

115TH CONGRESS
1ST SESSION

H. R. 3198

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

IN THE HOUSE OF REPRESENTATIVES

JULY 12, 2017

Mr. KNIGHT (for himself, Mr. SMITH of Texas, and Mr. BABIN) introduced the following bill; which was referred to the Committee on Science, Space, and Technology, and in addition to the Committee on Transportation and Infrastructure, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as fall within the jurisdiction of the committee concerned

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”.

- 1 (b) TABLE OF CONTENTS.—The table of contents for
 2 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.
 Sec. 25. Special rule for research and development.
 Sec. 26. Beyond line-of-sight research and development.

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.
 Sec. 45. Electromagnetic spectrum research and development.

3 **SEC. 2. DEFINITIONS.**

- 4 As used in this Act, the following definitions apply:

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

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

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

5 (4) SECRETARY.—The term “Secretary” means
6 the Secretary of Transportation.

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

8 (a) AUTHORIZATIONS.—Section 48102(a) of title 49,
9 United States Code, is amended—

10 (1) in the matter before paragraph (1) by strik-
11 ing “and, for each of fiscal years 2012 through
12 2015, under subsection (g)”;

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

15 (3) in paragraph (9) by striking the period at
16 the end and inserting a semicolon; and

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

18 “(10) for fiscal year 2018, \$181,000,000, in-
19 cluding—

20 “(A) \$128,500,000 for Safety Research
21 and Development programs, including—

22 “(i) Fire Research and Safety;

23 “(ii) Propulsion and Fuel Systems;

24 “(iii) Advanced Materials/Structural
25 Safety;

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

1 “(xviii) Single Piloted Commercial
2 Cargo Aircraft Program; and

3 “(xix) UAV-Manned Aircraft Collision
4 Research Program;

5 “(B) \$26,000,000 for Economic Competi-
6 tiveness Research and Development programs,
7 including—

8 “(i) NextGen–Wake Turbulence;

9 “(ii) NextGen–Air Ground Integration
10 Human Factors;

11 “(iii) Next Gen–Weather Technology
12 in the Cockpit; and

13 “(iv) Commercial Space Transpor-
14 tation Safety;

15 “(C) \$20,000,000 for Environmental Sus-
16 tainability Research and Development pro-
17 grams, including—

18 “(i) Environment and Energy; and

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

22 “(D) \$6,500,000 for Mission Support pro-
23 grams, including—

24 “(i) System Planning and Resource
25 Management; and

1 “(ii) William J. Hughes Technical
2 Center Laboratory Facility;

3 “(11) for fiscal year 2019, \$186,000,000, in-
4 cluding—

5 “(A) \$131,000,000 for Safety Research
6 and Development programs, including—

7 “(i) Fire Research and Safety;

8 “(ii) Propulsion and Fuel Systems;

9 “(iii) Advanced Materials/Structural
10 Safety;

11 “(iv) Aircraft Icing/Digital System
12 Safety;

13 “(v) Continued Airworthiness;

14 “(vi) Aircraft Catastrophic Failure
15 Prevention Research;

16 “(vii) Flightdeck/Maintenance/System
17 Integration Human Factors;

18 “(viii) System Safety Management;

19 “(ix) Air Traffic Control/Technical
20 Operations Human Factors;

21 “(x) Aeromedical Research;

22 “(xi) Weather Program;

23 “(xii) Unmanned Aircraft Systems
24 Research;

1 “(xiii) NextGen–Alternative Fuels for
2 General Aviation;

3 “(xiv) Joint Planning and Develop-
4 ment Office;

5 “(xv) Ocean and Other Remote Loca-
6 tions ATS Research Program;

7 “(xvi) Cybersecurity Research Pro-
8 gram;

9 “(xvii) Cybersecurity Threat Modeling
10 Program;

11 “(xviii) Single Piloted Commercial
12 Cargo Aircraft Program; and

13 “(xix) UAV-Manned Aircraft Collision
14 Research Program;

15 “(B) \$28,000,000 for Economic Competi-
16 tiveness Research and Development programs,
17 including—

18 “(i) NextGen–Wake Turbulence;

19 “(ii) NextGen–Air Ground Integration
20 Human Factors;

21 “(iii) Next Gen–Weather Technology
22 in the Cockpit; and

23 “(iv) Commercial Space Transpor-
24 tation Safety;

1 “(C) \$20,000,000 for Environmental Sus-
2 tainability Research and Development pro-
3 grams, including—

4 “(i) Environment and Energy; and

5 “(ii) NextGen–Environmental Re-
6 search–Aircraft Technologies, Fuels and
7 Metrics; and

8 “(D) \$7,000,000 for Mission Support pro-
9 grams, including—

10 “(i) System Planning and Resource
11 Management; and

12 “(ii) William J. Hughes Technical
13 Center Laboratory Facility;

14 “(12) for fiscal year 2020, \$190,000,000, in-
15 cluding—

16 “(A) \$133,500,000 for Safety Research
17 and Development programs, including—

18 “(i) Fire Research and Safety;

19 “(ii) Propulsion and Fuel Systems;

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

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

24 “(v) Continued Airworthiness;

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

“(B) \$29,000,000 for Economic Competitiveness Research and Development programs, including—

“(i) NextGen–Wake Turbulence;

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

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

“(iv) Commercial Space Transportation Safety;

“(C) \$20,000,000 for Environmental Sustainability Research and Development programs, including—

“(i) Environment and Energy; and

“(ii) NextGen–Environmental Research–Aircraft Technologies, Fuels and Metrics; and

“(D) \$7,500,000 for Mission Support programs, including—

“(i) System Planning and Resource Management; and

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

“(13) for fiscal year 2021, \$126,000,000;

“(14) for fiscal year 2022, \$130,000,000; and

1 “(15) for fiscal year 2023, \$132,000,000.”.

2 (b) CONTINGENCY FUNDING.—Section 48102(b) of
3 title 49, United States, Code, is amended by inserting
4 after paragraph (3) the following:

5 “(4) Notwithstanding subsection (a), no funds are
6 authorized for a fiscal year for Environmental Sustain-
7 ability Research and Development programs unless the
8 full amount authorized for that fiscal year under sub-
9 section (a) for the all of the following programs is appro-
10 priated for that fiscal year:

11 “(A) Safety Research and Development pro-
12 grams.

13 “(B) Economic Competitiveness Research and
14 Development programs.

15 “(C) Mission Support programs.”.

16 (c) ANNUAL SUBMISSION OF THE NATIONAL AVIA-
17 TION RESEARCH PLAN.—Section 48102(g) of title 49,
18 United States, Code, is amended to read as follows:

19 “(g) ANNUAL SUBMISSION OF THE NATIONAL AVIA-
20 TION RESEARCH PLAN.—Notwithstanding subsection (a),
21 no funds are authorized to be appropriated for the Office
22 of the Administrator for a fiscal year unless the Secretary
23 has submitted the National Aviation Research Plan to
24 Congress no later than the date of submission of the Presi-

1 dent’s budget request to Congress for that fiscal year, as
 2 required under section 44501(c).”.

3 **TITLE II—FAA RESEARCH AND** 4 **DEVELOPMENT ORGANIZATION**

5 **SEC. 11. ASSOCIATE ADMINISTRATOR FOR RESEARCH AND** 6 **DEVELOPMENT.**

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

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

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

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

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

23 (d) DUAL APPOINTMENT.—The Associate Adminis-
 24 trator for Research and Development may be a dual ap-

1 pointment, holding the responsibilities of another Asso-
2 ciate Administrator.

3 **SEC. 12. RESEARCH ADVISORY COMMITTEE.**

4 (a) ADVICE AND RECOMMENDATIONS.—Section
5 44508(a)(1)(A) of title 49, United States Code, is amend-
6 ed to read as follows:

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

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

18 “(f) WRITTEN REPLY.—

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

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

1 “(B) explains the rationale for the Admin-
2 istrator’s decision;

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

6 “(D) describes the steps the Administrator
7 will take to implement the recommendation.

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

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

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

18 “(3) NATIONAL AVIATION RESEARCH PLAN.—
19 The National Aviation Research Plan shall include a
20 summary of all research advisory committee rec-
21 ommendations and a description of the status of
22 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 (a) AMENDMENTS.—Section 332(a)(5) of the FAA
 10 Modernization and Reform Act of 2012 (49 U.S.C. 40101
 11 note) is amended—

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

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

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

22 “(i) the role of the 6 unmanned air-
 23 craft systems test ranges established under
 24 subsection (c) and the Unmanned Aircraft
 25 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 (b) LIMITATION.—No funds are authorized to be ap-
4 propriated for the Office of the Administrator for a fiscal
5 year unless the Secretary has submitted the unmanned
6 aircraft systems roadmap to Congress on an annual basis
7 as required under section 332(a) of the FAA Moderniza-
8 tion and Reform Act of 2012 (49 U.S.C. 40101 note).

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

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

13 (1) develop parameters to conduct research and
14 development for probabilistic metrics to enable the
15 identification of hazards and the assessment of risks
16 as necessary to make determinations under section
17 333(a) of the FAA Modernization and Reform Act
18 of 2012 (49 U.S.C. 40101 note) that certain un-
19 manned aircraft systems may operate safely in the
20 national airspace system;

21 (2) identify additional research needed to more
22 effectively develop and use such metrics and make
23 such determinations; and

24 (3) in developing parameters for probabilistic
25 metrics, this study shall take into account the utility

1 of performance standards to make determinations
2 under section 333(a) of the FAA Modernization and
3 Reform Act of 2012.

4 (b) CONSIDERATION OF RESULTS.—The Adminis-
5 trator shall consider the results of the study conducted
6 under subsection (a) when making a determination de-
7 scribed in subsection (a)(1).

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

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

15 The Administrator shall conduct research and devel-
16 opment to enable a probabilistic assessment of risks to in-
17 form requirements for standards for operational certifi-
18 cation of public unmanned aircraft systems in the national
19 airspace.

20 **SEC. 24. UNMANNED AERIAL VEHICLE-MANNED AIRCRAFT**
21 **COLLISION RESEARCH.**

22 (a) RESEARCH.—The Administrator shall coordinate
23 with NASA to conduct comprehensive testing of un-
24 manned aerial vehicles colliding with a manned aircraft,
25 including—

1 (1) collisions between unmanned aerial vehicles
2 of various sizes, traveling at various speeds, and
3 commercial jet airliners of various sizes, traveling at
4 various speeds;

5 (2) collisions between unmanned aerial vehicles
6 of various sizes, traveling at various speeds, and pro-
7 peller planes of various sizes, traveling at various
8 speeds;

9 (3) collisions between unmanned aerial vehicles
10 of various sizes, traveling at various speeds, and
11 blimps of various sizes, traveling at various speeds;

12 (4) collisions between unmanned aerial vehicles
13 of various sizes, traveling at various speeds, and
14 rotorcraft of various sizes, traveling at various
15 speeds; and

16 (5) collisions between unmanned aerial vehicles
17 and various parts of the aforementioned aircraft, in-
18 cluding—

19 (A) windshields;

20 (B) noses;

21 (C) engines;

22 (D) radomes;

23 (E) propellers; and

24 (F) wings.

1 (b) REPORT.—Not later than one year after the date
2 of enactment of this Act, the Administrator shall transmit
3 a report summarizing the costs and results of research
4 under this section to the Committee on Science, Space,
5 and Technology of the House of Representatives and the
6 Committee on Commerce, Science, and Transportation of
7 the Senate.

8 **SEC. 25. SPECIAL RULE FOR RESEARCH AND DEVELOP-**
9 **MENT.**

10 Except as necessary to support enforcement action
11 under applicable provisions of law against persons oper-
12 ating unmanned aircraft in a manner that endangers the
13 safety of the national airspace system, notwithstanding
14 any other provision of law relating to the incorporation
15 of unmanned aircraft systems into FAA plans and policies,
16 the Administrator may not promulgate any rule or regula-
17 tion regarding the operation of an unmanned aircraft sys-
18 tem—

19 (1) that is flown strictly for research and devel-
20 opment use;

21 (2) that is operated less than 400 feet above
22 the ground and in Class G airspace;

23 (3) that is operated in a manner that does not
24 interfere with and gives way to any manned aircraft;
25 and

1 (4) when flown within 5 miles of an airport, the
 2 operator of the aircraft provides the airport operator
 3 and the airport air traffic control tower (when an air
 4 traffic facility is located at the airport) with prior
 5 notice of the operation (unmanned aircraft operators
 6 flying from a permanent location within 5 miles of
 7 an airport should establish a mutually agreed upon
 8 operating procedure with the airport operator and
 9 the airport air traffic control tower (when an air
 10 traffic facility is located at the airport)).

11 **SEC. 26. BEYOND LINE-OF-SIGHT RESEARCH AND DEVELOP-**
 12 **MENT.**

13 (a) AMENDMENTS.—Section 332(c)(2) of the FAA
 14 Modernization and Reform Act of 2012 (49 U.S.C. 40101
 15 note) is amended—

16 (1) by striking “Administrator shall” and in-
 17 serting “Administrator”;

18 (2) at the beginning of each of subparagraphs
 19 (A) through (F), by inserting “shall”;

20 (3) at the end of subparagraph (E), by striking
 21 “and”;

22 (4) at the end of subparagraph (F), by striking
 23 the period and inserting a semicolon; and

24 (5) by adding at the end the following new sub-
 25 paragraphs:

1 “(G) shall allow beyond line-of-sight oper-
2 ation of unmanned aircraft systems to be flown
3 within the boundaries of a test range estab-
4 lished under this subsection;

5 “(H) may promulgate regulations gov-
6 erning beyond line-of-sight operation of un-
7 manned aircraft systems flown within the
8 boundaries of a test range established under
9 this subsection for the purposes of public safe-
10 ty; and

11 “(I) shall allow NASA to authorize oper-
12 ation of beyond line-of-sight unmanned aircraft
13 systems within the boundaries of any NASA
14 center or facility.”.

15 (b) STATUTORY CONSTRUCTION.—Nothing in the
16 amendments made by subsection (a) shall be construed to
17 limit the authority of the Administrator to pursue enforce-
18 ment action under applicable provisions of law against per-
19 sons operating unmanned aircraft in a manner that en-
20 dangers the safety of the national airspace system.

21 **TITLE IV—CYBERSECURITY**

22 **SEC. 31. CYBER TESTBED.**

23 Not later than 6 months after the date of enactment
24 of this Act, the Administrator shall develop an integrated
25 Cyber Testbed for research, development, evaluation, and

1 validation of air traffic control modernization programs or
2 technologies, before they enter the national airspace sys-
3 tem, as being compliant with FAA data security regula-
4 tions. The Cyber Testbed shall be part of an integrated
5 research and development test environment capable of cre-
6 ating, identifying, defending, and solving cybersecurity-re-
7 lated problems for the national airspace system. This inte-
8 grated test environment shall incorporate integrated test
9 capacities within the FAA related to the national airspace
10 system and NextGen.

11 **SEC. 32. CABIN COMMUNICATIONS, ENTERTAINMENT, AND**
12 **INFORMATION TECHNOLOGY SYSTEMS CY-**
13 **BERSECURITY VULNERABILITIES.**

14 (a) EVALUATION.—The Administrator shall evaluate
15 and determine the research and development needs associ-
16 ated with cybersecurity vulnerabilities of cabin commu-
17 nications, entertainment, and information technology sys-
18 tems on civil passenger aircraft. This evaluation shall in-
19 clude research and development to address—

- 20 (1) technical risks and vulnerabilities;
21 (2) potential impacts on the national airspace
22 and public safety; and
23 (3) identification of deficiencies in cabin-based
24 cybersecurity.

25 (b) ASSESSMENT.—The Administrator shall—

1 (1) conduct an assessment of opportunities to
2 cooperate with the private sector in conducting air-
3 craft in-cabin cybersecurity research and develop-
4 ment; and

5 (2) provide recommendations to improve re-
6 search and development on cabin-based cybersecurity
7 vulnerabilities.

8 (c) REPORT.—Not later than 9 months after the date
9 of enactment of this Act, the Administrator shall transmit
10 a report on the results of activities under this section to
11 the Committee on Science, Space, and Technology of the
12 House of Representatives and the Committee on Com-
13 merce, Science, and Transportation of the Senate. This
14 report may contain classified annexes.

15 **SEC. 33. CYBERSECURITY THREAT MODELING.**

16 (a) PROGRAM.—

17 (1) IN GENERAL.—The Administrator shall con-
18 sult the National Institute of Standards and Tech-
19 nology to research and develop an internal FAA cy-
20 bersecurity threat modeling program to detect cyber-
21 security vulnerabilities, track how those vulnerabili-
22 ties might be exploited, and assess the magnitude of
23 harm that could be caused by the exploitation of
24 those vulnerabilities.

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

3 (b) REPORT.—Not later than one year after the date
4 of enactment of this Act, and within 7 days of each threat
5 modeling program update under subsection (a)(2), the Ad-
6 ministrator shall transmit a report to the Committee on
7 Science, Space, and Technology of the House of Rep-
8 resentatives and the Committee on Commerce, Science,
9 and Transportation of the Senate detailing the status, re-
10 sults, and composition of the threat modeling program.

11 **SEC. 34. NATIONAL INSTITUTE OF STANDARDS AND TECH-**
12 **NOLOGY CYBERSECURITY STANDARDS.**

13 Not later than 6 months after the date of enactment
14 of this Act, the FAA shall, in consultation with the Na-
15 tional Institute of Standards and Technology, transmit to
16 the Committee on Science, Space, and Technology of the
17 House of Representatives and the Committee on Com-
18 merce, Science, and Transportation of the Senate a report
19 that includes—

20 (1) a cybersecurity standards plan to implement
21 National Institute of Standards and Technology re-
22 visions to cybersecurity guidance documents within
23 timeframes set by the Office of Management and
24 Budget; and

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

4 **SEC. 35. CYBERSECURITY RESEARCH COORDINATION.**

5 The Administrator shall, where feasible, cooperate on
6 cybersecurity research and development with other inter-
7 national air traffic management organizations, including
8 the European Aviation Safety Agency, the United King-
9 dom Civil Aviation Authority, Nav Canada, and Airser-
10 vices Australia.

11 **SEC. 36. CYBERSECURITY RESEARCH AND DEVELOPMENT**
12 **PROGRAM.**

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

18 (b) PLAN.—

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

1 (2) NATIONAL ACADEMIES' STUDY.—The Ad-
 2 ministrator shall—

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

6 (B) provide the results of that study to the
 7 Committee on Science, Space, and Technology
 8 of the House of Representatives and the Com-
 9 mittee on Commerce, Science, and Transpor-
 10 tation of the Senate not later than 18 months
 11 after the date of enactment of this Act.

12 **TITLE V—FAA RESEARCH AND** 13 **DEVELOPMENT ACTIVITIES**

14 **SEC. 41. RESEARCH PLAN FOR THE CERTIFICATION OF** 15 **NEW TECHNOLOGIES INTO THE NATIONAL** 16 **AIRSPACE SYSTEM.**

17 Not later than 1 year after the date of enactment
 18 of this Act, the Administrator, in consultation with NASA,
 19 shall transmit a comprehensive research plan for the cer-
 20 tification of new technologies into the national airspace
 21 system to the Committee on Science, Space, and Tech-
 22 nology of the House of Representatives and the Committee
 23 on Commerce, Science, and Transportation of the Senate.
 24 This plan shall identify research necessary to support the
 25 certification and implementation of NextGen, including

1 both ground and air elements, and explain the plan’s rela-
2 tionship to other activities and procedures required for
3 certification and implementation of new technologies into
4 the national airspace system. This plan shall be informed
5 by and conform to the recommendations of the National
6 Research Council report titled “Transformation in the
7 Air—A Review of the FAA Research Plan”, issued on
8 June 8, 2015. This report shall include, at a minimum—

9 (1) a description of the strategic and prescrip-
10 tive value of the research plan;

11 (2) an explanation of the expected outcomes
12 from executing the plan;

13 (3) an assessment of the FAA’s plan to use re-
14 search and development to improve cybersecurity
15 over the next 5 years, taking into account the cyber-
16 security research and development plan developed
17 under section 36(b);

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

21 (5) cost estimates, planned schedules, and per-
22 formance benchmarks, including specific tasks, mile-
23 stones, and timelines and including an identification
24 of cost and schedule reserves, for the certification of
25 new technologies into the national airspace system,

1 including NextGen, Automatic Dependent Surveil-
 2 lance-Broadcast, Data Communications, National
 3 Airspace System Voice System, Collaborative Air
 4 Traffic Management Technologies, NextGen Weath-
 5 er, and System Wide Information Management;

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

9 (7) best practices in research and development
 10 used by other organizations, such as NASA, Nav-
 11 Canada, and Eurocontrol.

12 **SEC. 42. AVIATION FUEL RESEARCH, DEVELOPMENT, AND**
 13 **USAGE.**

14 The Administrator may conduct or supervise re-
 15 search, development, and service testing, currently being
 16 conducted under the Piston Aviation Fuels Initiative
 17 (PAFI) unleaded avgas program, that is required to allow
 18 the use of an unleaded aviation gasoline in existing air-
 19 craft as a replacement for leaded gasoline.

20 **SEC. 43. AIR TRAFFIC SURVEILLANCE OVER OCEANS AND**
 21 **OTHER REMOTE LOCATIONS.**

22 (a) ESTABLISHMENT OF PROGRAM.—The Adminis-
 23 trator, in consultation with NASA and other relevant
 24 agencies, shall establish a research and development pro-

1 gram on civilian air traffic surveillance over oceans and
2 other remote locations. Such program shall—

3 (1) take into account the need for international
4 interoperability of technologies and air traffic control
5 systems; and

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

9 (b) PILOT PROGRAM.—The Administrator shall es-
10 tablish a pilot program to test, evaluate, and certify for
11 integration into the national airspace system air traffic
12 surveillance equipment for oceans and other remote loca-
13 tions.

14 (c) PARTNERSHIP WITH PRIVATE INDUSTRY.—The
15 Administrator shall partner with private industry on the
16 research, development, testing, and evaluation under this
17 section.

18 (d) REPORT.—Not later than 18 months after the
19 date of enactment of this Act, the Administrator shall
20 transmit a report on activities under this section to the
21 Committee on Science, Space, and Technology of the
22 House of Representatives and the Committee on Com-
23 merce, Science, and Transportation of the Senate.

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

2 (a) PROGRAM.—The FAA, in consultation with
3 NASA and other relevant agencies, shall establish a re-
4 search and development program in support of single-pi-
5 loted cargo aircraft assisted with remote piloting and com-
6 puter piloting.

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

11 (c) REPORT.—Not later than 6 months after the date
12 of enactment of this Act, the Administrator shall transmit
13 a report to the Committee on Science, Space, and Tech-
14 nology of the House of Representatives and the Committee
15 on Commerce, Science, and Transportation of the Senate
16 that describes—

17 (1) the program established under subsection
18 (a); and

19 (2) the results of the review conducted under
20 subsection (b).

21 **SEC. 45. ELECTROMAGNETIC SPECTRUM RESEARCH AND**
22 **DEVELOPMENT.**

23 The Administrator shall develop a program to re-
24 search the use of spectrum in the civil aviation domain,
25 including aircraft and unmanned aircraft systems. This
26 research shall, at a minimum, address—

1 (1) how, operating within an Unmanned Air-
2 craft System Traffic Management system, un-
3 manned aircraft systems can safely use, for control
4 link, tracking, diagnostics, payload communication,
5 collaborative-collision avoidance (e.g. vehicle-to-vehi-
6 cle communications), and other purposes—

7 (A) aviation-protected spectrum;

8 (B) commercial communications networks,
9 such as mobile communications networks; and

10 (C) any other licensed or unlicensed spec-
11 trum;

12 (2) how the reallocation of spectrum assigned
13 for use within frequency bands adjacent to those al-
14 located for position, navigation, and timing may im-
15 pact the safety of civil aviation; and

16 (3) measures to protect and mitigate against
17 spectrum interference in frequency bands used by
18 the civil aviation community to ensure public safety.

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