Government/Industry Operational Concept for the Evolution of Free Flight

Addendum 2:
Candidate Recommendations on
Near Term Procedural Enhancements
1998-2002

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Foreword

This report was approved by the RTCA Free Flight Steering Committee on August 19, 1998.

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- 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.

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Table of Contents

Section		Page
1	**Introduction**	**1-1**
1.1	Background	1-1
	1.1.1 NAS Improvement Initiatives	1-2
1.2	Purpose and Scope	1-4
1.3	Organization and Approach	1-4
2	**Candidate Near Term Procedural Enhancements**	**2-1**
2.1	Develop standardized taxi routes	2-3
2.2	Lower ceilings for simultaneous converging instrument approaches	2-4
2.3	Expand use of simultaneous ops at night	2-5
2.4	Expand use of simultaneous ops on wet intersecting runways	2-6
2.5	Expand use of simultaneous ops to three parallel runways	2-6
2.6	Develop FMS/RNAV based STARs and DPs	2-7
2.7	Develop FMS/RNAV routes from end of STARs to final approach	2-7
2.8	Expand terminal procedures for use of Area Navigation	2-8
2.9	Expand RNAV use to reduce congestion over waypoints	2-9
2.10	Increase use of RNAV routes below FL180	2-9
2.11	Provide options (ie, route offset) for maintaining en route separation	2-10
2.12	Remove 250 knot speed restriction in Class B Airspace	2-10
2.13	Continue expansion of NRP -- alter 200nm radius restriction	2-11
2.14	Reduce the number and duration of MIT restrictions	2-12
2.15	Reduce the number of ATC preferred routes	2-13
2.16	Improve civil use of and access to Special Use Airspace (SUA)	2-14
2.17	Implement Limited Dynamic Resectorization (LDR)	2-15
2.18	Reduce effective horizontal separation by revising Operational Error Detection Patch (OEDP) policy	2-16
2.19	Establish more flexible Ground Delay Program (GDP) procedures	2-17
2.20	Develop cooperative TFM information exchange	2-18
2.21	Reduce distance restrictions for In-Trail Climb (ITC) and In-Trail Descend (ITD)	2-19

2.22 Extend Reduced Vertical Separation Minima (RVSM) use in Oceanic Airspace 2-20
2.23 Reduce aircraft separation over Gulf of Mexico 2-20
2.24 Reduce oceanic horizontal separation, using distance basis 2-21
2.25 Develop better convective forecasts for pilots 2-22

3 Implementation Considerations **3-1**

List of References **RE-1**

Appendix A **A-1**

Glossary **GL-1**

List of Tables

Table	Page
Table 2-1 Near Term Enhancements (1998-2002)	2-1
Table 2-2 Procedural Enhancement Format	2-3
Table A-1 Mid and Long Term Procedural Enhancements	A-1

Section 1

Introduction

This document supplements the government and industry consensus on Free Flight operational concepts with candidate selections of procedural enhancements which may be made to the National Airspace System (NAS) in the near term timeframe of 1998-2002. RTCA Task Force 3 recognizes that there are procedural changes that can be introduced to provide benefit to the NAS, and to enhance system safety. At the same time, these procedural changes are not associated with changes to systems or the introduction of new capabilities. These are typically changes to how operations are performed today, that make better use of the tools and capabilities that are currently available to the users/service providers. These changes are collectively called "procedural enhancements".

1.1 Background

A number of procedural enhancements were documented in the original 1995 report, *The Final Report of RTCA Task Force 3: Free Flight Implementation.* In that report, RTCA Task Force 3 defined the Free Flight concept and outlined a series of recommended actions that would help progress toward Free Flight. These recommendations were designed to provide benefit to the NAS in three timeframes: the "near term", which was defined in the Task Force 3 report as 1995-1997; the "mid term", defined as 1998-2000; and the "far term", defined as 2001 and beyond.

Since the original report, some of the activities to address the recommendations have been implemented, and a number of others are underway. The RTCA *Free Flight Action Plan*, developed to support the Task Force 3 report recommendations, has recently been updated (April, 1998) to reflect the status and progress of the activities. Several other NAS initiatives (in particular Free Flight Phase 1, or FFP1) have also begun, targeting improvements to the NAS in the 1998-2002 timeframe, which is now considered the redefined "near term" timeframe.

Many of the near term recommendations of the Task Force 3 report and activities from the Action Plan are procedural changes that should continue to be considered in the redefined "near term" timeframe. These procedural enhancements can provide rapid benefit to the NAS, can be made with relatively little expenditure of program funds or resources, and are fundamentally independent of the other near term NAS initiatives, such as FFP1. Additionally, although progress has been made on many Task Force 3 recommendations (procedural and otherwise), the list of recommendations has not been expanded to include new ideas. Therefore, this document outlines the Action Plan recommendations that are near

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term procedural enhancements, and expands the list to include additional procedural enhancement ideas that have been uncovered elsewhere.

1.1.1 NAS Improvement Initiatives

To establish the context for near term improvements, several strategies have recently been identified by the Federal Aviation Administration (FAA) Administrator's NAS Modernization Task Force, to implement the goals of NAS modernization. The first strategy is to deliver early benefits to users by 2002 through the fielding of low-risk capabilities at specified locations throughout the NAS. This activity is entitled *Free Flight Phase 1* (FFP1). The second strategy addressed the complex issues and risks associated with major new communications, navigation, and surveillance (CNS) programs. The CNS risk reduction strategy was formalized into a re-focused *Flight 2000* activity, essentially acknowledging the need to mitigate the remaining substantial risks that exist in the CNS area.

In addition to the strategies defined above, it was recognized that there were two other efforts that would unfold in the near term: *infrastructure upgrades* that are already planned, and *procedural changes* -- not those that always need to be made with the introduction of new technology, but those that can be made without the need for new technology. Each of the near term efforts are discussed further in the following subsections.

Free Flight Phase 1 Capabilities

FFP1 is a set of capabilities comprising the limited deployment of the following core Air Traffic Management (ATM) capabilities:

- Conflict Probe as represented by the User Request Evaluation Tool (URET)
- Traffic Management Advisor (TMA), Single Center Operations (SC)
- Passive Final Approach Spacing Tool (pFAST)
- Controller-Pilot Data Link Communications (CPDLC), Build I
- Collaborative Decision Making (CDM) with Airline Operations Centers (AOCs)
- Surface Movement Advisor (SMA)

The intent is to deploy these capabilities, currently in development status or in limited operational use at some FAA facilities, to other facilities or locations as quickly as possible (to allow for evaluation by 2002) in order to provide early benefits to NAS users.

FFP1 is a subset of NAS modernization activities during the time period of 1998-2002. It should be noted that FFP1 capability deployment will occur simultaneously with other modernization activities planned for this time period. Further, many FFP1 capabilities are dependent on other modernization activities for critical prerequisite functions and

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architectural support. Without the successful deployment and implementation of these supporting activities, FFP1 capabilities and desired benefits will not be achieved.

It should also be noted that FFP1 is more than a collection of core capabilities; it is the *joint deployment* of those capabilities – government, industry, and labor working together – that ultimately defines the program. Details on the definition and operational concept of FFP1 is documented in RTCA's *Government/Industry Operational Concept for the Evolution of Free Flight Addendum 1: Free Flight Phase 1 – Limited Deployment of Select Capabilities (URET, TMA(SC), pFAST, CPDLC, CDM, SMA).*

CNS Risk Mitigation

In addition to the FFP1 capabilities that will be implemented in the near term, efforts will continue on the CNS risk mitigation activities under the re-focused *Flight 2000* activity, which was identified as a major strategy by the NAS Modernization Task Force. CNS risk mitigation will focus on fundamental changes and issues in ground based versus space based surveillance and navigation infrastructure, and new communications methods such as data link. Its goal in the near term is a solid architecture for CNS that answers the issues and thus reduces the risks in these major NAS areas.

Infrastructure Upgrades

There are many ongoing programs to provide improvements to the NAS infrastructure, including upgrades to radar systems, communications equipment, and automation, as well as the ongoing maintenance of existing systems. Deployment of the FFP1 capabilities will require necessary support infrastructure from some of these programs:

- Display System Replacement (DSR)
- Standard Terminal Automation Replacement System (STARS)
- Host Replacement

These and many other programs that are currently defined in the FAA Facilities and Equipment (F&E) budget plans are expected to continue through the near term timeframe, coincident with the introduction of the FFP1 capabilities.

Near Term Procedural Enhancements

In addition to the various near term system changes in the NAS, there are procedural changes that need to take place. A significant recognition of Task Force 3 was the idea that the NAS can rapidly benefit by procedure changes that do not depend on new technology or capability, such as FFP1. This recognition resulted in the inclusion of many near term procedural recommendations in the Task Force 3 report, to directly fulfill one of the Task Force 3 original intents of Free Flight: "Any activity which removes restrictions represents a

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move toward free flight." Additionally, any candidate enhancement that does not move the NAS toward increased safety represents a move away from an achievable Free Flight.

These procedural efforts reflect changes that can be introduced to the NAS to provide benefit and increase safety, but are not associated with changes to systems or the introduction of new capabilities, such as FFP1. These are typically changes to how things are done today, that make better use of what is currently available to the users/service providers. These near term procedural enhancements are the subject of this report.

1.2 Purpose and Scope

The purpose of this document is twofold. First, it extracts and outlines the Action Plan recommendations that are near term procedural enhancements; second, it expands the list to include additional procedural enhancement ideas that have been uncovered elsewhere. Both the Action Plan and the new procedural enhancements have been selected as those that will possibly be added to the NAS in the near term timeframe, but are not associated with any of the FFP1 capabilities, or to any of the infrastructure that will be put into place in the same timeframe. The procedural enhancements discussed here have little or no dependence on new automation or systems, depending only on existing or imminent systems or not depending on systems at all. They will provide benefit to the NAS in the same timeframe that FFP1 is being implemented, with little requirement for F&E funds.

All the procedural enhancements discussed herein are candidates which might be implemented in the near term; that is, for each, it should be possible to complete analysis and test of the procedure, and some limited (or occasionally complete) field implementation, by 2002. In some cases, the implementation will be very site specific; in others, it will be possible to perform a national implementation. In fact, several of the enhancements are currently being implemented; these are noted by statements in **bold** such as "**FAA Implementation**" (an example is *"Continue expansion of NRP -- alter 200nm radius restriction" #2.13*). Some enhancements also are not primarily procedural enhancements, but have procedural aspects and thus have been included in this set for completeness.

This set of procedural candidates represents the current government/industry thinking of potential procedural improvements that can be made in the near term, but is not warranted to be a complete set of possible near term enhancements. New ideas are continuously surfacing, and they should always be considered in addition to the currently existing candidates. Note that overall resource constraints will influence the ability to implement multiple candidates. Consideration of how each improvement supports the *Free Flight Operational Concepts* and the *Free Flight Action Plan* should also influence selection for implementation.

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With the information provided in this document, FAA and industry representatives should be able to make intelligent decisions about changes and enhancements to procedures that can be made in the near term timeframe.

1.3 Organization and Approach

This document is organized into three sections and one appendix.

Section 1 provides the background to the current initiatives in the NAS, outlines a current definition for "near term" as 1998-2002, and scopes the set of procedures that will be discussed in the document.

Section 2 provides detailed information (description, benefits, risks, background) on each of the procedural enhancements that are candidates for implementation in the near term.

Section 3 provides a summary and outline of a standard process for implementing any of the procedural enhancement candidates. This process is being developed by the aviation community to provide a consistent, evolutionary approach to implementing NAS improvements that, if adhered to, will provide the greatest chance of success, with minimum delay.

Appendix includes a list of all the procedural enhancements that were considered in the evaluation for term-ness, with descriptions of those that were judged to be Mid (by 2005), and Long (beyond 2005) Term (as they are now defined).

The procedural enhancements were gathered from several sources, primarily the Task Force 3 Action Plan recommendations. A total of 46 were considered in this first re-evaluation of the procedural enhancements, with consideration of adding to the list as new ideas are generated. These enhancements were discussed and evaluated in an RTCA government/industry forum, to determine the term (near, mid, or long) in which each candidate would have some level of achievement. Twenty-five agreed-upon near term candidates are detailed in this document.

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