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111TH CONGRESS, 1st Session } HOUSE OF REPRESENTATIVES { REPORT 111–102

NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT ACT OF 2009

MAY 12, 2009.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. GORDON of Tennessee, from the Committee on Science and Technology, submitted the following

R E P O R T

[To accompany H.R. 2020]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 2020) to amend the High-Performance Computing Act of 1991 to authorize activities for support of networking and information technology research, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

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79–006

I. BILL

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Networking and Information Technology Research and Development Act of 2009".

SEC. 2. PROGRAM PLANNING AND COORDINATION.

(a) PERIODIC REVIEWS.—Section 101 of the High-Performance Computing Act of 1991 (15 U.S.C. 5511) is amended by adding at the end the following new subsection:

"(d) PERIODIC REVIEWS.—The agencies identified in subsection (a)(3)(B) shall—

"(1) periodically assess the contents and funding levels of the Program Component Areas and restructure the Program when warranted, taking into consideration any relevant recommendations of the advisory committee established under subsection (b); and

"(2) ensure that the Program includes large-scale, long-term, interdisciplinary research and development activities, including activities described in section 104.".

(b) DEVELOPMENT OF STRATEGIC PLAN.—Section 101 of such Act (15 U.S.C. 5511) is amended further by adding after subsection (d), as added by subsection (a) of this Act, the following new subsection:

"(e) STRATEGIC PLAN.—

"(1) IN GENERAL.—The agencies identified in subsection (a)(3)(B), working through the National Science and Technology Council and with the assistance of the National Coordination Office established under section 102, shall develop, within 12 months after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, and update every 3 years thereafter, a 5-year strategic plan to guide the activities described under subsection (a)(1).

"(2) CONTENTS.—The strategic plan shall specify near-term and long-term objectives for the Program, the anticipated time frame for achieving the near-term objectives, the metrics to be used for assessing progress toward the objectives, and how the Program will—

"(A) foster the transfer of research and development results into new technologies and applications for the benefit of society, including through cooperation and collaborations with networking and information technology research, development, and technology transition initiatives supported by the States;

"(B) encourage and support mechanisms for interdisciplinary research and development in networking and information technology, including through collaborations across agencies, across Program Component Areas, with industry, with Federal laboratories (as defined in section 4 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703)), and with international organizations;

"(C) address long-term challenges of national importance for which solutions require large-scale, long-term, interdisciplinary research and development;

"(D) place emphasis on innovative and high-risk projects having the potential for substantial societal returns on the research investment;

"(E) strengthen all levels of networking and information technology education and training programs to ensure an adequate, well-trained workforce; and

"(F) attract more women and underrepresented minorities to pursue postsecondary degrees in networking and information technology.

"(3) NATIONAL RESEARCH INFRASTRUCTURE.—The strategic plan developed in accordance with paragraph (1) shall be accompanied by milestones and roadmaps for establishing and maintaining the national research infrastructure required to support the Program, including the roadmap required by subsection (a)(2)(E).

"(4) RECOMMENDATIONS.—The entities involved in developing the strategic plan under paragraph (1) shall take into consideration the recommendations—

"(A) of the advisory committee established under subsection (b); and

"(B) of the stakeholders whose input was solicited by the National Coordination Office, as required under section 102(b)(3).

"(5) REPORT TO CONGRESS.—The Director of the National Coordination Office shall transmit the strategic plan required under paragraph (1) to the advisory committee,

the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives.".

(c) ADDITIONAL RESPONSIBILITIES OF DIRECTOR.—Section 101(a)(2) of such Act (15 U.S.C. 5511(a)(2)) is amended—

(1) by redesignating subparagraphs (E) and (F) as subparagraphs (F) and (G), respectively; and

(2) by inserting after subparagraph (D) the following new subparagraph:

"(E) encourage and monitor the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the strategic plan under subsection (e) is developed and executed effectively and that the objectives of the Program are met;".

(d) ADVISORY COMMITTEE.—Section 101(b)(1) of such Act (15 U.S.C. 5511(b)(1)) is amended by inserting after "an advisory committee on high-performance computing," the following: "in which the co-chairs shall be members of the President's Council of Advisors on Science and Technology and with the remainder of the committee".

(e) REPORT.—Section 101(a)(3) of such Act (15 U.S.C. 5511(a)(3)) is amended—

(1) in subparagraph (C)—

(A) by striking "is submitted," and inserting "is submitted, the levels for the previous fiscal year,"; and

(B) by striking "each Program Component Area;" and inserting "each Program Component Area and research area supported in accordance with section 104;";

(2) in subparagraph (D)—

(A) by striking "each Program Component Area," and inserting "each Program Component Area and research area supported in accordance with section 104,";

(B) by striking "is submitted," and inserting "is submitted, the levels for the previous fiscal year,"; and

(C) by striking "and" after the semicolon;

(3) by redesignating subparagraph (E) as subparagraph (G); and

(4) by inserting after subparagraph (D) the following new subparagraphs:

"(E) include a description of how the objectives for each Program Component Area, and the objectives for activities that involve multiple Program Component Areas, relate to the objectives of the Program identified in the strategic plan required under subsection (e);

"(F) include—

"(i) a description of the funding required by the National Coordination Office to perform the functions specified under section 102(b) for the next fiscal year by category of activity;

"(ii) a description of the funding required by such Office to perform the functions specified under section 102(b) for the current fiscal year by category of activity; and

"(iii) the amount of funding provided for such Office for the current fiscal year by each agency participating in the Program; and".

(f) DEFINITION.—Section 4 of such Act (15 U.S.C. 5503) is amended—

(1) by redesignating paragraphs (1) through (7) as paragraphs (2) through (8), respectively;

(2) by inserting before paragraph (2), as so redesignated, the following new paragraph:

"(1) 'cyber-physical systems' means physical or engineered systems whose networking and information technology functions and physical elements are deeply integrated and are actively connected to the physical world through sensors, actuators, or other means to perform monitoring and control functions;";

(3) in paragraph (4), as so redesignated—

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

(B) by striking "supercomputer" and inserting "high-end computing";

(4) in paragraph (6), as so redesignated, by striking "network referred to as" and all that follows through the semicolon and inserting "network, including advanced computer networks of Federal agencies and departments;"; and

(5) in paragraph (7), as so redesignated, by striking "National High-Performance Computing Program" and inserting "networking and information technology research and development program".

SEC. 3. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

Title I of such Act (15 U.S.C. 5511) is amended by adding at the end the following new section:

"SEC. 104. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

"(a) IN GENERAL.—The Program shall encourage agencies identified in section 101(a)(3)(B) to support large-scale, long-term, interdisciplinary research and development activities in networking and information technology directed toward application areas that have the potential for significant contributions to national economic competitiveness and for other significant societal benefits. Such activities, ranging from basic research to the demonstration of technical solutions, shall be designed to advance the development of research discoveries. The advisory committee established under section 101(b) shall make recommendations to the Program for candidate research and development areas for support under this section.

"(b) CHARACTERISTICS.—

"(1) IN GENERAL.—Research and development activities under this section shall—

"(A) include projects selected on the basis of applications for support through a competitive, merit-based process;

"(B) involve collaborations among researchers in institutions of higher education and industry, and may involve nonprofit research institutions and Federal laboratories, as appropriate;

"(C) when possible, leverage Federal investments through collaboration with related State initiatives; and

"(D) include a plan for fostering the transfer of research discoveries and the results of technology demonstration activities, including from institutions of higher education and Federal laboratories, to industry for commercial development.

"(2) COST-SHARING.—In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

"(3) AGENCY COLLABORATION.—If 2 or more agencies identified in section 101(a)(3)(B), or other appropriate agencies, are working on large-scale research and development activities in the same area of national importance, then such agencies shall strive to collaborate through joint solicitation and selection of applications for support and subsequent funding of projects.

"(4) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities in areas described in subsection (a). Research may be carried out through existing interdisciplinary centers, including those authorized under section 7024(b)(2) of the America COMPETES Act (Public Law 110–69; 42 U.S.C. 1862o–10).".

SEC. 4. CYBER-PHYSICAL SYSTEMS AND INFORMATION MANAGEMENT.

(a) ADDITIONAL PROGRAM CHARACTERISTICS.—Section 101(a)(1) of such Act (15 U.S.C. 5511(a)(1)) is amended—

(1) in subparagraph (H), by striking "and" after the semicolon;

(2) in subparagraph (I), by striking the period at the end and inserting a semicolon; and

(3) by adding at the end the following new subparagraphs:

"(J) provide for increased understanding of the scientific principles of cyber-physical systems and improve the methods available for the design, development, and operation of cyber-physical systems that are characterized by high reliability, safety, and security; and

"(K) provide for research and development on human-computer interactions, visualization, and information management.".

(b) TASK FORCE.—Title I of such Act (15 U.S.C. 5511) is amended further by adding after section 104, as added by section 3, the following new section:

"SEC. 105. UNIVERSITY/INDUSTRY TASK FORCE.

"(a) ESTABLISHMENT.—Not later than 180 days after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, the Director of the National Coordination Office established under section 102 shall convene a task force to explore mechanisms for carrying out collaborative research and development activities for cyber-physical systems, including the related technologies required to enable these systems, through a consortium or other appropriate entity with participants from institutions of higher education, Federal laboratories, and industry.

"(b) FUNCTIONS.—The task force shall—

"(1) develop options for a collaborative model and an organizational structure for such entity under which the joint research and development activities could be planned, managed, and conducted effectively, including mechanisms for the

allocation of resources among the participants in such entity for support of such activities;

"(2) propose a process for developing a research and development agenda for such entity, including objectives and milestones;

"(3) define the roles and responsibilities for the participants from institutions of higher education, Federal laboratories, and industry in such entity;

"(4) propose guidelines for assigning intellectual property rights and for the transfer of research results to the private sector; and

"(5) make recommendations for how such entity could be funded from Federal, State, and non-governmental sources.

"(c) COMPOSITION.—In establishing the task force under subsection (a), the Director of the National Coordination Office shall appoint an equal number of individuals from institutions of higher education and from industry with knowledge and expertise in cyber-physical systems, of which 2 may be selected from Federal laboratories.

"(d) REPORT.—Not later than 1 year after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, the Director of the National Coordination Office shall transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives a report describing the findings and recommendations of the task force.".

SEC. 5. NATIONAL COORDINATION OFFICE.

Section 102 of such Act (15 U.S.C. 5512) is amended to read as follows:

"SEC. 102. NATIONAL COORDINATION OFFICE.

"(a) ESTABLISHMENT.—The Director shall establish a National Coordination Office with a Director and full-time staff.

"(b) FUNCTIONS.—The National Coordination Office shall—

"(1) provide technical and administrative support to—

"(A) the agencies participating in planning and implementing the Program, including such support as needed in the development of the strategic plan under section 101(e); and

"(B) the advisory committee established under section 101(b);

"(2) serve as the primary point of contact on Federal networking and information technology activities for government organizations, academia, industry, professional societies, State computing and networking technology programs, interested citizen groups, and others to exchange technical and programmatic information;

"(3) solicit input and recommendations from a wide range of stakeholders during the development of each strategic plan required under section 101(e) through the convening of at least 1 workshop with invitees from academia, industry, Federal laboratories, and other relevant organizations and institutions;

"(4) conduct public outreach, including the dissemination of findings and recommendations of the advisory committee, as appropriate; and

"(5) promote access to and early application of the technologies, innovations, and expertise derived from Program activities to agency missions and systems across the Federal Government and to United States industry.

"(c) SOURCE OF FUNDING.—

"(1) IN GENERAL.—The operation of the National Coordination Office shall be supported by funds from each agency participating in the Program.

"(2) SPECIFICATIONS.—The portion of the total budget of such Office that is provided by each agency for each fiscal year shall be in the same proportion as each such agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 101(a)(3).".

SEC. 6. IMPROVING NETWORKING AND INFORMATION TECHNOLOGY EDUCATION.

Section 201(a) of such Act (15 U.S.C. 5521(a)) is amended—

(1) by redesignating paragraphs (2) through (4) as paragraphs (3) through (5), respectively; and

(2) by inserting after paragraph (1) the following new paragraph:

"(2) the National Science Foundation shall use its existing programs, in collaboration with other agencies, as appropriate, to improve the teaching and learning of networking and information technology at all levels of education and to increase participation in networking and information technology fields, including by women and underrepresented minorities;".

SEC. 7. CONFORMING AND TECHNICAL AMENDMENTS.

(a) SECTION 3.—Section 3 of such Act (15 U.S.C. 5502) is amended—

(1) in the matter preceding paragraph (1), by striking "high-performance computing" and inserting "networking and information technology";

(2) in paragraph (1), in the matter preceding subparagraph (A), by striking "high-performance computing" and inserting "networking and information technology";

(3) in subparagraphs (A) and (F) of paragraph (1), by striking "high-performance computing" each place it appears and inserting "networking and information technology"; and

(4) in paragraph (2)—

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

(B) by striking "high-performance computing network" and inserting "networking and information technology".

(b) TITLE I.—The heading of title I of such Act (15 U.S.C. 5511) is amended by striking "**HIGH-PERFORMANCE COMPUTING**" and inserting "**NETWORKING AND INFORMATION TECHNOLOGY**".

(c) SECTION 101.—Section 101 of such Act (15 U.S.C. 5511) is amended—

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

(2) in subsection (a)—

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

(B) in paragraph (1) of such subsection—

(i) in the matter preceding subparagraph (A), by striking "National High-Performance Computing Program" and inserting "networking and information technology research and development program";

(ii) in subparagraph (A), by striking "high-performance computing, including networking" and inserting "networking and information technology"; and

(iii) in subparagraphs (B), (C), and (G), by striking "high-performance" each place it appears and inserting "high-end"; and

(C) in paragraph (2) of such subsection—

(i) in subparagraphs (A) and (C)—

(I) by striking "high-performance computing" each place it appears and inserting "networking and information technology"; and

(II) by striking "development, networking," each place it appears and inserting "development,"; and

(ii) in subparagraphs (F) and (G), as redesignated by section 2(c)(1) of this Act, by striking "high-performance" each place it appears and inserting "high-end";

(3) in subsection (b)(1), in the matter preceding subparagraph (A), by striking "high-performance computing" both places it appears and inserting "networking and information technology"; and

(4) in subsection (c)(1)(A), by striking "high-performance computing" and inserting "networking and information technology".

(d) SECTION 201.—Section 201(a)(1) of such Act (15 U.S.C. 5521(a)(1)) is amended by striking "high-performance computing" and all that follows through "networking;" and inserting "networking and information research and development;".

(e) SECTION 202.—Section 202(a) of such Act (15 U.S.C. 5522(a)) is amended by striking "high-performance computing" and inserting "networking and information technology".

(f) SECTION 203.—Section 203(a)(1) of such Act (15 U.S.C. 5523(a)(1)) is amended by striking "high-performance computing and networking" and inserting "networking and information technology".

(g) SECTION 204.—Section 204(a)(1) of such Act (15 U.S.C. 5524(a)(1)) is amended—

(1) in subparagraph (A), by striking "high-performance computing systems and networks" and inserting "networking and information technology systems and capabilities"; and

(2) in subparagraph (C), by striking "high-performance computing" and inserting "networking and information technology".

(h) SECTION 205.—Section 205(a) of such Act (15 U.S.C. 5525(a)) is amended by striking "computational" and inserting "networking and information technology".

(i) SECTION 206.—Section 206(a) of such Act (15 U.S.C. 5526(a)) is amended by striking "computational research" and inserting "networking and information technology research".

(j) SECTION 208.—Section 208 of such Act (15 U.S.C. 5528) is amended—

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

(2) in subsection (a)—

(A) in paragraph (1), by striking "High-performance computing and associated" and inserting "Networking and information";

(B) in paragraph (2), by striking "high-performance computing" and inserting "networking and information technologies";

(C) in paragraph (4), by striking "high-performance computers and associated" and inserting "networking and information"; and

(D) in paragraph (5), by striking "high-performance computing and associated" and inserting "networking and information".

II. Purpose of the Bill

The purpose of this bill is to strengthen the planning and coordination mechanisms of the Networking and Information Technology Research and Development (NITRD) program and to update the research content of the program. The legislation implements a number of recommendations made in a recent President's Council of Advisors on Science and Technology (PCAST) assessment of the program.

III. Background and Need for the Legislation

Over the past 50 years, advances in networking and information technology (NIT) such as the internet and wireless communication technologies have permeated society and contributed significantly to the growth of the U.S. economy. Breakthroughs in the coming decades are expected to lead to a more reliable and secure internet, personalized health monitoring, and increased transportation safety and efficiency. Advances in networking and information technologies and their anticipated benefits are built upon a strong foundation of research and development (R&D).

The NITRD program, originally authorized in the High Performance Computing Act of 1991 (P.L. 102–194), is a multi-agency research effort to accelerate progress in the advancement of computing and networking technologies and to support leading edge computational research in a range of science and engineering fields. The 1991 statute established a set of mechanisms and procedures to provide for interagency planning, coordination, and budgeting of R&D activities carried out under the program.

The NITRD Subcommittee of the National Science and Technology Council (NSTC) is the working body for interagency planning and coordination and includes representatives from each of the participating NITRD agencies as well as the Office of Management and Budget (OMB) and the Office of Science and Technology Policy (OSTP). In the current fiscal year (FY 2009), 13 Federal agencies are full participants in the NITRD program and requested a total budget of $3.55 billion, an increase of $0.21 billion or approximately 6 percent over the FY 2008 level of $3.34 billion. Additional agencies participate in the planning activities of the NITRD program, but do not report their funding levels or contribute to the operating budget of the National Coordination Office (NCO). The NCO provides staff support for the NITRD Subcommittee and the program's Advisory Committee and serves as the public interface for the program. Currently, the NITRD program is divided into eight major research components: Cyber Security and Information Assurance; High End Computing Infrastructure and Applications;

High End Computing Research and Development; Human Computer Interaction and Information Management; High Confidence Software and Systems; Large Scale Networking; Software Design and Productivity; and Social, Economic, and Workforce Implications of IT.

In August 2007, PCAST completed an assessment of the NITRD program and issued a report entitled, Leadership Under Challenge: Information Technology R&D in a Competitive World. The report indicates that while the U.S. remains the global leader in NIT, several countries, including China and India, are investing heavily in R&D and higher education. PCAST found that while the NITRD program has been effective at addressing the IT needs of the Federal agencies and the Nation, a number of changes are necessary to guarantee continued U.S. leadership in networking and information technology. Specifically, PCAST recommended improvements in the program's planning, prioritization and coordination functions; a rebalancing of the investment portfolio toward long-term, large-scale R&D; adjustments to the research content of the program; and a focus on workforce training through improved NIT education.

IV. Hearing Summary

During the 110th Congress, the Committee on Science and Technology held one hearing relevant to H.R. 2020.

On Thursday July 31, 2008, the Honorable Bart Gordon presiding, the Committee on Science and Technology held an oversight hearing to review the multi-agency NITRD program. The hearing examined the program in light of the recent assessment of PCAST and explored whether additional legislative adjustments to the program were needed. Witnesses for the hearing included: (1) Dr. Chris L. Greer, Director, National Coordination Office for Networking and Information Technology Research and Development program; (2) Dr. Daniel A. Reed, Director of Scalable and Multicore Computing, Microsoft; (3) Dr. Craig Stewart, Associate Dean, Research Technologies, Indian University, and representing the Coalition for Academic Scientific Computation (CASC); and (4) Mr. Don C. Winter, Vice President for Engineering and Information Technology, Phantom Works, the Boeing Company. Witnesses agreed with the PCAST recommendations and provided additional recommendations for the Committee to consider.

During the 111th Congress, the Committee on Science and Technology held one hearing relevant to H.R. 2020.

On Wednesday, April 1, 2009, the Honorable Bart Gordon presiding, the Committee on Science and Technology held a hearing to receive testimony on a draft legislative proposal to strengthen the planning and coordination mechanisms and to update the research scope of the NITRD program based on the recommendations and findings from the PCAST assessment. There were four witnesses: (1) Dr. Chris L. Greer, Director, National Coordination Office for Networking and Information Technology Research and Development program (2) Dr. Peter Lee, Professor and Head, Computer Science Department, Carnegie Mellon University; (3) Mr. Amit Yoran, Chairman and Chief Executive Officer, NetWitness Corporation; and (4) Dr. Deborah Estrin, Director, Center for Embedded Networked Sensing, University of California, Los Angeles. Wit-

nesses largely supported the draft legislation and provided recommendations on ways to improve the legislation. Specifically, witnesses highlighted the need to improve NIT education and asked the Committee to consider additional language to address that issue.

V. Committee Actions

As summarized in Section IV of this report, the Committee on Science and Technology heard testimony relevant to H.R. 2020 in the 110th Congress at a hearing held on July 31, 2008. The Committee heard testimony in the 111th Congress on a discussion draft of H.R. 2020 at a hearing held on April 1, 2009.

On April 22, 2009, Representative Bart Gordon, Chairman of the Committee on Science and Technology, for himself, Mr. Hall, Mr. Lipinski, Mr. Ehlers, Mr. Wu, Ms. Biggert, and Mr. Luján, introduced H.R. 2020, the Networking and Information Technology Research and Development Act of 2009, a bill to amend the High-Performance Computing Act of 1991 to authorize activities for support of networking and information technology research, and for other purposes.

The Committee on Science and Technology met to consider H.R. 2020 on April 29, 2009.

• An amendment was offered by Mr. Gordon requiring the replacement of the term "high-performance computing" throughout the bill and underlying statute with "networking and information technology" to more accurately reflect the current scope of R&D activities included in the program. The amendment was agreed to by voice vote.

• An amendment was offered by Ms. Woolsey requiring that the strategic plan address how the program will attract more women and underrepresented minorities to pursue postsecondary degrees in networking and information technology; the amendment also required the National Science Foundation to use its existing programs to improve networking and information technology education at all levels. The amendment was agreed to by voice vote.

• An amendment was offered by Mr. Luján clarifying that research activities conducted by federal laboratories and institutions of higher education should be considered in technology transfer plans; the amendment also required the task force established in section 4 to define the roles and responsibilities of Federal laboratories in a collaborative research model for cyber-physical systems. The amendment was agreed to by voice vote.

Mr. Hall moved that the Committee favorably report the bill, H.R. 2020, as amended, to the House with the recommendation that the bill, as amended, do pass, and that the staff be instructed to make technical and conforming changes to the bill, as amended, and prepare the legislative report and that the Chairman take all necessary steps to bring the bill before the House for consideration. The motion was agreed to by a voice vote.

VI. Summary of Major Provisions of the Bill

• Requires the development and periodic update of a strategic plan for the NITRD program which specifies near-term and long-

term objectives, and the timeframe and metrics for achieving those objectives.

• Authorizes NITRD agencies to support large-scale, long-term, interdisciplinary research in areas of national importance.

• Requires the NCO Director to convene a task force, with representatives from universities, industries, and federal laboratories, to explore mechanisms for carrying out collaborative research and development activities for cyber-physical systems.

• Formally establishes the NCO; delineates the office's responsibilities; mandates annual operating budgets; specifies the source of funding for the office (consistent with current practice); and stresses the role of the NCO in developing the strategic plan and in public outreach and communication with outside communities of interest.

VII. Section-by-Section Analysis

Section 1. Short title

"Networking and Information Technology Research and Development Act of 2009".

Sec. 2. Program planning and coordination

Requires the NITRD agencies to periodically assess the program contents and funding levels and to update the program accordingly.

Requires the NITRD agencies to develop and periodically update (at 3-year intervals) a strategic plan for the program. The characteristics and content of the strategic plan are described, and include strengthening NIT education, fostering technology transfer, and encouraging innovative, large-scale, and interdisciplinary research.

Encourages a more active role for OSTP in ensuring that the strategic plan is developed and executed effectively and that the objectives of the program are met.

Ensures that the existing advisory committee for NITRD is closely linked to the President's Council of Advisors on Science and Technology while retaining the necessary breadth and depth of expertise in NIT fields.

Specifies that the annual report now required for the NITRD program explicitly describes how the program activities planned and underway relate to the objectives specified in the strategic plan.

Specifies that the annual report now required for the NITRD program include a description of research areas supported in accordance with section 3, including the same budget information as is required for the program component areas.

Sec. 3. Large-scale research in areas of national importance

Authorizes NITRD agencies to support large-scale, long-term, interdisciplinary research with the potential to make significant contributions to society and U.S. economic competitiveness and to encourage collaboration between at least two agencies as well as cost-sharing from non-federal sources.

Characteristics of the projects supported include: collaborations among researchers in institutions of higher education and industry, and may involve nonprofit research institutions and federal laboratories; leveraging of federal investments through collaboration with

related State initiatives, when possible; and plans for fostering technology transfer.

Authorizes support of activities under this section through interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities.

Sec. 4. Cyber-physical systems and information management

Requires the program to support research and development in cyber-physical systems, human-computer interactions, visualization, and information management.

Requires the NCO Director to convene a university/industry task force to explore mechanisms for carrying out collaborative research and development activities for cyber-physical systems with participants from universities, federal laboratories, and industry. The NCO is to report to Congress on any findings and recommendations from the task force on models for collaborative R&D.

Sec. 5. National Coordination Office

Formally establishes the NCO; delineates the office's responsibilities; mandates annual operating budgets; specifies the source of funding for the office (consistent with current practice); and stresses the role of the NCO in developing the strategic plan and in public outreach and communication with outside communities of interest.

VIII. Committee Views

PROGRAM PLANNING AND COORDINATION

The Committee believes that while the NITRD program has been largely successful in coordinating networking and information R&D activities across the federal government, the continued success and strength of the program depends on the willingness of all relevant agencies to be fully engaged in the program. The Committee has identified two agencies that should be more active participants in the NITRD program: the Department of Homeland Security (DHS) and the Department of Education (ED).

Representatives from the Science and Technology Directorate of DHS do participate in working group meetings for some of the program component areas, in particular Cyber Security and Information Assurance. However, the lack of commitment by the agency as a whole inhibits the ability of DHS and other NITRD agencies to effectively leverage each other's research investments in cybersecurity and to accurately identify research gaps in this crucial area. With the number of reported cyber attacks rising every day, it is becoming increasingly important that the federal government effectively coordinate and strengthen its cybersecurity R&D efforts. The Committee feels that the small contribution DHS would have to make in support of the NITRD National Coordination Office—approximately $45,000 dollars annually—would be paid back many times by the benefits the agency would reap from full involvement in NITRD.

NETWORKING AND INFORMATION TECHNOLOGY EDUCATION

While ED was listed as one of the original agencies in the 1991 statute establishing the program, their involvement in NITRD has been limited. The Committee encourages ED to become an active participant in the Social, Economic, and Workforce Implications of IT and IT Workforce Development Coordinating Group (SEW) of the NITRD Subcommittee. The Committee is especially concerned by ED's lack of engagement in light of the PCAST finding that NIT curricula generally, and computer science curricula specifically, are inadequate to meet the needs of employers and students. Specifically, PCAST found that weak K–12 preparation in science and mathematics is a contributing factor in the declining number of students entering computer science and computer engineering programs.

This trend is particularly troubling in light of the Bureau of Labor Statistics (BLS) prediction of an increase of more than 800,000 jobs from 2006–2016 for all IT occupations, with an increase of 38 percent for computer software engineers and 22 percent for computer and information research scientists. In addition, the BLS anticipates that the growth in IT occupations—24 percent compared to 10 percent growth in all occupations—will occur in spite of a predicted rise in the offshoring of certain IT jobs such as computer programmers and computer support specialists.

Overall NITRD investment in K–16 educational activities is small and principally provided by NSF. The Committee feels NITRD should play a key role in strengthening computer science education, particularly at the K–12 level. In general, few students have the opportunity to take engaging and rigorous computer science classes in high school and few opportunities exist for teacher professional development. The Committee encourages the NITRD agencies to reinvigorate SEW and consider ways to improve the planning and coordination of the program's education component.

The Committee recognizes the key role NSF has played in NIT education, specifically computer science education, and notes that the Broadening Participating in Computing program has been actively addressing diversity concerns by supporting innovative methods, frameworks, and strategies to improve the recruitment and retention of underrepresented groups. The Committee applauds the efforts of NSF to reform the Advanced Placement Computer Science course. However, the Committee believes that NSF could do even more to improve the learning and teaching of computer science by broadening the scope of existing programs, including the Math and Science Partnership program, the Robert Noyce Scholarship program, and the Course, Curriculum, and Laboratory Improvement program.

STRATEGIC PLAN

The Committee expects the strategic plan to be a useful guide for setting program priorities and estimating time scales for reaching program objectives. The Committee expects that the plan will explain how the near-term objectives will be met, including expected milestones and metrics for the assessment of progress. Furthermore, the Committee intends for the development of the plan to be

informed by the research needs of industry and academia and expects the NCO to actively solicit stakeholder input through meetings, requests for information and other appropriate means.

Some areas of the program have developed detailed R&D plans. Specifically, the Federal Plan for High-End Computing was published in 2004, the Federal Plan for Cyber Security and Information Assurance R&D was published in 2006, the Federal Plan for Advanced Networking Research and Development was published in 2008, and most recently, Harnessing the Power of Digital Data for Science and Society was published in January. The Committee applauds these efforts by the NITRD Subcommittee, but is disappointed that the subsequent implementation roadmaps have not been produced. The Federal Plans themselves call for the development of roadmaps and the Committee encourages the NITRD Subcommittee to establish a formal process and schedule for creating and updating the roadmaps. In addition, the roadmaps should be aligned with the program's strategic plan and overall objectives.

RESEARCH IN AREAS OF NATIONAL IMPORTANCE

The Committee encourages the NITRD agencies to identify a few focused research and development areas for which large-scale, multi-agency projects or activities would be appropriate and have the potential to provide significant contributions to national economic competitiveness or benefit society in other ways. The areas selected could be more speculative and risky basic research opportunities that have the potential to offer substantial payoff and therefore justify the investment and risk.

The NITRD agencies are responsible for selecting the research areas to pursue, with advice from the NITRD Advisory Committee. The Committee intends that the areas selected have relevance to the mission responsibilities of more than one agency so that the level of resources provided will enable multiple projects and a variety of modes of research to be supported, including multiple investigator awards and interdisciplinary research centers. The Committee has not designated particular research areas that must be selected, but encourages the NITRD agencies to consider multi-agency NIT research activities that can contribute to advances in healthcare, energy, education and the environment. The Committee intends that the agencies treat planning and reporting on research areas under this section in a similar manner to the program component areas.

CYBER-PHYSICAL SYSTEMS

One of the top recommendations of PCAST was for new research investment in the area of computer-driven systems connected with the physical world—also called embedded, engineered, or cyber-physical systems (CPS). CPS are already in widespread use, but growing demand for new capabilities and applications will require significant technical advances. Such systems can be difficult and costly to design, build, test, and maintain. There is evidence that CPS will be an area of international economic competition. For example, the European Union's Advanced Research and Technology for Embedded Intelligence and Systems (ARTEMIS) program, funded by a public-private investment of 5.4 billion euros (over $7 billion in mid-2007 dollars) between 2007 and 2013, is pursuing R&D

to achieve "world leadership in intelligent electronic systems" by 2016. The Committee agrees with the PCAST recommendation and encourages new investment in CPS in accordance with section 3.

NITRD ADVISORY COMMITTEE

The NITRD Advisory Committee was originally established by P.L. 102–194 to review, assess and make recommendations regarding the administration, priorities, and content of the program. In the last Administration this function was assigned by the President to PCAST. The Committee believes the responsibilities assigned to the NITRD Advisory Committee are such that a high-level advisory committee with the broad policy role of PCAST cannot adequately provide the degree of attention and focused technical expertise required for detailed assessments of the functioning and programmatic content of the program. However, the Committee recognizes the benefits of having a straightforward pathway for providing advice to the President on national technology issues, scientific research priorities, and math and science education. Consequently, the Committee has specified that the NITRD Advisory Committee will be co-chaired by appropriate members of PCAST with the remaining membership composed of subject matter experts with collective expertise spanning the full range of activities authorized under the program.

The Committee expects the Advisory Committee to provide recommendations on the content of the strategic plan and to make recommendations for areas of research to be pursued by the NITRD agencies in accordance with section 3 of the bill. In addition, the Committee encourages the Advisory Committee to consult with subject matter experts in instances when sufficient expertise does not exist on the Advisory Committee and to convene public meetings to gather information from all communities of interest regarding NIT R&D in order to assist it in its assessments of the priorities and content of the program.

IX. Cost Estimate

A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted to the Committee on Science and Technology prior to the filing of this report and is included in Section X of this report pursuant to House Rule XIII, clause 3(c)(3).

H.R. 2020 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures. Assuming that the sums authorized under the bill are appropriated, H.R. 2020 does authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in Section X of this report.

X. Congressional Budget Office Cost Estimate

H.R. 2020—Networking and Information Technology Research and Development Act of 2009

H.R. 2020 would expand the activities of the Networking and Information Technology Research and Development (NITRD) program, which coordinates the federal government's advanced com-

puting, networking, and software development goals. The bill would codify the activities of the program's existing national coordination office. Activities currently include creating a strategic plan, soliciting input from various stakeholders, and coordinating periodic reviews of agencies' information technology activities. H.R. 2020 also would require the director of the program to evaluate and make recommendations on new projects of national importance related to high-performance computing. Finally, the legislation would require that a task force of industry and academic experts develop certain information technology systems.

Based on information from the NITRD program office, CBO estimates that implementing H.R. 2020 would cost about $500,000 annually, subject to the availability of appropriated funds. That amount includes the costs to support the task force and lead the evaluation of high-performance computing. Enacting the bill would not affect direct spending or revenues.

H.R. 2020 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act and would not affect the budgets of state, local, or tribal governments.

The CBO staff contact for this estimate is Leigh Angres. The estimate was approved by Peter H. Fontaine, Assistant Director for Budget Analysis.

XI. Compliance With Public Law 104–4

H.R. 2020 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The oversight findings and recommendations of the Committee on Science and Technology are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to clause 3(c) of House Rule XIII, the goals of H.R. 2020 are to strengthen the planning and coordination mechanisms of the interagency Networking and Information Technology Research and Development (NITRD) program; to update the research content of the program; to ensure adequate stakeholder input into program planning; and to authorize the NITRD national coordination office to provide technical and administrative support to participating agencies and to serve as the primary point of contact and outreach on Federal networking and information technology activities.

XIV. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 2020.

XV. Federal Advisory Committee Statement

H.R. 2020 does not establish nor authorize the establishment of any advisory committee.

XVI. Congressional Accountability Act

The Committee finds that H.R. 2020 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVII. Earmark Identification

H.R. 2020 does not contain any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9(d), 9(e), or 9(f) of rule XXI.

XVIII. Statement on Preemption of State, Local, or Tribal Law

This bill is not intended to preempt any state, local, or tribal law.

XIX. Changes in Existing Law Made by the Bill, as Reported

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

HIGH-PERFORMANCE COMPUTING ACT OF 1991

* * * * * * *

SEC. 3. PURPOSES.

The purposes of this Act are to help ensure the continued leadership of the United States in [high-performance computing] *networking and information technology* and its applications by—

(1) expanding Federal support for research, development, and application of [high-performance computing] *networking and information technology* in order to—

(A) expand the number of researchers, educators, and students with training in [high-performance computing] *networking and information technology* and access to [high-performance computing] *networking and information technology* resources;

* * * * * * *

(F) provide for the application of [high-performance computing] *networking and information technology* to Grand Challenges;

* * * * * * *

(2) improving the interagency planning and coordination of Federal research and development on [high-performance computing and] *networking and information technology and* maximizing the effectiveness of the Federal Government's [high-performance computing network] *networking and information technology* research and development programs;

* * * * * * *

SEC. 4. DEFINITIONS.

As used in this Act, the term—

(1) "cyber-physical systems" means physical or engineered systems whose networking and information technology functions and physical elements are deeply integrated and are actively connected to the physical world through sensors, actuators, or other means to perform monitoring and control functions;

[(1)**]** *(2)* "Director" means the Director of the Office of Science and Technology Policy;

[(2)**]** *(3)* "Grand Challenge" means a fundamental problem in science or engineering, with broad economic and scientific impact, whose solution will require the application of high-performance computing resources and multidisciplinary teams of researchers;

[(3)**]** *(4)* "**[**high-performance computing**]** *networking and information technology*" means advanced computing, communications, and information technologies, including **[**supercomputer**]** *high-end computing* systems, high-capacity and high-speed networks, special purpose and experimental systems, applications and systems software, and the management of large data sets;

[(4)**]** *(5)* "Internet" means the international computer network of both Federal and non-Federal interoperable data networks;

[(5)**]** *(6)* "Network" means a computer **[**network referred to as the National Research and Education Network established under section 102;**]** *network, including advanced computer networks of Federal agencies and departments;*

[(6)**]** *(7)* "Program" means the **[**National High-Performance Computing Program**]** *networking and information technology research and development program* described in section 101; and

[(7)**]** *(8)* "Program Component Areas" means the major subject areas under which related individual projects and activities carried out under the Program are grouped.

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TITLE I—[HIGH-PERFORMANCE COMPUTING] *NETWORKING AND INFORMATION TECHNOLOGY* RESEARCH AND DEVELOPMENT

SEC. 101. NATIONAL [HIGH-PERFORMANCE COMPUTING] *NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT* PROGRAM.

(a) **[**NATIONAL HIGH-PERFORMANCE COMPUTING**]** *NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT* PROGRAM.—(1) The President shall implement a **[**National High-Performance Computing Program**]** *networking and information technology research and development program*, which shall—

(A) provide for long-term basic and applied research on **[**high-performance computing, including networking**]** *networking and information technology*;

(B) provide for research and development on, and demonstration of, technologies to advance the capacity and capabilities of **[**high-performance**]** *high-end* computing and networking systems, and related software;

(C) provide for sustained access by the research community throughout the United States to [high-performance] *high-end* computing and networking systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems, including provision for technical support for users of such systems;

* * * * * * *

(G) provide for the technical support of, and research and development on, [high-performance] *high-end* computing systems and software required to address Grand Challenges;

(H) provide for educating and training additional undergraduate and graduate students in software engineering, computer science, computer and network security, applied mathematics, library and information science, and computational science; [and]

(I) provide for improving the security of computing and networking systems, including Federal systems, including providing for research required to establish security standards and practices for these systems[.]*;*

(J) provide for increased understanding of the scientific principles of cyber-physical systems and improve the methods available for the design, development, and operation of cyber-physical systems that are characterized by high reliability, safety, and security; and

(K) provide for research and development on human-computer interactions, visualization, and information management.

(2) The Director shall—

(A) establish the goals and priorities for Federal [high-performance computing] *networking and information technology* research, [development, networking,] *development,* and other activities;

* * * * * * *

(C) provide for interagency coordination of Federal [high-performance computing] *networking and information technology* research, [development, networking,] *development,* and other activities undertaken pursuant to the Program;

* * * * * * *

(E) encourage and monitor the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the strategic plan under subsection (e) is developed and executed effectively and that the objectives of the Program are met;

[(E)] *(F)* develop and maintain a research, development, and deployment roadmap covering all States and regions for the provision of [high-performance] *high-end* computing and networking systems under paragraph (1)(C); and

[(F)] *(G)* consult with academic, State, industry, and other appropriate groups conducting research on and using [high-performance] *high-end* computing.

(3) The annual report submitted under paragraph (2)(D) shall—

(A) * * *

* * * * * * *

(C) describe the levels of Federal funding for the fiscal year during which such report [is submitted,] *is submitted, the levels for the previous fiscal year,* and the levels proposed for the fiscal year with respect to which the budget submission applies, for [each Program Component Area;] *each Program Component Area and research area supported in accordance with section 104;*

(D) describe the levels of Federal funding for each agency and department participating in the Program, and for [each Program Component Area,] *each Program Component Area and research area supported in accordance with section 104,* for the fiscal year during which such report [is submitted,] *is submitted, the levels for the previous fiscal year,* and the levels proposed for the fiscal year with respect to which the budget submission applies; [and]

(E) include a description of how the objectives for each Program Component Area, and the objectives for activities that involve multiple Program Component Areas, relate to the objectives of the Program identified in the strategic plan required under subsection (e);

(F) include—

(i) a description of the funding required by the National Coordination Office to perform the functions specified under section 102(b) for the next fiscal year by category of activity;

(ii) a description of the funding required by such Office to perform the functions specified under section 102(b) for the current fiscal year by category of activity; and

(iii) the amount of funding provided for such Office for the current fiscal year by each agency participating in the Program; and

[(E)] *(G)* include an analysis of the progress made toward achieving the goals and priorities established for the Program and the extent to which the Program incorporates the recommendations of the advisory committee established under subsection (b).

(b) ADVISORY COMMITTEE.—(1) The President shall establish an advisory committee on [high-performance computing] *networking and information technology, in which the co-chairs shall be members of the President's Council of Advisors on Science and Technology and with the remainder of the committee* consisting of geographically dispersed non-Federal members, including representatives of the research, education, and library communities, network and related software providers, and industry representatives in the Program Component Areas, who are specially qualified to provide the Director with advice and information on [high-performance computing] *networking and information technology*. The recommendations of the advisory committee shall be considered in reviewing and revising the Program. The advisory committee shall provide the Director with an independent assessment of—

(A) * * *

* * * * * * *

(c) OFFICE OF MANAGEMENT AND BUDGET.—(1) Each Federal agency and department participating in the Program shall, as part of its annual request for appropriations to the Office of Manage-

ment and Budget, submit a report to the Office of Management and Budget which—

(A) identifies each element of its [high-performance computing] *networking and information technology* activities which contributes directly to the Program Component Areas or benefits from the Program; and

* * * * * * *

(d) PERIODIC REVIEWS.—The agencies identified in subsection (a)(3)(B) shall—

(1) periodically assess the contents and funding levels of the Program Component Areas and restructure the Program when warranted, taking into consideration any relevant recommendations of the advisory committee established under subsection (b); and

(2) ensure that the Program includes large-scale, long-term, interdisciplinary research and development activities, including activities described in section 104.

(e) STRATEGIC PLAN.—

(1) IN GENERAL.—The agencies identified in subsection (a)(3)(B), working through the National Science and Technology Council and with the assistance of the National Coordination Office established under section 102, shall develop, within 12 months after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, and update every 3 years thereafter, a 5-year strategic plan to guide the activities described under subsection (a)(1).

(2) CONTENTS.—The strategic plan shall specify near-term and long-term objectives for the Program, the anticipated time frame for achieving the near-term objectives, the metrics to be used for assessing progress toward the objectives, and how the Program will—

(A) foster the transfer of research and development results into new technologies and applications for the benefit of society, including through cooperation and collaborations with networking and information technology research, development, and technology transition initiatives supported by the States;

(B) encourage and support mechanisms for interdisciplinary research and development in networking and information technology, including through collaborations across agencies, across Program Component Areas, with industry, with Federal laboratories (as defined in section 4 of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703)), and with international organizations;

(C) address long-term challenges of national importance for which solutions require large-scale, long-term, interdisciplinary research and development;

(D) place emphasis on innovative and high-risk projects having the potential for substantial societal returns on the research investment;

(E) strengthen all levels of networking and information technology education and training programs to ensure an adequate, well-trained workforce; and

(F) attract more women and underrepresented minorities to pursue postsecondary degrees in networking and information technology.

(3) NATIONAL RESEARCH INFRASTRUCTURE.—The strategic plan developed in accordance with paragraph (1) shall be accompanied by milestones and roadmaps for establishing and maintaining the national research infrastructure required to support the Program, including the roadmap required by subsection (a)(2)(E).

(4) RECOMMENDATIONS.—The entities involved in developing the strategic plan under paragraph (1) shall take into consideration the recommendations—

(A) of the advisory committee established under subsection (b); and

(B) of the stakeholders whose input was solicited by the National Coordination Office, as required under section 102(b)(3).

(5) REPORT TO CONGRESS.—The Director of the National Coordination Office shall transmit the strategic plan required under paragraph (1) to the advisory committee, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives.

[SEC. 102. NATIONAL RESEARCH AND EDUCATION NETWORK.

[(a) ESTABLISHMENT.—As part of the Program, the National Science Foundation, the Department of Defense, the Department of Energy, the Department of Commerce, the National Aeronautics and Space Administration, and other agencies participating in the Program shall support the establishment of the National Research and Education Network, portions of which shall, to the extent technically feasible, be capable of transmitting data at one gigabit per second or greater by 1996. The Network shall provide for the linkage of research institutions and educational institutions, government, and industry in every State.

[(b) ACCESS.—Federal agencies and departments shall work with private network service providers, State and local agencies, libraries, educational institutions and organizations, and others, as appropriate, in order to ensure that the researchers, educators, and students have access, as appropriate, to the Network. The Network is to provide users with appropriate access to high-performance computing systems, electronic information resources, other research facilities, and libraries. The Network shall provide access, to the extent practicable, to electronic information resources maintained by libraries, research facilities, publishers, and affiliated organizations.

[(c) NETWORK CHARACTERISTICS.—The Network shall—

[(1) be developed and deployed with the computer, telecommunications, and information industries;

[(2) be designed, developed, and operated in collaboration with potential users in government, industry, and research institutions and educational institutions;

[(3) be designed, developed, and operated in a manner which fosters and maintains competition and private sector investment in high-speed data networking within the telecommunications industry;

[(4) be designed, developed, and operated in a manner which promotes research and development leading to development of commercial data communications and telecommunications

standards, whose development will encourage the establishment of privately operated high-speed commercial networks;

[(5) be designed and operated so as to ensure the continued application of laws that provide network and information resources security measures, including those that protect copyright and other intellectual property rights, and those that control access to data bases and protect national security;

[(6) have accounting mechanisms which allow users or groups of users to be charged for their usage of copyrighted materials available over the Network and, where appropriate and technically feasible, for their usage of the Network;

[(7) ensure the interoperability of Federal and non-Federal computer networks, to the extent appropriate, in a way that allows autonomy for each component network;

[(8) be developed by purchasing standard commercial transmission and network services from vendors whenever feasible, and by contracting for customized services when not feasible, in order to minimize Federal investment in network hardware;

[(9) support research and development of networking software and hardware; and

[(10) serve as a test bed for further research and development of high-capacity and high-speed computing networks and demonstrate how advanced computers, high-capacity and high-speed computing networks, and data bases can improve the national information infrastructure.

[(d) DEFENSE ADVANCED RESEARCH PROJECTS AGENCY RESPONSIBILITY.—As part of the Program, the Department of Defense, through the Defense Advanced Research Projects Agency, shall support research and development of advanced fiber optics technology, switches, and protocols needed to develop the Network.

[(e) INFORMATION SERVICES.—The Director shall assist the President in coordinating the activities of appropriate agencies and departments to promote the development of information services that could be provided over the Network. These services may include the provision of directories of the users and services on computer networks, data bases of unclassified Federal scientific data, training of users of data bases and computer networks, access to commercial information services for users of the Network, and technology to support computer-based collaboration that allows researchers and educators around the Nation to share information and instrumentation.

[(f) USE OF GRANT FUNDS.—All Federal agencies and departments are authorized to allow recipients of Federal research grants to use grant moneys to pay for computer networking expenses.

[(g) REPORT TO CONGRESS.—Within one year after the date of enactment of this Act, the Director shall report to the Congress on—

[(1) effective mechanisms for providing operating funds for the maintenance and use of the Network, including user fees, industry support, and continued Federal investment;

[(2) the future operation and evolution of the Network;

[(3) how commercial information service providers could be charged for access to the Network, and how Network users could be charged for such commercial information services;

[(4) the technological feasibility of allowing commercial information service providers to use the Network and other federally funded research networks;

[(5) how to protect the copyrights of material distributed over the Network; and

[(6) appropriate policies to ensure the security of resources available on the Network and to protect the privacy of users of networks.]

SEC. 102. NATIONAL COORDINATION OFFICE.

(a) ESTABLISHMENT.—The Director shall establish a National Coordination Office with a Director and full-time staff.

(b) FUNCTIONS.—The National Coordination Office shall—

(1) provide technical and administrative support to—

(A) the agencies participating in planning and implementing the Program, including such support as needed in the development of the strategic plan under section 101(e); and

(B) the advisory committee established under section 101(b);

(2) serve as the primary point of contact on Federal networking and information technology activities for government organizations, academia, industry, professional societies, State computing and networking technology programs, interested citizen groups, and others to exchange technical and programmatic information;

(3) solicit input and recommendations from a wide range of stakeholders during the development of each strategic plan required under section 101(e) through the convening of at least 1 workshop with invitees from academia, industry, Federal laboratories, and other relevant organizations and institutions;

(4) conduct public outreach, including the dissemination of findings and recommendations of the advisory committee, as appropriate; and

(5) promote access to and early application of the technologies, innovations, and expertise derived from Program activities to agency missions and systems across the Federal Government and to United States industry.

(c) SOURCE OF FUNDING.—

(1) IN GENERAL.—The operation of the National Coordination Office shall be supported by funds from each agency participating in the Program.

(2) SPECIFICATIONS.—The portion of the total budget of such Office that is provided by each agency for each fiscal year shall be in the same proportion as each such agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 101(a)(3).

* * * * * * *

SEC. 104. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

(a) IN GENERAL.—The Program shall encourage agencies identified in section 101(a)(3)(B) to support large-scale, long-term, interdisciplinary research and development activities in networking and information technology directed toward application areas that have the potential for significant contributions to national economic com-

petitiveness and for other significant societal benefits. Such activities, ranging from basic research to the demonstration of technical solutions, shall be designed to advance the development of research discoveries. The advisory committee established under section 101(b) shall make recommendations to the Program for candidate research and development areas for support under this section.

(b) CHARACTERISTICS.—

(1) IN GENERAL.—Research and development activities under this section shall—

(A) include projects selected on the basis of applications for support through a competitive, merit-based process;

(B) involve collaborations among researchers in institutions of higher education and industry, and may involve nonprofit research institutions and Federal laboratories, as appropriate;

(C) when possible, leverage Federal investments through collaboration with related State initiatives; and

(D) include a plan for fostering the transfer of research discoveries and the results of technology demonstration activities, including from institutions of higher education and Federal laboratories, to industry for commercial development.

(2) COST-SHARING.—In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

(3) AGENCY COLLABORATION.—If 2 or more agencies identified in section 101(a)(3)(B), or other appropriate agencies, are working on large-scale research and development activities in the same area of national importance, then such agencies shall strive to collaborate through joint solicitation and selection of applications for support and subsequent funding of projects.

(4) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities in areas described in subsection (a). Research may be carried out through existing interdisciplinary centers, including those authorized under section 7024(b)(2) of the America COMPETES Act (Public Law 110–69; 42 U.S.C. 1862o–10).

SEC. 105. UNIVERSITY/INDUSTRY TASK FORCE.

(a) ESTABLISHMENT.—Not later than 180 days after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, the Director of the National Coordination Office established under section 102 shall convene a task force to explore mechanisms for carrying out collaborative research and development activities for cyber-physical systems, including the related technologies required to enable these systems, through a consortium or other appropriate entity with participants from institutions of higher education, Federal laboratories, and industry.

(b) FUNCTIONS.—The task force shall—

(1) develop options for a collaborative model and an organizational structure for such entity under which the joint research and development activities could be planned, managed, and conducted effectively, including mechanisms for the allocation

of resources among the participants in such entity for support of such activities;

(2) propose a process for developing a research and development agenda for such entity, including objectives and milestones;

(3) define the roles and responsibilities for the participants from institutions of higher education, Federal laboratories, and industry in such entity;

(4) propose guidelines for assigning intellectual property rights and for the transfer of research results to the private sector; and

(5) make recommendations for how such entity could be funded from Federal, State, and non-governmental sources.

(c) COMPOSITION.—In establishing the task force under subsection (a), the Director of the National Coordination Office shall appoint an equal number of individuals from institutions of higher education and from industry with knowledge and expertise in cyber-physical systems, of which 2 may be selected from Federal laboratories.

(d) REPORT.—Not later than 1 year after the date of enactment of the Networking and Information Technology Research and Development Act of 2009, the Director of the National Coordination Office shall transmit to the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Science and Technology of the House of Representatives a report describing the findings and recommendations of the task force.

TITLE II—AGENCY ACTIVITIES

SEC. 201. NATIONAL SCIENCE FOUNDATION ACTIVITIES.

(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I—

(1) the National Science Foundation shall provide computing and networking infrastructure support for all science and engineering disciplines, and support basic research and human resource development in all aspects of ⟦high-performance computing and advanced high-speed computer networking;⟧ *networking and information research and development;*

(2) the National Science Foundation shall use its existing programs, in collaboration with other agencies, as appropriate, to improve the teaching and learning of networking and information technology at all levels of education and to increase participation in networking and information technology fields, including by women and underrepresented minorities;

⟦(2)⟧ *(3)* to the extent that colleges, universities, and libraries cannot connect to the Network with the assistance of the private sector, the National Science Foundation shall have primary responsibility for assisting colleges, universities, and libraries to connect to the Network;

⟦(3)⟧ *(4)* the National Science Foundation shall serve as the primary source of information on access to and use of the Network; and

⟦(4)⟧ *(5)* the National Science Foundation shall upgrade the National Science Foundation funded network, assist regional networks to upgrade their capabilities, and provide other Fed-

eral departments and agencies the opportunity to connect to the National Science Foundation funded network.

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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 [high-performance computing] *networking and information technology*, particularly in the field of computational science, with emphasis on aerospace sciences, earth and space sciences, and remote exploration and experimentation.

* * * * * * *

SEC. 203. DEPARTMENT OF ENERGY ACTIVITIES.

(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the Secretary of Energy shall—

(1) conduct and support basic and applied research in [high-performance computing and networking] *networking and information technology* to support fundamental research in science and engineering disciplines related to energy applications; and

* * * * * * *

SEC. 204. DEPARTMENT OF COMMERCE ACTIVITIES.

(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I—

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

(A) conduct basic and applied measurement research needed to support various [high-performance computing systems and networks] *networking and information technology systems and capabilities*;

* * * * * * *

(C) be responsible for developing benchmark tests and standards for [high-performance computing] *networking and information technology* systems and software; and

* * * * * * *

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 [computational] *networking and information technology* techniques and software tools which form the core of ecosystem, atmospheric chemistry, and atmospheric dynamics models.

* * * * * * *

SEC. 206. ROLE OF THE DEPARTMENT OF EDUCATION.

(a) GENERAL RESPONSIBILITIES.—As part of the Program described in title I, the Secretary of Education is authorized to conduct basic and applied research in [computational research] *networking and information technology research* with an emphasis on the coordination of activities with libraries, school facilities, and

education research groups with respect to the advancement and dissemination of computational science and the development, evaluation and application of software capabilities.

* * * * * * *

SEC. 208. FOSTERING UNITED STATES COMPETITIVENESS IN [HIGH-PERFORMANCE COMPUTING] *NETWORKING AND INFORMATION TECHNOLOGY* AND RELATED ACTIVITIES.

(a) FINDINGS.—The Congress finds the following:

(1) [High-performance computing and associated] *Networking and information* technologies are critical to the United States economy.

(2) While the United States has led the development of [high-performance computing] *networking and information technologies*, United States industry is facing increasing global competition.

* * * * * * *

(4) It is appropriate for Federal agencies and departments to use the funds authorized for the Program in a manner which most effectively fosters the maintenance and development of United States leadership in [high-performance computers and associated] *networking and information* technologies in and for the benefit of the United States.

(5) It is appropriate for Federal agencies and departments to use the funds authorized for the Program in a manner, consistent with the Trade Agreements Act of 1979 (19 U.S.C. 2501 et seq.), which most effectively fosters reciprocal competitive procurement treatment by foreign governments for United States [high-performance computing and associated] *networking and information* technology products and suppliers.

* * * * * * *

XX. COMMITTEE RECOMMENDATIONS

On April 29, 2009, the Committee on Science and Technology favorably reported H.R. 2020.

XXI: PROCEEDINGS OF THE FULL COMMITTEE MARKUP ON H.R. 2020, THE NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT ACT OF 2009

WEDNESDAY, APRIL 29, 2009

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met, pursuant to call, at 10:03 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chair of the Committee] presiding.

Chair GORDON. Good morning, everyone. The Committee will come to order pursuant to notice. The Committee on Science and Technology meets to consider the following measures: H.R. 2020, the *Networking and Information Technology Research and Development Act of 2009,* H.R. 1736, the *International Science and Technology Cooperation Act of 2009,* and H.R. 1709, the *STEM Education Coordination Act of 2009.*

I would like to thank Chair Lipinski and Ranking Member Ehlers and other Members of the Research and Science Education Subcommittee for their work to improve these bills at the Subcommittee level, and I think we should also in abstentia thank Jim Wilson. I hope that you will pass it onto him for leaving a good legacy to us, which was certainly improved with our current staff and Members.

While the subject matter varies greatly, there is a common theme in all three of the bills before us today. They all strengthen an interagency coordination process to achieve the set of goals that no one agency can achieve on its own. In fact, this theme cuts across many of the priorities of the Science and Technology Committee of this Congress, beginning with the National Nanotechnology Initiative Bill that passed the House in February, to the *National Water Research and Development Initiative Act of 2009,* that passed the House by a vote of 413 to 10 just last week.

H.R. 2020, the *Networking and Information Technology Research and Development Act of 2009,* continues to improve and update a program that was originally created by the Committee in the *High Performance Competing Act of 1991.* The NITRD Program, as it is known, involves a collaboration of more than a dozen federal research and development agencies for current total federal investment of approximately $3.5 billion. This may sound like a lot, but

the European Union is investing $7 billion over the next five years in cyber physical systems alone. To ensure that we make the most effective use of our own resources to remain a leader in these fields, it is critical that these many agencies come together to develop common goals and well-defined strategies for networking and information technology R&D.

H.R. 2020 strengthens the interagency strategic planning process, formally authorizes the National Coordination Office that oversees and enforces this process, and requires that a wide range of industry and academic stakeholders have input into the process. Given how rapidly this field evolves, a regular and comprehensive look at the NITRD Program by Congress is timely.

And I want to thank Mr. Hall for introducing this important piece of legislation with me, and I urge my colleagues to support it.

H.R. 1736, the *International Science and Technology Cooperation Act of 2009,* would create a committee under the National Science and Technology Council to coordinate international S&T activities at our federal agencies by bringing together the Department of State and the R&D activities to focus on the international component of national R&D priorities. A similar committee in the 1990s launched some important initiatives, most notably in the area of infectious diseases.

It is critical that we don't miss opportunities to leverage our resources against those of other nations to tackle today's greatest global challenges, including energy and water, and to strengthen the contribution of U.S. science and technology to our national security. There is no existing entity whose primary purpose is to look across the Federal Government for such opportunities, and I commend Dr. Baird and Dr. Ehlers for introducing this legislation, and I urge my colleagues to support it.

H.R. 1709, the *STEM Education Coordination Act of 2009,* would strengthen and elevate an existing committee under NSTC to coordinate STEM education activities across the Federal Government. When half the world's workers earn less than $2 a day, we cannot compete on numbers. To stay competitive we must keep feeding the marketplace with new ideas that lead to new U.S. companies and new highly-paying jobs. The foundation for this innovative economy is the 21st century skilled workforce.

The Federal Government can play an important role in STEM education at all levels because of the richness of S&T resources at our science agencies. It may not surprise you to learn that our science agencies have little idea what other science agencies are funding in terms of STEM education and often don't even communicate between offices within a single agency. This is not an acceptable situation. Mr. Hall has joined me in introducing this bill because we agree that agencies need to be sharing best practices with each other, evaluating their programs for effectiveness and generally making more efficient and effective use of taxpayers' dollars.

And I want to thank Mr. Hall and the Chair and Ranking Member of the Research and Science Education Subcommittee for introducing this bill with me, and I urge my colleagues to support it.

These are three good bipartisan bills that strengthen interagency coordination and as President Obama has said in his inaugural,

make our government smarter. I thank my colleagues and staff for their hard work on these bills, and I look forward to improving them even further with your amendments today.

And I now recognize Mr. Hall, who will soon be recognizing his 49th what, birthday, several times over.

Mr. HALL. My 39th.

Chair GORDON. Thirty-ninth. Thirty-ninth.

Mr. HALL. Thirty-ninth reunion of my 39th birthday.

Chair GORDON. And I now recognize the spry Mr. Hall for his——

[The prepared statement of Chair Gordon follows:]

PREPARED STATEMENT OF CHAIR BART GORDON

Pursuant to notice, the Committee on Science and Technology meets to consider the following measures:

- H.R. 2020, the *Networking and Information Technology Research and Development Act of 2009;*
- H.R. 1736, the *International Science and Technology Cooperation Act of 2009;* and,
- H.R. 1709, the *STEM Education Coordination Act of 2009.*

As I mentioned, the Committee will consider three good bills today.

I would like to thank Chairman Lipinski and Ranking Member Ehlers and other Members of the Research and Science Education Subcommittee for their work to improve these bills at the Subcommittee level.

While the subject matter varies greatly, there is a common theme in all three of the bills before us today. They all strengthen an interagency coordination process to achieve a set of goals that no one agency can achieve on its own.

In fact, this theme cuts across many of the priorities of the Science and Technology Committee this Congress, beginning with the National Nanotechnology Initiative bill that passed the House in February, to the *National Water Research and Development Initiative Act of 2009* that passed the House by a vote of 413 to 10 just last week.

H.R. 2020, the *Networking and Information Technology Research and Development Act of 2009,* continues to improve and update a program that was originally created by this committee in the *High Performance Computing Act of 1991.*

The NITRD Program, as it is known, involves a collaboration of more than a dozen federal research and development agencies for a current total federal investment of approximately $3.5 billion.

This may sound like a lot, but the European Union is investing $7 billion over the next five years in cyberphysical systems alone.

To ensure that we make the most effective use of our own resources to remain a leader in these fields, it is critical that these many agencies come together to develop common goals and well defined strategies for networking and information technology R&D.

H.R. 2020 strengthens the interagency strategic planning process, formally authorizes the National Coordination Office that oversees and enforces this process, and requires that a wide range of industry and academic stakeholders have input into the process. Given how rapidly this field evolves, a regular and comprehensive look at the NITRD program by Congress is timely.

I thank Mr. Hall for introducing this important piece of legislation with me and I urge my colleagues to support it.

H.R. 1736, the *International Science and Technology Cooperation Act of 2009,* would recreate a committee under the National Science and Technology Council (NSTC) to coordinate international S&T activities at our federal agencies.

By bringing together the Department of State and the R&D agencies to focus on the international component of national R&D priorities, a similar committee in the 1990's launched some important initiatives, most notably in the area of infectious diseases.

It is critical that we don't miss opportunities to leverage our resources against those of other nations to tackle today's greatest global challenges, including energy and water, and to strengthen the contribution of U.S. science and technology to our national security.

There is no existing entity whose primary purpose is to look across the Federal Government for such opportunities. I commend Dr. Baird and Dr. Ehlers for introducing this legislation and I urge my colleagues to support it.

H.R. 1709, the *STEM Education Coordination Act of 2009,* would strengthen and elevate an existing committee under NSTC to coordinate STEM education activities across the Federal Government.

When half the world's workers earn less than $2 a day, we cannot compete on numbers. To stay competitive, we must keep feeding the marketplace with new ideas that lead to new U.S. companies and new highly paying jobs. The foundation for this innovation economy is the 21st century skilled workforce.

The Federal Government can play an important role in STEM education at all levels because of the richness of the S&T resources at our science agencies. It may not surprise you to learn that our science agencies have little idea what other science agencies are funding in terms of STEM education and often don't even communicate between offices within a single agency.

This is not an acceptable situation.

Mr. Hall joined me in introducing this bill because we agree that agencies need to be sharing best practices with each other, evaluating their programs for effectiveness, and generally making more efficient and effective use of taxpayers' dollars. I thank Mr. Hall, and the Chair and Ranking Member of the Research and Science Education Subcommittee for introducing this bill with me and I urge my colleagues to support it.

These are three good bipartisan bills that strengthen interagency coordination to, as President Obama said in his inaugural, make our government "smarter." I thank my colleagues and staff for their hard work on these bills and I look forward to improving them even further with your amendments today.

I now recognize Mr. Hall to present his opening remarks.

Mr. HALL. Good morning, Mr. Chair, and I thank you for several reasons. I don't know why I have to thank you because it is your duty to schedule this markup, but I still thank you for doing it, and whoever wrote this for me thanks you, and that means that all of us on this side thank you. So—and you thank me, and we are all thanked today.

It would appear that we are doing a great deal of coordinating, and that is true. In addition to authorizing the Networking and Information Technology Research and Development, the NITRD Program, we are also marking up legislation to improve STEM education coordination among the federal agencies and a bill to coordinate science and technology initiatives that can help foster international cooperation.

All of these bills do exactly what this committee should be doing; ensuring that our government is effectively and efficiently using federal science and technology dollars to guarantee we stay on top of cutting-edge research, both domestically and internationally, while continuing to develop the best and brightest STEM workforce for our future.

I am pleased to join you as an original co-sponsor of H.R. 2020 and the *Federal STEM Education Coordination Act,* H.R. 2020 and H.R. 1709. I also want to thank you for maintaining regular order with both H.R. 1709 and H.R. 1736 and giving everyone the opportunity to work on these at Subcommittee level first. That is the way you work things out.

When it comes to STEM education in particular, I think we are all better served to have Dr. Ehlers involved in the beginning as he brings so much to the table along this line.

I know that all—both of our staffs have worked diligently to get these bills to where we are today, and I look forward to a discussion and proposed amendments, and I thank you.

I yield back.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Good morning, Mr. Chairman. I want to thank you for scheduling this markup and for the bipartisan spirit in which the bills before us today have been handled. It would appear that we are doing a great deal of coordinating today. In addition to authorizing the Networking and Information Technology Research and Development (NITRD) program, we are also marking-up legislation to improve STEM education coordination among the federal agencies and a bill to help coordinate science and technology initiatives that can help foster international cooperation.

All of these bills do exactly what this committee should be doing, ensuring that our government is effectively and efficiently using federal science and technology dollars to guarantee we stay on top of cutting edge research both domestically and internationally, while continuing to develop the best and brightest STEM workforce for our future.

I am pleased to join you as an original co-sponsor of H.R. 2020, the *NITRD Authorization Act,* and H.R. 1709, the *Federal STEM Education Coordination Act.* I want to also thank you for maintaining regular order with both H.R. 1709 and H.R. 1736 and giving everyone the opportunity to work on these at the Subcommittee level first. When it comes to STEM education, in particular, I think we are all better served to have Dr. Ehlers involved from the beginning, as he brings so much to the table.

I know both of our staffs have worked diligently to get these bills to where we are today, and I look forward to a discussion of proposed amendments.

Chair GORDON. Thank you, Mr. Hall.

[The prepared statement of Mr. Mitchell follows:]

PREPARED STATEMENT OF REPRESENTATIVE HARRY E. MITCHELL

Thank you, Mr. Chairman.

Today we will mark up the *Networking and Information Technology Research and Development Act,* H.R. 2020, the *International Science and Technology Cooperation Act,* H.R. 1736, and the *STEM Education Coordination Act,* H.R. 1709.

Last Congress, we took a critical step in encouraging students and teachers to focus on STEM education in the *America COMPETES Act,* which is now law. Ensuring that our students receive a top level STEM education is vital to grow our economy and remain competitive in the global economy.

However, I have heard from STEM teachers in Arizona that they are struggling to identify federal resources to help them develop effective STEM lesson plans.

H.R. 1709 would help STEM teachers in Arizona and nationwide by establishing a committee to coordinate federal programs and activities in support of STEM education through the Office of Science and Technology and Policy (OSTP).

I encourage my colleagues to support this important legislation.

I yield back.

Chair GORDON. We will now consider H.R. 2020, the Networking——

Mr. BAIRD. Mr. Chair.

Chair GORDON. Dr. Baird is recognized.

Mr. BAIRD. I know you are going to get to important business, but I just want to take the opportunity to share with all the Members of the Committee who may not know it, and lend my personal congratulations. Chair Gordon won for the 20th consecutive year, the Capital Challenge, a three-mile race. I think he ran it in 16:58, was it?

Chair GORDON. That was a few years ago. No. Not quite that this year.

Mr. BAIRD. But still 20 consecutive years, and he certainly doesn't look it, but the Chair is now 60 years old, and this is an extraordinary accomplishment, and I just want to express my congratulations to the Chair. He leads the Committee admirably, and

he leads the race admirably as well, and with that I yield back and thank the Chair.

Chair GORDON. Thank you, Dr. Baird. I may not look it, but I feel it.

All right. Now, we will now consider H.R. 2020, the *Networking Information Technology Research and Development Act of 2009.* I will recognize myself.

I think that this bill has been adequately described already in our earlier remarks, and I thank Mr. Hall for his remarks, and I also—Mr. Hall made a very good point in his remarks—and that is the regular order of going through a subcommittee process, I have to say that I think we have done a good job of that these last few years, and I think because of it we did better bills. But it also puts work on our Subcommittee Chairs and Ranking Members, and I want to thank them for the time. I don't think we have ever called upon our Ranking Members and our Subcommittee Chairs to do as much as we have here recently, and it helps us to do a better job.

I now recognize Mr. Hall to present any remarks on the bill.

[The prepared statement of Chair Gordon follows:]

PREPARED STATEMENT OF CHAIR BART GORDON

H.R. 2020 takes an already successful interagency program, known as NITRD and makes it even better by strengthening interagency coordination and the strategic planning process, facilitating technology transfer, and ensuring support for large-scale research in areas of national importance.

I would like to thank Mr. Hall and several other Members of this committee for joining me in introducing this good bipartisan legislation. The bill draws upon the recommendations of a recent PCAST assessment of the program and two hearings held by this committee, including a hearing on a draft of the legislation we are considering today.

H.R. 2020 strengthens interagency planning, coordination, and prioritization for NITRD by requiring the development and periodic update of a strategic plan informed by both industry and academia.

This plan is meant to create a vision for information technology R&D across the Federal Government, and provide specific metrics for measuring progress toward that vision.

Next, the bill calls for increased support of large-scale, long-term, interdisciplinary research in networking and information technology that will help us tackle national challenges such as effective and efficient health care and energy delivery systems.

Finally, H.R. 2020 promotes partnerships between the Federal Government, academia and industry to foster technology transfer, including for cyber-physical systems, and ensures that education of the future IT workforce remains an important component of the NITRD program. I urge my colleagues to support this bill.

I now recognize Mr. Hall to present any remarks on the bill.

Mr. HALL. Thank you, Mr. Chair. I already mentioned that I am pleased to join you as an original co-sponsor. Networking and information technology plays an enormous roll in our everyday lives, often in ways we don't even realize. Even more significant it is of vital importance to our homeland security and to our economy.

The legislation is a combination of recommendations from the PCAST report and feedback we received from hearing witnesses and numerous organizations. You know, we have people come here to testify before us, and it takes their time to drive here to wherever they depart from, and it has taken them a lot of years to be capable and qualified to come and give us information, and then they give us their time to be here. So we are very fortunate to have that type of cooperation with the Chair, because the Chair invites

them, and they do us a great service. Accordingly, we draw a lot of our testimony from them, and it finds its way into the bills. So they do a good job for us.

And with the addition of the manager's amendment, I think it is a good, solid bill, and I understand that a few of my friends on the other side would like to tweak it a little bit more, and I am sure the Chair is going to maybe allow them to take a shot at it, but I yield back the balance of my time so they can get underway.

Thank you, Mr. Chair.

By the way, I ran the mile. Jim Ryun and I both ran the mile years ago. Together we ran a 10-minute mile. He ran his in four.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL (H.R. 2020)

I already mentioned that I am pleased to join you as an original co-sponsor of this measure. Networking and information technology plays an enormous role in our everyday lives, often in ways we don't even realize. Even more significant, it is of vital importance to our homeland security and to our economy. This legislation is a culmination of recommendations from the PCAST report and feedback we have received from hearing witnesses and numerous organizations. With the addition of the manager's amendment, I think it is a good, solid bill. However, I understand that a few of my friends on the other side would like to tweak it a bit more, so I yield back the balance of my time so that they may proceed.

Chair GORDON. Does anyone else wish to be recognized?

I ask unanimous consent that the bill is considered as read and open to amendment at any point and that the Members proceed with the amendments in the order of the roster.

Without objection, so ordered.

The first amendment on the roster is a manager's amendment. The Clerk will report the amendment.

The CLERK. Amendment to H.R. 2020, Amendment number 019, offered by Mr. Gordon of Tennessee.

Chair GORDON. I ask unanimous consent we dispense with the reading.

Without objection, so ordered.

I recognize myself for five minutes to explain the amendment.

This amendment makes a technical correction to the underlying legislation. It replaces the term "high-performance computing" with the phrase "networking and information technology." The scope of the original program established in 1991, has expanded beyond R&D and high performance or super computing to include research and development in all areas of networking and information technology. The change in terminology more accurately reflects the breath of the current program. I urge my colleagues to support this amendment.

[The prepared statement of Chair Gordon follows:]

PREPARED STATEMENT OF CHAIR BART GORDON

This amendment makes a technical correction to the underlying legislation; it replaces the term 'high-performance computing' with the phrase 'networking and information technology.'

The scope of the original program established in 1991 has expanded beyond R&D in high-performance or supercomputing to include research and development in all areas of networking and information technology.

The change in terminology more accurately reflects the breadth of the current program.

I urge my colleagues to support this amendment.

Chair GORDON. Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. Opposed, no. The ayes have it, and the amendment is agreed to.

The second amendment on the roster is an amendment offered by the gentlelady from California, Ms. Woolsey.

Ms. WOOLSEY. Woolsey.

Chair GORDON. Woolsey.

Ms. WOOLSEY. Thank you, sir.

Chair GORDON. And we are glad that you are out on bail and with us today. Are you ready to proceed with your amendment?

Ms. WOOLSEY. Mr. Chair, I am. I have an amendment at the desk.

Chair GORDON. The Clerk will report the amendment.

The CLERK. Amendment to H.R. 2020, amendment number 132, offered by Ms. Woolsey of California.

Chair GORDON. Ask unanimous consent to dispense with the reading.

Without objection, so ordered.

I recognize the gentlelady for five minutes to explain the amendment.

Ms. WOOLSEY. Thank you, Mr. Chair. I would like to say that Mr. Hall couldn't say my name ever either. So you—I am in good company with both—you are in good company.

Mr. Chair, computing, networking, and information technology and the innovations they yield are critical to our American economy. Unfortunately, the current education pipeline does not meet the demands of these crucial industries.

There are two major challenges that must be addressed if we are going to remain competitive with other countries when it comes to computing. First, we need to get more students exposed to innovative engaging and rigorous computer science curriculum at the K through 12 level, and second, we need to ensure that more of these students are girls and minorities. It is only—well, under-represented minorities is what I should say. It is only by increasing the diversity of students, those who are being brought into the computer science fields, that we will be able to fulfill the need for this wide range of jobs.

That is why I am offering this amendment to H.R. 2020, the *Networking and Information Technology Research and Development Act.* This amendment does two things. One, it requires NITRD as part of its required strategic plan to include diversity goals and programs to bring in more women and unrepresented minorities, and two, it requires the National Science Foundation to better coordinate and expand its education programs in the area of computer science education, with a special focus towards including more girls and minorities.

It is clear we need to get more women involved in computer science. In fact, in 2008, only 17 percent of advanced placement, AP computer science test takers were women, even though women represent a 55 percent of all AP test takers. Participation in computer science AP tests among under-represented minorities has increased in the past decade, but it is still only at 11 percent, compared to 19 percent of all AP test takers.

Mr. Chair, these low participation numbers are truly disturbing. We must do more to strengthen computer science curricula and to expose and attract a more diverse population of students to computing of the K through 12 level. This amendment is an important step towards these goals. I urge my colleagues to support the Woolsey amendment, and go girl! I yield back the balance of my time.

[The prepared statement of Ms. Woolsey follows:]

PREPARED STATEMENT OF REPRESENTATIVE LYNN WOOLSEY

Mr. Chairman, computing, networking, and information technology . . . and the innovations they yield . . . are critical to our American economy. Unfortunately, the current education pipeline does not meet the demands of these crucial industries.

There are two major challenges that must be addressed if we are going to remain competitive with other countries when it comes to computing. First, we need to get more students exposed to innovative, engaging, and rigorous computer science curriculum at the K–12 level.

And second, we need to ensure that more of these students are girls and minorities. It's only by increasing the diversity of students who are being brought into the computer science fields that we will be able to fulfill the need for this wide range of jobs.

That's why I am offering this amendment to H.R. 2020, the *Networking and Information Technology Research and Development* (NITRD) *Act.* This amendment does two things:

1) It requires NITRD, as part of its required strategic plan, to include diversity goals and programs to bring in more women and under-represented minorities; and,
2) It requires the National Science Foundation to better coordinate and expand its education programs in the area of computer science education, with a special focus towards including more girls and minorities.

It's clear we need to get more women involved in computer science. In fact, in 2008, only 17 percent of Advanced Placement (AP) computer science test-takers were women, even though women represented 55 percent of all AP test-takers. Participation in computer science AP tests among under-represented minorities has increased in the past decade, but it is still only at 11 percent, compared to 19 percent of all AP test-takers.

Mr. Chairman, these low participation numbers are truly disturbing. We must do more to strengthen computer science curricula, and to expose and attract a more diverse population of students to computing at the K–12 level. This amendment is an important step toward those goals.

I urge my colleagues to support the Woolsey amendment, and I yield back the balance of my time.

Chair GORDON. Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. Those opposed, say no. The ayes have it, and Ms. Woolsey, thank you again for carrying out your mission here. You have been very consistent and helpful in that.

The third amendment on the roster is an amendment offered by the gentleman from New Mexico, Mr. Luján. Are you ready to proceed with your amendment?

Mr. LUJÁN. Mr. Chair, I have an amendment at the desk.

Chair GORDON. The Clerk will report the amendment.

The CLERK. Amendment to H.R. 2020, amendment number 014, offered by Mr. Luján of New Mexico.

Chair GORDON. I ask unanimous consent to dispense with the reading.

Without objection, so ordered.

I recognize the gentleman for five minutes to explain his amendment.

Mr. LUJÁN. Thank you, Mr. Chair.

My amendment today promotes collaboration between our federal laboratories and higher learning institutions and industry so that laboratories and higher learning institutions research and development activities can assist industry's commercial development efforts.

Our national labs are making tremendous technological advances every day, and we must take advantage of their discoveries and support their innovative research programs to improve America's economic competitiveness. In my district, Los Alamos National Laboratories has been utilizing super computers to analyze the cyber physical interface for many years.

In addition, Mr. Chair, Los Alamos is at the forefront of modeling our nation's energy grid down to the substation level and to understand how to better manipulate and control the operating systems and mechanics. Our national laboratories are the world's leaders in advanced applications of super computing technology and software.

My amendment today will ensure that their expertise and the resources and expertise of our colleges and universities are included in this legislation and that the United States continues to benefit from their knowledge.

Thank you, Mr. Chair, and I yield back the balance of my time.

[The prepared statement of Mr. Luján follows:]

PREPARED STATEMENT OF REPRESENTATIVE BEN R. LUJÁN

Thank you Mr. Chairman. My amendment today promotes collaboration between federal laboratories, higher learning institutions, and industry—so that laboratories and higher learning institutions' research and development activities can assist industry's commercial development efforts. Our national labs are making tremendous technological advances every day, and we must take advantage of their discoveries and support their innovative research programs to improve America's economic competitiveness.

In my district, Los Alamos National Laboratory has been utilizing supercomputers to analyze the cyber-physical interface for many years. In addition, Mr. Chairman, Los Alamos is at the forefront of modeling our nation's energy grid down to the substation level, and to understand how to better manipulate and control the operating systems and mechanics.

Our national laboratories are the world leaders in advanced applications of supercomputing technology and software. My amendment today will ensure that their expertise is included in this legislation and that the United States continues to benefit from their knowledge.

Chair GORDON. Thank you, Mr. Luján.

Are there any further discussion on Mr. Luján's amendment?

Mr. HALL. Mr. Chair.

Chair GORDON. Mr. Hall is recognized.

Mr. HALL. Mr. Chair, I just would like to thank the gentleman from New Mexico for his willingness to modify his amendment to make sure we are not inadvertently missing a potential research breakthrough opportunity.

I thank you, and I would like to ask Mr. Luján a question. Were you related to Manuel Luján?

Mr. LUJÁN. Mr. Chair, that is an interesting question. I am actually Luján on both sides of the family, and the former secretary, former Member of Congress, Manuel Luján, his sister was my second grade elementary teacher, and Mr. Luján is actually a distant cousin on Mom's side of the family, sir.

Chair GORDON. Sounds like you are from the south.

Mr. LUJÁN. Whether New Mexico or from the south it is something you understand.

Mr. HALL. I don't really know what you were telling me.

Chair GORDON. The answer is yes.

Mr. HALL. I want to brag on your amendment anyway.

Chair GORDON. Manuel Luján was respected by all of us. He was a good Member of Congress.

Is there further discussion on the amendment?

If no, the vote occurs on the amendment. All in favor, say aye. All those opposed, no. The ayes have it. The amendment is agreed to.

Are there any other amendments?

If no, then the vote is on the bill, H.R. 2020, as amended. All those in favor, say aye. All opposed, no. In the opinion of the Chair the ayes have it.

I recognize Mr. Hall now for a motion.

Mr. HALL. Mr. Chair, I move that the Committee favorably report H.R. 2020 as amended to the House with the recommendation that the bill as amended, do pass. Furthermore, I move that the staff be instructed to prepare the legislative report and make necessary technical and conforming changes and that the Chair take all necessary steps to bring the bill before the House for consideration.

I yield back.

Chair GORDON. The question is on the motion to report the bill favorably. Those in favor of the motion will signify by saying, aye. Opposed, no. The ayes have it. The bill is favorably reported.

Without objection the motion to reconsider is laid upon the table. Members will have two subsequent calendar days in which to submit supplemental, Minority, or additional views on the measure.

And let me point out to everyone, particularly our newer Members, we won't file this bill until next week, and so if any of you would like to become co-sponsors of any of these bills, we welcome that. I think you should all go home, take credit for these. These are good bills, and once again, I hope you are not disappointed that we are not arguing and fighting, and you know, and having a big rumpus here, but that doesn't mean that these aren't good, thoughtful bills. They went to the regular order, a law that was taken care of at the Subcommittee level, and so, again, we welcome all to be co-sponsors, and I want to thank the Members for their attendance.

This concludes our markup.

[Whereupon, at 10:51 a.m., the Committee was adjourned.]

Appendix

H.R. 2020, Section-by-Section Analysis, Amendment Roster

I

111TH CONGRESS
1ST SESSION

H. R. 2020

To amend the High-Performance Computing Act of 1991 to authorize activities for support of networking and information technology research, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

APRIL 22, 2009

Mr. GORDON of Tennessee (for himself, Mr. HALL of Texas, Mr. LIPINSKI, Mr. EHLERS, Mr. WU, Mrs. BIGGERT, and Mr. LUJÁN) introduced the following bill; which was referred to the Committee on Science and Technology

---

A BILL

To amend the High-Performance Computing Act of 1991 to authorize activities for support of networking and information technology research, 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 and Development Act of 2009".

SEC. 2. PROGRAM PLANNING AND COORDINATION.

(a) PERIODIC REVIEWS.—Section 101 of the High-Performance Computing Act of 1991 (15 U.S.C. 5511) is amended by adding at the end the following new subsection:

"(d) PERIODIC REVIEWS.—The agencies identified in subsection (a)(3)(B) shall—

"(1) periodically assess the contents and funding levels of the Program Component Areas and restructure the Program when warranted, taking into consideration any relevant recommendations of the advisory committee established under subsection (b); and

"(2) ensure that the Program includes large-scale, long-term, interdisciplinary research and development activities, including activities described in section 104.".

(b) DEVELOPMENT OF STRATEGIC PLAN.—Section 101 of such Act (15 U.S.C. 5511) is amended further by adding after subsection (d), as added by subsection (a), the following new subsection:

"(e) STRATEGIC PLAN.—

"(1) IN GENERAL.—The agencies identified in subsection (a)(3)(B), working through the National Science and Technology Council and with the assistance of the National Coordination Office established

1 under section 106, shall develop, within 12 months
2 after the date of enactment of the Networking and
3 Information Technology Research and Development
4 Act of 2009, and update every 3 years thereafter, a
5 5-year strategic plan to guide the activities described
6 under subsection (a)(1).

7 "(2) CONTENTS.—The strategic plan shall
8 specify near-term and long-term objectives for the
9 Program, the anticipated time frame for achieving
10 the near-term objectives, the metrics to be used for
11 assessing progress toward the objectives, and how
12 the Program will—

13 "(A) foster the transfer of research and
14 development results into new technologies and
15 applications for the benefit of society, including
16 through cooperation and collaborations with
17 networking and information technology re-
18 search, development, and technology transition
19 initiatives supported by the States;

20 "(B) encourage and support mechanisms
21 for interdisciplinary research and development
22 in high-performance computing, including
23 through collaborations across agencies, across
24 Program Component Areas, with industry, with
25 Federal laboratories (as defined in section 4 of

the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3703)), and with international organizations;

"(C) address long-term challenges of national importance for which solutions require large-scale, long-term, interdisciplinary research and development;

"(D) place emphasis on innovative and high-risk projects having the potential for substantial societal returns on the research investment; and

"(E) strengthen all levels of networking and information technology education and training programs to ensure an adequate, well-trained workforce.

"(3) NATIONAL RESEARCH INFRASTRUCTURE.—The strategic plan developed in accordance with paragraph (1) shall be accompanied by milestones and roadmaps for establishing and maintaining the national research infrastructure required to support the Program, including the roadmap required by subsection (a)(2)(E).

"(4) RECOMMENDATIONS.—The entities involved in developing the strategic plan under paragraph (1) shall take into consideration the recommendations—

"(A) of the advisory committee established under subsection (b); and

"(B) of the stakeholders whose input was solicited by the National Coordination Office, as required under section 106(b)(3).

"(5) REPORT TO CONGRESS.—The Director of the National Coordination Office shall transmit the strategic plan required under paragraph (1) to the advisory committee, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Science and Technology of the House of Representatives.".

(c) ADDITIONAL RESPONSIBILITIES OF DIRECTOR.—Section 101(a)(2) of such Act (15 U.S.C. 5511(a)(2)) is amended—

(1) by redesignating subparagraphs (E) and (F) as subparagraphs (F) and (G), respectively; and

(2) by inserting after subparagraph (D) the following new subparagraph:

"(E) encourage and monitor the efforts of the agencies participating in the Program to allocate the level of resources and management attention necessary to ensure that the strategic plan under subsection (e) is developed and executed effectively and that the objectives of the Program are met;".

(d) ADVISORY COMMITTEE.—Section 101(b)(1) of such Act (15 U.S.C. 5511(b)(1)) is amended by inserting after "an advisory committee on high-performance computing," the following: "in which the co-chairs shall be members of the President's Council of Advisors on Science and Technology and with the remainder of the committee".

(e) REPORT.—Section 101(a)(3) of such Act (15 U.S.C. 5511(a)(3)) is amended—

(1) in subparagraph (C)—

(A) by striking "is submitted," and inserting "is submitted, the levels for the previous fiscal year,"; and

(B) by striking "each Program Component Area;" and inserting "each Program Component Area and research area supported in accordance with section 104;";

(2) in subparagraph (D)—

(A) by striking "each Program Component Area," and inserting "each Program Component Area and research area supported in accordance with section 104,";

(B) by striking "is submitted," and inserting "is submitted, the levels for the previous fiscal year,"; and

(C) by striking "and" after the semicolon;

(3) by redesignating subparagraph (E) as subparagraph (G); and

(4) by inserting after subparagraph (D) the following new subparagraphs:

"(E) include a description of how the objectives for each Program Component Area, and the objectives for activities that involve multiple Program Component Areas, relate to the objectives of the Program identified in the strategic plan required under subsection (e);

"(F) include—

"(i) a description of the funding required by the National Coordination Office to perform the functions specified under section 106(b) for the next fiscal year by category of activity;

"(ii) a description of the funding required by such Office to perform the functions specified under section 106(b) for the current fiscal year by category of activity; and

"(iii) the amount of funding provided for such Office for the current fiscal year

by each agency participating in the Program; and''.

(f) DEFINITION.—Section 4 of such Act (15 U.S.C. 5503) is amended—

(1) by redesignating paragraphs (1) through (7) as paragraphs (2) through (8), respectively; and

(2) by inserting before paragraph (2), as so redesignated, the following new paragraph:

''(1) 'cyber-physical systems' means physical or engineered systems whose networking and information technology functions and physical elements are deeply integrated and are actively connected to the physical world through sensors, actuators, or other means to perform monitoring and control functions;''.

SEC. 3. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

Title I of such Act (15 U.S.C. 5511) is amended by adding at the end the following new section:

''SEC. 104. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

''(a) IN GENERAL.—The Program shall encourage agencies identified in section 101(a)(3)(B) to support large-scale, long-term, interdisciplinary research and development activities in high-performance computing di-

1 rected toward application areas that have the potential for
2 significant contributions to national economic competitive-
3 ness and for other significant societal benefits. Such ac-
4 tivities, ranging from basic research to the demonstration
5 of technical solutions, shall be designed to advance the de-
6 velopment of research discoveries. The advisory committee
7 established under section 101(b) shall make recommenda-
8 tions to the Program for candidate research and develop-
9 ment areas for support under this section.

10 "(b) CHARACTERISTICS.—

11 "(1) IN GENERAL.—Research and development
12 activities under this section shall—

13 "(A) include projects selected on the basis
14 of applications for support through a competi-
15 tive, merit-based process;

16 "(B) involve collaborations among re-
17 searchers in institutions of higher education
18 and industry, and may involve nonprofit re-
19 search institutions and Federal laboratories, as
20 appropriate;

21 "(C) when possible, leverage Federal in-
22 vestments through collaboration with related
23 State initiatives; and

24 "(D) include a plan for fostering the trans-
25 fer of research discoveries and the results of

technology demonstration activities to industry for commercial development.

"(2) COST-SHARING.—In selecting applications for support, the agencies shall give special consideration to projects that include cost sharing from non-Federal sources.

"(3) AGENCY COLLABORATION.—If 2 or more agencies identified in section 101(a)(3)(B), or other appropriate agencies, are working on large-scale research and development activities in the same area of national importance, then such agencies shall strive to collaborate through joint solicitation and selection of applications for support and subsequent funding of projects.

"(4) INTERDISCIPLINARY RESEARCH CENTERS.—Research and development activities under this section may be supported through interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities in areas described in subsection (a). Research may be carried out through existing interdisciplinary centers, including those authorized under section 7024(b)(2) of the America COMPETES Act (Public Law 110–69; 42 U.S.C. 1862o–10).".

SEC. 4. CYBER-PHYSICAL SYSTEMS AND INFORMATION MANAGEMENT.

(a) ADDITIONAL PROGRAM CHARACTERISTICS.—Section 101(a)(1) of such Act (15 U.S.C. 5511(a)(1)) is amended—

(1) in subparagraph (H), by striking "and" after the semicolon;

(2) in subparagraph (I), by striking the period at the end and inserting a semicolon; and

(3) by adding at the end the following new subparagraphs:

"(J) provide for increased understanding of the scientific principles of cyber-physical systems and improve the methods available for the design, development, and operation of cyber-physical systems that are characterized by high reliability, safety, and security; and

"(K) provide for research and development on human-computer interactions, visualization, and information management.".

(b) TASK FORCE.—Title I of such Act (15 U.S.C. 5511) is amended further by adding after section 104, as added by section 3, the following new section:

"SEC. 105. UNIVERSITY/INDUSTRY TASK FORCE.

"(a) ESTABLISHMENT.—Not later than 180 days after the date of enactment of the Networking and Infor-

1 mation Technology Research and Development Act of
2 2009, the Director of the National Coordination Office es-
3 tablished under section 106 shall convene a task force to
4 explore mechanisms for carrying out collaborative research
5 and development activities for cyber-physical systems, in-
6 cluding the related technologies required to enable these
7 systems, through a consortium or other appropriate entity
8 with participants from institutions of higher education,
9 Federal laboratories, and industry.

10 "(b) FUNCTIONS.—The task force shall—

11 "(1) develop options for a collaborative model
12 and an organizational structure for such entity
13 under which the joint research and development ac-
14 tivities could be planned, managed, and conducted
15 effectively, including mechanisms for the allocation
16 of resources among the participants in such entity
17 for support of such activities;

18 "(2) propose a process for developing a re-
19 search and development agenda for such entity, in-
20 cluding objectives and milestones;

21 "(3) define the roles and responsibilities for the
22 participants from institutions of higher education
23 and industry in such entity;

1 "(4) propose guidelines for assigning intellec-
2 tual property rights and for the transfer of research
3 results to the private sector; and
4 "(5) make recommendations for how such enti-
5 ty could be funded from Federal, State, and non-
6 governmental sources.
7 "(c) COMPOSITION.—In establishing the task force
8 under subsection (a), the Director of the National Coordi-
9 nation Office shall appoint an equal number of individuals
10 from institutions of higher education and from industry
11 with knowledge and expertise in cyber-physical systems,
12 of which 2 may be selected from Federal laboratories.
13 "(d) REPORT.—Not later than 1 year after the date
14 of enactment of the Networking and Information Tech-
15 nology Research and Development Act of 2009, the Direc-
16 tor of the National Coordination Office shall transmit to
17 the Committee on Commerce, Science, and Transportation
18 of the Senate and the Committee on Science and Tech-
19 nology of the House of Representatives a report describing
20 the findings and recommendations of the task force.".
21 **SEC. 5. NATIONAL COORDINATION OFFICE.**
22 Title I of such Act (15 U.S.C. 5511) is amended fur-
23 ther by adding after section 105, as added by section 4,
24 the following new section:

1 **"SEC. 106. NATIONAL COORDINATION OFFICE.**

2 "(a) ESTABLISHMENT.—The Director shall establish
3 a National Coordination Office with a Director and full-
4 time staff.

5 "(b) FUNCTIONS.—The National Coordination Office
6 shall—

7 "(1) provide technical and administrative sup-
8 port to—

9 "(A) the agencies participating in planning
10 and implementing the Program, including such
11 support as needed in the development of the
12 strategic plan under section 101(e); and

13 "(B) the advisory committee established
14 under section 101(b);

15 "(2) serve as the primary point of contact on
16 Federal high-performance computing activities for
17 government organizations, academia, industry, pro-
18 fessional societies, State computing and networking
19 technology programs, interested citizen groups, and
20 others to exchange technical and programmatic in-
21 formation;

22 "(3) solicit input and recommendations from a
23 wide range of stakeholders during the development
24 of each strategic plan required under section 101(e)
25 through the convening of at least 1 workshop with
26 invitees from academia, industry, Federal labora-

tories, and other relevant organizations and institutions;

"(4) conduct public outreach, including the dissemination of findings and recommendations of the advisory committee, as appropriate; and

"(5) promote access to and early application of the technologies, innovations, and expertise derived from Program activities to agency missions and systems across the Federal Government and to United States industry.

"(c) SOURCE OF FUNDING.—

"(1) IN GENERAL.—The operation of the National Coordination Office shall be supported by funds from each agency participating in the Program.

"(2) SPECIFICATIONS.—The portion of the total budget of such Office that is provided by each agency for each fiscal year shall be in the same proportion as each such agency's share of the total budget for the Program for the previous fiscal year, as specified in the report required under section 101(a)(3).".

○

SECTION-BY-SECTION ANALYSIS OF
H.R. 2020, NETWORKING AND INFORMATION TECHNOLOGY
RESEARCH AND DEVELOPMENT ACT OF 2009

SECTION 1. SHORT TITLE.

"Networking and Information Technology Research and Development Act of 2009".

SEC. 2. PROGRAM PLANNING AND COORDINATION.

Requires the NITRD agencies to periodically assess the program contents and funding levels and to update the program accordingly.

Requires the NITRD agencies to develop and periodically update (at three-year intervals) a strategic plan for the program. The characteristics and content of the strategic plan are described, and include strengthening networking and information technology education, fostering technology transfer, and encouraging innovative, large-scale, and interdisciplinary research.

Encourages a more active role for the Office of Science and Technology Policy (OSTP) in ensuring that the strategic plan is developed and executed effectively and that the objectives of the program are met.

Ensures that the existing advisory committee for NITRD is closely linked to the President's Council of Advisors on Science and Technology while retaining the necessary breadth and depth of expertise in NIT fields.

Specifies that the annual report now required for the NITRD program explicitly describe how the program activities planned and underway relate to the objectives specified in the strategic plan.

Specifies that the annual report now required for the NITRD program include a description of research areas supported in accordance with section 3, including the same budget information as is required for the Program Component Areas.

SEC. 3. LARGE-SCALE RESEARCH IN AREAS OF NATIONAL IMPORTANCE.

Authorizes NITRD agencies to support large-scale, long-term, interdisciplinary research with the potential to make significant contributions to society and U.S. economic competitiveness and encourage collaboration between at least two agencies as well as cost-sharing from non-federal sources.

Characteristics of the projects supported include: collaborations among researchers in institutions of higher education and industry, and may involve nonprofit research institutions and federal laboratories; leveraging of federal investments through collaboration with related State initiatives, when possible; and plans for fostering technology transfer.

Authorizes support of activities under this section through interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities.

SEC. 4. CYBER-PHYSICAL SYSTEMS AND INFORMATION MANAGEMENT.

Requires the program to support research and development in cyber-physical systems, human-computer interactions, visualization, and information management.

Requires the National Coordination Office (NCO) Director to convene a university/industry task force to explore mechanisms for carrying out collaborative research and development activities for cyber-physical systems with participants from universities, federal laboratories, and industry. The NCO is to report to Congress on any findings and recommendations from the task force on models for collaborative R&D.

SEC. 5. NATIONAL COORDINATION OFFICE.

Formally establishes the NCO; delineates the Office's responsibilities; mandates annual operating budgets; specifies the source of funding for the office (consistent with current practice); and stresses the role of the NCO in developing the strategic plan and in public outreach and communication with outside communities of interest.

COMMITTEE ON SCIENCE AND TECHNOLOGY
FULL COMMITTEE MARKUP
APRIL 29, 2009

AMENDMENT ROSTER

H.R. 2020, the Networking and Information Technology Research and Development Act of 2009

No.	Sponsor	Description	Results
1	Mr. Gordon	Manager's amendment makes technical changes and replaces the term "high-performance computing" throughout the bill and underlying statute with "networking and information technology".	Agreed to by voice vote.
2	Ms. Woolsey	Amends Section 2 to add "attract more women and underrepresented minorities to pursue postsecondary degrees in networking and information technology" to the activities of the program that must be detailed in the strategic plan. Adds a new section to the bill to require the National Science Foundation to use its existing programs, in collaboration with other agencies, as appropriate, to improve the teaching and learning of networking and information technology at all levels of education and to increase participation in networking and information technology fields, including women and underrepresented minorities.	Agreed to by voice vote.
3	Mr. Lujan	Amends Section 3 to clarify that the activities to be included in a plan for fostering the transfer of research discoveries and the results of technology demonstration activities to industry for commercial development include the activities of institutions of higher education and federal laboratories. Amends Section 4 to add "federal laboratories" to the participants whose roles and responsibilities must be defined by the task force exploring mechanisms for carrying out collaborative research and development activities for cyber-physical systems through a consortium or other appropriate entity.	Agreed to by voice vote.

AMENDMENT TO H.R. 2020
OFFERED BY MR. GORDON

Page 2, line 20, strike "subsection (a)" and insert "subsection (a) of this Act".

Page 3, line 1, strike "106" and insert "102".

Page 3, line 22, strike "high-performance computing" and insert "networking and information technology".

Page 5, line 5, strike "106(b)(3)" and insert "102(b)(3)".

Page 7, line 16, strike "106(b)" and insert "102(b)".

Page 7, line 20, strike "106(b)" and insert "102(b)".

Page 8, line 6, strike "and" after the semicolon.

Page 8, line 15, strike the period at the end and insert a semicolon.

Page 8, after line 15, insert the following:

1 (3) in subparagraph (4), as so redesignated—

1 (A) by striking "high-performance com-
2 puting" and inserting "networking and infor-
3 mation technology"; and
4 (B) by striking "supercomputer" and in-
5 serting "high-end computing";
6 (4) in subparagraph (6), as so redesignated,
7 strike "network referred to as" and all that follows
8 through the semicolon and insert "network, includ-
9 ing advanced computer networks of Federal agencies
10 and departments;"; and
11 (5) in subparagraph (7), as so redesignated, by
12 striking "National High-Performance Computing
13 Program" and inserting "networking and informa-
14 tion technology research and development program".

Page 8, line 25, strike "high-performance computing" and insert "networking and information technology".

Page 12, line 3, strike "106" and insert "102".

Page 13, strike lines 22 through 24 and insert the following:

15 Section 102 of such Act (15 U.S.C. 5512) is amended
16 to read as follows:

Page 14, line 1, strike "**106**" and insert "**102**".

Page 14, line 16, strike "high-performance computing" and insert "networking and information technology".

At the end of the bill, add the following (with the correct sequential provision designations [replacing the spaces or numbers currently shown for such designations]):

1 **SEC. 6. CONFORMING AND TECHNICAL AMENDMENTS.**

2 (a) SECTION 3.—Section 3 of such Act (15 U.S.C.
3 5502) is amended—

4 (1) in the matter preceding paragraph (1), by
5 striking "high-performance computing" and insert-
6 ing "networking and information technology";

7 (2) in paragraph (1), in the matter preceding
8 subparagraph (A), by striking "high-performance
9 computing" and inserting "networking and informa-
10 tion technology";

11 (3) in subparagraphs (A) and (F) of paragraph
12 (1), by striking "high-performance computing" each
13 place it appears and inserting "networking and in-
14 formation technology"; and

15 (4) in paragraph (2)—

16 (A) by striking "high-performance com-
17 puting and" and inserting "networking and in-
18 formation technology and"; and

1 (B) by striking "high-performance com-
2 puting network" and inserting "networking and
3 information technology".
4 (b) TITLE I.—The heading of title I of such Act (15
5 U.S.C. 5511) is amended by striking "**HIGH-PER-**
6 **FORMANCE COMPUTING**" and inserting "**NET-**
7 **WORKING AND INFORMATION TECH-**
8 **NOLOGY**".
9 (c) SECTION 101.—Section 101 of such Act (15
10 U.S.C. 5511) is amended—
11 (1) in the section heading, by striking "**HIGH-**
12 **PERFORMANCE COMPUTING**" and inserting
13 "**NETWORKING AND INFORMATION TECH-**
14 **NOLOGY RESEARCH AND DEVELOPMENT**";
15 (2) in subsection (a)—
16 (A) in the subsection heading, by striking
17 "NATIONAL HIGH-PERFORMANCE COMPUTING"
18 and inserting "NETWORKING AND INFORMA-
19 TION TECHNOLOGY RESEARCH AND DEVELOP-
20 MENT";
21 (B) in paragraph (1) of such subsection—
22 (i) in the matter preceding subpara-
23 graph (A), by striking "National High-Per-
24 formance Computing Program" and insert-
25 ing "networking and information tech-

nology research and development program";

(ii) in subparagraph (A), by striking "high-performace computing, including networking" and inserting "networking and information technology"; and

(iii) in subparagraphs (B), (C), and (G), by striking "high-performance" each place it appears and inserting "high-end"; and

(C) in paragraph (2) of such subsection—

(i) in subparagraphs (A) and (C)—

(I) by striking "high-performance computing" each place it appears and inserting "networking and information technology"; and

(II) by striking "development, networking," each place it appears and inserting "development,"; and

(ii) in subparagraphs (E) and (F), by striking "high-performance" each place it appears and inserting "high-end";

(3) in subsection (b)(1), in the matter preceding subparagraph (A), by striking "high-perform-

1 ance computing'' both places it appears and insert-
2 ing ''networking and information technology''; and
3 (4) in subsection (c)(1)(A), by striking ''high-
4 performance computing'' and inserting ''networking
5 and information technology''.
6 (d) SECTION 201.—Section 201(a)(1) of such Act
7 (15 U.S.C. 5521(a)(1)) is amended by striking ''high-per-
8 formance computing'' and all that follows through ''net-
9 working;'' and inserting ''networking and information re-
10 search and development;''.
11 (e) SECTION 202.—Section 202(a) of such Act (15
12 U.S.C. 5522(a)) is amended by striking ''high-perform-
13 ance computing'' and inserting ''networking and informa-
14 tion technology''.
15 (f) SECTION 203.—Section 203(a)(1) of such Act (15
16 U.S.C. 5523(a)(1)) is amended by striking ''high-perform-
17 ance computing and networking'' and inserting ''net-
18 working and information technology''.
19 (g) SECTION 204.—Section 204(a)(1) of such Act
20 (15 U.S.C. 5524(a)(1)) is amended—
21 (1) in subparagraph (A), by striking ''high-per-
22 formance computing systems and networks'' and in-
23 serting ''networking and information technology sys-
24 tems and capabilities''; and

(2) in subparagraph (C), by striking "high-performance computing" and inserting "networking and information technology".

(h) SECTION 205.—Section 205(a) of such Act (15 U.S.C. 5525(a)) is amended by striking "computational" and inserting "networking and information technology".

(i) SECTION 206.—Section 206(a) of such Act (15 U.S.C. 5526(a)) is amended by striking "computational research" and inserting "networking and information technology research".

(j) SECTION 208.—Section 208 of such Act (15 U.S.C. 5528) is amended—

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

(2) in subsection (a)—

(A) in paragraph (1), by striking "High-performance computing and associated" and inserting "Networking and information";

(B) in paragraph (2), by striking "high-performance computing" and inserting "networking and information technologies"; and

(C) in paragraphs (4) and (5), by striking "high-performance computing and associated"

1 each place it appears and inserting ''networking
2 and information''.

☒

AMENDMENT TO H.R. 2020

OFFERED BY MS. WOOLSEY OF CALIFORNIA

Page 4, line 11, strike "and" after the semicolon.

Page 4, line 15, strike the period and insert "; and".

Page 4, after line 15, insert the following:

1 (F) attract more women and underrep-
2 resented minorities to pursue postsecondary de-
3 grees in networking and information tech-
4 nology.

Page 15, after line 22, add the following:

5 **SEC. 6. IMPROVING NETWORKING AND INFORMATION**
6 **TECHNOLOGY EDUCATION.**
7 Section 201(a) of such Act (15 U.S.C. 5521(a)) is
8 amended—
9 (1) by redesignating paragraphs (2) through
10 (4) as paragraphs (3) through (5), respectively; and
11 (2) by inserting after paragraph (1) the fol-
12 lowing new paragraph:
13 "(2) the National Science Foundation shall use
14 its existing programs, in collaboration with other
15 agencies, as appropriate, to improve the teaching

1 and learning of networking and information tech-
2 nology at all levels of education and to increase par-
3 ticipation in networking and information technology
4 fields, including by women and underrepresented mi-
5 norities;".

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AMENDMENT TO H.R. 2020

OFFERED BY MR. LUJAN OF NEW MEXICO

Page 10, line 1, strike "activities" and insert "activities, including from institutions of higher education and federal laboratories,".

Page 12, line 22, strike "education" and insert "education, federal laboratories,".