RTCA, Inc.
1140 Connecticut Avenue, NW, Suite 1020
Washington, DC 20036-4001 USA

Free Flight Action Plan

Prepared by:

August 15, 1996

Free Flight Steering Committee

Copies of this document may be obtained from

RTCA, Inc.

Telephone: 202-833-9339
Facsimile: 202-833-9434
Internet: www.rtca.org

Please visit the RTCA Online Store for document pricing and ordering information.

FOREWORD

This report was prepared as a collaborative government/industry activity and was approved by the Free Flight Steering Committee, a committee formed under the auspices of RTCA, Inc. at the request of the FAA in response to the *Final Report of RTCA Task Force 3, Free Flight Implementation.* The objectives of the Free Flight Steering Committee are:

- To establish an agreed-to implementation strategy and milestones;
- To periodically review government and industry progress in meeting implementation commitments, via the use of appropriate metrics; and
- To identify new free flight implementation opportunities as well as events/situations that are inhibiting progress and review actions that are taken.

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. 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.

Table of Contents

JOINT GOALS STATEMENT ii
FUNDAMENTAL PRECEPTS iii

INTRODUCTION 1

BACKGROUND 1
FREE FLIGHT DEFINED 1
COLLABORATION ON IMPLEMENTATION 2
AVIATION COMMUNITY PARTICIPATION 2
RECOMMENDED ACTIONS 3
ECONOMIC PERSPECTIVE 4
INCREMENTAL APPROACH TO IMPLEMENTATION 4
EARLY BENEFITS 5
TECHNOLOGY ADVANTAGES 5

MANAGEMENT SUMMARY 7

GOVERNMENT AND INDUSTRY INITIATIVES 7
RELATIONSHIPS WITH FAA ADVISORY COMMITTEES 8
FREE FLIGHT ACTION ITEMS 8
MAINTENANCE OF THE FREE FLIGHT ACTION PLAN 8
ADDITIONAL OPPORTUNITIES 8
ANALYSIS, MODELING, AND SIMULATION 9
INTRODUCTION TO FREE FLIGHT ACTION PLAN 10

FREE FLIGHT ACTION ITEMS 11

APPENDIX A
Dependencies for Analysis, Modeling, and Simulation A-1

APPENDIX B
Schedule Summary B-1

APPENDIX C
List of Acronyms C-1

Free Flight Action Plan
Joint Goals Statement

The overall guiding principles for moving toward mature Free Flight were developed over a 2 year period by an RTCA sponsored Select Committee on Free Flight involving both industry and Government representatives and by RTCA's Task Force 3 on Free Flight implementation. Task Force 3 approximately 250 representatives from the Federal Aviation Administration (FAA) and the aviation community. In October 1995, the task force published the following guiding principles:

- Ensure that the transition to Free Flight will not compromise safety.
- Expand the Free Flight definition to include strategic flight planning and ground phases of operation.
- Emphasize initiatives that give users a high return on investment.
- Ensure that the transition to Free Flight is benefits-driven.
- Emphasize the need for collaborative planning.
- Emphasize procedural improvements with proven technology.
- Consider end-to-end impact and benefits when planning improvements.
- Address human factors issues during all stages of development.
- Assess benefits when possible prior to implementation.
- Utilize modeling and analysis to anticipate operational impacts on the National Airspace System (NAS) users and service providers.
- Accommodate users with various levels of equipage during the transition to Free Flight.

The FAA and industry agree with the guiding principles. The joint Government/Industry Free Flight Steering Committee (referred to as the "Steering Committee" hereafter) shall agree to use these principles in deliberations and preparation of further recommendations on the implementation of Free Flight.

Free Flight Action Plan
Fundamental Precepts

The Government/Industry Free Flight Action Plan culminates a historically unprecedented effort in U.S. aviation. This undertaking was forged from the collaboration and consensus among representatives from the FAA, air carriers, the Department of Defense, pilot and air traffic controller unions, business and general aviation, airframe manufacturers, academia, research organizations, and industry suppliers. Its elements were subject to critical review, discussion, and comment by all participants in pursuit of its main objective, to promptly improve the capacity, efficiency, and safety of air transportation for the benefit of all.

Today's airspace architecture and management will be unable to accommodate the growth in air traffic, which is forecasted at an annual rate of 3 to 5 percent for at least the next 15 years. Without immediate action, the much needed improvements in system safety, capacity, and efficiency will not be realized. This will adversely impact commerce and trade, with concomitant effects on the economy, jobs, and the standard of living. Implementation of the Free Flight Action Plan is key to ensuring the perpetuity of air commerce by satisfying the nation's growing airspace needs.

The Free Flight Steering Committee represents the continuation of this new process of collaboration and consensus, and is essential to the successful implementation of the Action Plan. The Committee's attention will be focused on several fundamental precepts concerning strategic oversight, continued commitment, adequate funding, and sound program management.

Commitment to Success

Acceptance of the Free Flight Action Plan is an important step in the realization of achieving the full Free Flight capabilities. The needed changes will depend heavily on the commitment of new capital, as program funding is a crucial factor for achieving ultimate success. There must be firm commitment on the part of both industry and the FAA to take all the necessary steps toward achieving the Free Flight objectives. There are several key challenges that will need to be addressed as the plan moves forward:

Funding commitment and stability - The commitment to the Free Flight initiatives and the collaborative process used in their development should be demonstrated by all participants, who commit necessary resources and make long term investments. Federal funding shortfalls threaten the ability of both the Government and industry to reliably support the programs in the Action Plan.

Prioritization and funding allocation - As we move forward in a cooperative environment, the Government and industry face the challenge of program prioritization and funding allocation. A more effective mechanism will be needed to secure necessary funds and coordinate plans in support of Free Flight priorities.

Transition strategy - Transition to new technologies will require a stepwise benefit plan to incrementally justify airborne and ground equipage improvements. Firm commitment to early benefits is necessary for each equipage upgrade. A benefit path and cost analysis must be fully defined to ensure that the economic transition toward Free Flight is achievable.

Strategic Oversight of Critical Issues

While the Action Plan details specific Government and industry program activities, it does not address the overall strategic concerns that affect the integrity of the entire plan and process. The Steering Committee will fulfill a strategic oversight role to ensure that both industry and the Government are moving toward the realization of Free Flight.

During its deliberations, the Steering Committee identified several key issues concerning strategic planning, funding, decision making, and program management. Critical decision and planning for research, development, and acquisition must take place now, even though they apply to programs with milestones in the mid- and long-term timeframes. Since rapid progress on these issues is necessary to the integrity of the Action Plan, there must be no delay in resolving these issues, as they apply to the following areas:

- Datalink decisions and transition
- GPS navigation and landing (including dis-investment of ground based systems)
- ADS-B (expanded air-to-air and air/ground; ground-based radar dis-investment)
- Terminal automation (e.g. CTAS) - implementation beyond prototype sites
- En route automation (e.g. AERA) - implementation beyond prototype sites
- Common platforms/information architecture and system integration productivity
- Host/EDARC capacity
- Digital communications conversion

The Action Plan as the Free Flight Baseline

The RTCA Task Force 3 effort is the foundation upon which the Action Plan was developed. The Action Plan, in turn, should serve as the baseline for reflecting the needs and requirements of the aviation community against which initiatives are tracked, prioritized and funded.

Those initiatives that do not have sufficient resources to be implemented should be identified. The Free Flight Steering Committee has the responsibility to help prioritize those needs and requirements and take appropriate steps to ensure adequate funding is made available for those initiatives most important to the aviation community.

Operational Concepts, Architecture and Interdependent Initiatives

All of the Action Plan initiatives have been divided into separate partitions, each defined under a specific Task Force 3 recommendation. However, many of the operational concepts described in the Task Force 3 report are dependent on multiple recommendations. The relationships between the desired operational capabilities (e.g. dynamic route and altitude) and individual program components (e.g. conflict probe) must be understood so that the Steering Committee can ensure that appropriate initiatives receive proper attention and priority. This involves the following areas and will be lead collaboratively by the FAA and industry within the next twelve months:

- Definition of a unified gate-to-gate Air Traffic Management (ATM) operational concept to facilitate development of a more effective decision support system architecture.

- Validation of prior ATM cost benefit analyses and their refinement based on the unified ATM operational concept, allowing proper prioritization of all programs.

- Development of a new collaborative and strategic national process to secure and allocate adequate funding as well as to establish program priorities, associated with all significant Government initiatives supporting the Free Flight concept.

- The management of program implementation with full recognition of their interdependencies, within the context of the new NAS Architecture.

- Development and implementation of new certification processes that reduce system development costs, thereby allowing an affordable and rapid transition to new technologies.

Free Flight Action Plan

Introduction

Background

On April 20, 1995, the FAA Administrator asked RTCA to "form a new task force, led by an appropriate representative from the civilian aviation community to develop consensus regarding Free Flight implementation." The task force completed its work in October 31, 1995, and produced a report, *Final Report of RTCA Task Force 3 Free Flight Implementation*, that further defined the Free Flight operational concept, evaluated the Free Flight architecture and technology needs, and identified an incremental transition to Free Flight.

Free Flight is an innovative concept born out of the need for increased user flexibility with operating efficiencies and increased levels of capacity and safety to meet growing demand for air transportation. This new concept of operation recognized the need to rethink the traditional notions of traffic flow management, air traffic separation services, and the classification of airspace itself. The Free Flight concept asserts 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 decisionmaking 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.

Free Flight Defined

Free Flight is defined as:

> A safe and efficient flight operating capability under instrument flight rules in which the operators have the freedom to select their path and speed in real time. Air traffic restrictions are imposed only to ensure separation, to preclude exceeding airport capacity, to prevent unauthorized flight through special use airspace, 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.