services, access mechanisms, and research facilities available for use through the Internet;

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

(D) accelerate the development of high-end computing systems and subsystems;

(E) provide for the application of networking and information technology to Grand Challenges;

(F) invest in basic research and education, and promote the inclusion of networking and information technology into educational institutions at all levels; and

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

(2) improving the interagency planning and coordination of Federal research and development on networking and information technology and maximizing the effectiveness of the Federal Government's 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.

(Pub. L. 102–194, §3, Dec. 9, 1991, 105 Stat. 1594; Pub. L. 105–305, §3(b), Oct. 28, 1998, 112 Stat. 2920; Pub. L. 114–329, title I, §105(c), Jan. 6, 2017, 130 Stat. 2976.)

AMENDMENTS

2017—Pub. L. 114–329, §105(c)(1), substituted "networking and information technology" for "high-performance computing" in introductory provisions.

Par. (1). Pub. L. 114–329, §105(c)(2)(A), substituted "supporting Federal research, development, and application of networking and information technology" for "expanding Federal support for research, development, and application of high-performance computing" in introductory provisions.

Par. (1)(A). Pub. L. 114–329, §105(c)(2)(B), substituted "networking and information technology" for "high-performance computing" in two places.

Par. (1)(C). Pub. L. 114–329, §105(c)(2)(C), (D), added subpar. (C) and struck out former subpar. (C) which read as follows: "stimulate research on software technology;".

Par. (1)(D). Pub. L. 114–329, §105(c)(2)(C), (E), (F), redesignated subpar. (E) as (D), inserted "high-end" after "the development of", and struck out former subpar. (D) which read as follows: "promote the more rapid development and wider distribution of computing software tools and applications software;".

Par. (1)(E), (F). Pub. L. 114–329, §105(c)(2)(E), (G), redesignated subpars. (F) and (G) as (E) and (F), respectively, and substituted "networking and information technology" for "high-performance computing". Former subpar. (E) redesignated (D).

Par. (1)(G), (H). Pub. L. 114–329, §105(c)(2)(E), (H), redesignated subpar. (H) as (G) and substituted "high-end" for "high-performance". Former subpar. (G) redesignated (F).

Par. (2). Pub. L. 114–329, §105(c)(3), substituted "networking and information technology and" for "high-performance computing and" and "networking and information technology" for "high-performance computing network".

1998—Pub. L. 105–305, §3(b)(1), substituted "Purposes" for "Purpose" as section catchline.

Pub. L. 105–305, §3(b)(2), substituted "purposes of this chapter are" for "purpose of this chapter is" in introductory provisions.

Par. (1)(A). Pub. L. 105–305, §3(b)(3), redesignated subpar. (B) as (A) and struck out former subpar. (A) which read as follows: "establish a high-capacity and high-speed National Research and Education Network;".

Par. (1)(B). Pub. L. 105–305, §3(b)(3), (4), redesignated subpar. (C) as (B) and substituted "Internet" for "Network". Former subpar. (B) redesignated (A).

Par. (1)(C) to (I). Pub. L. 105–305, §3(b)(3), (5), redesignated subpars. (D) to (I) as (C) to (H), respectively, and struck out "and" at end of par. (H).

Par. (2). Pub. L. 105–305, §3(b)(6), substituted "network research and development programs;" for "efforts."

Pars. (3), (4). Pub. L. 105–305, §3(b)(7), added pars. (3) and (4).

§ 5503. Definitions

As used in this chapter, 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 enable safe and effective, real-time performance in safety-critical and other applications;

(2) "Director" means the Director of the Office of Science and Technology Policy;

(3) "Grand Challenge" means a fundamental problem in science or engineering, with broad economic and scientific impact, whose solution will require the application of networking and information technology resources and multidisciplinary teams of researchers;

(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 to solve computational problems of national importance that are beyond the capability of small- to medium-scale systems, including computing formerly known as high-performance computing;

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

(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;

(7) "participating agency" means an agency described in section 5511(a)(3)(C) of this title;

(8) "Program" means the Networking and Information Technology Research and Development Program described in section 5511 of this title; and

(9) "Program Component Areas" means the major subject areas under which related individual projects and activities carried out under the Program are grouped.

(Pub. L. 102–194, §4, Dec. 9, 1991, 105 Stat. 1595; Pub. L. 105–305, §7(b), Oct. 28, 1998, 112 Stat. 2924; Pub. L. 110–69, title VII, §7024(a)(2), Aug. 9, 2007,

121 Stat. 689; Pub. L. 114–329, title I, § 105(d), Jan. 6, 2017, 130 Stat. 2977.)

2017—Pars. (1), (2). Pub. L. 114–329, § 105(d)(2), (3), added par. (1) and redesignated former par. (1) as (2). Former par. (2) redesignated (3).

Par. (3). Pub. L. 114–329, § 105(d)(1), (2), (4), redesignated par. (2) as (3), substituted ''networking and information technology'' for ''high-performance computing'', and struck out former par. (3) which read as follows: '''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;''.

Par. (4). Pub. L. 114–329, § 105(d)(5), added par. (4). Former par. (4) redesignated (5).

Par. (5). Pub. L. 114–329, § 105(d)(1), (2), redesignated par. (4) as (5) and struck out former par. (5) which read as follows: '''Network' means a computer network referred to as the National Research and Education Network established under section 5512 of this title;''.

Pars. (6), (7). Pub. L. 114–329, § 105(d)(6), added pars. (6) and (7). Former pars. (6) and (7) redesignated (8) and (9), respectively.

Par. (8). Pub. L. 114–329, § 105(d)(2), (7), redesignated par. (6) as (8) and substituted ''Networking and Information Technology Research and Development Program'' for ''National High-Performance Computing Program''.

Par. (9). Pub. L. 114–329, § 105(d)(2), redesignated par. (7) as (9).

2007—Par. (2). Pub. L. 110–69, § 7024(a)(2)(A), inserted ''and multidisciplinary teams of researchers'' after ''high-performance computing resources''.

Par. (3). Pub. L. 110–69, § 7024(a)(2)(B), struck out ''scientific workstations,'' after ''technologies, including'' and ''(including vector supercomputers and large scale parallel systems)'' after ''supercomputer systems'', substituted ''applications'' for ''and applications'', and inserted '', and the management of large data sets'' after ''systems software''.

Par. (4). Pub. L. 110–69, § 7024(a)(2)(C), struck out ''packet switched'' before ''data networks''.

Par. (7). Pub. L. 110–69, § 7024(a)(2)(D)–(F), added par. (7).

1998—Pars. (4) to (6). Pub. L. 105–305 added par. (4) and redesignated former pars. (4) and (5) as (5) and (6), respectively.

SUBCHAPTER I—NETWORKING AND INFORMATION TECHNOLOGY RESEARCH AND DEVELOPMENT

Pub. L. 114–329, title I, § 105(e), Jan. 6, 2017, 130 Stat. 2978, substituted ''NETWORKING AND INFORMATION TECHNOLOGY'' for ''HIGH-PERFORMANCE COMPUTING'' in subchapter heading.

§ 5511. Networking and Information Technology Research and Development Program

(a) Networking and Information Technology research and development

(1) The President shall implement a Networking and Information Technology Research and Development Program, which shall—

　(A) provide for long-term basic and applied research on networking and information technology;

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

　(C) provide for sustained access by the research community throughout the United States to 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 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-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;

　(I) provide for 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, including the human facets of cyber threats and secure cyber systems;

　(M) provide for the understanding of the science, engineering, policy, and privacy protection related to networking and information technology;

　(N) provide for the transition of high-end computing hardware, system software, development tools, and applications into development and operations; and

　(O) foster public-private collaboration among government, industry research laboratories, academia, and nonprofit organizations to maximize research and development efforts and the benefits of networking and information technology, including high-end computing.

(2) The Director shall—

　(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;