By Juan Antonio Osuna
CRA Staff

The Senate and House are working vigorously with the Clinton administration on legislation that would revamp communications law.

"This legislation represents the most comprehensive revision of the Communications Act of 1934 since it was passed 60 years ago," Sen. Larry Pressler (R-SD) said at a hearing on the Communications Act of 1994 (S 1822) before the Senate Commerce, Science and Transportation Committee.

The Senate bill remains at the subcommittee level. In March the House bills were amended and ordered to be reported by the Energy and Commerce Committee.

The legislation would allow local telephone and cellular companies to provide long-distance service, under certain restrictions. Telephone companies also would be allowed to provide video programming services, but cross-ownership of cable and telephone companies would be prohibited.

The legislation prohibits cross-subsidization of costs between basic telephone services and other services such as video programming, and prohibits common carriers from releasing or otherwise abusing customer proprietary information.

The Federal Communications Commission would be required to study privacy issues, suggest legislation and develop regulations in response to privacy concerns. The FCC would have the broad authority to fill in regulatory details and enforce compliance among common carriers.

Newly created joint state and federal boards would make recommendations to the FCC on issues such as universal service.

In a broad sense, the House and Senate bills conform to one another and to the Clinton administration's proposals. However, there has been some debate, and details have changed.

Continued on Page 10
Are we producing too many Ph.D.s?

By Ashok K. Chandra, David A. Patterson, Joseph Traub and Paul Young

Computer science and engineering is continuing its dynamic growth as a discipline, and so is the rate of production of CS&E Ph.D.s. Although some Ph.D.s receive several job offers, many appear ill-prepared for the realities of the market. Students are finding that university jobs are hard to come by; the role of postdoctoral positions is increasing; the base of computing research is no longer rapidly broadening to a larger set of universities; and industry, while continuing to provide jobs, does so with a changing mix of requirements.

How should the field step up to its obligation to inform students of job prospects? What advice, if any, can we give to government agencies to encourage funding patterns that serve national goals of economic prosperity? What information can we collect about our field in a systematic way that will shed light on these issues and encourage discussion at the Computer Science Conference in Phoenix in March 1994.

Although some Ph.D.s receive several job offers, many appear ill-prepared for the realities of the market.

The number of Ph.D.s granted in computer science and engineering in North America has quadrupled from about 250 10 years ago to more than 1,100 in 1991-92. (This number already is much greater than the number of mathematics Ph.D.s produced annually, though not quite up to the number for physics (1,346 in 1992).) The size of the field and the rate of increase have resulted in strains in the balance between demand and supply. Some students are courted with several offers, but many have to apply to an inordinate number of institutions just to receive a few interview invitations. A significant number of students receive no invitations to interview.

The survey showed that academia in North America continues to be the largest employer of new Ph.D.s—331 or 30% of the Ph.D.s found jobs in academia. Industry was not far behind—292 or 29% found jobs in this sector.

In academia, too, changes are afoot. These include some broadening of CS&E graduate education and Ph.D. production to more institutions across the United States and Canada, as well as increasing the connections with other disciplines. However, a panel sponsored by the National Science Foundation, the National Research Council and the Office of Science and Technology Policy in early February concluded that in all areas of science and engineering, most Ph.D.s are too narrowly educated. Panel discussions suggested that increased emphasis on cross-disciplinary research and the requirements of research flexibility across a lifetime career will require a broader education and one more closely tied to industrial experience.

In the latest CRA Taubee Survey, 28% of the academic CS and CE hiring was in non-Ph.D. departments. Our additional 9% of the hiring was in departments other than computer science or computer engineering. If it is true that most of the current Ph.D. training is designed to educate students to be like their mentors, the above data suggests that perhaps only 20% of our Ph.D. students have their education targeted to the kinds of jobs they will end up taking.

The same survey also indicated that only 2% of new Ph.D.s were unemployed. The accuracy of this may be questionable because 17% of new Ph.D.s were unaccounted for in the survey.

Possible actions

We believe that it is a major responsibility of the field to obtain and disseminate information to allow stakeholders (students, university, employers, administrators and funding agencies) to make informed decisions. The CRA Taubee Survey forms a good baseline. The survey has been extended to include information related to the employment of Ph.D.s, the number of B.S. and M.S. degrees granted by departments on the CRA Forsythe List (North American CS&E Ph.D.-granting departments) and the number of incoming graduate students. But more could be done. The following list of suggestions is not intended to be a definitive set of ideas, but rather they are possibilities worth discussing. Some of these items were discussed at the Computer Science Conference in Phoenix in March.
Collect information by subfields. While the partitioning of any discipline such as computer science and engineering into subfields is fraught with difficulty of definition, it would be useful for stakeholders to know what is happening in areas such as artificial intelligence, systems, theory or VLSI. CRA Forsythe schools could be asked to provide information about the number of Ph.D.s by subfield and their employment profile, using either the Association for Computing Machinery or the NSF classification system.

Collect information from potential employers, particularly industry and schools not on the CRA Forsythe List. It would be particularly useful to obtain information about future hiring trends and qualitative needs employers see regarding how well universities prepare Ph.D.s for these employers' segment of the job market. If done exhaustively, this would be a huge undertaking. It probably would not be feasible to obtain a complete picture, particularly from industrial organizations. But more could be done to obtain more accurate forecasts of industrial demand and much more could be done to obtain accurate forecasts of demand from non-Ph.D.-granting departments. This information, when combined with the CRA Tauibee Survey, could yield a better quantitative and qualitative picture of the demand-supply picture in computer science and engineering. A starting point might be to collect information on recent hires to see if there are historical trends.

Gather perspectives from various university departments. A number of departments in North America have some systematic mechanisms for informing their students about the job market. More departments could work to make their students, as well as prospective students, better informed about the job prospects and the job history of their department's Ph.D. recent recipients. Reports and papers from departments now doing this—possibly published in news journals such as Computing Research News—would give the community useful examples of what others are doing.

Broaden or change training for Ph.D.s in computer science. The following questions should be asked: Should the current education program for Ph.D.s be broadened to be more interdisciplinary? Should the education program prepare students for a career teaching in four-year institutions where they will be expected to teach a range of computer science classes? Should Ph.D. training include more industrial experience? If the above-mentioned emphases are added, what should be subtracted from the education program?

Offer grant support for human resource development. Granting agencies could encourage innovative Ph.D. programs. They also could direct human resource support through research assistants by increasing such support for principal investigators who have good track records for placing their Ph.D.s.

These are just a few possibilities. Discussing these suggestions and others would be helpful so we can refine these ideas into a useful and manageable set. Overall, the CS&E community should get together to effectively leverage its human resources for the maximum benefit of society and its stakeholders.

Readers who would like to discuss their views with the authors of this article can contact the authors at the E-mail addresses listed below. The CRA Conference at Snowbird '94 this July will feature a discussion of the supply-demand topic and a draft proposal.

Ashok K. Chandra is director of database and distributed systems and manager of computer science at the IBM Almaden Research Center. He also is a member of the CRA Board of Directors. E-mail: ashok@almaden.ibm.com.

David A. Patterson is a professor of electrical engineering and computer science at the University of California at Berkeley and chair of the CRA Board of Directors. E-mail: pattrsn@cs.berkeley.edu.

Joseph Traub is the Edwin Howard Armstrong Professor of computer science at Columbia University. E-mail: traub@cs.columbia.edu.

Paul Young is a professor of computer science and engineering at the University of Washington. E-mail: young@cs.washington.edu.
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The format of ads must conform to the following:
1. The first line must contain the name of the university or organization and will be printed in bold, 2. the second line must contain the name of the department or unit and will be printed in italics, and 3. the body of the ad should be in paragraph form. The words in the first two lines are indexed and added to the total word count for the ad. Headings or text requested in uppercase or bold will be set in bold and will count as two words.

The rate is $2 (US) per word. Mail order ads cost $30 (US) per column inch. The ad must be submitted in camera ready, offset (positives or negatives) or mechanical form. Please call for information on placing display ads for products or services.

Communications Research News is published five times per year: in January, March, May, September and November. Professional Opportunity ads with application deadlines falling within the month of publication will not be accepted. A display ad published in the September issue will show an application deadline of Oct. 1 or later.

A display ad must be received at least one month before publication. (The deadline for the September issue is Aug. 15.)

Computing Research News

NASA Goddard Space Flight Center

center of Excellence in Space Data and Information Science

The Universities Space Research Association (USRA) and the University of Maryland invite applications for the position of director of the Center of Excellence in Space Data and Information Science (CESDIS), located on-site at the NASA Goddard Space Flight Center in Greenbelt, MD. CESDIS was established in 1988 by NASA, USRA and the University of Maryland with the mission of fostering advanced research on computer science issues supporting large-scale SA data and computational systems for Earth and space science. CESDIS places research at leading laboratories, houses an on-site staff of 11 and is an equal opportunity employer. Women and minorities are encouraged to apply. Please send resume, list of publications, copies of your best publications and names of at least three references to: Dr. Richard Herman, Dean, College of Computer, Mathematical and Physical Sciences, University of Maryland, College Park, MD 20742-3281.

The Universiies Space Research Association invites applications for a tenured-track position from persons with promise for innovative research and teaching in areas of theoretical importance to NASA. Exceptionally well-qualified applicants may be considered at the level of associate or full professor. Initial junior faculty appointment is normally for four years and is contingent upon completion of Ph.D. by the date of appointment (except for instructorships). Our department seeks to strengthen and broaden its research and teaching program from present strengths in concurrent computation, VLSI, computer graphics and formal methods of programming into complementary areas. Please send a resume, list of publications, copies of your best publications and names of at least three references to: Professor Max Kandag, Chair, Computer Science and Engineering Committee, Caltech 526-80, Pasadena, CA 91125.

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The Department of Electrical Engineering and Computer Science invites applications for a tenure-track faculty position for a faculty at the junior and senior levels. Applications for instructorships also are invited. A Ph.D. in computer science or equivalent is required by the date of appointment (except for instructorships). Applicants should have outstanding research and teaching potential. Women and minorities are encouraged to apply.

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University of Illinois

EECS (M/C 154), University of Illinois at Urbana-Champaign, 1101 S. Sixth St., Champaign, IL 61820. T 60637. E-mail inquiries can be directed to: crassh@uiuc.edu.

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Syracuse University

School of Computer and Information Science

The Syracuse University School of Computer and Information Science (CSIS) offers comprehensive programs in computer science and information science. CSIS is strongly interdisciplinary, reflecting the fact that information and computation are integral parts of many disciplines.

Degree programs are offered at the bachelor’s, master’s and doctoral levels. CSIS also offers an undergraduate concentration in computational science as well as master’s and doctoral degree programs.

The research interests of the faculty lie in the areas of theory of computation, programming languages, parallel programming, artificial intelligence, computer architecture and VLSI, parallel computing, neural networks, combinatorial optimization, algorithm design, and coding theory and combinatorics. Two independent research centers maintained by Syracuse University— the Northeast Parallel Architectures Center (NPAC) and the Center for Computer Applications and Software Engineering (CASE)—provide computing and research opportunities for all students.

Syracuse University has a growing stature in the sciences and maintains outstanding traditions in music, art, drama and public affairs.

Syracuse University offers financial aid and information, contact Barbara Powers, School of Computer and Information Science, Suite 4-135, Educational Services Building, Syracuse University, Syracuse, NY 13244-4100. Tel. 315-443-2296; fax 315-443-1122.
Association News

CRA CONFERENCE AT SNOWBIRD '94 ● JULY 10-12 ● SNOWBIRD, UTAH

The theme for this year's Computing Research Association conference for department chairs and research program directors is "Preparing for the 21st Century." We will focus on two areas:

Education: What are the changes and challenges in public and industrial expectations for higher education in general? For computer science and engineering education in particular?

Research: What changes and challenges will occur in research interactions between academia, government and industry? In federal science and technology policy? In international collaborations?

His year's plenary sessions are designed to foster interaction between the key representatives from industry and academia, who are leading the sessions, and attendees. The conference agenda lists possible discussion topics, but other relevant issues raised by attendees will be discussed.

A special program specifically for industrial research directors will run parallel to the regular conference program. The research directors will attend the conference's morning plenary sessions. In the afternoons they will attend workshops specifically oriented toward issues of concern to them.

To receive registration information, contact CRA at 1875 Connecticut Ave. N.W., Suite 718, Washington, D.C. 20009. E-mail: info@cra.org

Preliminary Agenda

Sunday, July 10

Registration 3:00PM - 7:00PM
Welcome Reception 6:00PM - 7:30PM
Dinner and State of the CRA Address 7:30PM - 9:30PM
Speakers: David A. Patterson, chair of the CRA Board of Directors, and Fred W. Weinberg, CRA's executive director.

The CRA Distinguished Service Award and the CRA Nico Habermann Award are announced.

The CRA board members will host at each table and solicit input about the conference themes and other issues of concern to the computing research community.

Workshops I (parallel sessions) 2:00PM - 3:30PM
Topics to be announced.

Registration 7:00PM - 9:00PM
Reception 6:00PM - 7:00PM
Dinner and Discussion 7:00PM - 9:00PM
CRA Chair David Patterson will summarize and discuss comments gathered by board members during the luncheon.

Monday, July 11

Breakfast Buffet 7:00AM - 8:30AM
Plenary Session I 8:30AM - 10:15AM
Education for the 21st Century
Session leaders: To be announced.
Possible discussion topics:
• What will a computer professional's job be like in 2000?
• What skills will professionals in industry need?
• What shifts are likely in the education of computer professionals?
• What supplies and demands likely to be?
• How is the role of the university changing? Are the changes permanent or just temporary and related to the recession?
• What is the role of industrial research labs?

Tuesday, July 12

Breakfast Buffet 7:00AM - 8:30AM
Workshops II (parallel sessions) 8:30AM - 10:00AM
Topics to be announced.

Registration 10:00AM - 10:30AM
Plenary Session III 10:30AM - Noon
Perspectives on the Conference Themes
Session leaders will discuss the key concerns, preliminary findings and actions proposed in workshops and informal sessions that relate to the conference theme.

Luncheon Noon - 1:30PM
Attendants are invited to form their own affinity discussion groups.

Workshops III (parallel sessions) 1:30PM - 3:00PM
Topics to be announced.

The Computing Research Association was a joint sponsor of a meeting on R&D issues related to the National Information Infrastructure. More than 300 academic, industrial, and government researchers attended "R&D for the NII: Technical Challenges," held Feb. 28 and March 1 in Gaithersburg, Md.

The meeting was held in response to requests from the administration and Congress for a more detailed agenda of research to support the development of an advanced NII. Other co-sponsors were EDUCAUSE, the Computer Systems Policy Project, the American Electronics Association, the Computer and Business Equipment Manufacturers Association, the Council on Competitiveness and the Cross Industry Working Team. The National Institute of Standards and Technology was the host.

Many key informants, including computer science professor at the University of Wisconsin and a CRA board member, chaired the technical program committee.

The Office of Science and Technology Policy, the National Economic Council, NIST, the National Science Foundation and the Advanced Research Projects Agency coordinated and advised in the planning of the meeting. NSF helped fund the effort.

The meeting began with a plenary discussion on applications, then broke into nine parallel sessions:
• Mechanics for Security and Privacy
• Interoperability
• Information Access
• Ease of Use
• Portability, Mobility, Ubiquity, Network Dependability and Movable Aggregates
• Infrastructure for Applications
• Multimedia Technologies and Networks and Systems Components and Architecture

A formal report containing the research recommendations for each track will be published in May and presented to the administration and congressional staff. For information on pricing and availability, send E-mail inquiries to info@cra.org.

CRA co-sponsors forum

The Computing Research Association recently established the Specialist Group on Foundations of Computer Science (SGFCS). This is the first special body in IFIP that will support the development of theoretical computer science (TCS) worldwide.

SGFCS members are being appointed based solely on their professional achievements. However, an effort is being made to appoint members who represent various technical and geographical areas. Three working groups have been established: Continuous Algorithms and Complexity, Descriptive Complexity, and Foundations of Systems Specifications. Of special importance is the support of working groups in cross-disciplinary areas and in important emerging areas of TCS.

TCS will be presented at the IFIP World Computer Congress in an effort to be made to initiate and support meetings outside of North America and Europe.

IFIP creates new group

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A though it may be difficult for SGFCS to achieve its goals, this worldwide, unifying activity should be important to the computer science community. The increase in financing at local or regional levels makes regionalization in science and technology an increasingly visible issue that does not go well with attempts for worldwide cooperation. However, the increasing competition between sciences and technology areas for resources creates a strong need for the TCS community to be well-organized and have an international base.

The TCS community is using getting enough support for essential problems and may not be fully aware of importance of the coordinated international activities that IFIP and its bodies are developing.