

114TH CONGRESS
2D SESSION

H. R. 4489

To provide for Federal Aviation Administration research and development,
and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 8, 2016

Mr. KNIGHT (for himself, Mr. BABIN, and Mr. SMITH of Texas) introduced
the following bill; which was referred to the Committee on Science, Space,
and Technology

A BILL

To provide for Federal Aviation Administration research and
development, 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 **TITLE I—GENERAL PROVISIONS**

4 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

5 (a) SHORT TITLE.—This Act may be cited as the
6 “FAA Leadership in Groundbreaking High-Tech Research
7 and Development Act” or the “FLIGHT R&D Act”.

8 (b) TABLE OF CONTENTS.—The table of contents for
9 this Act is as follows:

TITLE I—GENERAL PROVISIONS

- Sec. 1. Short title; table of contents.
- Sec. 2. Definitions.
- Sec. 3. Authorization of appropriations.

TITLE II—FAA RESEARCH AND DEVELOPMENT ORGANIZATION

- Sec. 11. Associate Administrator for Research and Development.
- Sec. 12. Research advisory committee.
- Sec. 13. Plan to determine research and development responsibility.

TITLE III—UNMANNED AIRCRAFT SYSTEMS

- Sec. 21. Unmanned aircraft systems research and development roadmap.
- Sec. 22. Probabilistic metrics for exemptions.
- Sec. 23. Probabilistic assessment of risks.
- Sec. 24. Unmanned aerial vehicle-manned aircraft collision research.

TITLE IV—CYBERSECURITY

- Sec. 31. Cyber Testbed.
- Sec. 32. Cabin communications, entertainment, and information technology systems cybersecurity vulnerabilities.
- Sec. 33. Cybersecurity threat modeling.
- Sec. 34. National Institute of Standards and Technology cybersecurity standards.
- Sec. 35. Cybersecurity research coordination.
- Sec. 36. Cybersecurity research and development program.

TITLE V—FAA RESEARCH AND DEVELOPMENT ACTIVITIES

- Sec. 41. Research plan for the certification of new technologies into the national airspace system.
- Sec. 42. Aviation fuel research, development, and usage.
- Sec. 43. Air traffic surveillance over oceans and other remote locations.
- Sec. 44. Single-piloted commercial cargo aircraft.

1 **SEC. 2. DEFINITIONS.**

2 As used in this Act, the following definitions apply:

3 (1) ADMINISTRATOR.—The term “Adminis-
4 trator” means the Administrator of the Federal
5 Aviation Administration.

6 (2) FAA.—The term “FAA” means the Fed-
7 eral Aviation Administration.

8 (3) NASA.—The term “NASA” means the Na-
9 tional Aeronautics and Space Administration.

1 (4) SECRETARY.—The term “Secretary” means
2 the Secretary of Transportation.

3 **SEC. 3. AUTHORIZATION OF APPROPRIATIONS.**

4 Section 48102(a) of title 49, United States Code, is
5 amended—

6 (1) in the matter before paragraph (1) by strik-
7 ing “and, for each of fiscal years 2012 through
8 2015, under subsection (g)”;

9 (2) at the end of paragraph (8), by striking
10 “and”;

11 (3) by striking paragraph (9); and

12 (4) by adding at the end the following:

13 “(9) for fiscal year 2016, \$166,000,000, includ-
14 ing—

15 “(A) \$95,969,000 for Safety Research and
16 Development programs, including—

17 “(i) Fire Research and Safety;

18 “(ii) Propulsion and Fuel Systems;

19 “(iii) Advanced Materials/Structural
20 Safety;

21 “(iv) Aircraft Icing/Digital System
22 Safety;

23 “(v) Continued Airworthiness;

24 “(vi) Aircraft Catastrophic Failure
25 Prevention Research;

1 “(vii) Flightdeck/Maintenance/System
2 Integration Human Factors;
3 “(viii) System Safety Management;
4 “(ix) Air Traffic Control/Technical
5 Operations Human Factors;
6 “(x) Aeromedical Research;
7 “(xi) Weather Program;
8 “(xii) Unmanned Aircraft Systems
9 Research;
10 “(xiii) NextGen–Alternative Fuels for
11 General Aviation;
12 “(xiv) Joint Planning and Develop-
13 ment Office;
14 “(xv) Ocean and Other Remote Loca-
15 tions ATS Research Program;
16 “(xvi) Cybersecurity Research Pro-
17 gram;
18 “(xvii) Cybersecurity Threat Modeling
19 Program;
20 “(xviii) Single Piloted Commercial
21 Cargo Aircraft Program; and
22 “(xix) UAV-Manned Aircraft Collision
23 Research Program;

1 “(B) \$22,589,000 for Economic Competi-
2 tiveness Research and Development programs,
3 including—

4 “(i) NextGen–Wake Turbulence;

5 “(ii) NextGen–Air Ground Integration
6 Human Factors;

7 “(iii) Next Gen–Weather Technology
8 in the Cockpit; and

9 “(iv) Commercial Space Transpor-
10 tation Safety;

11 “(C) \$41,897,000 for Environmental Sus-
12 tainability Research and Development pro-
13 grams, including—

14 “(i) Environment and Energy; and

15 “(ii) NextGen–Environmental Re-
16 search–Aircraft Technologies, Fuels and
17 Metrics; and

18 “(D) \$5,545,000 for Mission Support pro-
19 grams, including—

20 “(i) System Planning and Resource
21 Management; and

22 “(ii) William J. Hughes Technical
23 Center Laboratory Facility;

24 “(10) for fiscal year 2017, \$169,000,000, in-
25 cluding—

1 “(A) \$98,400,000 for Safety Research and
2 Development programs, including—
3 “(i) Fire Research and Safety;
4 “(ii) Propulsion and Fuel Systems;
5 “(iii) Advanced Materials/Structural
6 Safety;
7 “(iv) Aircraft Icing/Digital System
8 Safety;
9 “(v) Continued Airworthiness;
10 “(vi) Aircraft Catastrophic Failure
11 Prevention Research;
12 “(vii) Flightdeck/Maintenance/System
13 Integration Human Factors;
14 “(viii) System Safety Management;
15 “(ix) Air Traffic Control/Technical
16 Operations Human Factors;
17 “(x) Aeromedical Research;
18 “(xi) Weather Program;
19 “(xii) Unmanned Aircraft Systems
20 Research;
21 “(xiii) NextGen–Alternative Fuels for
22 General Aviation;
23 “(xiv) Joint Planning and Develop-
24 ment Office;

1 “(xv) Ocean and Other Remote Loca-
2 tions ATS Research Program;

3 “(xvi) Cybersecurity Research Pro-
4 gram;

5 “(xvii) Cybersecurity Threat Modeling
6 Program;

7 “(xviii) Single Piloted Commercial
8 Cargo Aircraft Program; and

9 “(xix) UAV-Manned Aircraft Collision
10 Research Program;

11 “(B) \$25,110,000 for Economic Competi-
12 tiveness Research and Development programs,
13 including—

14 “(i) NextGen–Wake Turbulence;

15 “(ii) NextGen–Air Ground Integration
16 Human Factors;

17 “(iii) Next Gen–Weather Technology
18 in the Cockpit; and

19 “(iv) Commercial Space Transpor-
20 tation Safety;

21 “(C) \$39,548,000 for Environmental Sus-
22 tainability Research and Development pro-
23 grams, including—

24 “(i) Environment and Energy; and

1 “(ii) NextGen–Environmental Re-
2 search–Aircraft Technologies, Fuels and
3 Metrics; and

4 “(D) \$5,942,000 for Mission Support pro-
5 grams, including—

6 “(i) System Planning and Resource
7 Management; and

8 “(ii) William J. Hughes Technical
9 Center Laboratory Facility;

10 “(11) for fiscal year 2018, \$173,000,000, in-
11 cluding—

12 “(A) \$100,738,000 for Safety Research
13 and Development programs, including—

14 “(i) Fire Research and Safety;

15 “(ii) Propulsion and Fuel Systems;

16 “(iii) Advanced Materials/Structural
17 Safety;

18 “(iv) Aircraft Icing/Digital System
19 Safety;

20 “(v) Continued Airworthiness;

21 “(vi) Aircraft Catastrophic Failure
22 Prevention Research;

23 “(vii) Flightdeck/Maintenance/System
24 Integration Human Factors;

25 “(viii) System Safety Management;

1 “(ix) Air Traffic Control/Technical
2 Operations Human Factors;
3 “(x) Aeromedical Research;
4 “(xi) Weather Program;
5 “(xii) Unmanned Aircraft Systems
6 Research;
7 “(xiii) NextGen–Alternative Fuels for
8 General Aviation;
9 “(xiv) Joint Planning and Develop-
10 ment Office;
11 “(xv) Ocean and Other Remote Loca-
12 tions ATS Research Program;
13 “(xvi) Cybersecurity Research Pro-
14 gram;
15 “(xvii) Cybersecurity Threat Modeling
16 Program;
17 “(xviii) Single Piloted Commercial
18 Cargo Aircraft Program; and
19 “(xix) UAV-Manned Aircraft Collision
20 Research Program;
21 “(B) \$25,703,000 for Economic Competi-
22 tiveness Research and Development programs,
23 including—
24 “(i) NextGen–Wake Turbulence;

1 “(ii) NextGen–Air Ground Integration
2 Human Factors;

3 “(iii) Next Gen–Weather Technology
4 in the Cockpit; and

5 “(iv) Commercial Space Transpor-
6 tation Safety;

7 “(C) \$40,475,000 for Environmental Sus-
8 tainability Research and Development pro-
9 grams, including—

10 “(i) Environment and Energy; and

11 “(ii) NextGen–Environmental Re-
12 search–Aircraft Technologies, Fuels and
13 Metrics; and

14 “(D) \$6,084,000 for Mission Support pro-
15 grams, including—

16 “(i) System Planning and Resource
17 Management; and

18 “(ii) William J. Hughes Technical
19 Center Laboratory Facility; and

20 “(12) for fiscal year 2019, \$174,000,000, in-
21 cluding—

22 “(A) \$101,397,000 for Safety Research
23 and Development programs, including—

24 “(i) Fire Research and Safety;

25 “(ii) Propulsion and Fuel Systems;

- 1 “(iii) Advanced Materials/Structural
2 Safety;
3 “(iv) Aircraft Icing/Digital System
4 Safety;
5 “(v) Continued Airworthiness;
6 “(vi) Aircraft Catastrophic Failure
7 Prevention Research;
8 “(vii) Flightdeck/Maintenance/System
9 Integration Human Factors;
10 “(viii) System Safety Management;
11 “(ix) Air Traffic Control/Technical
12 Operations Human Factors;
13 “(x) Aeromedical Research;
14 “(xi) Weather Program;
15 “(xii) Unmanned Aircraft Systems
16 Research;
17 “(xiii) NextGen–Alternative Fuels for
18 General Aviation;
19 “(xiv) Joint Planning and Develop-
20 ment Office;
21 “(xv) Ocean and Other Remote Loca-
22 tions ATS Research Program;
23 “(xvi) Cybersecurity Research Pro-
24 gram;

1 “(xvii) Cybersecurity Threat Modeling
2 Program;

3 “(xviii) Single Piloted Commercial
4 Cargo Aircraft Program; and

5 “(xix) UAV-Manned Aircraft Collision
6 Research Program;

7 “(B) \$25,837,000 for Economic Competi-
8 tiveness Research and Development programs,
9 including—

10 “(i) NextGen–Wake Turbulence;

11 “(ii) NextGen–Air Ground Integration
12 Human Factors;

13 “(iii) Next Gen–Weather Technology
14 in the Cockpit; and

15 “(iv) Commercial Space Transpor-
16 tation Safety;

17 “(C) \$40,603,000 for Environmental Sus-
18 tainability Research and Development pro-
19 grams, including—

20 “(i) Environment and Energy; and

21 “(ii) NextGen–Environmental Re-
22 search–Aircraft Technologies, Fuels and
23 Metrics; and

24 “(D) \$6,163,000 for Mission Support pro-
25 grams, including—

1 “(i) System Planning and Resource
2 Management; and

3 “(ii) William J. Hughes Technical
4 Center Laboratory Facility.”.

5 **TITLE II—FAA RESEARCH AND**
6 **DEVELOPMENT ORGANIZATION**

7 **SEC. 11. ASSOCIATE ADMINISTRATOR FOR RESEARCH AND**
8 **DEVELOPMENT.**

9 (a) APPOINTMENT.—Not later than 3 months after
10 the date of enactment of this Act, the Administrator shall
11 appoint an Associate Administrator for Research and De-
12 velopment.

13 (b) SENIOR EXECUTIVE SERVICE.—The Associate
14 Administrator for Research and Development shall be a
15 Senior Executive Service position.

16 (c) RESPONSIBILITIES.—The Associate Adminis-
17 trator for Research and Development shall, at a minimum,
18 be responsible for—

19 (1) management and oversight of all the FAA’s
20 research and development programs and activities;
21 and

22 (2) production of all congressional reports from
23 the FAA relevant to research and development, in-
24 cluding the National Aviation Research Plan.

1 (d) DUAL APPOINTMENT.—The Associate Adminis-
2 trator for Research and Development may be a dual-ap-
3 pointment, holding the responsibilities of another Asso-
4 ciate Administrator.

5 **SEC. 12. RESEARCH ADVISORY COMMITTEE.**

6 (a) ADVICE AND RECOMMENDATIONS.—Section
7 44508(a)(1)(A) of title 49, United States Code, is amend-
8 ed to read as follows:

9 “(A) provide advice and recommendations to
10 the Administrator of the Federal Aviation Adminis-
11 tration and Congress about needs, objectives, plans,
12 approaches, content, and accomplishments of all
13 aviation research and development activities and
14 programs carried out, including those under sections
15 40119, 44504, 44505, 44507, 44511–44513, and
16 44912 of this title;”.

17 (b) WRITTEN REPLY TO RESEARCH ADVISORY COM-
18 MITTEE.—Section 44508 of title 49, United States Code,
19 is amended by adding at the end the following:

20 “(f) WRITTEN REPLY.—

21 “(1) IN GENERAL.—Not later than 60 days
22 after receiving any recommendation from the re-
23 search advisory committee, the Administrator shall
24 provide a written reply to the research advisory com-
25 mittee that, at a minimum—

1 “(A) clearly states whether the Adminis-
2 trator accepts or rejects the recommendations;

3 “(B) explains the rationale for the Admin-
4 istrator’s decision;

5 “(C) sets forth the timeframe in which the
6 Administrator will implement the recommenda-
7 tion; and

8 “(D) describes the steps the Administrator
9 will take to implement the recommendation.

10 “(2) TRANSPARENCY.—The written reply to the
11 research advisory committee, when transmitted to
12 the research advisory committee, shall be—

13 “(A) made publicly available on the re-
14 search advisory committee website; and

15 “(B) transmitted to the Committee on
16 Science, Space, and Technology of the House of
17 Representatives and the Committee on Com-
18 merce, Science, and Transportation of the Sen-
19 ate.

20 “(3) NATIONAL AVIATION RESEARCH PLAN.—
21 The National Aviation Research Plan shall include a
22 summary of all research advisory committee rec-
23 ommendations and a description of the status of
24 their implementation.”.

1 **SEC. 13. PLAN TO DETERMINE RESEARCH AND DEVELOP-**
2 **MENT RESPONSIBILITY.**

3 (a) PLAN.—Not later than 90 days after the date of
4 enactment of this Act, the Administrator, in consultation
5 with the Research, Engineering, and Development Advi-
6 sory Committee, NASA, and other relevant agencies, shall
7 enter into an arrangement with an external independent
8 systems engineering and technical assistance organization
9 to develop a plan, in the event that the national air traffic
10 control system is required to be transferred to a non-Fed-
11 eral entity, for the transition of FAA research and devel-
12 opment activities to such entity.

13 (b) PLAN CONTENTS.—At a minimum, the plan de-
14 veloped pursuant to subsection (a) shall—

15 (1) examine all FAA research and development
16 activities, regardless of the budget account funding
17 such activities;

18 (2) take into account such required transfer of
19 the national air traffic control system;

20 (3) recommend research and development ac-
21 tivities that—

22 (A) should be transferred to such non-Fed-
23 eral entity;

24 (B) should not be transferred to such non-
25 Federal entity; and

1 (C) should be shared between the FAA and
2 such non-Federal entity;

3 (4) identify the necessary authorities that exist
4 or are required to carry out the recommendations
5 under paragraph (3);

6 (5) assess the pros and cons of transferring
7 particular categories of research and development
8 activities from the FAA to such non-Federal entity;
9 and

10 (6) take into account the safety of the national
11 airspace system, national security, foreign policy,
12 and the economic interests of the United States.

13 (c) REPORT.—Not later than 1 year after the date
14 of enactment of this Act, the Administrator shall submit
15 the plan required under subsection (a) to—

16 (1) the Research, Engineering, and Develop-
17 ment Advisory Committee; and

18 (2) the Committee on Science, Space, and
19 Technology of the House of Representatives and the
20 Committee on Commerce, Science, and Transpor-
21 tation of the Senate.

22 (d) ADVISORY COMMITTEE ASSESSMENT.—Not later
23 than 6 months after receiving the report under subsection
24 (c), the Research, Engineering, and Development Advisory
25 Committee shall submit an assessment of the plan re-

1 quired under subsection (a) to the Committee on Science,
 2 Space, and Technology of the House of Representatives
 3 and the Committee on Commerce, Science, and Transpor-
 4 tation of the Senate.

5 **TITLE III—UNMANNED** 6 **AIRCRAFT SYSTEMS**

7 **SEC. 21. UNMANNED AIRCRAFT SYSTEMS RESEARCH AND** 8 **DEVELOPMENT ROADMAP.**

9 Section 332(a)(5) of the FAA Modernization and Re-
 10 form Act of 2012 (49 U.S.C. 40101 note) is amended—

11 (1) by inserting “, in coordination with NASA
 12 and relevant stakeholders, including those in indus-
 13 try and academia,” after “Web site”; and

14 (2) by inserting after “annually.” the following:
 15 “The roadmap shall include, at a minimum—

16 “(A) cost estimates, planned schedules,
 17 and performance benchmarks, including specific
 18 tasks, milestones, and timelines for unmanned
 19 aircraft systems integration into the national
 20 airspace system, including—

21 “(i) the role of the 6 unmanned air-
 22 craft systems test ranges established under
 23 subsection (c) and the Unmanned Aircraft
 24 Systems Center of Excellence;

1 “(ii) performance and certification
2 standards for unmanned aircraft systems
3 that operate in the national airspace sys-
4 tem; and

5 “(iii) an identification of tools needed
6 to assist air traffic controllers in managing
7 unmanned aircraft systems in the national
8 airspace system;

9 “(B) a description of how the FAA plans
10 to use research and development, including re-
11 search and development conducted through
12 NASA’s Unmanned Aircraft Systems Traffic
13 Management, to accommodate, integrate, and
14 provide for the evolution of unmanned aircraft
15 systems into the national airspace system;

16 “(C) an assessment of critical performance
17 abilities necessary to integrate unmanned air-
18 craft systems into the national airspace system,
19 and how these performance abilities can be
20 demonstrated; and

21 “(D) an update on the advancement of
22 technologies needed to integrate unmanned air-
23 craft systems into the national airspace system,
24 including decisionmaking by adaptive systems

1 such as sense-and-avoid, availability of fre-
2 quency spectrum, and cyber physical security.”.

3 **SEC. 22. PROBABILISTIC METRICS FOR EXEMPTIONS.**

4 (a) STUDY.—Not later than 30 days after the date
5 of enactment of this Act, the Administrator shall commis-
6 sion an independent study to—

7 (1) develop parameters to conduct research and
8 development for probabilistic metrics to enable the
9 identification of hazards and the assessment of risks
10 as necessary to make determinations under section
11 333(a) of the FAA Modernization and Reform Act
12 of 2012 (49 U.S.C. 40101 note) that certain un-
13 manned aircraft systems may operate safely in the
14 national airspace system;

15 (2) identify additional research needed to more
16 effectively develop and use such metrics and make
17 such determinations; and

18 (3) in developing parameters for probabilistic
19 metrics, this study shall take into account the utility
20 of performance standards to make determinations
21 under section 333(a) of the FAA Modernization and
22 Reform Act of 2012.

23 (b) CONSIDERATION OF RESULTS.—The Adminis-
24 trator shall consider the results of the study conducted

1 under subsection (a) when making a determination de-
2 scribed in subsection (a)(1).

3 (c) REPORT.—Not later than 9 months after the date
4 of enactment of this Act, the Administrator shall transmit
5 the results of the study conducted under subsection (a)
6 to the Committee on Science, Space, and Technology of
7 the House of Representatives and the Committee on Com-
8 merce, Science, and Transportation of the Senate.

9 **SEC. 23. PROBABILISTIC ASSESSMENT OF RISKS.**

10 The Administrator shall conduct research and devel-
11 opment to enable a probabilistic assessment of risks to in-
12 form requirements for standards for operational certifi-
13 cation of public unmanned aircraft systems in the national
14 airspace.

15 **SEC. 24. UNMANNED AERIAL VEHICLE-MANNED AIRCRAFT**
16 **COLLISION RESEARCH.**

17 (a) RESEARCH.—The Administrator shall coordinate
18 with NASA to conduct comprehensive testing of un-
19 manned aerial vehicles colliding with a manned aircraft,
20 including—

21 (1) collisions between unmanned aerial vehicles
22 of various sizes, traveling at various speeds, and
23 commercial jet airliners of various sizes, traveling at
24 various speeds;

1 (2) collisions between unmanned aerial vehicles
2 of various sizes, traveling at various speeds, and pro-
3 peller planes of various sizes, traveling at various
4 speeds;

5 (3) collisions between unmanned aerial vehicles
6 of various sizes, traveling at various speeds, and
7 blimps of various sizes, traveling at various speeds;

8 (4) collisions between unmanned aerial vehicles
9 of various sizes, traveling at various speeds, and
10 rotorcraft of various sizes, traveling at various
11 speeds; and

12 (5) collisions between unmanned aerial vehicles
13 and various parts of the aforementioned aircraft, in-
14 cluding—

15 (A) windshields;

16 (B) noses;

17 (C) engines;

18 (D) radomes;

19 (E) propellers; and

20 (F) wings.

21 (b) REPORT.—Not later than one year after the date
22 of enactment of this Act, the Administrator shall transmit
23 a report summarizing the costs and results of research
24 under this section to the Committee on Science, Space,
25 and Technology of the House of Representatives and the

1 Committee on Commerce, Science, and Transportation of
2 the Senate.

3 **TITLE IV—CYBERSECURITY**

4 **SEC. 31. CYBER TESTBED.**

5 Not later than 6 months after the date of enactment
6 of this Act, the Administrator shall develop an integrated
7 Cyber Testbed for research, development, evaluation, and
8 validation of air traffic control modernization programs or
9 technologies, before they enter the national airspace sys-
10 tem, as being compliant with FAA data security regula-
11 tions. The Cyber Testbed shall be part of an integrated
12 research and development test environment capable of cre-
13 ating, identifying, defending, and solving cybersecurity-re-
14 lated problems for the national airspace system. This inte-
15 grated test environment shall incorporate integrated test
16 capacities within the FAA related to the national airspace
17 system and NextGen.

18 **SEC. 32. CABIN COMMUNICATIONS, ENTERTAINMENT, AND** 19 **INFORMATION TECHNOLOGY SYSTEMS CY-** 20 **BERSECURITY VULNERABILITIES.**

21 (a) EVALUATION.—The Administrator shall evaluate
22 and determine the research and development needs associ-
23 ated with cybersecurity vulnerabilities of cabin commu-
24 nications, entertainment, and information technology sys-

1 tems on civil passenger aircraft. This evaluation shall in-
2 clude research and development to address—

- 3 (1) technical risks and vulnerabilities;
4 (2) potential impacts on the national airspace
5 and public safety; and
6 (3) identification of deficiencies in cabin-based
7 cybersecurity.

8 (b) ASSESSMENT.—The Administrator shall—

- 9 (1) conduct an assessment of opportunities to
10 cooperate with the private sector in conducting air-
11 craft in-cabin cybersecurity research and develop-
12 ment; and

- 13 (2) provide recommendations to improve re-
14 search and development on cabin-based cybersecurity
15 vulnerabilities.

16 (c) REPORT.—Not later than 9 months after the date
17 of enactment of this Act, the Administrator shall transmit
18 a report on the results of activities under this section to
19 the Committee on Science, Space, and Technology of the
20 House of Representatives and the Committee on Com-
21 merce, Science, and Transportation of the Senate. This
22 report may contain classified annexes.

23 **SEC. 33. CYBERSECURITY THREAT MODELING.**

24 (a) PROGRAM.—

1 (1) IN GENERAL.—The Administrator shall con-
2 sult the National Institute of Standards and Tech-
3 nology to research and develop an internal FAA cy-
4 bersecurity threat modeling program to detect cyber-
5 security vulnerabilities, track how those
6 vulnerabilities might be exploited, and assess the
7 magnitude of harm that could be caused by the ex-
8 ploitation of those vulnerabilities.

9 (2) UPDATES.—This program shall be updated
10 regularly, not less than once every 5 years.

11 (b) REPORT.—Not later than one year after the date
12 of enactment of this Act, and within 7 days of each threat
13 modeling program update under subsection (a)(2), the Ad-
14 ministrator shall transmit a report to the Committee on
15 Science, Space, and Technology of the House of Rep-
16 resentatives and the Committee on Commerce, Science,
17 and Transportation of the Senate detailing the status, re-
18 sults, and composition of the threat modeling program.

19 **SEC. 34. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
20 **NOLOGY CYBERSECURITY STANDARDS.**

21 Not later than 6 months after the date of enactment
22 of this Act, the FAA shall, in consultation with the Na-
23 tional Institute of Standards and Technology, transmit to
24 the Committee on Science, Space, and Technology of the
25 House of Representatives and the Committee on Com-

1 merce, Science, and Transportation of the Senate a report
2 that includes—

3 (1) a cybersecurity standards plan to implement
4 National Institute of Standards and Technology re-
5 visions to cybersecurity guidance documents within
6 timeframes set by the Office of Management and
7 Budget; and

8 (2) an explanation of why any such rec-
9 ommendations are not incorporated in the plan or
10 are not incorporated within such timeframes.

11 **SEC. 35. CYBERSECURITY RESEARCH COORDINATION.**

12 The Administrator shall, where feasible, cooperate on
13 cybersecurity research and development with other inter-
14 national air traffic management organizations, including
15 the European Aviation Safety Agency, the United King-
16 dom Civil Aviation Authority, Nav Canada, and
17 Airservices Australia.

18 **SEC. 36. CYBERSECURITY RESEARCH AND DEVELOPMENT**
19 **PROGRAM.**

20 (a) ESTABLISHMENT.—Not later than 6 months after
21 the date of enactment of this Act, the FAA, in consulta-
22 tion with other agencies as appropriate, shall establish a
23 research and development program to improve the cyber-
24 security of civil aircraft and the national airspace system.

25 (b) PLAN.—

1 (1) IN GENERAL.—Not later than 1 year after
 2 the date of enactment of this Act, the FAA shall de-
 3 velop a plan for the research and development pro-
 4 gram established under subsection (a) that contains
 5 objectives, proposed tasks, milestones, and a 5-year
 6 budgetary profile.

7 (2) NATIONAL ACADEMIES’ STUDY.—The Ad-
 8 ministrator shall—

9 (A) enter into an arrangement with the
 10 National Academies for a study of the plan de-
 11 veloped under paragraph (1); and

12 (B) provide the results of that study to the
 13 Committee on Science, Space, and Technology
 14 of the House of Representatives and the Com-
 15 mittee on Commerce, Science, and Transpor-
 16 tation of the Senate not later than 18 months
 17 after the date of enactment of this Act.

18 **TITLE V—FAA RESEARCH AND** 19 **DEVELOPMENT ACTIVITIES**

20 **SEC. 41. RESEARCH PLAN FOR THE CERTIFICATION OF** 21 **NEW TECHNOLOGIES INTO THE NATIONAL** 22 **AIRSPACE SYSTEM.**

23 Not later than 1 year after the date of enactment
 24 of this Act, the Administrator, in consultation with NASA,
 25 shall transmit a comprehensive research plan for the cer-

1 tification of new technologies into the national airspace
2 system to the Committee on Science, Space, and Tech-
3 nology of the House of Representatives and the Committee
4 on Commerce, Science, and Transportation of the Senate.
5 This plan shall identify research necessary to support the
6 certification and implementation of NextGen, including
7 both ground and air elements, and explain the plan's rela-
8 tionship to other activities and procedures required for
9 certification and implementation of new technologies into
10 the national airspace system. This plan shall be informed
11 by and conform to the recommendations of the National
12 Research Council report titled "Transformation in the
13 Air—A Review of the FAA Research Plan", issued on
14 June 8, 2015. This report shall include, at a minimum—
15 (1) a description of the strategic and prescrip-
16 tive value of the research plan;
17 (2) an explanation of the expected outcomes
18 from executing the plan;
19 (3) an assessment of the FAA's plan to use re-
20 search and development to improve cybersecurity
21 over the next 5 years, taking into account the cyber-
22 security research and development plan developed
23 under section 36(b);

1 (4) an assessment of the current software as-
2 surance practices, and the desired level or attributes
3 to target in the software assurance program;

4 (5) cost estimates, planned schedules, and per-
5 formance benchmarks, including specific tasks, mile-
6 stones, and timelines and including an identification
7 of cost and schedule reserves, for the certification of
8 new technologies into the national airspace system,
9 including NextGen, Automatic Dependent Surveil-
10 lance-Broadcast, Data Communications, National
11 Airspace System Voice System, Collaborative Air
12 Traffic Management Technologies, NextGen Weath-
13 er, and System Wide Information Management;

14 (6) methods for integrating emerging tech-
15 nologies throughout NextGen's development, certifi-
16 cation, and implementation process; and

17 (7) best practices in research and development
18 used by other organizations, such as NASA,
19 NavCanada, and Eurocontrol.

20 **SEC. 42. AVIATION FUEL RESEARCH, DEVELOPMENT, AND**
21 **USAGE.**

22 The Administrator may conduct or supervise re-
23 search, development, and service testing, currently being
24 conducted under the Piston Aviation Fuels Initiative
25 (PAFI) unleaded avgas program, that is required to allow

1 the use of an unleaded aviation gasoline in existing air-
2 craft as a replacement for leaded gasoline.

3 **SEC. 43. AIR TRAFFIC SURVEILLANCE OVER OCEANS AND**
4 **OTHER REMOTE LOCATIONS.**

5 (a) ESTABLISHMENT OF PROGRAM.—The Adminis-
6 trator, in consultation with NASA and other relevant
7 agencies, shall establish a research and development pro-
8 gram on civilian air traffic surveillance over oceans and
9 other remote locations. Such program shall—

10 (1) take into account the need for international
11 interoperability of technologies and air traffic control
12 systems; and

13 (2) recognize that Automatic Dependent Sur-
14 veillance-Broadcast (ADS-B) is an element of the
15 Next Generation Air Transportation System.

16 (b) PILOT PROGRAM.—The Administrator shall es-
17 tablish a pilot program to test, evaluate, and certify for
18 integration into the national airspace system air traffic
19 surveillance equipment for oceans and other remote loca-
20 tions.

21 (c) PARTNERSHIP WITH PRIVATE INDUSTRY.—The
22 Administrator shall partner with private industry on the
23 research, development, testing, and evaluation under this
24 section.

1 (d) REPORT.—Not later than 18 months after the
2 date of enactment of this Act, the Administrator shall
3 transmit a report on activities under this section to the
4 Committee on Science, Space, and Technology of the
5 House of Representatives and the Committee on Com-
6 merce, Science, and Transportation of the Senate.

7 **SEC. 44. SINGLE-PILOTED COMMERCIAL CARGO AIRCRAFT.**

8 (a) PROGRAM.—The FAA, in consultation with
9 NASA and other relevant agencies, shall establish a re-
10 search and development program in support of single-pi-
11 loted cargo aircraft assisted with remote piloting and com-
12 puter piloting.

13 (b) REVIEW.—The FAA, in consultation with NASA,
14 shall conduct a review of FAA research and development
15 activities in support of single-piloted cargo aircraft as-
16 sisted with remote piloting and computer piloting.

17 (c) REPORT.—Not later than 6 months after the date
18 of enactment of this Act, the Administrator shall transmit
19 a report to the Committee on Science, Space, and Tech-
20 nology of the House of Representatives and the Committee
21 on Commerce, Science, and Transportation of the Senate
22 that describes—

23 (1) the program established under subsection
24 (a); and

- 1 (2) the results of the review conducted under
- 2 subsection (b).

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