

[116H8279IH]



(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.”.