International Civil Aviation Organization

The Twenty-Second Meeting of the APANPIRG ATM/AIS/SAR Sub-Group (ATM/AIS/SAR/SG/22)

Bangkok, Thailand, 25 – 29 June 2012

Agenda Item 5: Provision of ATM/AIS/SAR in the Asia/Pacific Region, including associated CNS matters

OPTIMIZATION OF AIRSPACE AND PROCEDURES IN MAJOR METROPOLITAN REGIONS

(Presented by United States of America)

SUMMARY

This paper presents the progress of a recently implemented program to expedite the integrated development and modernization of airspace and procedures in 21 major metropolitan areas in the U.S. Significant components of OAPM include an accelerated development schedule, focus on collaboration with all stakeholders, and strong focus on PBN structures to reduce flight miles, delays and emissions.

This paper relates to –

Strategic Objectives:

*A: **Safety** – Enhance global civil aviation safety*

*C: **Environmental Protection and Sustainable Development of Air Transport** – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment*

Global Plan Initiatives:

GPI-5 RNAV and RNP (Performance-based navigation)
GPI-6 Air traffic flow management
GPI-8 Collaborative airspace design and management
GPI-10 Terminal area design and management
GPI-11 RNP and RNAV SIDs and STARs
GPI-21 Navigation systems

1. INTRODUCTION

1.1 The FAA has been moving for several years toward an integrated approach to airspace redesign and PBN procedure development as the future for large-scale airspace and procedures efforts. **Optimization of Airspace and Procedures** (OAPM) in the Metroplex is a systematic, integrated, and expedited approach to implementing Performance-based Navigation (PBN) procedures and associated airspace changes.

1.2 OAPM focuses on a geographic area, rather than a single airport. This approach considers multiple airports and the airspace surrounding a metropolitan area, including all types of operations, as well as connectivity with other metroplexes. A metroplex is an area where flights into and out of multiple commercial and general aviation airports make for busy airspace and complex traffic patterns.

1.3 The OAPM solution approach is part of the larger metroplex solution approach and a foundational step for other NextGen implementation activities. OAPM was developed in direct response to RTCA's Task Force 5 Final Report on Mid-term Next Generation Air Transportation System (NextGen) Implementation, specifically the recommendations on the quality, timeliness, and scope of metroplex activities.

2. DISCUSSION

2.1 Description

2.1.1 There are three factors that distinguish OAPM from the other traditional airspace redesign or PBN development efforts:

- Expedited life cycle of approximately 3 years from planning to implementation
- Focused scope with defined design parameters
- Prioritized national approach to address major metroplexes

2.1.2 The OAPM expedited timeline and focused scope bound airspace and procedures solutions to those that can be achieved without requiring an Environmental Impact Statement (e.g., only requiring an Environmental Assessment (EA) or Categorical Exclusion) and within current infrastructure and operating criteria. The major metroplexes addressed under OAPM have been defined in the RTCA Task Force 5 Final Report and the FAA Flight Plan, and have been prioritized using criteria and considerations developed through collaboration with FAA and industry stakeholders.

2.1.3 A characteristic of OAPM is its collaborative team concept. Study teams are the critical first step of the OAPM process. Study teams provide a top-down, comprehensive, expeditious front-end strategic look at each major metroplex. The study teams analyze the operational challenges and situations, assess current/planned airspace and procedures efforts, and explore new solution opportunities in a consistent manner. Design and Implementation (D&I) teams provide a systematic, effective approach to the design, evaluation and implementation of PBN-optimized airspace and procedures. Using the results of the study teams, D&I teams are responsible for executing the design, evaluation, and implementation portions of these projects.

2.1.4 The study team results may also identify airspace and procedures solutions that do not fit within the environmental and criteria boundaries of an OAPM project. These other recommendations then become candidates for other Integrated Airspace and Procedures efforts.

2.2 Process

OAPM solutions are developed and implemented through a five-phase process:

2.2.1 Study and Scoping: The Study Phase is conducted by study teams that identify issues and propose potential solutions through facility and industry interface meetings. The result of this phase is a set of conceptual designs, with a high-level assessment of benefits, costs, and risks.

2.2.2 Design and Procedure Development: The Design Phase is where the detailed Integrated Airspace and Procedures design work is conducted. The work conducted in this phase uses the results of the study teams and is conducted by a D&I team. When appropriate and justified, on-site Human-in-the-Loop (HITL) simulations and other design analyses may be part of this phase.

2.2.3 Operational Evaluation and Environmental Review: The Evaluation Phase is the second stage conducted by the D&I team. It includes all necessary operational modeling, safety analyses, and environmental reviews. If analyses are conducted during the Design Phase, they may feed into the Evaluation Phase.

2.2.4 Implementation and Training: The Implementation Phase is the last part of the OAPM process conducted by the D&I team. This phase includes all steps required for implementation of the OAPM project including flight inspections, publishing procedures, planning and executing training.

2.2.5 Post Implementation Review and Modifications: The Post-Implementation Phase includes a review of the implemented airspace and procedures changes to determine if they have delivered desired benefits and/or caused other impacts. Modifications or refinements may be made to better achieve desired benefits or address unforeseen impacts.

2.3 Metroplexes in Process and Projected Benefits

Metroplex development is in progress or planned for 21 metropolitan areas in the U.S. Four examples of completion of the Study Phase are listed below:

2.3.1 **Washington, D.C.**: The proposed solutions included modifying existing and creating new Area Navigation (RNAV) Standard Instrument Departures (SIDs) and Standard Terminal Arrivals (STARs), the application of Q-/T-Routes, and the modification of airspace. Quantitative analyses of the changes proposed by the Washington, D.C., Metroplex Study Team show that they could result in estimated annual fuel savings of 2.5 to 7.5 million gallons, primarily due to more efficient arrival profiles and reductions in lateral track distances. Carbon emissions are expected to be reduced between 25 and 75 thousand metric tons.

2.3.2 **North Texas**: The proposed solutions included several conceptual procedural and airspace changes including segregating Dallas/Fort Worth Terminal Radar Approach Control (TRACON) (D10) arrival flows, adding Optimized Profile Descents (OPDs) for Dallas/Fort Worth International Airport (DFW) primary STARs, introducing and modifying RNAV procedures (including Required Navigation Performance (RNP) – Authorization Required (RNP AR) procedures for Dallas Love Field Airport [DAL] arrivals), and adding ultra-high sectors in Fort Worth Center (ZFW). Quantitative analyses and stakeholder estimates of the changes proposed by the study team show they could result in annual fuel savings of 4.1 to 8.6 million gallons, largely from the use of OPDs and reduced track distances. Carbon emissions are expected to be reduced between 21 and 52 thousand metric tons.

2.3.3 **Charlotte, North Carolina:** The proposed solutions included several procedural and airspace changes including segregating Charlotte/Douglas International Airport (CLT) arrival flows, adding dual OPDs for CLT STARs, adding additional departure gates supporting CLT SIDs, reducing the distance to divergence for CLT SIDs, and introducing and modifying RNAV procedures for the satellite and adjacent airports. Adopting the study team recommendations for CLT is estimated to result in increased fuel efficiency and reduced track distances. Fuel savings are estimated at 3.7 to 6.2 million gallons annually. Filed track distances are estimated to decrease about 2.5 million nautical miles reducing fuel loading requirements and resulting in cost-to-carry savings. In addition, increasing the number of departure gates, and reducing the distance to SID divergence should increase departure throughput. Carbon emissions are expected to be reduced between 35 and 59 thousand metric tons.

2.3.4 **Northern California**: Proposed procedural changes included segregating arrival flows from the east, adding RNAV STARs with OPD benefits, and introducing RNAV SIDs with additional egress fixes. Adopting the study team recommendations is estimated to result in an annual savings of fuel savings 2.3 to 5.6 million gallons. Filed track distances are estimated to decrease about 1.5 million nautical miles reducing fuel loading requirements and resulting in cost-to-carry savings. Carbon emissions are expected to be reduced between 23 and 56 thousand metric tons.

3. CONCLUSION

3.1 The meeting is invited to note the information contained in this paper and discuss any relevant matters, as appropriate.

…………………………….