International Civil Aviation Organization

THIRD MEETING OF THE GREPECAS ATM/CNS SUBGROUP ATM COMMITTEE AIR TRAFFIC MANAGEMENT TASK FORCE – (ATFM/TF/3)

(San Andrés, Colombia, 18 to 22 June 2007)

Agenda Item 2: Necessary documentation on ATFM for the CAR/SAM Regions

CAR/SAM AIR TRAFFIC FLOW MANAGEMENT CONCEPT OF OPERATIONS

(Presented by the United States of America)

SUMMARY

In July 2006, the CAR/SAM Air Traffic Flow Management (ATFM) Task Force/2 created a comprehensive draft Caribbean/South American ATFM Concept of Operations (CAR/SAM ATFM CONOPS). The draft ATFM CONOPS was then presented to the ATM/CNS/SG/5 Meeting in November 2006 and GREPECAS in April 2007. GREPECAS considered that the document could be adopted for the CAR/SAM Regions with the understanding that it is a living document and can be amended as necessary. This paper strives to build on the Task Force's work by recommending an update to the document in light of ATFM elements that have been developed, tested, and implemented in other States and regions.

Appendix A to this paper presents updates to various sections of the CAR/SAM ATFM CONOPS document for the ATFM/TF/3 to consider. The document draws on the ATFM experience gained by Centro de Control de Flujo de Mexico (CCFMEX), NAV CANADA National Operations Centre (NOC), and Piarco ACC, and the Federal Aviation Administration's Air Traffic Control System Command Center (ATCSCC).

1. Introduction

1.1 At the second meeting of the ATFM Task Force of the GREPECAS ATM/CNS Subgroup, ATM Committee, the group prepared a draft Caribbean/South American ATFM Concept of Operations (CAR/SAM ATFM CONOPS). The document was then presented as a Working Paper in November 2006 to the ATM/CNS/SG5 Meeting in Lima, Peru and then to GREPECAS/14 in April 2007 in San Jose, Costa Rica. The CAR/SAM ATFM CONOPS is a high-level document that will assist and guide planners in the design and development of ATFM in the CAR/SAM Regions.

1.2 This paper endeavors to build on the Task Force's excellent work by presenting an update to the document in light of ATFM elements that have been developed, tested, and implemented in other States and regions.

1.3 As a Task Force, we can benefit from the ATFM development work and lessons learned by other States and regions. An important next step is to consider the lessons learned and incorporate them into the document. Aspects of the key lessons learned have been included in the recommended revision to the CAR/SAM ATFM CONOPS shown in the Appendix.

2. Recommendation

2.1 The Meeting is invited to:

a) review the sections of the CAR/SAM ATFM CONOPS presented in the Appendix;

b) provide input and comments; and

c) update the CAR/SAM ATFM CONOPS taking into consideration the input provided in **Appendix A.**

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APPENDIX A

From the title page:

Caribbean/South American Air Traffic Flow Management Concept of Operation (CAR/SAM *ATFM* CONOPS)

From page 2:

FOREWORD

The *Caribbean/South American ATFM Concept of Operations (CAR/SAM ATFM CONOPS)* is published by the ATM/CNS Subgroup of the Caribbean/South American Regional Planning and Implementation Group (GREPECAS). It describes *an* air traffic flow management *operational* concept to be applied in both regions.

From page 4:

AMENDMENTS TO THE DOCUMENT

1. The *CAR/SAM ATFM CONOPS* is a regional document that includes *aeronautical, scientific, and technological advances related to ATFM. It also includes the operational experiences gained in the CAR/SAM Regions, as well as in other ICAO Regions, that may affect ATFM concepts and procedures.*

2. Due to *its unique and regional focus,* the *CAR/SAM* ATFM CONOPS is also a dynamic document *and is* in permanent progress and permeable in order to accept every modification originated by *the members of the Task Force. This will allow for constant improvement based on experience gained from aeronautical disciplines and activities, enable its harmonious implementation in the CAR/SAM Regions, and ensure air operations safety.*

From Page 5:
Document content

From Page 6:

GLOSARIO DE ACRÓNIMOS/ACRONYMS GLOSSARY

APP Oficina de control de aproximación
Approach control

From Page 7:

GLOSARIO DE ACRÓNIMOS/ACRONYMS GLOSSARY

TWR Torre de control
Control tower

From Page 7:

Explanation of terms and expressions

Homogeneous *Air Traffic Management (*ATM*)* area. A homogeneous ATM area is *airspace* with a common ATM interest, based on similar characteristics of traffic density, complexity, air navigation system infrastructure, requirements or other specified considerations. *In the area,* a common detailed plan will foster the implementation of interoperable ATM systems.

Centralized ATFM *unit.* A centralized unit responsible for the provision of air traffic flow management within a specific area.

From page 8:

Explanation of terms and expressions

ATC Capacity. *The maximum number of aircraft that can be accepted over a given time period within the airspace or at the aerodrome concerned. Air Traffic Service authorities assess and declare the ATC capacity for control areas, sectors, and aerodromes.*

ATM Community. *The* organizations, bodies or entities *which participate*, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM System.

Demand. The number of aircraft requesting to use the ATM system in a given time period.

Efficiency. *With regard to ATFM, efficiency is maintaining an expeditious flow of traffic while maintaining the highest level of safety within the system. It also takes into consideration the* ratio of the cost of ideal flight to the cost of procedurally constrained flight.

Air Traffic Flow Management (ATFM). A service established with the objective of contributing to a safe, orderly and expeditious flow of air traffic by ensuring that ATC capacity is utilized to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air Traffic Management. *A* service which comprises airspace management, air traffic flow management and air traffic services.

Flight Management Position/Unit – FMP/FMU. A position or working unit established in an appropriate air traffic control *facility* to ensure the necessary *link* between the local *unit* and *the C*entralized ATFM *unit* related to air traffic flow management.

Main Traffic Flows. *A* concentration of significant volumes of air traffic on the same or *similar* flight trajectories.

Air Traffic Management System. A system which provides ATM through the integration *of personnel,* information, technology, facilities and services. *It also relies on* the support of communications, *on-board and spatial-based* navigation, and surveillance.

Air Traffic Volume. The number of aircraft within a defined airspace or *airport* movement *area in a* specific *period of time.*

From page 9:

Executive summary

The main actors involved in air traffic flow management *are* the organizations, bodies or entities which might participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATFM System.

Also, several airspaces with common interests have been identified *with regard to* air traffic management, based on similar characteristics of traffic density, complexity and air navigation system infrastructure requirements within which a common plan shall foster the implementation of an ATM Global Concept. A description of such homogeneous and routing areas is attached *to the* CAR/SAM ATFM CONOPS.

In view of the above, this document describes the main objectives of the Centralized ATFM *units which include: assist ATC in making the maximum use of its airspace and capacity; issue flow management initiatives, as required ,in order to maintain a safe, orderly and expeditious flow of air traffic; ensure* that air traffic volume is compatible with declared capacities; *develop a description of the principles and functions of flow management units; and establish the requirements for equipping flow management and Centralized ATFM units.*

From page 11:

2. Purpose of the document

2.1 *The* CAR/SAM *ATFM CONOPS* document *describes a* high level *of* service to be provided in the CAR/SAM Regions *during* a specific time horizon. *It explains the current situation as well as the future situation which will be reached through a series of specific stages.*

2.2 The operational concept described herein reflects the *expected order of events* and should assist and guide the planners in the design and gradual development of ATFM system. *The concept is designed to promote safety, efficiency, and an optimum flow of traffic in areas where demands exceed, or is forecast to exceed, the available capacity of the ATC system.*

3. Actors involved in ATFM

3.1 The ATFM community includes organizations, bodies or entities which participate, collaborate, and cooperate in the planning, development, *utilization*, regulation, operation and maintenance of *the* ATFM system. Among them, the following may be emphasized:

3.2 ***Aerodrome Community*** - *includes the* aerodromes, aerodromes authorities and other parties involved in the provision and operation of the physical infrastructure needed to support the take-off, landing and ground handling of aircraft.

3.3 ***Airspace Providers*** – *refers* in general terms to *the* Contracting States, *along with their owner capacity and legal authority,* to permit or deny access to their *sovereign airspace.* The expression may also be applied to organizations of the State *which have been assigned the responsibility for establishing the standards and guidelines for use of the airspace.*
and guidelines for the airspace use.

3.4 ***Airspace users*** – *refers to the airline, air taxi, military and general aviation pilots and companies that utilize the sovereign airspace and services of the States.*

3.5 ***ATM service providers –*** *includes the* organizations and personnel (controllers, engineers, technicians, *and others*) implied in the provision of *air traffic* services to airspace users.

3.6 ***Military aviation –*** *refers* to *the personnel, aircraft, and materiel of military organizations that serve a* vital role in States' security.

3.7 ***International Civil Aviation Organization (ICAO)*** – *the* international organization *that coordinates the implementation and harmonization of global ATM activities.*

From page 12:

6. Identification of areas and/or routes where traffic congestion is produced

6.1 Currently, saturation periods have been identified in several airports and traffic flows *in* some of the CAR/SAM Regions FIRs. In view of this, it is necessary that CAR/SAM States maintain *a list of* the saturation periods of their respective airports, terminal areas and traffic flows.

From page 13:

7. Objectives, principles and functions of a Centralized ATFM *unit*
Objective of the Centralized ATFM *unit*

7.1 As established in the PANS ATM (Doc 4444), air traffic flow management should be implemented within a region, *or other defined area*, as a *C*entralized ATFM organization with the support of flow management positions (FMP) established in each ACC within the region or area of application.

7.2 *The purpose of a Centralized ATFM is to enhance air traffic safety by balancing demand with capacity and ensuring efficient utilization of the ATC system.*

7.3 *The objective of a Centralized ATFM is to produce a safe, orderly, and expeditious flow of air traffic while making every effort to minimize delays. This is achieved through continual analysis, coordination, communication, and dynamic use of traffic management initiatives.*

7.4 *Consequently, administrations should define whether a Flow Management Unit, and the associated Flow Management Positions, should be established in ATC units.*

From pages 13 and 14:

Principles in which ATFM will be based

7.4 Regional ATFM structure should be developed according to agreed upon guidelines and in such a manner that each State/Territory and International Organization of the CAR/SAM Regions has access to a Centralized ATFM.

7.5 The Centralized ATFM should be based on the following principles. It should:

a) *Be* at *the* disposal of all States/Territories and International Organizations in the region under their responsibility, *taking into consideration* the requirements of operators, airports, ATC units and *pertinent* ATFM units.

b) Use a common and permanently updated database.

c) Take *appropriate* measures well in advance to *balance air traffic demand with capacity.*

d) *Maintain* close and continuous coordination with FMUs and/or FMPs, aircraft and airport operators, corresponding ATC units, and other pertinent Centralized ATFM units.

e) Take measures *to* ensure that existing delays are equitably distributed among operators.

f) Apply quality management to the services provided.

g) *Use the collaborative decision making (CDM) process as the basis for developing and implementing* ATFM measures.

h) Favor, to the maximum possible, the use of the existing capacity without compromising safety.

i) Contribute *to* the achievement of the global ATM objectives.

j) *Provide the flexibility necessary* to enable operators to change their arrival or departure schedules.

From page 14:

Functions of a Centralized ATFM

7.6 To provide ATFM service, the Centralized ATFM *should:*

a) Establish and maintain a *regional* database *that includes*:
- the air navigation infrastructure, ATS units and registered aerodromes;
- pertinent ATC sector and airport capacity; and
- foreseen flight data.

b) Establish a *method for displaying:*
- a chart of foreseen air traffic demand;
- a comparison *of demand and* available capacity *for pre-determined areas;* and
- the time-frame of *foreseen* air traffic overloads.

c) Make *the necessary coordination to attempt to increase available capacity, when necessary.*

d) When *demand will exceed available capacity, coordinate and apply ATFM measures in a timely manner.*

e) Carry out a follow-up on the result of measures adopted.

f) Coordinate ATFM *measures* with the other Centralized ATFM units, when so required.

From page 14:

8. Equipment requirements for FMU/FMP and Centralized ATFM

8.1 The implementation *of ATFM in the CAR/SAM Regions* shall require identifying and determining the minimum *equipment* requirements for *implementing a* Centralized ATFM *unit*, FMU, or FMP.
Note: A more detailed description of these requirements is shown in ***Appendix C*** *to this document.*

From page 15:

9. Personnel requirements for FMU/FMP and Centralized ATFM

9.1 Personnel *that work in a Centralized ATFM, FMU, or FMP shall be trained and qualified to provide an* efficient flow management service. ATFM training shall be designed *to include segments regarding techniques to balance demand and capacity, benefits of optimizing traffic flows and creating operational efficiency, techniques for managing change in the operational environment, and the process for ensuring high levels of service to the customers.*

From page 15:

10. Operational procedures

10.1 The operational procedures *for* the Centralized ATFM, FMUs and FMPs should be developed in separate documents.

10.2 The purpose of these documents shall be to:
- *establish the roles and responsibilities of personnel working in the Centralized ATFM unit, FMUs and FMPs in regard to implementing flow management service.*
- *describe the procedures to be used between the Centralized ATFM, FMUs, and FMPs.*

10.3 ATFM *initiatives* should be *designed to address specific daily traffic flows, flight series, or specific flights.* To this end, *traffic management* planning, *strategy* development, and day-to-day monitoring, should be *conducted.* With regard to the above, ATFM activities could be developed in three phases: strategic - up to 48 hours before the day of the operation; pre-tactical - during 48 hours prior to the operation day; and, tactical - during the day of the operation. *During all three ATFM phases, responsible units should maintain a close liaison with system stakeholders to ensure efficient and equitable service.*

10.4 *Changes to operational procedures shall be coordinated among all parties involved, agreed upon, and published as amendments to the documents.*

From page 15:

11. ATFM Implementation Strategy

11.1 The operational concept establishes a simple implementation strategy. *The implementation strategy* should be develop in phases *in order to* ensure maximum utilization of available capacity and enable all concerned parties to obtain sufficient experience.

11.2 The experience acquired in other Regions and by some States in the CAR/SAM Regions permits States/Territories and International Organizations to apply basic ATFM procedures in airports *and airspace* without the immediate need for a *Centralized* ATFM *unit.* A *Centralized* ATFM *unit* shall *require* ample studies to define operational concepts, *system* requirements, and institutional aspects for implementation in the CAR/SAM Regions.

From pages 15 and 16:

12. ATFM implementation stages

12.1 In order to enable maximum use of all resources available in the regions – *considering* personnel, equipment, facilities, and *automation* -- the implementation process of ATFM should be established, planned and developed in stages, according to the following sequence:

Strategic – more than 48 hours before the day of operation

12.x The implementation process of ATFM in the CAR/SAM Regions should start with the establishment of a common methodology for determining airport capacity. This would enable traffic managers to identify airports -- and timeframes -- where demand exceeds capacity and help them develop the appropriate traffic management initiatives to ensure a safe and efficient operation.

12.x Normally, the application of strategic ATFM measures at airports with low air traffic density helps prevent congestion and saturation at such airports. The adoption of ATFM strategic measures in airports are usually not complex to develop because they require reduced data collection of flight intentions (RPL, Official Airline Guide -OAG, flight lists, etc.) and they use existing infrastructure and automation tools.

12.x States/Territories should also consider conducting an analysis of sector demand, particularly in those areas in which airport ATFM measures are not sufficient to solve congestion and airspace saturation problems. This would require the use of more sophisticated infrastructure and automation tools to analyze air traffic movement in the Enroute environment. This analysis would assist traffic managers with developing ATFM measures to balance sector demand and capacity.

Pre-tactical - during the 48 hours prior to the day of operation

12.x The development of pre-tactical ATFM measures for airports and airspace would require an increase in data collection in addition to the use of more complex infrastructure and automation tools.

Tactical - during the day of operation

12.x The balance between demand and capacity in the tactical phase should consider scheduled flights as well as non-scheduled flights. This would include the development and use of dynamic ATFM measures to manage both airport and airspace demand.

12.x Normally, the application of miles-in-trail or minutes-in-trail initiatives are sufficient to tactically balance demand and capacity in airspace and at low to medium density airports.

12.x The development of airport arrival slots is one possible traffic management initiative that could be used to balance demand and capacity. While use of arrival slots is not applicable at all airports and in all situations, it can be an effective method for managing demand at high volume airports.

From pages 17 and 18:

13. **Centralized ATFM implementation strategy in the CAR/SAM Regions**

13.1 GREPECAS/13 was of the opinion that two CAR and SAM scenarios should be taken into account, but that they could be modified insofar as the operational concept development and the implementation plans progress. The strategy is to develop a harmonized planning of a CAR and SAM interregional ATFM system.

13.2 In order to enhance the efficiency of a Centralized ATFM unit, it should have responsibility for providing service to the maximum amount of homogeneous airspace possible. In accordance with ATFM planning in the CAR and SAM Regions, it is envisioned that there will be at least two Centralized ATFM units, one for each region.

13.3 To avoid risks to operational safety, GREPECAS considered it necessary to develop implementation procedures among the ATFM units in a harmonious manner. This should involve establishing a regional and interregional strategy to facilitate and harmonize the entire implementation process. The ATFM Task Force will address these implementation objectives, establish two scenarios based on the operational needs of each CAR and SAM Region, and plan for the establishment of two ATFM Implementation Groups – one for each Region.

13.4 GREPECAS considered that operational implementation should be carried out in phases, according to ICAO Doc 9854 – Global Air Traffic Management Operational Concept. This would permit a progressive implementation and allow States/Territories time to acquire the necessary capabilities for a safe and efficient implementation. Each phase should be implemented according to the established strategy and be based the descriptive documents of the operational models, systems, and configurations.

13.5 In order to harmonize the National Plans with the Regional ATFM Plan, it will be necessary for civil aviation administrations to prepare an ATFM implementation program. This will require an assessment of equipment and personnel needs, of the impact to the national ATC system, of the impact to airport services, and of the steps for implementation.

From page 18:

14. Special flights exempt from application of ATFM measures

14.1 Aircraft *that file flight plans as air* ambulance flights, humanitarian flights, search and rescue operations, *and State aircraft* would be exempt from the application of ATFM measures. States would continue *to have jurisdiction on these aircraft when they file as* domestic flights.

From page 18:

15. Contingency plan

15.1 In case of a partial or total interruption of the flow management service and/or support services, ATFM and FMUs/FMPs *will have corresponding contingency plans prepared in accordance with GREPECAS guidelines. These contingency plans will help ensure the safe and orderly movement of air traffic and the plans will be incorporated into the operational procedures documents associated with the Centralized ATFM units and FMUs/FMPs.*