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NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT MODERNIZATION ACT OF 2016

JUNE 13, 2016.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

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Mr. SMITH of Texas, from the Committee on Science, Space, and Technology, submitted the following

R E P O R T

[To accompany H.R. 5312]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, Space, and Technology, to whom was referred the bill (H.R. 5312) 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 without amendment and recommend that the bill do pass.

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COMMITTEE STATEMENT AND VIEWS

PURPOSE AND SUMMARY

The purpose of H.R. 5312 is to advance America's networking and information technology research and development by updating the High-Performance Computing Act of 1991. H.R. 5312 establishes a strategic planning, coordination, and review process for the Networking and Information Technology Research and Development Program (NITRD) investment portfolio with metrics and objectives. The bill also improves communication among Federal government agencies and laboratories with industry and academia through an expert advisory council, steering groups, and workshops to explore mechanisms for carrying out collaborative research and development activities, such as in data analytics, privacy protection, and human-computer interaction and systems. Further, the bill focuses the NITRD portfolio on large-scale, long-term, interdisciplinary research with the potential to make breakthroughs for society and U.S. competitiveness, including R&D on cyber-physical interactions, visualizations, and big data. It also authorizes the NITRD. National Coordination Office (NCO). The bill also removes outdated sections of the U.S. Code.

BACKGROUND AND NEED FOR LEGISLATION

Advances in networking and information technology continue at a rapid pace, leading to an increasing reliance on the systems, tools, and services of this ever-growing and ever-changing domain. Further advances are critical to future economic prosperity, health, and security.

Federal support for research and development (R&D) in networking and information technology originally stemmed from an interest in and the challenge of developing computers capable of addressing complex problems, primarily those focused on national security and scientific questions. Today, networking and information technology encompasses a broad array of technologies from smart phones to digital libraries to cloud computing.

R&D in networking and information technology also provides an improving understanding of how to protect essential systems and networks that support fundamental sectors of the economy, from emergency communications and power grids to air-traffic control systems and financial assets. Networking and information technology research outcomes can prevent or minimize disruptions to critical information infrastructure, protect public and private services, and detect and respond to threats while mitigating the severity of and assisting in the recovery from those threats.

Networking and Information Technology Research and Development Program (NITRD)

Congress originally authorized the High-Performance Computing and Communications Program in the High-Performance Computing Act of 1991 (P.L. 102–194), after recognizing that a number of Federal agencies had ongoing computing programs without a coordinating body. The Act established that coordinating body to improve interagency coordination, cooperation, and planning among those agencies with high-performance computing programs.

In addition, it authorized 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 law established a set of mechanisms and procedures to provide for the interagency planning, coordination, and budgeting of the research and development activities carried out under the Program. The Act has since been amended through the Next Generation Internet Research Act of 1998 and the America COMPETES Act of 2007.

Reconstituted as NITRD in the George W. Bush Administration, the Program is the main Federal R&D investment portfolio in networking, computing, software, cyber security, and related information technologies. NITRD coordinates this unclassified R&D across 21 Federal agencies. Additional agencies that do not contribute funding also participate in NITRD planning activities.

NITRD has played a role in several important technological advances including the computational decoding of the human genome; modeling and simulation of complex physical systems (aircraft, automobiles, power grids, and pharmaceuticals); unmanned aerial vehicles; search-and-rescue robots; and computer-based education and training.

The President's National Science and Technology Council (NSTC) Subcommittee on NITRD is the internal deliberative organization for NITRD policy, program, and budget guidance.[1] NITRD research activities are currently organized in ten Program Component Areas (PCAs). The PCAs also align the NITRD program budget categories.[2] NITRD research areas and activities shift regularly as the networking and information technology field creates and develops new R&D challenges.

The NITRD National Coordination Office (NCO) provides staff support for the NITRD Program. The NCO provides program and financial management services, technical and subject matter expertise in facilitation, strategic planning, technical writing, and administrative staff support for the NSTC NITRD Subcommittee and other NITRD subgroups. The National Science Foundation (NSF) serves as the host agency for the NCO.[3]

LEGISLATIVE HISTORY

On October 28, 2015, the Research and Technology Subcommittee of the House Committee on Science, Space, and Technology held a hearing entitled, "A Review of the Networking and Information Technology Research and Development (NITRD) Program." Witnesses included: Dr. Keith Marzullo, Director, NITRD National Coordination Office; Dr. Gregory D. Hager, Mandell Bellmore Professor, Department of Computer Science, Johns Hopkins University and Co-Chair, NITRD Working Group, The President's Council of Advisors on Science and Technology; and Dr. Edward Seidel, Director, National Center for Supercomputing Applications, University of Illinois at Urbana-Champaign.

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[1] About the Subcommittee on Networking and Information Technology Research and Development (NITRD Subcommittee), *http://www.nitrd.gov/subcommittee/program.aspx*

[2] NITRD Program PCA Definitions, *http://www.nitrd.gov/subcommittee/pca-definitions.aspx*

[3] About the Subcommittee on Networking and Information Technology Research and Development (NITRD Subcommittee), *http://www.nitrd.gov/subcommittee/program.aspx*

On May 24, 2016, the Committee marked up a Committee Print of the "Networking and Information Technology Research and Development Modernization Act of 2016." The Committee Print as amended was approved by voice vote by the Committee, then introduced by Rep. Darin LaHood with Rep. Eddie Bernice Johnson, Rep. Lamar Smith, Rep. Daniel Lipinski, Rep. Frank Lucas, Rep. Barbara Comstock, Rep. John Moolenaar, and Rep. Ralph Lee Abraham as H.R. 5312 later that day and referred to the Committee on Science, Space, and Technology.

On May 25, 2016, the Committee on Science, Space, and Technology met to order H.R. 5312 reported by voice vote.

COMMITTEE VIEWS

Program planning and coordination

The Committee believes that while the NITRD Program has been successful in coordinating networking and information technology 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 and on the collaboration of agencies and laboratories with industry and academia.

Strategic plan

The Committee expects the strategic plan to be a useful guide for setting Program priorities, estimating time frames for reaching Program objectives, and establishing metrics for assessing progress and successes. The Committee intends for the development of the plan to be informed by the research capabilities, contributions, and needs of industry and academia and expects the NCO to actively solicit stakeholder input through meetings, requests for information, and other appropriate means.

Research in areas of national importance

The Committee encourages the NITRD agencies to continue to identify a limited number of critical, focused research and development areas for which large-scale, multi-agency projects or activities would be appropriate and that have the potential to provide the most significant contributions to national economic competitiveness. These areas may be high-risk basic research opportunities that have the potential to be transformative and therefore justify the investment and risk.

The NITRD agencies collectively are responsible for selecting these "Grand Challenges" research areas to pursue, with advice from the NITRD Advisory Committee. The Science 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.

Cyber-physical systems

Computer-driven systems connected with the physical world—also called embedded, engineered, or cyber-physical systems (CPS)—are already in use, but growing need and demand for new

capabilities and applications continue to require significant technical advances. Such visionary systems will be data and processing intensive and costly to design and test. The Committee encourages continued research on CPS development.

Big data

The Committee encourages big data science and engineering research that would focus on advancing the management, analysis, visualization, and extraction of useful information from large, diverse, distributed, and heterogeneous data sets.

High performance computing

Instances in this bill where the term "networking and information technology" is substituted for "high-performance computing" in the existing code reflect how the Program set up by the High Performance Computing Act of 1991 has grown to encompass more than just computing. While high-performance computing is still an important piece of what the NITRD Program supports and coordinates, the updated terminology is intended to capture the entire spectrum of advanced computing and networking research coordinated by the Program without diminishing any part of it.

In addition, instances in this bill where the term "high-end computing" is substituted for "high-performance computing" in the existing code represent a focus on the subfield of advanced computing on the cutting-edge of what is possible. Instead of primarily focusing on increasing processor speed, the term "high-end computing" is meant to include new hardware, storage, software, and network capabilities.

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. This function is currently assigned by the President to the President's Council of Advisors on Science and Technology (PCAST). The Science Committee recognizes the benefits of having a direct pathway for providing advice to the President on national technology issues, scientific research priorities, and math and science education. Consequently, the Science Committee has specified that each NITRD Advisory Committee chair under PCAST must meet the same expertise criteria as the Advisory Committee membership and may also be a member of PCAST. The Science Committee expects each chair, if more than one, to come from different sectors of the networking and information technology community. The Science Committee further expects that any expert committee established under PCAST to review NITRD have an open line of communication with PCAST to ensure full sharing of concerns and questions in both directions.

The Science Committee expects the NITRD 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. The Science Committee has changed the reporting requirements of the NITRD Advisory Committee from two years to three years and expects the NITRD NSTC Subcommittee to take into consideration information and recommenda-

tions from the NITRD Advisory Committee to inform the strategic plan. In addition, the Committee encourages the NITRD 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 interested parties regarding R&D in order to assist it in its assessments of the priorities and content of the Program.

NIT workforce needs

The Committee recognizes that the demand for new and existing information technology employees in the United States will continue to grow and, as such, encourages efforts to increase the number of American information technology graduates at all degree levels.

SECTION-BY-SECTION

Section 1. Short title

This section establishes the short title of the bill as the "Networking and Information Technology Research and Development Modernization Act of 2016."

Section 2. Purposes

This section updates Section 3 of the underlying Act by striking "high-performance computing" and inserting "networking and information technology" or "high-end computing," as appropriate, in instances where it appears.

Section 3. Definitions

This section updates Section 4 of the underlying Act by defining "cyber-physical systems," "high-end computing," and "networking and information technology." This section also changes the "National High-Performance Computing Program" to the "Networking and Information Technology Research and Development Program."

Section 4. Title I heading

This section updates title I of the underlying Act by striking "High-Performance Computing" and inserting "Networking and Information Technology."

Section 5. Networking and Information Technology Research and Development Program

This section requires the NITRD Program to periodically assess the Program agency contents and funding levels and to update the Program accordingly.

Requires the NITRD Program agencies to develop and periodically update (at 5-year intervals) a strategic plan for the Program agencies. Describes the characteristics and content of the strategic plan, including how the Program will foster technology transfer; encourage innovative, large-scale, and interdisciplinary research; address long-term challenges of national importance; emphasize innovative and high-risk projects; and strengthen information technology education and the IT workforce.

Encourages a more active role for the Office of Science and Technology Policy (OSTP) in ensuring that the strategic plan is devel-

oped and executed effectively and that the objectives of the Program are met.

Provides for the OSTP Director to establish goals and priorities for Federal information technology education.

Ensures that the NITRD Advisory Committee retains the necessary breadth and depth of expertise in networking and information technology fields, provides guidance on the Committee's chairs, and allows that it may be linked to the President's Council of Advisors on Science and Technology.

Specifies that the annual report now required for the NITRD Program explicitly provides, as appropriate, a list of the senior steering groups and strategic plans that are planned or underway. In addition, the annual report should provide: a description of workshops and other activities conducted; a detailed description of the nature and scope of research infrastructure designated as such under the Program; the levels of Federal funding for each agency and department participating in the Program; a description of how the objectives for each Program Component Area relate to the objectives of the Program identified in the strategic plan; and a description of funding required by the National Coordination Office.

Incorporates "networking and information technology" and "high-end computing" terminology.

Section 6. National Coordination Office

This section strikes Section 102 of underlying Act and replaces it with new language that formally codifies the existing National Coordination Office, delineates the office's roles and responsibilities, and specifies the source of funding for the office, consistent with current practice.

Section 7. Next generation Internet

This section strikes Section 103 of the underlying Act.

Section 8. Grand challenges in areas of national importance

This section provides language for a new Section 103 of the Act, which 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, industry, non-profit 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 existing interdisciplinary research centers that are organized to investigate basic research questions and carry out technology demonstration activities.

Section 9. Workshops and senior steering group.

This section provides language for a new section 104 of the Act, which gives the OSTP Director the option to conduct workshops and other activities on research areas of emerging importance with participants from institutions of higher education, Federal labora-

tories, and industry, in order to help guide Program investments and strategic planning.

States that in selecting research areas, the OSTP Director shall consider the following topics: data analytics to identify the current and future state of performing inference, prediction, and other forms of analysis of data, and methods for the collection, management, preservation and use of data; the current and future state of the science, engineering, policy, and social understanding of privacy protection; and the current and future state of fundamental research on the systems and science of interplay of people and computing, as well as the coordination and support being undertaken in areas such as social computing, human-robot interaction, health IT, and privacy.

States that the participants in the workshops shall: develop options for models of research and development partnerships among institutions of higher education, Federal laboratories, and industry, including mechanisms for the support of research and development carried out under these partnerships; develop options for research and development for the specific issue areas that would be addressed through such partnerships; propose guidelines for assigning intellectual property rights and for the transfer of research results to the private sector; and make recommendation for how Federal agencies participating in the Program can help support research and development partnerships for specific issue areas.

States that the OSTP Director shall ensure that all participants in the workshops are individuals with knowledge and expertise in specific issue areas and represent a broad mix of relevant stakeholders, including academic researchers, industry, and Federal agencies.

States that the OSTP Director shall establish senior steering groups and develop focused strategic plans to coordinate and guide activities under the research areas, taking into the consideration the findings and recommendations from any workshops carried out on those research topics.

Section 10. National Science Foundation activities

This section amends Section 201 of the underlying Act by eliminating outdated authorizations of appropriations and incorporating "high-end computing" and "networking and information technology" terminology.

Provides for NSF to use its existing programs, in collaboration with other agencies, as appropriate, to improve the teaching and learning of information technology science at all levels of education and to increase participation in IT fields.

Section 11. National Aeronautics and Space Administration activities

This section amends Section 202 of the underlying Act by eliminating outdated authorizations of appropriations and incorporating "networking and information technology" terminology.

Section 12. Department of Energy activities

This section amends Section 203 of the underlying Act by eliminating outdated authorizations of appropriations and incorporating

"networking and information technology" and "high-end computing" terminology.

Section 13. Department of Commerce activities

This section amends Section 204 of the underlying Act by eliminating outdated authorizations of appropriations and incorporating "networking and information technology" terminology. Further, it removes references to the outdated Computer Security Act of 1987.

Section 14. Environmental Protection Agency activities

This section amends Section 205 of the underlying Act by eliminating outdated authorizations of appropriations and incorporating "networking and information technology" terminology.

Provides that the Environmental Protection Agency (EPA) will make publically available all software and code developed under the Program and used in conducting scientific research, except in cases where that software or code is proprietary or contains confidential business information, in which case, the EPA shall disclose only the name and vendor.

Provides that the EPA shall ensure that there is no duplication of research and initiatives, and that no EPA funds shall be used toward research that duplicates the scope or aims of similar research and initiatives at other Federal agencies.

Section 15. Role of the Department of Education

This section amends Section 206 of the underlying Act by eliminating outdated authorizations of appropriations.

Ensure that the Department of Education is supporting programs and activities that improve teaching and learning in information technology fields as well as contribute to the development of a skilled IT workforce.

Section 16. Miscellaneous provisions

This section amends Section 207(b) of the underlying Act by incorporating "networking and information technology."

Section 17. Repeal

This section repeals Section 208 of the underlying Act.

Section 18. Additional repeal

This section repeals Section 4 of the Department of Energy High-End Computing Revitalization Act of 2004 as it includes outdated authorizations of appropriations.

EXPLANATION OF AMENDMENTS

When the Committee marked up the Committee print of the bill on May 24, 2016, the Committee accepted by voice vote two amendments. The first amendment was the manager's amendment offered by Rep. Lamar Smith which made minor and technical changes. The second amendment was offered by Rep. Daniel Lipinski, which provided for a research framework for IT and physical infrastructure integration as part of the NITRD Program.

COMMITTEE CONSIDERATION

On May 25, 2016, the Committee met in open session and ordered reported favorably the bill, H.R. 5312, by voice vote, a quorum being present.

APPLICATION OF LAW TO THE LEGISLATIVE BRANCH

Section 102(b)(3) of Public Law 104–1 requires a description of the application of this bill to the legislative branch where the bill relates to the terms and conditions of employment or access to public services and accommodations. This bill would update the High-Performance Computing Act of 1991. As such this bill does not relate to employment or access to public services and accommodations.

STATEMENT OF OVERSIGHT FINDINGS AND RECOMMENDATIONS OF THE COMMITTEE

In compliance with clause 3(c)(1) of rule XIII and clause (2)(b)(1) of rule X of the Rules of the House of Representatives, the Committee's oversight findings and recommendations are reflected in the descriptive portions of this report.

STATEMENT OF GENERAL PERFORMANCE GOALS AND OBJECTIVES

H.R. 5312, the Networking and Information Technology Research and Development Modernization Act of 2016, would update the High-Performance Computing Act of 1991.

DUPLICATION OF FEDERAL PROGRAMS

No provision of H.R. 5312 establishes or reauthorizes a program of the Federal Government known to be duplicative of another Federal program, a program that was included in any report from the Government Accountability Office to Congress pursuant to section 21 of Public Law 111–139, or a program related to a program identified in the most recent Catalog of Federal Domestic Assistance.

DISCLOSURE OF DIRECTED RULE MAKINGS

The Committee estimates that enacting H.R. 5312 does not direct the completion of any specific rule makings within the meaning of 5 U.S.C. 551.

FEDERAL ADVISORY COMMITTEE ACT

The Committee finds that the legislation does not establish or authorize the establishment of an advisory committee within the definition of 5 U.S.C. App., Section 5(b).

UNFUNDED MANDATE STATEMENT

Section 423 of the Congressional Budget and Impoundment Control Act (as amended by Section 101(a)(2) of the Unfunded Mandate Reform Act, P.L. 104–4) requires a statement as to whether the provisions of the reported include unfunded mandates. In compliance with this requirement the Committee has received a letter from the Congressional Budget Office included herein.

EARMARK IDENTIFICATION

H.R. 5312 does not include any congressional earmarks, limited tax benefits, or limited tariff benefits as defined in clause 9 of rule XXI.

COMMITTEE ESTIMATE

Clause 3(d)(2) of rule XIII of the Rules of the House of Representatives requires an estimate and a comparison by the Committee of the costs that would be incurred in carrying out H.R. 5312. However, clause 3(d)(3)(B) of that rule provides that this requirement does not apply when the Committee has included in its report a timely submitted cost estimate of the bill prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act.

BUDGET AUTHORITY AND CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

With respect to the requirements of clause 3(c)(2) of rule XIII of the Rules of the House of Representatives and section 308(a) of the Congressional Budget Act of 1974 and with respect to requirements of clause (3)(c)(3) of rule XIII of the Rules of the House of Representatives and section 402 of the Congressional Budget Act of 1974, the Committee has received the following cost estimate for H.R. 5312 from the Director of Congressional Budget Office:

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, June 10, 2016.

Hon. LAMAR SMITH,
Chairman, Committee on Science, Space, and Technology,
U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 5312, the Networking and Information Technology Research and Development Modernization Act of 2016.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Marin Burnett.

Sincerely,

KEITH HALL.

Enclosure.

H.R. 5312—Networking and Information Technology Research and Development Modernization Act of 2016

H.R. 5312 would amend the High-Performance Computing Act of 1991 to rename the National High-Performance Computing Program as the Networking and Information Technology Research and Development Program (NITRD). That program is a multiagency research and development program dedicated to advancing information technologies, high-performance computing, and software. The legislation would direct agencies participating in NITRD to focus on further development of high-performance computing and networking.

Based on budgetary information from the agencies participating in NITRD, it appears that the program's research focus is already shifting to those areas specified in the legislation. Therefore, CBO estimated that implementing the bill would not have a significant effect on the federal budget (In 2015, agency budgets for those activities totaled about $4.3 billion.)

Enacting H.R. 5312 would not affect direct spending or revenues; therefore, pay-as-you-go procedures do not apply.

CBO estimates that enacting H.R. 5312 would not increase net direct spending or on-budget deficits in any of the four consecutive 10-year periods beginning in 2027.

H.R. 5312 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act and would impose no costs on state, local, or tribal governments.

The CBO staff contact for this estimate is Marin Burnett. The estimate was approved by H. Samuel Papenfuss, Assistant Director for Budget Analysis.

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 and 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] *supporting Federal research, development, and application of 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;

(B) promote the further development of an information infrastructure of data bases, services, access mechanisms, and research facilities available for use through the Internet;

[(C) stimulate research on software technology;

[(D) promote the more rapid development and wider distribution of computing software tools and applications software;]

(C) stimulate research on and promote more rapid development of high-end computing systems software and applications software;

[(E)] *(D)* accelerate the development of *high-end* computing systems and subsystems;

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

[(G)] *(F)* invest in basic research and education, and promote the inclusion of [high-performance computing] *networking and information technology* into educational institutions at all levels; and

[(H)] *(G)* promote greater collaboration among government, Federal laboratories, industry, [high-performance] *high-end* computing centers, and universities;

(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;

(3) promoting the more rapid development and wider distribution of networking management and development tools; and

(4) promoting the rapid adoption of open network standards.

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] *networking and information technology* resources and multidisciplinary teams of researchers;

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

(4) "high-end computing" means the most advanced and capable computing systems, including their hardware, storage, networking and software, encompassing both massive computational capability and large-scale data analytics;

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

[(5) "Network" means a computer network referred to as the National Research and Education Network established under section 102;]

(6) "networking and information technology" means high-end computing, communications, and information technologies, high-capacity and high-speed networks, special purpose and experimental systems, high-end computing systems software and applications software, and the management of large data sets;

[(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.

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

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

(a) [NATIONAL HIGH-PERFORMANCE COMPUTING PROGRAM] *NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT.*—(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 computing and networking] *high-end computing, distributed, 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;

[(D) provide for widely dispersed efforts to increase software availability, productivity, capability, security, portability, and reliability;]

(D) provide for efforts to increase software security and reliability;

(E) provide for high-performance networks, including experimental testbed networks, to enable research and development on, and demonstration of, advanced applications enabled by such networks;

(F) provide for computational science and engineering research on mathematical modeling and algorithms for applications in all fields of science and engineering;

(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 *support and guidance* 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] *improving the security, reliability, and resilience* 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;

(K) provide for research and development on human-computer interactions, visualization, and big data;

(L) provide for research and development on the enhancement of cybersecurity; and

(M) provide for a research framework to leverage cyber-physical systems, high capacity and high speed communication networks, and large-scale data analytics to integrate city-scale information technology and physical infrastructures.

(2) The Director shall—

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

(A) establish the goals and priorities for Federal networking and information technology research, development, education, and other activities;

(B) establish Program Component Areas that implement the goals established under subparagraph (A), and identify the Grand Challenges that the Program should address;

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

(C) provide for interagency coordination of Federal networking and information technology research, development, education, and other activities undertaken pursuant to the Program;

(D) submit to the Congress an annual report, along with the President's annual budget request, describing the implementation of the Program;

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

(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; and

(F) 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) provide a detailed description of the Program Component Areas, including a description of any changes in the definition of or activities under the Program Component Areas from the preceding report, and the reasons for such changes, and a description of Grand Challenges addressed under the Program;

(B) provide, as appropriate, a list of the senior steering groups and strategic plans that are planned or underway as addressed under section 104;

(C) provide a description of workshops and other activities conducted under section 104, including participants and findings;

(D) provide a detailed description of the nature and scope of research infrastructure designated as such under the Program;

[(B)] *(E)* set forth the relevant programs and activities, for the fiscal year with respect to which the budget submission applies, of each Federal agency and department, including—

(i) the Department of Agriculture;

(ii) the Department of Commerce;

(iii) the Department of Defense;

(iv) the Department of Education;

(v) the Department of Energy;

(vi) the Department of Health and Human Services;

(vii) the Department of Homeland Security;

[(vii)] *(viii)* the Department of the Interior;

[(viii)] *(ix)* the Environmental Protection Agency;

[(ix)] *(x)* the National Aeronautics and Space Administration;

[(x)] *(xi)* the National Science Foundation; and

[(xi)] *(xii)* such other agencies and departments as the President or the Director considers appropriate;

[(C)] *(F)* 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 103;*

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

(G) describe the levels of Federal funding for each agency and department participating in the Program, and for each Program Component Area, for the fiscal year during which such report 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;

(H) 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);

(I) include—

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

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

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

[(E)**]** *(J)* 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*, 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. Each chair of the advisory committee shall meet the qualifications of committee membership and may be a member of the President's Council of Advisors on Science and 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) progress made in implementing the Program;

(B) the need to revise the Program;

(C) the balance between the components of the Program, including funding levels for the Program Component Areas;

(D) whether the research and development undertaken pursuant to the Program is helping to maintain United States leadership in **[**high-performance computing, networking technology, and related software**]** *networking and information technology*; and

(E) other issues identified by the Director.

(2) In addition to the duties outlined in paragraph (1), the advisory committee shall conduct periodic evaluations of the funding, management, coordination, implementation, and activities of the Program. The advisory committee shall report not less frequently than once every **[**2**]** *3* fiscal years to the **[**Committee on Science and Technology**]** *Committee on Science, Space, and Technology* of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate on its findings and recommendations. **[**The first report shall be due within 1 year after the date of enactment of the America COMPETES Act.**]**

(3) Section 14 of the Federal Advisory Committee Act shall not apply to the advisory committee established under this subsection.

(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 Management 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

(B) states the portion of its request for appropriations that is allocated to each such element.

(2) The Office of Management and Budget shall review each such report in light of the goals, priorities, and agency and departmental responsibilities set forth in the annual report submitted under subsection (a)(2)(D), and shall include, in the President's annual budget estimate, a statement of the portion of each appropriate agency's or department's annual budget estimate relating to its activities undertaken pursuant to the Program.

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

(1) periodically assess and update, as appropriate, the contents, scope, and funding levels of the Program Component Areas and work through the National Science and Technology Council and with the assistance of the National Coordination Office described under section 102 to restructure the Program when warranted, taking into consideration any relevant recommendations of the advisory committee established under subsection (b); and

(2) working through the National Science and Technology Council and with the assistance of the National Coordination Office described under section 102, ensure that the Program includes large-scale, long-term, interdisciplinary research and development activities, including activities described in section 103.

(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 described under section 102, shall develop, within 12 months after the date of enactment of the Networking and Information Technology Research and Development Modernization Act of 2016, and update every five years thereafter, a five-year strategic plan for the Program.

(2) CONTENTS.—The strategic plan shall specify near-term and long-term cross-cutting 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) address long-term challenges of national importance for which solutions require large-scale, long-term, interdisciplinary research and development;

(B) encourage and support mechanisms for interdisciplinary research and development in networking and information technology and for Grand Challenges, 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) foster the transfer of research and development results into new technologies and applications in the national interest, including through cooperation and collaborations with networking and information technology research, de-

velopment, and technology transition initiatives supported by the States;

(D) provide for cyberinfrastructure needs, as appropriate, across federally funded large-scale research facilities that produce or will produce large amounts of data that will need to be stored, curated, and made publicly available;

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

(F) attract individuals identified in sections 33 and 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a and 1885b) to networking and information technology fields.

(3) 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);

(B) of the Committee on Science and relevant subcommittees of the National Science and Technology Council; and

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

(4) 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 Science, Space, and Technology of the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate.

[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) OFFICE.—The Director shall maintain 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), as appropriate;

(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) and the scope of the Program Component Areas through the convening of at least one workshop with invitees from academia, industry, Federal laboratories, and other relevant organizations and institutions;

(4) conduct and increase outreach, including to academia, industry, other relevant organizations and institutions, and the public, in order to increase awareness of the Program and the benefits of the Program and to increase potential opportunities for collaboration between agencies participating in the Program and the private sector; 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).

(3) WAIVER.—As appropriate, the Director may consider and approve a reduction or waiver of an agency contribution requirement under paragraph (2).

[SEC. 103. NEXT GENERATION INTERNET.

[(a) ESTABLISHMENT.—The National Science Foundation, the Department of Energy, the National Institutes of Health, the National Aeronautics and Space Administration, and the National Institute of Standards and Technology may support the Next Generation Internet program. The objectives of the Next Generation Internet program shall be to—

[(1) support research, development, and demonstration of advanced networking technologies to increase the capabilities and improve the performance of the Internet;

[(2) develop an advanced testbed network connecting a significant number of research sites, including universities, Federal research institutions, and other appropriate research partner institutions, to support networking research and to demonstrate new networking technologies; and

[(3) develop and demonstrate advanced Internet applications that meet important national goals or agency mission needs, and that are supported by the activities described in paragraphs (1) and (2).

[(b) DUTIES OF ADVISORY COMMITTEE.—The President's Information Technology Advisory Committee (established pursuant to section 101(b) by Executive Order No. 13035 of February 11, 1997 (62 F.R. 7131), as amended by Executive Order No. 13092 of July 24, 1998), in addition to its functions under section 101(b), shall—

[(1) assess the extent to which the Next Generation Internet program—

[(A) carries out the purposes of this Act; and

[(B) addresses concerns relating to, among other matters—

[(i) geographic penalties (as defined in section 7(1) of the Next Generation Internet Research Act of 1998);

[(ii) the adequacy of access to the Internet by Historically Black Colleges and Universities, Hispanic Serving Institutions, and small colleges and universities (whose enrollment is less than 5,000) and the degree of participation of those institutions in activities described in subsection (a); and

[(iii) technology transfer to and from the private sector;

[(2) review the extent to which the role of each Federal agency and department involved in implementing the Next Generation Internet program is clear and complementary to, and non-duplicative of, the roles of other participating agencies and departments;

[(3) assess the extent to which Federal support of fundamental research in computing is sufficient to maintain the Nation's critical leadership in this field; and

[(4) make recommendations relating to its findings under paragraphs (1), (2), and (3).

[(c) REPORTS.—The Advisory Committee shall review implementation of the Next Generation Internet program and shall report, not less frequently than annually, to the President, the Committee on Commerce, Science, and Transportation, the Committee on Appropriations, and the Committee on Armed Services of the Senate, and the Committee on Science, the Committee on Appropriations, and the Committee on Armed Services of the House of Representatives on its findings and recommendations for the preceding fiscal year. The first such report shall be submitted 6 months after the date of the enactment of the Next Generation Internet Research Act of 1998 and the last report shall be submitted by September 30, 2000.

[(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated for the purposes of this section—

[(1) for the Department of Energy, $22,000,000 for fiscal year 1999 and $25,000,000 for fiscal year 2000;

[(2) for the National Science Foundation, $25,000,000 for fiscal year 1999 and $25,000,000 for fiscal year 2000, as authorized in the National Science Foundation Authorization Act of 1998;

[(3) for the National Institutes of Health, $5,000,000 for fiscal year 1999 and $7,500,000 for fiscal year 2000;

[(4) for the National Aeronautics and Space Administration, $10,000,000 for fiscal year 1999 and $10,000,000 for fiscal year 2000; and

[(5) for the National Institute of Standards and Technology, $5,000,000 for fiscal year 1999 and $7,500,000 for fiscal year 2000.

Such funds may not be used for routine upgrades to existing federally funded communication networks.]

SEC. 103. GRAND CHALLENGES IN AREAS OF NATIONAL IMPORTANCE.

(a) IN GENERAL.—The Program shall encourage agencies identified in section 101(a)(3)(E) to support large-scale, long-term, interdisciplinary research and development activities in networking and information technology directed toward agency mission 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 fundamental 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) leverage Federal investments through collaboration with related State and private sector 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 may give special consideration to projects that include cost sharing from non-Federal sources.

(3) AGENCY COLLABORATION.—If two or more agencies identified in section 101(a)(3)(E), or other appropriate agencies, are working on large-scale networking and information technology 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.

SEC. 104. ADDRESSING EMERGING ISSUES.

(a) IN GENERAL.—In order to address emerging issues, the Director of the National Coordination Office may conduct workshops and other activities on research areas of emerging importance, which may include the grand challenge areas identified under section 103, with participants from institutions of higher education, Federal laboratories, and industry, in order to help guide Program investments and strategic planning in those areas, including areas identified in subsection (b).

(b) FOCUS AREAS.—In selecting research areas under subsection (a), the Director of the National Coordination Office shall consider the following topics:

(1) Data analytics to identify the current and future state of performing inference, prediction, and other forms of analysis of data, and methods for the collection, management, preservation, and use of data.

(2) The current and future state of the science, engineering, policy, and social understanding of privacy protection.

(3) The current and future state of fundamental research on the systems and science of the interplay of people and computing as well as the coordination and support being undertaken in areas such as social computing, human-robot interaction, privacy, and health-related aspects in human-computer systems.

(c) FUNCTIONS.—The participants in the workshops shall, as appropriate—

(1) develop options for models for research and development partnerships among institutions of higher education, Federal laboratories, and industry, including mechanisms for the support of research and development carried out under these partnerships;

(2) develop options for research and development for the specific issue areas that would be addressed through such partnerships;

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

(4) make recommendations for how Federal agencies participating in the Program can help support research and development partnerships for the specific issue areas.

(d) PARTICIPANTS.—The Director of the National Coordination Office shall ensure that the participants in the workshops—

(1) are individuals with knowledge and expertise in the specific issue areas; and

(2) represent a broad mix of relevant stakeholders, including academic and industry researchers and, as appropriate, Federal agencies.

(e) SENIOR STEERING GROUPS AND STRATEGIC PLANS.—As appropriate, the Director of the National Coordination Office shall establish senior steering groups and develop focused strategic plans to coordinate and guide activities under the research areas identified under this section, taking into consideration the findings and recommendations from any workshops carried out on those research topics.

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 *high-end* 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 technology; and*

[(2) 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) the National Science Foundation shall serve as the primary source of information on access to and use of the Network; and

[(4) the National Science Foundation shall upgrade the National Science Foundation funded network, assist regional networks to upgrade their capabilities, and provide other Federal departments and agencies the opportunity to connect to the National Science Foundation funded network.]

(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 individuals identified in sections 33 and 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a and 1885b).

[(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the National Science Foundation for the purposes of the Program $213,000,000 for fiscal year 1992; $262,000,000 for fiscal year 1993; $305,000,000 for fiscal year 1994; $354,000,000 for fiscal year 1995; and $413,000,000 for fiscal year 1996.]

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.

[(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the National Aeronautics and Space Administration for the purposes of the Program $72,000,000 for fiscal year 1992; $107,000,000 for fiscal year 1993; $134,000,000 for fiscal year 1994; $151,000,000 for fiscal year 1995; and $145,000,000 for fiscal year 1996.]

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

(2) provide computing and networking infrastructure support, including—

(A) the provision of [high-performance] *high-end* computing systems that are among the most advanced in the world in terms of performance in solving scientific and engineering problems; and

(B) support for advanced software and applications development for science and engineering disciplines related to energy applications.

[(b) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to the Secretary of Energy such sums as are necessary to carry out this section.]

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*;

(B) develop and propose standards and guidelines, and develop measurement techniques and test methods, for the [interoperability of high-performance computing systems in networks and for common user interfaces to systems]

interoperability and usability of networking and information technology systems; and

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

(2) the National Oceanic and Atmospheric Administration shall conduct basic and applied research in weather prediction and ocean sciences, particularly in development of new forecast models, in computational fluid dynamics, and in the incorporation of evolving computer architectures and networks into the systems that carry out agency missions.

(b) [HIGH-PERFORMANCE COMPUTING AND NETWORK] *NETWORKING AND INFORMATION TECHNOLOGY* SECURITY.—[Pursuant to the Computer Security Act of 1987 (Public Law 100–235; 101 Stat. 1724), the] *The* National Institute of Standards and Technology shall be responsible for developing and proposing standards and guidelines needed to assure the cost-effective security and privacy of [sensitive] information in Federal computer systems.

[(c) STUDY OF IMPACT OF FEDERAL PROCUREMENT REGULATIONS.—(1) The Secretary of Commerce shall conduct a study to—

[(A) evaluate the impact of Federal procurement regulations that require that contractors providing software to the Federal Government share the rights to proprietary software development tools that the contractors use to develop the software; and

[(B) determine whether such regulations discourage development of improved software development tools and techniques.

[(2) The Secretary of Commerce shall, within one year after the date of enactment of this Act, report to the Congress regarding the results of the study conducted under paragraph (1).

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

[(1) to the National Institute of Standards and Technology for the purposes of the Program $3,000,000 for fiscal year 1992; $4,000,000 for fiscal year 1993; $5,000,000 for fiscal year 1994; $6,000,000 for fiscal year 1995; and $7,000,000 for fiscal year 1996; and

[(2) to the National Oceanic and Atmospheric Administration for the purposes of the Program $2,500,000 for fiscal year 1992; $3,000,000 for fiscal year 1993; $3,500,000 for fiscal year 1994; $4,000,000 for fiscal year 1995; and $4,500,000 for fiscal year 1996.]

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. *All software and code, along with any subsequent updates to the software and code, developed by the Environmental Protection Agency under the Program and used in conducting scientific research shall be made publically available. In cases where the underlying software or code is proprietary or contains confidential*

business information, the Agency shall disclose only the name and vendor of the software and code used for all proprietary or confidential business information portions of the software or code. The Environmental Protection Agency shall ensure that the research conducted under the Program does not duplicate the scope or aims of similar research and initiatives at other Federal agencies. No Environmental Protection Agency funds shall be used towards research that duplicates the scope or aims of similar research and initiatives at other Federal agencies.

[(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the Environmental Protection Agency for the purposes of the Program $5,000,000 for fiscal year 1992; $5,500,000 for fiscal year 1993; $6,000,000 for fiscal year 1994; $6,500,000 for fiscal year 1995; and $7,000,000 for fiscal year 1996.]

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 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] *to support programs and activities to improve the teaching and learning of networking and information technology fields and contribute to the development of a skilled networking and information technology workforce*.

[(b) AUTHORIZATION OF APPROPRIATIONS.—From sums otherwise authorized to be appropriated, there are authorized to be appropriated to the Department of Education for the purposes of this section $1,500,000 for fiscal year 1992; $1,700,000 for fiscal year 1993; $1,900,000 for fiscal year 1994; $2,100,000 for fiscal year 1995; and $2,300,000 for fiscal year 1996.]

SEC. 207. MISCELLANEOUS PROVISIONS.

(a) NONAPPLICABILITY.—Except to the extent the appropriate Federal agency or department head determines, the provisions of this Act shall not apply to—

(1) programs or activities regarding computer systems that process classified information; or

(2) computer systems the function, operation, or use of which are those delineated in paragraphs (1) through (5) of section 2315(a) of title 10, United States Code.

(b) ACQUISITION OF PROTOTYPE AND EARLY PRODUCTION MODELS.—In accordance with Federal contracting law, Federal agencies and departments participating in the Program may acquire prototype or early production models of new [high-performance computing] *networking and information technology* systems and subsystems to stimulate hardware and software development. Items of computing equipment acquired under this subsection shall be considered research computers for purposes of applicable acquisition regulations.

[SEC. 208. FOSTERING UNITED STATES COMPETITIVENESS IN HIGH-PERFORMANCE COMPUTING AND RELATED ACTIVITIES.

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

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

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

[(3) Despite existing international agreements on fair competition and nondiscrimination in government procurements, there is increasing concern that such agreements are not being honored, that more aggressive enforcement of such agreements is needed, and that additional steps may be required to ensure fair global competition, particularly in high-technology fields such as high-performance computing and associated technologies.

[(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 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 technology products and suppliers.

[(b) ANNUAL REPORT.—

[(1) REPORT.—The Director shall submit an annual report to Congress that identifies—

[(A) any grant, contract, cooperative agreement, or cooperative research and development agreement (as defined under section 12(d)(1) of the Stevenson-Wydler Technology Innovation Act of 1980 (15 U.S.C. 3710a(d)(1)) made or entered into by any Federal agency or department for research and development under the Program with—

[(i) any company other than a company that is either incorporated or located in the United States, and that has majority ownership by individuals who are citizens of the United States; or

[(ii) any educational institution or nonprofit institution located outside the United States; and

[(B) any procurement exceeding $1,000,000 by any Federal agency or department under the Program for—

[(i) unmanufactured articles, materials, or supplies mined or produced outside the United States; or

[(ii) manufactured articles, materials, or supplies other than those manufactured in the United States substantially all from articles, materials, or supplies mined, produced, or manufactured in the United States,

under the meaning of title III of the Act of March 3, 1933 (41 U.S.C. 10a–10d; popularly known as the Buy American Act) as amended by the Buy American Act of 1988.

[(2) CONSOLIDATION OF REPORTS.—The report required by this subsection may be included with the report required by section 101(a)(3)(A).

[(c) APPLICATION OF BUY AMERICAN ACT.—This Act does not affect the applicability of title III of the Act of March 3, 1933 (41 U.S.C. 10a–10d; popularly known as the Buy American Act), as amended by the Buy American Act of 1988, to procurements by Federal agencies and departments undertaken as a part of the Program.]

DEPARTMENT OF ENERGY HIGH-END COMPUTING REVITALIZATION ACT OF 2004

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[SEC. 4. AUTHORIZATION OF APPROPRIATIONS.

[In addition to amounts otherwise made available for high-end computing, there are authorized to be appropriated to the Secretary to carry out this Act—

[(1) $50,000,000 for fiscal year 2005;

[(2) $55,000,000 for fiscal year 2006; and

[(3) $60,000,000 for fiscal year 2007.]

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