Federal Aviation Administration

REDAC / NAS Ops

Review of FY 2021 Proposed Portfolio

New ATM Requirements

BLI Number: 1A09D

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New ATM Requirements/ 1A09D

What are the benefits to the FAA

- The New ATM Requirements program is needed to identify new opportunities to improve the efficiency and effectiveness of air traffic management operations.

- Activities include the research and development of procedures, tools, and systems in support of operational improvements.

- These developments support the NextGen goal of expanding capacity and improving the strategic management of operations in the NAS.

What determines program success

- The service analysis and operational demonstration activities within this program support the development of operational improvements that will increase the number of arrivals and departures at major airports.

- The results of these early development efforts will transition into future standards, and implementations.

New ATM Requirements / 1A09D Overview Capabilities

People:

- Program Manager / Portfolio Manager
- Project Managers
- Subject Matter Experts (air traffic control specialists, meteorologists, information management and communications specialists)

Laboratories:

- Boeing Avionics Lab

- Honeywell IPS Labs

- Rockwell Collins Labs

- NASA Glenn Labs (communications standards development and validation work)

- NextGen Integration and Evaluation Capability (NIEC)

- Embry Riddle Florida Test Bed (FTB)

New ATM Requirements

FY19 Accomplishments

- NextGen Information Services Development, Harmonization and Governance Support developed a Current and Emerging IS Alternatives Assessment Report

- Evaluated safety performance requirements for the Airborne Collision Avoidance System (ACAS) variant for unmanned aircraft, ACAS Xu.

- Continued work on synchronization of trajectory information between aircraft and ATM systems.

- Spectrum Reallocation Study: Spectrum Valuation

- Evolution plan for the Northeast Corridor, the first operational area of the Initial Trajectory Based Operations Implementation Strategy

- Continued work at ICAO and RTCA in development of standards for Aeronautical Telecommunications Network (ATN) over Internet Protocol (IP) communications.

- Enterprise Services Infrastructure (ESI) developed a framework for potential future services regarding requirements allocation to functional capabilities

Future Collision Avoidance Systems (Future CAS)

Future CAS will complement work planned under the Airborne Collision Avoidance System (ACAS) X program to include new user classes such as Unmanned Aircraft Systems (Xu) and General Aviation /Rotorcraft Systems (Xp). This activity will conduct research to develop requirements for these new classes of users to ensure future collision avoidance systems are interoperable within the NAS.

Planned Research Activities

- FY19 - Develop ACAS Xp system concept and requirements (including rotorcraft) to inform ongoing ACAS X development activities.

- FY20 - Complete ACAS-Xp (rotorcraft) interoperability assessment and updates to applicable encounter models to include trajectory considerations; and proof of concept to inform standards development activities.

- FY21 - Develop System Requirements Specification (SRS) document for ACAS Xp (rotorcraft) and complete flight demo.

- FY22 - Complete report on Operational Tuning for ACAS-Xp (rotorcraft) logic and complete safety and operational suitability analysis

- FY23 – Complete draft version of minimum operational performance standards for ACAS Xp.

Expected Research Products

- Standards for collision avoidance systems for new user classes

Weather Transition

This activity ensures that aviation weather research concepts are matured and technically developed under FAA guidelines to a level of readiness for operational use in the NAS. This includes Concept Maturity and Technology Development based work in support of the Research for Service Analysis and Service Analysis AMS lifecycle phases. The matured capabilities developed will support future weather information enabled decision support for the NAS.

Planned Research Activities

- FY19 - Analyze operational needs, usage, and service shortfalls for in-flight icing information support capabilities and develop report..

- FY20 - Analyze current winter weather information support capabilities in operations to determine unmet FAA needs and develop report.

- FY21 - Create, test and evaluate ceiling and visibility information support prototypes and conduct operational demonstrations to display pre-service functionality.

- FY22 - Conduct studies surrounding the operational usage of convective weather information support capabilities, determine the performance level of current weather products and develop report.

- FY23 - Analyze current inflight icing capabilities at low flight levels to validate gaps and develop report.

Expected Research Products

- Matured capabilities to support future weather information-enabled decision support for the NAS.

Synchronization of Air/Ground Procedures

The Air/Ground Procedure Synchronization activity will explore the trajectory synchronization concept of use and validate proposed solutions in collaboration with industry partners and operational stakeholders through simulations and flight trials. In current operations, various ATM and airspace user functions utilize disparate trajectory predictions for future position of aircraft. Trajectory synchronization will provide a common picture of trajectory information between flight deck, air traffic systems, and airspace user systems. The activity will document and provide recommendations for the implementation of trajectory synchronization methodologies and integration of gate-to-gate ATM functions to enable Trajectory Based Operations.

Planned Research Activities

- FY19 - Complete prototype development of trajectory synchronization demonstration systems.

- FY20 - Complete trajectory synchronization simulation.

- FY21 - Conduct trajectory synchronization shadow evaluation, and complete and document analysis.

- FY22 - Complete trajectory synchronization flight demonstration/trial and document lessons learned.

- FY23 - Develop preliminary air/ground trajectory synchronization implementation recommendations and strategy.

Expected Research Products

- Recommendations for the implementation of trajectory synchronization methodologies and integration of gate-to-gate ATM functions to enable Trajectory Based Operations.

- Requirements for exchange and synchronization of trajectory information between aircraft and ATM systems.

Advanced Air/Ground Communications

In collaboration with international partners, this activity will support the development of advanced communication technologies such as the Aeronautical Telecommunications Network (ATN) Internet Protocol Suite (IPS) standards for operational usage. This activity will result in the development and validation of Standards for Future Communications Infrastructure technologies. These advanced communications technologies will help to alleviate spectrum congestion issues and enable the achievement of more stringent NextGen performance requirements needed for future applications.

Planned Research Activities

- FY19 – Develop IPS Standards to support the FAA's Data Comm Segment 2 and Future Communication Systems

- FY19 - Complete draft Security standards development for future ATN/IPS Air-Ground Communication Systems.

- FY20 - Complete final standards for future ATN/IPS Air-Ground Communication Systems.

- FY21 - Complete report documenting requirements for a Software Defined Radio to support multi-modal operation

- FY22 - Complete a report on the findings of investigating further usage of Software Defined Radios to support Multi-modal operations in the NAS environment.

- FY23 - Document the findings of potential use of Commercial Off the Shelf (COTS) Equipment to meet future Data Communications requirements, including the quality service levels required and the regulatory and security considerations associated with the use of COTS hardware and software.

Expected Research Products

- Development and validation of Standards for Future Communications Infrastructure technologies.

Command and Control in the Cloud

This activity will evaluate technical assumptions based on safety, mission criticality, and the ability of current and planned cloud architecture to provide command and control services in the future.

Planned Research Activities

- FY19 - Assess gaps in current cloud architecture to support command and control capability for NAS systems.

- FY20 - Identify and evaluate NAS Systems potentially suitable for command and control in a cloud environment.

- FY21 - Develop prototype command and control instance in the cloud for a selected demonstrator system.

- FY22 - Prepare and deliver a technology transfer package for Command and Control in the Cloud technologies.

Expected Research Products

- Evaluation of and recommendations for cloud architecture to provide command and control services in the future.

Next Generation Automation Input Devices

This activity will support the definition of requirements and concept development for an enterprise solution to next generation input devices for automation systems in the NAS.

Planned Research Activities

- FY20 - Complete an engineering analysis to define performance requirements for an enterprise solution to next generation input devices for automation systems in the NAS.

- FY21 - Identify gaps in current input device capabilities for automation systems in the NAS and complete report.

- FY22 - Identify and evaluate candidate technologies suitable for an enterprise solution for automation systems in the NAS and develop transition strategy.

- FY23 - Down-select identified candidate technologies for more in depth assessment for automation systems in the NAS and complete report.

Expected Research Products

- Recommendations for next generation input devices for automation systems in the NAS.

IP Based Command and Control Data Links

This activity will conduct engineering and analysis to support the potential use of internet based data exchange for command and control applications.

Planned Research Activities

- FY21 - Complete initial analysis of performance, security requirements, and risk management analysis to support the potential use of internet based data exchange for command and control applications

- FY22 – Complete final analysis of performance, security requirements, and risk management analysis to support the potential use of internet based data exchange for command and control applications

- FY23 - Develop requirements for hardware application and link performance requirements to support the potential use of internet based data exchange for command and control applications.

Expected Research Products

- Recommendations for next generation input devices for automation systems in the NAS.

Emerging FY21 Focal Areas

- **IP Based Command and Control Data Links**

New ATM Requirements

Research Requirement

The New ATM Requirements program is needed to identify new opportunities to improve the efficiency and effectiveness of air traffic management operations. Activities include the research and development of procedures, tools, and systems in support of operational improvements.

Outputs/Outcomes

- Recommendations for harmonizing protocols and standards for enterprise information use both internally and with external agency partners.
- Standards for collision avoidance systems for new user classes.
- Weather data integrated into air traffic management systems.
- Requirements for exchange and synchronization of trajectory information between aircraft and ATM systems.
- Advanced communications technologies for data exchange between air and ground systems.
- Evaluation of cloud architecture to provide command and control services in the future.
- Transition strategy for the possible use of COTS displays as Common Displays in the NAS.
- Enterprise solution to next generation input devices for automation systems in the NAS.

FY 2021 Planned Research

- Develop System Requirements Specification (SRS) document for ACAS Xp (rotorcraft).
- Conduct trajectory synchronization shadow evaluation, and complete and document analysis.
- Develop prototype command and control instance in the cloud for a selected demonstrator system.
- Build prototype common display and complete report on shadow-mode testing of prototype display at an operational facility.
- Identify gaps in current input device capabilities for automation systems in the NAS and complete report.

Out Year Funding Requirements

FY19	FY20	FY21	FY22	FY23
9.5	9.0	7.5	7.5	7.5