Union Calendar No. 306

107TH CONGRESS
2D SESSION

H. R. 3400

[Report No. 107–511]

To amend the High-Performance Computing Act of 1991 to authorize appropriations for fiscal years 2003 through 2007 for the coordinated Federal program on networking and information technology research and development, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

DECEMBER 4, 2001

Mr. SMITH of Michigan (for himself, Ms. EDDIE BERNICE JOHNSON of Texas, Mr. BOEHLERT, and Mr. HALL of Texas) introduced the following bill; which was referred to the Committee on Science

JUNE 18, 2002

Additional sponsor: Mr. FORBES

JUNE 18, 2002

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in italic]

[For text of introduced bill, see copy of bill as introduced on December 4, 2001]

A BILL

To amend the High-Performance Computing Act of 1991 to authorize appropriations for fiscal years 2003 through 2007 for the coordinated Federal program on networking and information technology research and development, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Networking and Information Technology Research Advancement Act''.

SEC. 2. FINDINGS.

The Congress makes the following findings:

(1) Information technology is an enabling technology that contributes to other scientific disciplines. Advances in nanotechnology, bioinformatics, intelligent networks, wireless networking, robotics, artificial intelligence, and other fields depend on further advances in information technology research and development. In turn, advances in networking and information technology depend on research in a wide range of fields, such as computer science and engineering, mathematics, and many others, and in the development of electronic components such as semiconductors and fiber optics that are faster, denser, and cheaper. Research in fields such as materials sciences, physics, chemistry, and photonics lays the foundation for building these advanced components.

(2) Federal investment in information technology research and development over the past 50 years has led to technological innovations that have

transformed our society and stimulated economic growth.

(3) A 1999 report from the President's Information Technology Advisory Committee entitled "Information Technology Research: Investing in Our Future" states that—

(A) Federal support for research in information technology is inadequate;

(B) Federal investment in information technology research and development should give a higher priority to long-term, basic research; and

(C) Federal information technology research management should develop a long-term and coherent strategy for sustained attention to national goals.

(4) Long-term, basic research is necessary to create technological breakthroughs in information technology. The Federal Government is uniquely positioned to support long-term fundamental research.

(5) Advances in networking and information technology have permeated and dramatically improved product design and development processes, production efficiency, and distribution systems of a wide range of manufacturing and other industries. From the aeronautical and automotive industries to

farming, advances in networking and information technology have allowed United States industry to compete more effectively and better utilize limited resources through improved quality control and other means. Therefore, research in networking and information technology that advances the field also advances productivity and economic growth for the United States economy.

(6) Information technology encompasses ways to develop, store and retrieve, organize and use, make sense of, compute, and communicate information to further a number of societal goals, including increasing economic growth through product development and increased efficiency of services and manufacturing, advancing scientific research, and education.

SEC. 3. DEFINITIONS.

Section 4 of the High-Performance Computing Act of 1991 (15 U.S.C. 5503) is amended—

(1) in paragraph (3)—

(A) by striking "high-performance computing" and inserting "networking and information technology"; and

(B) by striking "(including vector supercomputers and large scale parallel systems)";

(2) in paragraph (4), by striking "packet switched";

(3) by striking paragraphs (5) and (6); and

(4) by adding at the end the following new paragraphs:

"(5) 'Program' means the Networking and Information Technology Research and Development Program described in section 101; and

"(6) 'Program Component Areas' means the major subject areas under which are grouped related individual projects and activities carried out under the Program and which are developed according to section 101(a)(3)(B) and identified in the annual report required under section 101(a)(3)(A).".

SEC. 4. NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM.

(a) AMENDMENTS.—Section 101 of the High-Performance Computing Act of 1991 (15 U.S.C. 5511) is amended—

*(1) in the section heading, by striking "**NATIONAL HIGH-PERFORMANCE COMPUTING**" and inserting "**NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT**";*

(2) by striking "high-performance computing" each place it appears other than in subsection

(a)(2)(F) and inserting "networking and information technology";

(3) in the subsection heading of subsection (a), by striking "NATIONAL HIGH-PERFORMANCE COMPUTING" and inserting "NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT";

(4) in subsection (a)—

(A) by striking "National High-Performance Computing" and inserting "Networking and Information Technology Research and Development";

(B) in paragraph (1)—

(i) by striking "and" at the end of subparagraph (A);

(ii) by redesignating subparagraph (B) as subparagraph (C); and

(iii) by inserting after subparagraph (A) the following new subparagraph:

"(B) establish Program Component Areas that implement the goals established under subparagraph (A); and";

(C) by striking "and" at the end of paragraph (2)(H);

(D) by striking subparagraph (I) of paragraph (2) and inserting the following:

"(I) provide for improving the security of networked information systems, including research required to establish security standards and practices for computing systems and networks; and

"(J) provide for long-term basic research on networking and information technology, with priority given to research that helps address issues related to—

"(i) high end computing and software;

"(ii) network stability, fragility, reliability, security (including privacy), and scalability; and

"(iii) the social and economic consequences of information technology.";

(E) in subparagraph (B) of paragraph (3), by inserting ", including establishing the process by which Program Component Areas are defined" after "of the Program";

(F) by amending subparagraph (A) of paragraph (4) to read as follows:

"(A) provide a detailed description of the Program Component Areas, including—

"(i) a description of any changes in the Program Component Areas from the preceding report and the reasons for such changes; and

"(ii) a description of activities within each Program Component Area that contribute to the improvement of the security of networked information systems;";

(G) in paragraph (4)(C), by striking "specific activities" and all that follows through "the Network" and inserting "each Program Component Area";

(H) in paragraph (4)(D), by inserting "for each Program Component Area and for all activities that contribute to the improvement of the security of networked information systems" after "budget submission applies"; and

(I) in paragraph (4)(F), by inserting ", and the extent to which the Program incorporates the recommendations of the Advisory Committee established under subsection (b)" after "for the Program";

(5) in subsection (b)—

(A) by redesignating paragraphs (1) through (5) as subparagraphs (A) through (E), respectively;

(B) by inserting "(1)" after "ADVISORY COMMITTEE.—";

(C) in paragraph (1)(C), as so redesignated by this paragraph, by inserting ", including funding levels for the Program Component Areas" after "of the Program";

(D) in paragraph (1)(D), as so redesignated by this paragraph, by striking "computing" and inserting "networking and information"; and

(E) by adding at the end the following new paragraph:

"(2) In addition to the duties outlined in paragraph (1), the advisory committee shall conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program, and shall report not less frequently than once every two fiscal years to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on its findings and recommendations. The first report shall be due within one year after the date of the enactment of this paragraph."; and

(6) in subsection (c)(1)(A), by striking "Program or" and inserting "Program Component Areas or".

(b) REPEALS.—Sections 102 and 103 of the High-Performance Computing Act of 1991 (15 U.S.C. 5512 and 5513) are repealed.

(c) CONFORMING AMENDMENT.—The heading of title I of the High-Performance Computing Act of 1991 is amended to read as follows:

"TITLE I—NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM".

SEC. 5. AGENCY ACTIVITIES.

(a) NATIONAL SCIENCE FOUNDATION ACTIVITIES.—Section 201 of the High-Performance Computing Act of 1991 (15 U.S.C. 5521) is amended to read as follows:

"SEC. 201. NATIONAL SCIENCE FOUNDATION ACTIVITIES.

"(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the National Science Foundation shall—

"(1) generate fundamental scientific and technical knowledge with the potential of advancing networking and information technology and its applications; and

"(2) provide computing and networking infrastructure support for all science and engineering disciplines, and support basic research and human resource development in all aspects of networking and information technology and advanced high speed computer networking.

"(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the National Science Foundation for the purposes of the Program $704,000,000 for fiscal year 2003; $774,000,000 for fiscal year 2004, $851,000,000 for fiscal year 2005, $937,000,000 for fiscal year 2006, and $1,030,000,000 for fiscal year 2007.".

(b) NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ACTIVITIES.—Section 202 of the High-Performance Computing Act of 1991 (15 U.S.C. 5522) is amended to read as follows:

"SEC. 202. NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ACTIVITIES.

"(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the National Aeronautics and Space Administration shall conduct basic and applied research in networking and information technology, with emphasis on—

"(1) computational fluid, thermal, and aerodynamics;

"(2) scientific data dissemination and tools to enable data to be fully analyzed and combined from multiple sources and sensors;

"(3) remote exploration and experimentation; and

"(4) tools for collaboration in systems design, analysis, and testing.

"(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the National Aeronautics and Space Administration for the purposes of the Program $199,000,000 for fiscal year 2003, $219,000,000 for fiscal year 2004, $240,000,000 for fiscal year 2005, $265,000,000 for fiscal year 2006, and $292,000,000 for fiscal year 2007.".

(c) DEPARTMENT OF ENERGY ACTIVITIES.—Section 203 of the High-Performance Computing Act of 1991 (15 U.S.C. 5523) is amended—

(1) in subsection (a), by striking all after "the Secretary of Energy shall" and inserting "conduct basic and applied research in networking and information technology, with emphasis on—

"(1) supporting fundamental research in the physical sciences and engineering, and energy applications;

"(2) providing supercomputer access and advanced communication capabilities to scientific researchers; and

"(3) developing tools for distributed scientific collaboration."; and

(2) in subsection (e)—

(A) by striking "(1)";

(B) by striking "$93,000,000" and all that follows through "fiscal year 1996" and inserting "$193,000,000 for fiscal year 2003, $212,000,000 for fiscal year 2004, $234,000,000 for fiscal year 2005, $258,000,000 for fiscal year 2006, and $283,000,000 for fiscal year 2007"; and

(C) by striking paragraph (2).

(d) DEPARTMENT OF COMMERCE ACTIVITIES.—Section 204 of the High-Performance Computing Act of 1991 (15 U.S.C. 5524) is amended—

(1) by striking paragraphs (1) and (2) of subsection (a) and inserting the following:

"(1) the National Institute of Standards and Technology shall—

"(A) conduct basic and applied measurement research needed to support various computing systems and networks;

"(B) develop and propose voluntary standards and guidelines, and develop measurement techniques and test methods, for the interoperability of computing systems in networks and for common user interfaces to systems;

"(C) be responsible for developing benchmark tests and standards for computing systems and software; and

"(D) encourage the development, deployment, and implementation of voluntary guidelines and standards for—

"(i) robust security technology; and

"(ii) best practices and interoperability relating to the security of commercial and government computer networks; and

"(2) the National Oceanic and Atmospheric Administration shall conduct basic and applied research in networking and information technology, with emphasis on—

"(A) improving weather forecasting and climate prediction;

"(B) collection and dissemination of environmental information; and

"(C) development of more accurate models of the atmosphere-ocean system."; and

(2) by striking subsections (c) and (d) and inserting the following:

"(c) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated—

"(1) to the National Institute of Standards and Technology for the purposes of the Program $24,000,000 for fiscal year 2003, $27,000,000 for fiscal year 2004, $29,000,000 for fiscal year 2005, $32,000,000 for fiscal year 2006, and $35,000,000 for fiscal year 2007; and

"(2) to the National Oceanic and Atmospheric Administration for the purposes of the Program $22,000,000 for fiscal year 2003, $24,000,000 for fiscal year 2004, $26,000,000 for fiscal year 2005, $29,000,000 for fiscal year 2006, and $32,000,000 for fiscal year 2007.".

(e) ENVIRONMENTAL PROTECTION AGENCY ACTIVITIES—Section 205 of the High-Performance Computing Act of 1991 (15 U.S.C. 5525) is amended to read as follows:

"SEC. 205. ENVIRONMENTAL PROTECTION AGENCY ACTIVITIES.

"(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the Environmental Protection Agency shall conduct basic and applied research directed toward the advancement and dissemination of computa-

tional techniques and software tools with an emphasis on modeling of—

"(1) ecosystems;

"(2) human effects

"(3) atmospheric dynamics and chemistry; and

"(4) pollutant transport.

"(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the Environmental Protection Agency for the purposes of the Program $4,000,000 for fiscal year 2003, $4,400,000 for fiscal year 2004, $4,800,000 for fiscal year 2005, $5,300,000 for fiscal year 2006, and $5,800,000 for fiscal year 2007.".

SEC. 6. REPORTS.

(a) INTERNATIONAL BENCHMARKING STUDIES.—

(1) STUDY.—Not later than 3 months after the date of the enactment of this Act, the Director of the National Science Foundation shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct an assessment of the state of research on networking and information technology in the United States. The study shall use the methodology and approach developed by the Committee on Science, Engineering, and Public Policy of the National Academies and documented in

its 2000 report entitled "Experiments in International Benchmarking of U.S. Research Fields".

(2) REPORT.—Not later than 2 years after the date of the enactment of this Act, the Director of the National Science Foundation shall transmit to the Committee on Science of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, the Director of the Office of Science and Technology Policy, and the advisory committee established under section 101(b) of the High-Performance Computing Act of 1991 (15 U.S.C. 5511(b)) (in this section referred to as the "advisory committee") a report setting forth the findings of the study conducted under paragraph (1).

(3) ADVISORY COMMITTEE RECOMMENDATIONS.—Not later than 3 months after receipt of the report transmitted under paragraph (2), the advisory committee shall provide recommendations to the Director of the Office of Science and Technology Policy on appropriate changes to the Program established by section 101(a) of the High-Performance Computing Act of 1991 (15 U.S.C. 5511(a)) to address issues raised by the study conducted under paragraph (1).

(4) ANNUAL REPORT.—The first annual report required by section 101(a)(3)(A) of the High-Perform-

ance Computing Act of 1991 (15 U.S.C. 5511(a)(3)(A)) that is due after the expiration of 9 months after receipt by the Director of the Office of Science and Technology Policy of the report transmitted under paragraph (2) shall include a description of activities under the Program established by section 101(a) of the High-Performance Computing Act of 1991 (15 U.S.C. 5511(a)) that address issues raised by the study conducted under paragraph (1), including strategies for—

(A) raising or maintaining the position of the United States relative to other nations in the research priority areas addressed by the report transmitted under paragraph (2); and

(B) promoting international research cooperation to leverage international niches of excellence identified by the report transmitted under paragraph (2).

(5) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Science Foundation for carrying out the study under this subsection $850,000.

(b) INFORMATION TECHNOLOGY WORKFORCE STUDY.—

(1) DATA COLLECTION.—The Director of the National Science Foundation shall on a continuing basis collect data on the information technology workforce, including information on—

(A) the size and nature of the information technology workforce by occupation category, level of education and training, personnel demographics, and industry characteristics;

(B) the long-term employability of information technology professionals;

(C) various forms of employee compensation, including salaries, bonuses, and stock options;

(D) the role of foreign workers in the information technology workforce;

(E) the previous and subsequent immigration and employment status of workers who are aliens having the status of a nonimmigrant described in section 101(a)(15)(H)(i)(b) of the Immigration and Nationality Act (8 U.S.C. 1101(a)(15)(H)(i)(b)); and

(F) other relevant issues.

(2) ANALYSIS.—Not later than 3 months after the date of the enactment of this Act, the Director of the National Science Foundation shall enter into an

arrangement with the National Research Council of the National Academy of Sciences to analyze the data collected under paragraph (1) and publish a biennial update to the "Building a Workforce in the Information Economy" report, issued in October of 2000.

(3) TRANSMITTAL TO CONGRESS.—Biennial updates required under paragraph (2) shall be transmitted to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate, and to the National Coordination Office for Information Technology Research and Development, not later than 1 year after the date of the enactment of this Act and biennially thereafter.

SEC. 7. RESEARCH CENTER.

(a) IN GENERAL.—(1) As part of the Program described in section 101 of the High-Performance Computing Act of 1991 (15 U.S.C. 5511), the National Science Foundation, in consultation with the National Aeronautics and Space Administration, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration, and other Federal agencies as appropriate, shall establish a center for research on information technology questions related to crisis management.

(2) The award to support the establishment and operation of the center established under paragraph (1) shall be made to an eligible nonprofit organization or consortium thereof through a merit-reviewed, competitive process in accordance with requirements specified by the National Science Foundation.

(b) USE OF FUNDS.—The center established under subsection (a) shall carry out research to advance the role of information technology in crisis management. Such activities may include—

(1) research on—

(A) human-computer interface technologies suitable for meeting user needs and limitations;

(B) network-based collaboration tools, including virtual situation rooms;

(C) the interconnection, interoperation, and reliability of networks involving diverse information resources;

(D) rapidly deployable, self-configuring wireless networks;

(E) software to assist crisis managers in making decisions in the absence of complete information;

(F) means for improving the performance of distributed systems; and

(G) simulation of natural phenomena, such as severe storms or forest fires, that could provide guidance to crisis managers;

(2) establishment and use of experimental testbeds for crisis management-related research and development to allow for testing and validating technologies under realistic conditions; and

(3) analyses of the design and operation of existing national-scale infrastructures to identify features that enable such systems to be scalable and functionally flexible.

(c) SELECTION CRITERIA.—In evaluating applications submitted under this section, the Director of the National Science Foundation shall consider, at a minimum, the extent to which the applicant will work with individuals and organizations that would be users of the results of the research conducted by the center in establishing a research agenda and conducting activities under subsection (b)(2).

(d) DEFINITION.—In this section, the term "eligible nonprofit organization" means an institution of higher education as defined by section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001), or a nonprofit research institute or nonprofit association with experience related to applications of information technology in crisis management as determined by the National Science Foundation.

(e) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the National Science Foundation for the purposes of this section $10,000,000 for each of the fiscal years 2003, 2004, 2005, 2006, and 2007.

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