includes anniversaries that have occurred from May 1994 through October 1994.

35 Years	
Preston Smith	Edward Starr

30 Years
Douglas Steele

25 Years	
Howard Briscoe	Anthony Michel

20 Years	
Michael Beeler	Richard Pew
Bill Huggins	Elaine Spiro
Biagio Mitrano	Norman Westlake
Rafal Mlawski	

15 Years	
Hank Baig	Michael Krasner
Carl Cascio	Carol Luddecke
Ruth Chatterton	Elizabeth O'Neil
Brian Donahue	Edward Tkachuk
Paul Horwitz	Mark Whitney

10 Years	
Justin Aborn	John Lowry
Josefa Alvarez	Leslie Madden
Robert Bartlett	Robert Masters
Edgar Burkett	John Miner
Thomas Calderwood	Priscilla Molea
Frank Cardillicchio	John Montjoy
Rosemary Carter	John Oliveira
Alan Dahlbom	Barbara Reisdorf
Jeffrey Davis	Michael Reynolds*
Heidi Dempsey	Richard Rourke
Robert Fields	Kenneth Schroder
Jurgen Georgs*	Varda Shaked
Griffith Harrison	Ronald Singleton
David Johnston	Kathleen Sullivan
Kathy Kerby	Julie Tiao*
Francis Kubala	Edward Vaccaro
Donnalee Lane	Ralph Weischedel
Kenneth Likis	Theresa Whitestone
Martha Lillie	John Wiggins*
Susan LoPrete	Robert Willis

5 Years	
Steven Avruch	Markutter McIntosh
Dennis Berry	Jonathan McLaughlin
Roy Booth	Charles Miksis
Steven Vanden Bosch	Joseph Musacchia
Kathryn Brennan	Patricia O'Donnell
Maeve Brennan	Anthony Palazola
Brian Brock	Rose Marie Pascale
Gregory Brown*	Terese Patterson
Isidro Castineyra	Paul Placeway
Ana Cecilio	Kelly Polisson
Martin Clark	John Price
William Coney	Kristin Ragucci
Michael Corcoran	Catherine Rocchio
Therese Cwikla	Ira Scharf
Tony Davis	Beverly Schwartz
Leo Dopson	Harold Shallman
Joseph Dow	Lisa Sebell
Beverly Duquette	Laura Silvati-Fidell
John Eldridge	Janine Silver
Peter Farina	Man-Hung Siu
Thomas Finn	Karen Sivret
Christina Fulkerson	Valerie Smith
Mary Galluzzo	Lenore Gauthier Smith
Lisa Giberti	Vik Solem
Virginia Gosdanian*	Donald Sutton
Jeffrey Granger	Barbara Taylor
William Harris	Elizabeth Thoenen*
Kathleen Heidt	Gary Torressen
Leianne Imaoka	David Trasatti
Makiko Kamamoto	Irene Walborsky
Theodore Kral	Guyton Watkins*
Heather Lamarre	Jane Wojcik
Anne Leaman	Clive Wilmot
Vinh Luong	Jeffrey Zuccaro
Richard Lyons	
Robin Martin	

*Denotes LightStream employee

Ungar Receives Gold Medal from ASME

Eric Ungar, a Chief Engineer at BBN and member of the Physical Scienses Business Unit of BBN Systems and Technologies, has been selected by the Americal Society of Mechanical Engineers (ASME) to receive the 1994 Per Bruel Gold Medal for Noise Control and Acoustics.

The Per Bruel Gold Medal, the preeminent medal awarded by ASME's Noise Control and Acoustics Division, is "for fundamental contributions to noise and vibration control engineering involving structural damping, vibration isolation, and vibrations of complex structures, as applied to aerospace vehicles, ships, machinery, and buildings." Formal presentation of the medal will take place at the President's Luncheon during the Winter Annual Meeting of ASME November 1994, in Chicago, IL. ■

Papers and Publications

Charlie Berger, Bob Blauth, Reinhart Richter, and Dave Walden from BBN contributed to a special issue of *The Center for Quality Management Journal*, vol.2, no. 4, Fall 1993. They are among the authors of a paper entitled "Kano's Methods of Understanding Customer-Defined Quality."

A paper by Dave Walden, "Thoughts on Goals and Metrics," will appear in *The Center for Quality Management Journal*, vol.3, no. 1, Winter 1994, pp. 33-38. ■

New Principal and Division Scientists and Engineers

The Science Development Program recognizes the outstanding technical accomplishments of some of BBN's staff members by promoting them to the positions of Chief, Principal, and Division Scientist. Brief biographies of this year's appointees follow.

New Principal Scientists

Greg Duckworth earned an Sc.D. degree in 1983 in electrical engineering and oceanographic engineering from the Joint Program of MIT and the Woods Hole Oceanographic Institution. In 1987, Dr. Duckworth joined BBN's Underwater Technologies Division and is currently in the Acoustic Sciences and Technologies Group. His primary focus has been on the physical analysis of underwater and noise-control acoustics problems and the design and development of data acquisition, signal processing, and control systems for application to these areas. Dr. Duckworth has recently provided technical leadership for the measurement of the scattering of low-frequency underwater sound incidents at the arctic ice canopy, and he has been involved with developing a high-precision-model and multiple-sensor-location measurement systems for a Navy test facility.

Paul Horwitz received a Ph.D. in physics from New York University in 1967. At BBN he works in the Educational Technologies Department, developing new computer-based instructional techniques for physics and mathematics. Dr. Horwitz was a principal investigator of the National Science Foundation-funded ThinkerTools Project, which has a curriculum and associated software to teach Newtonian physics to sixth-grade students. He developed the award-winning RelLab system for teaching Special Relativity to high-school and college students. He is currently principal investigator for a project exploring students' difficulties in understanding genetics. This project is producing a program called GenScope, an open-ended, computer-based, exploratory tool that presents the complex processes of genetics visually and dynamically and makes explicit the causal connections and interactions among them.

Ralph Weischedel received a Ph.D. in computer science from the University of Pennsylvania in 1975. Before coming to BBN in 1984, he was a professor of computer science for nine years. His research interests are in artificial intelligence, and, more particularly, natural language processing and knowledge representation. Dr. Weischedel is currently the principal investigator for three contracts from ARPA: "Research in Automated Document Processing—TIPSTER Text Phase II," "Language Modelling for Text Understanding," and "HOOKAH." These contracts employ the use of probabilistic algorithms and learning algorithms in linguistically motivated models of natural language text. The goal of the approach is to process free text, such as newswire and technical abstracts, to update a database automatically.

New Division Scientists

Ron Coleman received a Ph.D. in mechanical engineering from North Carolina State University in 1984. He joined BBN's Applied Physics Department in 1985 and has led several projects in the field of active noise and vibration control. For the past five years, he has been the project manager and lead designer for BBN's development of the Advanced Vibration Reducer (AVR). Dr. Coleman is currently managing the development of control algorithms for the General-Purpose Noise-Cancellation Processor (QuietChip).

Henry Olds earned an Ed.D. in children's language development from Harvard University in 1968 and joined BBN's Educational Technologies Department in 1991. He is co-director of the Co-NECT project, for which BBN is using modern technology of many kinds—computers and software tools, telephones, fax machines, video and teleconferencing, and local area networks—to create a new approach to education. Dr. Olds is also co-principal investigator of a new Teacher Enhancement project funded by the National Science Foundation to create "The Mathematical Inquiry Videotapes: Tools for Professional Growth." ■

Voice Commands

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The current interface has been pilot tested by a group of SmartRoute and BBN employees. For the pilot test all calls are recorded and digitally stored on disk for a subsequent Human Factors analysis. BBN is creating a database and maintaining a log of system outputs, which will be reviewed periodically to assess the system's effectiveness. The system's vocabulary will be expanded to new route segments based on results of the assessment.

SmartRoute Systems is very enthusiastic about BBN's speech recognizer. David Stein, Executive Vice President at SmartRoutes, says that his company is "ecstatic about the prospects for a voice recognition traffic information system. We think it will be a big enhancement to our product and will meet with extreme favor among federal highway officials because it enhances safety and accessibility to traffic information."

BBN staff are invited to participate in the voice recognition trial by calling 494-9425. ■

1993 SDP Publications and Patent Awards

In October 1992, BBN's Science Development Program (SDP), which promotes scientific and professional staff development at BBN, established a company-wide incentive program that encourages staff to publish technical articles and books as well as file patent applications.

Publications Awards

This year the Publications and Patents Awards Committee, chaired by John Makhoul, gave cash awards for 15 publications written by the following staff members: Marilyn Adams, Madeleine Bates, Rusty Bobrow, Lyman Chapin, Herb Gish, Paul Horwitz, Gregory McDaniel, Craig Partridge, Subramanian Ramanathan, Bruce Roberts, Robin Rohlicek, Richard Schwartz, Larry Sher, Martha Steenstrup, Ralph Weischedel, and Ying Zhao.

Patents Awards

The committee gave cash awards for five patent applications submitted by the following staff: David Getty, Herb Gish, Bill Huggins, Philippe Jeanrenaud, Richard Madden, John McDonough, Kenny Ng, Long Nguyen, Robin Rohlicek, Richard Schwartz, and Istvan Ver.

Outstanding Publication Awards

The SDP has also established the Outstanding Publication Award, for publications that have appeared in print and that a committee of senior staff have judged to be of high quality. The winners of the 1994 awards were Bruce Roberts, for a paper in the area of computer and communication sciences, and two young authors, Subramanian Ramanathan and Gregory McDaniel. ■

BBN Reports

BBN Report No. 7842B, Encryption of Asynchronous Circuits Using the KG-84A, Norman Westlake

BBN Report No. 7920, Advanced Network Management (ANM): User's Guide for ANM Release 5.43, BBN Network Services

BBN Report No. 7921, Advanced Network Management (ANM): Installation Guide for ANM release 5.4, David Waitzman

BBN Report No. 7941, Development of Instrument Approach Plate Display Technology to Support the Management of Approach Plate Information Study (MAPLIST), Nichael Cramer and Carl E. Feehrer

BBN Report No. 7961, Research, Development, Training and Evaluation Support (RDT&E), William J. Salter

BBN Report No. 7967, Reciprocity-based Experimental Determination of Dynamic Forces and Moments: A Feasibility Study, Istvan Ver

BBN Report No. 7979, Research, Development, Training and Evaluation Support (RDT&E), William Salter, Mark Burstein, and David Getty

BBN Report No. 7980, Evaluation of Subscriber-based Cost Recovery Model for NIHnet, Cynthia Mills

BBN Report No. 7982, Configuration of the OCONUS Bulk Modems for DDN Applications, Norman Westlake

BBN Report No. 7983, Toward a Methodology for Defining Situation Awareness Requirements—A Progress Report, Stephen E. Deutsch, Richard W. Pew, William Rogers, and Yvette J. Tenney

BBN Report No. 7990, Effects of Simulated Sonic Booms on the Hatchability of White Leghorn Chicken Eggs, Matthew Sneddon

BBN Report No. 7996, Requirements for the Operator's Assistant, Elizabeth Montanye

BBN Report No. 7998, Internet Traffic and Connection Analysis, Karen McIlhenny

BBN Report No. 8000, MTAC Throughput Investigation, Mary Akers

BBN Report No. 8002B, Integrated High Performance Distributed System Software Design Document, Edward F. Walker

BBN Report No. 8004, Integrated High Performance Distributed System Software User's Manual, Christopher Barber

BBN Report No. 8005, Integrated High Performance Distributed System Software Operator's Manual, Christopher Barber

BBN Report No. 8008, Real-time Data Analysis and Acquisition Systems Software Design Document (and Appendices), Nancy Aramaki

BBN

BBN Names Fjeldstad to Board

In August, BBN appointed Lucie J. Fjeldstad to the board of directors, filling a vacancy created by the departure of John A. Gilmartin, who resigned to concentrate on other responsibilities. Fjeldstad is president and CEO of Fjeldstad International, an independent consulting group that advises corporate clients in the computing, telecommunications, media/entertainment, and consumer electronics industries.

A veteran executive with more than 25 years' experience at IBM, Fjeldstad was also instrumental in negotiating strategic alliances for multimedia, creating independent business subsidiaries, and establishing the company's Internet strategy.

BBN STD

BBN Introduces an Internet Server for School Networks

In June, BBN Systems and Technologies unveiled the BBN Internet Server™, an Internet server for school networks that is a complete, easy-to-use, hardware and software package. This meets the current demand for Internet access in K-12 schools due to current educational reforms.

The product provides a full-featured, UNIX-based Internet server that teachers and students can use to construct and manage their own network resources from their desktop computers. The server supports a range of Internet services, and BBN offers any consulting and training that the schools may need in site preparation, establishing a full connection to an Internet service provider, configuring personal computers to interact with the Internet, managing the server, constructing information resources on it, and planning end-user training.

The BBN Internet Server grew out of two years of research and development within the National School Network Testbed, a partnership funded in part by the National Science Foundation to develop and better understand technologies that will support universal participation in the National Information Infrastructure.

BBN's TotalView™ Multiprocess Debugger Available for the Alpha AXP Workstation

TotalView™—BBN's fast, easy-to-use source-level debugger—is available for Digital Equipment Corporation's Alpha AXP RISC workstation running the OSF/1 operating system. With TotalView software, programmers can view and debug all aspects of their applications—source, variables, and multiple processes—simultaneously. They can debug applications that run on multiple workstations, making network distributed debugging a reality.

TotalView has a point-and-click interface, on-line help, and easy menus. It provides source-level debugging for C, C++, and FORTRAN as well as support for assembly and mixed source/assembler debugging. TotalView software requires no special make files and imposes no restrictions on code or symbol table size.

BBN Internet Services Corporation (BBN ISC)

Recently BBN ISC has expanded its NEARNET Internet services to the New York metropolitan area, lowered their prices, acquired the Bay Area Regional Research Network (BARRNET), and created a training group (see related story on NEARNET, p. 7).

Expansion to New York

BBN ISC has expanded its NEARNET Internet services to the New York and northern New Jersey metropolitan area. There, the financial services and publishing industries traditionally have been reluctant to join the Internet community because of fears about security and reliability of service. BBN ISC's custom security services and reliable support should go a long way toward convincing them that their internal networks can remain secure. BBN ISC has also reduced its prices for its Internet services, in a bid for even greater market share.

BARRNET Acquisition Merges Internet Services on Two Coasts

BBN has recently acquired the Bay Area Regional Research Network (BARRNET) from Stanford, which has served since 1986 as the principal Internet service provider in the San Francisco Bay area. BBN's extensive NEARNET service offerings and 25 years' experience with network technology were cited as key factors in Stanford's decision to sell BARRNET to BBN.

BARRNET provides Internet access to more than 200 leading San Francisco Bay Area businesses and research, university, and medical facilities, including Apple Computer, Hewlett-Packard, the NASA Ames Research Center, four University of California campuses, and Stanford itself. BARRNET also is a key part of the "CommerceNet" project, under which the federal and state governments have provided an $8-million grant to help Bay area businesses make commercial use of the Information Superhighway.

On the East Coast, NEARNET clients include corporations such as Polaroid, Raytheon, and Lotus, as well as medical facilities such as Massachusetts General Hospital, Beth Israel Hospital, and the Dana-Farber Cancer Institute. Harvard, MIT, Boston University, Yale, and Dartmouth also use Nearnet to access the Internet.

New Training Group/Services

The BBN ISC Internet Training Group offers a full range of Internet training courses to help organizations make stra-

tegic business use of the Internet. The curriculum is open to the public, and provides a key service for organizations wanting to maximize their existing Internet investments. It also makes BBN ISC the most complete Internet service provider, with programs ranging from network consulting and integration to Internet access services to business and technical training. The BBN ISC Internet Training Group's curriculum development team includes Mary Cronin, author of the best-selling book *Doing Business on the Internet.*

BBN SPC

BBN Names John Kish Head of SPC

In June, BBN Software Products Corporation got a new president and CEO in John T. Kish, who also will serve on its board of directors. He has also been elected a vice president of BBN. Kish comes from Oracle Corporation, where he served as the vice president, Desktop Division, and most recently as the senior vice president, Business Development. There he was instrumental in creating strategic development and marketing partnerships with companies such as Apple, British Telecom, Microsoft, Novell, IBM, and Lotus, as well as strategic alliances with Bell Atlantic and US West. The addition of John Kish supports BBN's overall strategy to enhance and expand worldwide sales and marketing capabilities.

RS/1 Release 5.0 Enhances External Interface

In September, BBN Software Products announced significant enhancements to its RS/1® data-analysis software to improve integration with other applications and data sources in a networked computing environment. The new Interprocess Communications Interface enables the exchange of commands, control, and data between RS-based applications and other external applications on remote and local computers. This new functionality facilitates RS/1 integration within a heterogeneous computing environment.

RS/1 is one of the most widely used data analysis software packages in manufacturing, engineering and research. RS/1 provides statistical and analytic functionality needed by technical professionals to solve data driven problems. RS/1's unique flexibility and extensibility lets users develop and share customized solutions across multiple computing environments.

MicroNova electronic GmbH to Distribute BBN/Probe Data Analysis Software

MicroNova electronic GmbH will distribute BBN/Probe™ in Germany, Austria, and Switzerland. (The BBN/Probe group has recently moved from BBN STD to BBN SPC.) The German company is the first of several distributors expected to sell the BBN/Probe product line internationally. BBN/Probe is the leading time-series, visual data analysis software for engineering data applications.

In addition to direct sales and system integration, MicroNova will provide BBN/Probe software customers in the German region with hot-line support, application consulting, and educational services. In addition, BBN's current German customers will benefit from MicroNova's experience and capabilities.

LightStream

LightStream CEO Appointed Vice President of BBN

BBN's board of directors elected LightStream CEO Jonathan Crane a vice president of the company, making all presidents of BBN's operating units company vice presidents. Crane, who was appointed president and CEO of LightStream Corporation—BBN's Asynchronous Transfer Mode (ATM) networking subsidiary—in February 1994, will continue in that capacity. He has stated that one of his major goals is to make LightStream a leader in ATM switch technology and customer service (see profile in the May 1994 *Digest* issue).

Already this year the company has sold seven of its LightStream™ 2010 Enterprise ATM switches to Continental Cablevision's New England division, entered into a distribution agreement with Japan's NEC Corporation, and signed a technology licensing agreement with Tellabs Operations, Inc., a voice and data equipment manufacturer, to jointly develop and distribute ATM switching systems in the information-services market.

LightStream, BBN, and NEC to Expand ATM Relationship

BBN will enter a broad-based relationship to jointly develop multiplexing products based on Asynchronous Transfer Mode technology with NEC Corporation and LightStream. NEC and LightStream plan to jointly develop an ATM-based multiplexing system. The partners expect the new multiplexing system to be used at the core of new multimedia networks. This agreement builds upon previously established relationships among NEC, BBN, and LightStream.

Currently, NEC is reselling the LightStream™ 2010 ATM platform in Japan while LightStream resells BBN's T/10™ Integrated Access Device. NEC and BBN are also considering expanding their current relationship to include joint product development in other areas. ■

Julie Donahue Named CEO of New BBN HARK Systems Corporation

On October 17, 1994, BBN announced the establishment of BBN HARK Systems Corporation, a new subsidiary, and named Julie Donahue as its chief executive officer. The new unit will develop and sell BBN's HARK™ line of speech recognition products. Donahue was also named to the board of directors of the subsidiary.

Donahue, age 35, was most recently president and chief operating officer of Voice Processing Corporation, where she was responsible for establishing numerous OEM agreements and for creating partnerships with such major desktop application companies as Microsoft, WordPerfect, Lotus, and Borland.

In her previous position, she was a senior vice president at Dun & Bradstreet Software, responsible for strategic planning, mergers and acquisitions, marketing, and channel development. She negotiated key business partnerships with such companies as Microsoft, Powersoft, Hewlett-Packard, and Sybase. She has also held management positions at Cullinet Software and Motorola/Four Phase Systems. Donahue received a B.S. from the University of Pennsylvania and an MBA from the Wharton School of Business Administration.

"I am very excited to join the BBN family of companies," said Donahue. "BBN helped create the field of computer speech recognition. BBN's large-vocabulary, speaker-independent, continuous speech technology is the class of the field. I also see tremendous potential in collaborating with the other BBN business units, with their leadership in computer networking and distributed applications, to provide powerful solutions for customer needs.

"Our goal is to drive the mainstream adoption of speech recognition among users in telephony and desktop environments, through increased ease of use, higher quality, and flexible application development. HARK's new Release 2.0 makes new categories of form-filling and information retrieval applications possible for the first time, including the exciting new growth area of computer-telephony integration."

Of the new subsidiary, BBN President and CEO George Conrades said, "We are delighted to announce the formation of BBN HARK Systems Corporation with Julie Donahue as its CEO. We believe that speech recognition will become a very important interface between people and computers in the next few years. BBN researchers have spent two decades developing outstanding speech technology for government customers. With Julie Donahue's extraordinary business development skills and her knowledge of the industry, we intend to convert our technology leadership into commercial market success."

Among the customers for the new subsidiary's HARK speech recognition products are: Thomas Cook Travel, Bellcore, Booz Allen Hamilton, Lawrence Livermore Labs, Loral Federal Systems Company, Lockheed Sanders, Magnavox, Motorola, Reuters, Speechcraft, Inc., Sun Microsystems, UFA, Inc., Umecorp, and Volt Delta Resources.

An interview with Donahue will appear in a future issue of the *BBN Digest*. ■

BBN Digest

The *BBN Digest* includes news from all divisions and subsidiaries of BBN, as well as corporate news. We welcome your suggestions and contributions. Please send photographs, news items, and suggestions for articles to Deborah Melone, by interoffice mail to Mail Stop 6/6a or by electronic mail to *dmelone*. Photographs can be in the form of negatives, black & white or color prints, or slides.

This newsletter is published for BBN employees. We must be careful to avoid printing items of proprietary interest either to BBN or to its customers. Therefore, please understand if we cannot use all items submitted. Also, please do not send the *BBN Digest* to anyone outside the company.

The *BBN Digest* is edited by Deborah Melone, Cheryl Rohlicek, and Anne Wagner with help from many others.

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