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(Original Signature of Member)

116TH CONGRESS
2D SESSION

H. R. _____

To establish and support a quantum network infrastructure research and development program at the Department of Energy and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

Mr. ZELDIN introduced the following bill; which was referred to the Committee on _____

A BILL

To establish and support a quantum network infrastructure research and development program at the Department of Energy and for other purposes.

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

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Quantum Network Infrastructure Act of 2020''.

SEC. 2. DEFINITIONS.

Section 2 of the National Quantum Initiative Act (15 U.S.C. 8801) is amended—

(1) by redesignating paragraph (7) as paragraph (8); and

(2) by inserting after paragraph (6) the following:

''(7) QUANTUM NETWORK INFRASTRUCTURE.—The term 'quantum network infrastructure' means any facility, expertise, or capability that is necessary to enable the development and deployment of scalable and diverse quantum network technologies.''.

SEC. 3. DEPARTMENT OF ENERGY QUANTUM NETWORK INFRASTRUCTURE RESEARCH AND DEVELOPMENT PROGRAM.

Title IV of the National Quantum Initiative Act (15 U.S.C. 8851 et seq.) is amended by adding at the end the following:

''SEC. 403. DEPARTMENT OF ENERGY QUANTUM NETWORK INFRASTRUCTURE RESEARCH AND DEVELOPMENT PROGRAM.

''(a) IN GENERAL.—The Secretary of Energy (referred to in this section as the 'Secretary') shall carry out a research, development, and demonstration program to accelerate innovation in quantum network infrastructure in order to—

''(1) facilitate the advancement of distributed quantum computing systems through the internet and intranet;

''(2) improve the precision of measurements of scientific phenomena and physical imaging technologies; and

''(3) develop secure national quantum communications technologies and strategies.

''(b) PROGRAM.—In carrying out this section, the Secretary shall—

''(1) coordinate with—

''(A) the Director of the National Science Foundation;

''(B) the Director of the National Institute of Standards and Technology;

''(C) the Chair of the subcommittee on Quantum Information Science of the National Science and Technology Council established under section 103(a); and

''(D) the Chair of the subcommittee on the Economic and Security Implications of Quantum Science;

''(2) conduct cooperative research with industry, National Laboratories, institutions of higher education, and other research institutions to facili-

tate new quantum infrastructure methods and technologies, including—

''(A) quantum-limited detectors, ultra-low loss optical channels, space-to-ground connections, and classical networking and cybersecurity protocols;

''(B) entanglement and hyper-entangled state sources and transmission, control, and measurement of quantum states;

''(C) quantum interconnects that allow short range local connections between quantum processors;

''(D) transducers for quantum sources and signals between optical and telecommunications regimes and quantum computer-relevant domains, including microwaves;

''(E) development of quantum memory buffers and small-scale quantum computers that are compatible with photon-based quantum bits in the optical or telecommunications wavelengths;

''(F) long-range entanglement distribution at both the terrestrial and space-based level using quantum repeaters, allowing entangle-

ment-based protocols between small- and large-scale quantum processors;

''(G) quantum routers, multiplexers, repeaters, and related technologies necessary to create secure long-distance quantum communication; and

''(H) integration of systems across the quantum technology stack into traditional computing networks, including the development of remote controlled, high performance, and reliable implementations of key quantum network components;

''(3) engage with the Quantum Economic Development Consortium (QED–C) to transition component technologies to help facilitate as appropriate the development of a quantum supply chain for quantum network technologies;

''(4) advance basic research in advanced scientific computing and material science to enhance the understanding, prediction, and manipulation of materials and processes relevant to quantum network infrastructure;

''(5) develop experimental tools and testbeds necessary to support cross-cutting fundamental research and development activities with diverse stake-

holders from industry and institutions of higher education; and

''(6) consider quantum network infrastructure applications that span the Department of Energy's missions in energy, environment, and national security.

''(c) LEVERAGING.—In carrying out this section, the Secretary shall leverage resources, infrastructure, and expertise across the Department of Energy and from—

''(1) the National Institute of Standards and Technology;

''(2) the National Science Foundation;

''(3) the National Aeronautics and Space Administration;

''(4) other relevant Federal agencies;

''(5) the National Laboratories;

''(6) industry stakeholders;

''(7) institutions of higher education; and

''(8) the National Quantum Information Science Research Centers.

''(d) RESEARCH PLAN.—Not later than 180 days after the date of the enactment of the Quantum Network Infrastructure Act of 2020, the Secretary shall submit to the Committee on Science, Space, and Technology of the House of Representatives and the Committee on Energy

and Natural Resources of the Senate, a 4-year research plan that identifies and prioritizes basic research needs relating to quantum network infrastructure.

''(e) STANDARD OF REVIEW.—The Secretary shall review activities carried out under this section to determine the achievement of technical milestones.

''(f) FUNDING.—Funds authorized to be appropriated for the Department of Energy's Office of Science, there shall be made available to the Secretary to carry out the activities under this section, $100,000,000 for each of fiscal years 2021 through 2025.''.