

.....
(Original Signature of Member)

117TH CONGRESS
1ST 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.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE.**

4 This Act may be cited as the “Quantum Network In-
5 frastructure Act of 2021”.

6 **SEC. 2. DEFINITIONS.**

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

1 (1) by redesignating paragraph (7) as para-
2 graph (8); and

3 (2) by inserting after paragraph (6) the fol-
4 lowing:

5 “(7) QUANTUM NETWORK INFRASTRUCTURE.—
6 The term ‘quantum network infrastructure’ means
7 any facility, expertise, or capability that is necessary
8 to enable the development and deployment of scal-
9 able and diverse quantum network technologies.”.

10 **SEC. 3. DEPARTMENT OF ENERGY QUANTUM NETWORK IN-**
11 **FRASTRUCTURE RESEARCH AND DEVELOP-**
12 **MENT PROGRAM.**

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

16 **“SEC. 403. DEPARTMENT OF ENERGY QUANTUM NETWORK**
17 **INFRASTRUCTURE RESEARCH AND DEVELOP-**
18 **MENT PROGRAM.**

19 “(a) IN GENERAL.—The Secretary of Energy (re-
20 ferred to in this section as the ‘Secretary’) shall carry out
21 a research, development, and demonstration program to
22 accelerate innovation in quantum network infrastructure
23 in order to—

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

4 “(2) improve the precision of measurements of
5 scientific phenomena and physical imaging tech-
6 nologies; and

7 “(3) develop secure national quantum commu-
8 nications technologies and strategies.

9 “(b) PROGRAM.—In carrying out this section, the
10 Secretary shall—

11 “(1) coordinate with—

12 “(A) the Director of the National Science
13 Foundation;

14 “(B) the Director of the National Institute
15 of Standards and Technology;

16 “(C) the Chair of the subcommittee on
17 Quantum Information Science of the National
18 Science and Technology Council established
19 under section 103(a); and

20 “(D) the Chair of the subcommittee on the
21 Economic and Security Implications of Quan-
22 tum Science;

23 “(2) conduct cooperative research with indus-
24 try, National Laboratories, institutions of higher
25 education, and other research institutions to facili-

1 tate new quantum infrastructure methods and tech-
2 nologies, including—

3 “(A) quantum-limited detectors, ultra-low
4 loss optical channels, space-to-ground connec-
5 tions, and classical networking and cybersecu-
6 rity protocols;

7 “(B) entanglement and hyper-entangled
8 state sources and transmission, control, and
9 measurement of quantum states;

10 “(C) quantum interconnects that allow
11 short range local connections between quantum
12 processors;

13 “(D) transducers for quantum sources and
14 signals between optical and telecommunications
15 regimes and quantum computer-relevant do-
16 mains, including microwaves;

17 “(E) development of quantum memory
18 buffers and small-scale quantum computers
19 that are compatible with photon-based quantum
20 bits in the optical or telecommunications wave-
21 lengths;

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

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

3 “(G) quantum routers, multiplexers, re-
4 peaters, and related technologies necessary to
5 create secure long-distance quantum commu-
6 nication; and

7 “(H) integration of systems across the
8 quantum technology stack into traditional com-
9 puting networks, including the development of
10 remote controlled, high performance, and reli-
11 able implementations of key quantum network
12 components;

13 “(3) engage with the Quantum Economic De-
14 velopment Consortium (QED-C) to transition com-
15 ponent technologies to help facilitate as appropriate
16 the development of a quantum supply chain for
17 quantum network technologies;

18 “(4) advance basic research in advanced sci-
19 entific computing and material science to enhance
20 the understanding, prediction, and manipulation of
21 materials and processes relevant to quantum net-
22 work infrastructure;

23 “(5) develop experimental tools and testbeds
24 necessary to support cross-cutting fundamental re-
25 search and development activities with diverse stake-

1 holders from industry and institutions of higher edu-
2 cation; and

3 “(6) consider quantum network infrastructure
4 applications that span the Department of Energy’s
5 missions in energy, environment, and national secu-
6 rity.

7 “(c) LEVERAGING.—In carrying out this section, the
8 Secretary shall leverage resources, infrastructure, and ex-
9 pertise across the Department of Energy and from—

10 “(1) the National Institute of Standards and
11 Technology;

12 “(2) the National Science Foundation;

13 “(3) the National Aeronautics and Space Ad-
14 ministration;

15 “(4) other relevant Federal agencies;

16 “(5) the National Laboratories;

17 “(6) industry stakeholders;

18 “(7) institutions of higher education; and

19 “(8) the National Quantum Information
20 Science Research Centers.

21 “(d) RESEARCH PLAN.—Not later than 180 days
22 after the date of the enactment of the Quantum Network
23 Infrastructure Act of 2021, the Secretary shall submit to
24 the Committee on Science, Space, and Technology of the
25 House of Representatives and the Committee on Energy

1 and Natural Resources of the Senate, a 4-year research
2 plan that identifies and prioritizes basic research needs re-
3 lating to quantum network infrastructure.

4 “(e) STANDARD OF REVIEW.—The Secretary shall
5 review activities carried out under this section to deter-
6 mine the achievement of technical milestones.

7 “(f) FUNDING.—Funds authorized to be appro-
8 priated for the Department of Energy’s Office of Science,
9 there shall be made available to the Secretary to carry out
10 the activities under this section, \$100,000,000 for each
11 of fiscal years 2022 through 2026.”.