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Government/Industry Operational Concept for the Evolution of Free Flight

Edition 2

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Foreword

This report was approved the RTCA Free Flight Steering Committee on August 16, 2000.

RTCA, Incorporated is a not-for-profit corporation formed to advance the art and science of aviation and aviation electronic systems for the benefit of the public. The organization functions as a Federal Advisory Committee and develops consensus based recommendations on contemporary aviation issues. RTCA's objectives include but are not limited to:

- coalescing aviation system user and provider technical requirements in a manner that helps government and industry meet their mutual objectives and responsibilities;

- analyzing and recommending solutions to the system technical issues that aviation faces as it continues to pursue increased safety, system capacity and efficiency;

- developing consensus on the application of pertinent technology to fulfill user and provider requirements, including development of minimum operational performance standards for electronic systems and equipment that support aviation; and

- assisting in developing the appropriate technical material upon which positions for the International Civil Aviation Organization and the International Telecommunication Union and other appropriate international organizations can be based.

The organization's recommendations are often used as the basis for government and private sector decisions as well as the foundation for many Federal Aviation Administration Technical Standard Orders.

Since RTCA is not an official agency of the United States Government, its recommendations may not be regarded as statements of official government policy unless so enunciated by the U.S. government organization or agency having statutory jurisdiction over any matters to which the recommendations relate.

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1. 0 Introduction

This document provides an evolutionary concept of operations from the perspectives of National Airspace System (NAS) users and service providers. The concepts provided herein cover the transition of the current NAS from the near term through the far-term time when mature Free Flight[1] occurs. It is intended to incorporate the needs and requirements of NAS users and service providers and to serve as the basis for an incremental and a benefits-driven approach towards Free Flight. It is also intended to form the basis for both the Federal Aviation Administration (FAA) and the user community to plan procedural, investment and architectural decisions that will provide the operational capabilities needed to achieve Free Flight.

The information provided in this document combines concepts described in the Joint/Government Industry Concept, the Commercial Space Transportation Concept of Operations in the National Airspace System, and the ATS Concept of Operations for the National Airspace System in 2005. It represents collaboration and consensus external to the agency with the RTCA Select Committee on Free Flight Implementation Working Group on ATM Operational Concepts and internally it is the work of Air Traffic Services (ATS), with support from the organizations of the Associate Administrators for Certification & Regulation, Commercial Space Transportation, and Research & Acquisition. This broad support within the FAA reflects the continued migration of the NAS from a ground-based infrastructure to one that encompasses both ground and airborne systems. The participation of these FAA organizations also demonstrates recognition of the need to engage the acquisition components of the FAA early in the concept formulation process. Participation of DoD and industry also recognize the need for early involvement of these stakeholders to facilitate development of a coherent strategy across the entire NAS.

1.1 Background

Free Flight is an innovative concept born out of the need for increased user flexibility, operating efficiencies, and safety to meet the growing demand for air transportation. The concept of Free Flight was developed by the RTCA Task Force on Free Flight during 1995. The RTCA Task Force produced a report entitled The Final Report of RTCA Task Force 3: Free Flight Implementation [1], that further defined the Free Flight operational concept, evaluated the Free Flight architecture and technology needs, and identified an incremental transition to Free Flight. The RTCA Task Force 3 report also outlined specific operational capabilities and potential procedures and technologies that could achieve those concepts. Although flights conducted under Visual Flight Rules (VFR) will receive some benefit from greater information sharing under a Free Flight concept, flights under Instrument Flight Rules will benefit the most by greater flexibility, historically only enjoyed by VFR flights.

The Free Flight concept suggests that significant benefits can be achieved by concentrating on (1) removal of constraints and restrictions to flight operations, (2) better exchange of information and collaborative decision making among users and service providers, (3) more efficient management of airspace and airport resources, and (4) tools and models to aid air traffic service providers. The RTCA Task Force 3 report illustrates incremental concepts for near-, mid-, and far-term timeframes.

[1] Free Flight is "...a safe and efficient operating capability under instrument flight rules (IFR) in which the operators have the freedom to select their path and speed in real time. Air traffic restrictions are only imposed to ensure separation, to preclude exceeding airport capacity, to prevent unauthorized flight through Special Use Airspace (SUA), and to ensure safety of flight. Restrictions are limited in extent and duration to correct the identified problem. Any activity which removes restrictions represents a move toward Free Flight." [Citation]

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The Free Flight Action Plan [2], prepared by the Government/Industry Free Flight Steering Committee, outlines the specific FAA and industry program activities that implement the concepts and capabilities defined in the RTCA Task Force 3 report in the timeframe needed by the user community. It reflects a benefits-driven incremental approach to the provision of services to the users of the airspace.

1.2 Development Process

This document, *Government/Industry Operational Concept for the Evolution of Free Flight, Edition 2*, is a further refinement of the Free Flight operational concepts. The concepts are described from the airspace user and service provider perspectives during all phases of flight. This document uses the RTCA Task Force 3 report, as well as the Action Plan, as the basis to further refine those concepts and to more specifically define the communication, navigation and surveillance/Air Traffic Management (CNS/ATM) concepts needed to achieve Free Flight.

This document is also a reflection of the second edition of the *Air Traffic Service Plan* issued by ATS in the fall of 1996 to facilitate an ongoing dialogue between the air traffic service organizations and airspace users. This dialogue is intended to develop a clear understanding of user needs, and to provide the air traffic services necessary to meet them. Its primary purpose is to highlight the views of the aviation community, focusing on changes that must be made to increase user flexibility, operating efficiencies, and safety. This document describes an air traffic environment that provides additional flexibility and efficiency through development of a global airspace system incorporating the International Civil Aviation Organization's communication, navigation and surveillance (CNS/ATM) concept.

It is important to remember that the existing NAS continues to reflect its origins as a system in which aircraft flew directly from NAVigational AID (NAVAID) to NAVAID along a set of FAA defined routes. The airspace structure and boundary restrictions strongly reflect the constraints that the communication and computational systems imposed when the NAS was developed. For this system to progress toward meeting the NAS user needs and requirements, there must be changes in procedures, roles and responsibilities, equipment, and automation functions to evolve into a structure that accommodates greater user flexibility in planning and conducting flights. This operational concept provides a basis for the NAS architectural decisions and strategies needed to complete this transition. It also serves as a source for strategic decision making from the NAS user and service provider perspectives.

1.3 Scope and Intended Use

This document reflects the joint FAA and industry view of how the air traffic management system will operate in three timeframes: near-term, mid-term, and far-term or mature state. For each concept described, the respective roles and responsibilities of the participants in that concept are described. Where appropriate, operational scenarios are used to better illustrate the concept and more easily convey the roles that the various participants will have to play.

This document will be used by both the FAA and the user community to coordinate activities related to the development and implementation of air traffic services and operational capabilities within the NAS. This document will be updated as necessary to reflect changes in FAA and user strategy. As rigorous concept evaluation and validation is conducted, this document will be modified to reflect the results of those efforts to provide a more detailed definition and analysis of the concepts.

In this document, the term "Service Provider" is used generically to refer to any air traffic service employee or DoD member who provides separation assurance, traffic management,

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