

**International Civil Aviation Organization**

CAR/SAM REGIONAL PLANNING IMPLEMENTATION GROUP (GREPECAS)

First Meeting of the Communications, Navigation and Surveillance / Air Traffic Management Subgroup (CNS/ATM/SG/1)

(Lima, Peru, 15 to 19 March 2010)

Agenda Item 2: Review of global and CAR/SAM CNS/ATM developments**Report of the GREPECAS ATM/CNS SUBGROUP ATM Committee Air Traffic Flow Management (ATFM) Task Force (ATFM/TF/5)****ATFM Task Force Developments**

(Presented by the Rapporteur)

Summary

This paper presents the report of the activities of the ATFM Task Force since the Fifteenth Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/15), Rio de Janeiro, Brazil, October 2008.

ICAO Strategic*A - Safety***Objectives:***D - Efficiency***1. Background**

1.1 The Fifth Meeting of the GREPECAS ATM/CNS SUBGROUP ATM Committee Air Traffic Flow Management (ATFM) Task Force (ATFM/TF/5) was held in Armenia, Colombia, from 8 to 12 June 2009.

1.2 The meeting was attended by 50 participants from 7 States of the CAR Region, 5 States of the SAM Region, and by 2 International Organizations (COCESNA and IFATCA).

1.3 The meeting reviewed topics that included: ATFM and the ICAO Global ATM concept; ATFM strategy and planning in the CAR/SAM Regions; ATS capacity methodologies; ATFM documentation for the CAR/SAM regions; and collaborative decision making.

2. Agenda Items from the Fifth Meeting of the ATFM Task Force

2.1 ATFM and the ICAO Global ATM Concept.

2.1.1 ICAO guidelines and GREPECAS Strategy for ATFM implementation

2.1.2 Review of main air traffic flows and airports delays

2.1.3 Network of air traffic flow management units in CAR/SAM Regions

2.2 Review of ATFM strategy and planning in CAR/SAM Regions

2.2.1 ATFM Pre-Tactical Phase: Coordinated arrival / departure management measures between main airports in the CAR/SAM Regions

2.2.2 The flight plan and its impact on an efficient system

2.2.3 The ATFM and ATS Contingency Plans

2.2.4 ATFM and severe weather conditions (Volcanic Ash, Hurricane events, etc.)

- 2.3 ATS Capacity Methodologies
 - 2.3.1 Methodology to calculate runway occupancy time
 - 2.3.2 Estimating capacity requirements for airport master plans
 - 2.3.3 ATFM role in Airspace Design and Evaluation
 - 2.3.4 Potential Capacity Enhancements using RNAV
 - 2.3.5 Airspace Analysis and division based on ATS Capacity
- 2.4 Review of ATFM documentation for the CAR/SAM Regions
 - 2.4.1 CAR/SAM ATFM Roadmap
 - 2.4.2 Draft CAR/SAM Air Traffic Flow Management Manual
 - 2.4.3 Model Agreements between Central Flow Management Units for Planning and Operational Roles in the CAR/SAM region
- 2.5 Collaborative Decision Making (CDM) Process
 - 2.5.1 Elements of the CDM process
 - 2.5.2 Training in CDM for the CAR/SAM Regions
- 2.6 Review of ATFM/TF Terms of Reference and Work Programme
- 3. **Recommendation**
 - 3.1 The Meeting is invited to:
 - a) Take into consideration the information presented in this paper; and
 - b) Consider adopting the draft CAR/SAM ATFM Manual included in the **Appendix** of this working paper for application and implementation by the States/Territories/Organizations in the CAR/SAM Regions.

APPENDIX



DRAFT

**Caribbean/South American Air Traffic Flow Management
Manual
(CAR/SAM ATFM Manual)**

Draft Version	1.0
Date	July 2009

FOREWORD

The *Caribbean/South American (CAR/SAM) ATFM Manual* is published by the ATM/CNS Subgroup of the Caribbean/South American Regional Planning and Implementation Group (GREPECAS). It describes air traffic flow management practices and procedures to be applied in the CAR/SAM Regions.

The GREPECAS and its contributory bodies will issue revised editions of the Document as required to reflect ongoing implementation activities.

Copies of the *CAR/SAM ATFM Manual* can be obtained by contacting:

ICAO South American Office

Victor Andres Belaunde 147
Torre Real 4, Piso 4
Lima 27, Peru
Postal Address: P. O. Box 4127, Lima 100, Peru
Tel: +511 611-8686
Fax : +511 611-8689
E-mail: mail@lima.icao.int
Web site: www.lima.icao.int
Point of contact: E-mail : jfernandez@lima.icao.int; aorero@lima.icao.int

ICAO North American, Central American and Caribbean Office

Av. Presidente Masaryk 29 – 3rd floor
Col. Chapultepec Morales
11570 México D.F., México
Postal Address: Apartado Postal 5-377, 06500 México, D.F., Mexico
Web site: www.mexico.icao.int
Tel: +5255 5250 3211
Fax: +5255 5203 2757
icao_nacc@mexico.icao.int
Point of contact: E-mail: vhernandez@mexico.icao.int

The present edition (Draft Version 1.0) includes all revisions and modifications until July 2009. Subsequent amendments and corrigenda will be indicated in the Record of Amendment and Corrigenda Table, according to the procedure established in page X.

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Chapter 1: Background

1.1 ICAO CNS/ATM Systems received support from the Tenth Air Navigation Conference held in 1991 at ICAO Headquarters in Montreal, Canada. The same year, the CAR/SAM Regional Planning and Implementation Group (GREPECAS) started to work towards a regional application of this new air navigation services concept.

1.2 Further, at the Eleventh Air Navigation Conference (AN-Conf/11, Montreal September 2003), States supported and approved the new ICAO ATM Global Operational Concept, which encourages the implementation of a services management system which enables an operationally continuous regional airspace through the application of a series of ATM functions.

1.3 As per the guidance principles established by ICAO Council with regard to the facilitation of the inter-regional harmonization, the regional plans for CNS/ATM systems implementation in the regions should be prepared in accordance to the general profiles defined in the Global Air Navigation Plan for CNS/ATM Systems. After a careful analysis of the guidance principles of this Global Plan, GREPECAS adopted them and incorporated characteristics inherent to the CAR/SAM Regions, using as a basis the definitions of Homogeneous Areas and Main Traffic Flows. Homogeneous areas are those airspace portions with ATM requirements and similar complexity degrees, while main air traffic flows are airspaces where a significant amount of air traffic exists.

1.4 From the analysis carried out by ICAO/UNDP Project RLA/98/003, it may be inferred that while in general terms in the CAR/SAM Regions environment, currently no traffic congestions are registered requiring a complex flow management, they have been identified in some airports and airspace sectors, mainly in special periods and specific hours, where some congestions are already produced, which should be avoided.

1.5 In view of the above, GREPECAS considered that the early implementation of the ATFM shall ensure an optimum air traffic flow towards some areas or through them, during periods in which the demand exceeds or is foreseen to exceed the available capacity of the ATC system. Therefore, an ATFM system should reduce aircraft delays both in flight and ground and avoid system overloading. The ATFM system shall assist the ATC to comply with its objectives and achieve a more effective utilization of the airspace and airports available capacity. ATFM should also ensure that air operations safety is not compromised in case unacceptable levels of air traffic congestion occur and at the same time ensure that air traffic is effectively administered without applying unnecessary restrictions to flow.

1.6 The ATFM/TF/5 Meeting examined the draft ATFM Manual to be applied by the CAR/SAM Region FMU/FMP, which contained guidelines related with ATFM implementation, such as demand and capacity, traffic management tools, traffic Management initiatives (TMI), Communications and coordination, organization and structure, system performance measurement, collaborative decision-making, common ATFM terminology whose aim was to provide orientation in ATFM management.

1.7 The document was in its initial stage and the Meeting agreed that it would be convenient to continue with its development. Subsequently, a number of the States that participated in ATFM/TF/5 reviewed the document and brought the work forward to its current version.

Overview of Changes Made to Draft ATFM Manual

1.8 The objective was to review and enhance the draft ATFM Manual that resulted from the Fifth Air Traffic Flow Management Task Force Meeting (ATFM/TF/5) held in Armenia, Colombia, 8-12 June 2009.

1. Document reformatted, chapters 1-8 renamed and re-sequenced for continuity.
2. History of document was included with background information.
3. ATFM Stages updated and examples provided.
4. Included was “Centralized ATFM strategy for CAR/SAM Regions”.
5. “Concepts to consider” incorporated.
6. Chapter 3, Organization and Structure enhanced.
7. Chapter 4, Demand, Capacity and Impact Analysis: “Guidelines for application of a methodology for calculation of airport and ATC sector airspace capacity for the CAR/SAM Regions.” Also, added was a paragraph regarding pre/post event actions/analyses.
8. Chapter 5, Traffic Management Initiatives (TMIs); purpose, description of TMIs, explanation of approval authority, and processing added.
9. Chapter 6, Collaborative Decision Making Process (CDM); reorganized and” enhanced.
10. Chapter 7, Coordination; enhanced to depict model and explanation 11. Chapter 8, Common ATFM Message Terminology; enhanced to include examples.
11. The following appendices were included:
 - Trinidad and Tobago ATFM organizational structure
 - Flow Chart ATFM Analyses
 - Screen-shots of ATFM tools; i.e., SYNCHROMAX, PROSAT and TFMS
 - International Operations Planning Teleconference.

Chapter 2: Purpose

2.1 Implementation of Air Traffic Flow Management (ATFM) in CAR/SAM Regions

2.1.1 The purpose of this document shall be to assist the States/Territories of the CAR/SAM Regions to establish a common understanding of the roles of each party interested in the effective provision of the flow management service, capacity to air traffic services, and to aircraft operators.

2.1.2 The intent of this document is to function as an introduction and not as an all inclusive body of knowledge. It is implied that this will be considered a living document that will be modified as needed to reflect the growth, future needs and harmonization of the CAR/SAM Regions.

2.2 ATFM Implementation Strategy

2.2.1 The operational concept establishes a simple implementation strategy. It is recommended that this strategy be developed in phases, so as to ensure maximum utilization of the available capacity and enable all concerned parties to obtain sufficient experience.

2.2.2 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, without the immediate need for a Regional ATFM Center. A Regional ATFM Center shall demand ample studies to define operational concepts, requirements of systems and institutional aspects for ATFM implementation in the CAR/SAM Regions.

Note: For additional details, see Caribbean/South America Air Traffic Flow Management Operation (CAR/SAM ATFM CONOPS).

2.3 Centralized ATFM strategy for CAR/SAM Regions

2.3.1 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.

2.3.2 In the future, in order to maximize terminal and regional efficiency, consideration should be given to the establishment of a Centralized ATFM facility(s) that would have oversight responsibility for providing ATFM service.

2.3.3 It was also considered necessary that the procedures during all the implementation process be developed in a harmonious manner among the ATFM units to avoid risking operational safety. This entails establishing a regional and interregional strategy to facilitate and harmonize all the implementation process.

2.4 ATFM stages

2.4.1 Initially ATFM initiatives may only be required during certain periods when aerodromes and ATC sectors experience delays due to demand and capacity related issues. In order to maximize the use of all resources available in the regions, either from personnel, equipment, facilities and/or automated systems, the ATFM implementation process should be established, planned and developed in phases (airport and airspace), according to the following sequence.

Note: Doc 9854, Global Air Traffic Management Operation Concept defines the ATFM stages.

2.4.2 **Strategic stage.** At the strategic stage, demand and capacity balancing will respond to the fluctuations in schedules and demands, seasonal changes of weather and major weather phenomena, and special traffic management events such as Carnival. This takes place seven days or more prior to the day of operation and includes research, planning and coordination activities. This phase consists of analyzing the evolution of the forecast demand and the identification of potential new problems and in evaluating possible solutions. The outputs of this phase are the capacity plan for the following year, the Route Allocation Plans and sets of other plans that can be activated as necessary during the next phases. Through collaborative decision making, assets will be optimized in order to maximize throughput, thus providing a basis for predictable scheduling.

2.4.2.1 For example: The ATFM service provider in anticipation of an event would gather statistical data and discuss this with stakeholders for the development of an action plan. This plan should take into consideration both scheduled and non-scheduled FPLs.

2.4.2.2 This could include a special traffic management event such as a sporting event, or a planned outage that would impact airport/airspace capacities. The integral part of the strategic phase is to mitigate impact as much as possible through advance planning.

2.4.3 **Pre-tactical stage.** Applied six days prior to the day of operation and includes revisiting the strategic phase. It analyses and decides the best way to manage the available capacity resources and the need for the adjustment of TMIs. For example, this may include demand and capacity balancing, evaluation of the current capabilities of the ATC service provider, airspace user and aerodrome operator assets.

2.4.3.1 In the pre-tactical phase, you are required to revisit the strategic plan and make appropriate adjustments as needed based upon newly received/changed information.

2.4.4 **Tactical stage.** At the tactical stage, demand and capacity balancing will focus more closely on demand management to adjust imbalances. It will consider weather conditions, infrastructure status, resource allocations, and disruptions in schedules that would cause an imbalance. Through collaborative decision making, these actions will include dynamic adjustments to the organization of airspace to balance capacity, dynamic changes to the entry/exit times for aerodromes and airspace volumes, and adjustments to the schedules by users.

2.4.4.1 Tactical stage includes making appropriate real time adjustments based upon unanticipated factors and informing stakeholders of these changes.

2.5 **Concepts for Consideration**

2.5.1 ATFM shall be established with a view to optimizing the use of available airspace and airport capacity, and to enhance air traffic flow management processes. It shall be based on transparency and efficiency, ensuring that capacity is provided in a flexible and timely manner, consistent with the guidelines issued by ICAO.

2.5.1.1 Implementation shall support cooperation between air navigation service providers, airport operators and airspace users and shall cover the following areas:

- a. flight planning
- b. use of available airspace capacity during all flight phases
- c. Issuing guideline initiatives for the optimization for the flow of air traffic

2.5.2 Implementation shall seek to balance the financial benefits for stakeholders with the expected operational safety improvements by the relevant parties and operational and technical benefits, taking into account the requirements for ATM global interoperability.

2.5.3 The following operations shall be excluded from the implementation of ATFM initiatives

- a. State aircraft (Special military missions)
- b. Emergency/priority aircraft
- c. ambulance flights
- d. humanitarian flights (ambulance flights)
- e. Search and rescue missions
- f. Transport of human organs

Note: For additional details, see Caribbean/South America Air Traffic Flow Management Operation (CAR/SAM ATFM CONOPS).

2.5.4 It shall be recognized that airspace and airports are resources shared by all user categories with fairness and transparency, taking into account the operational safety needs of States and the commitments of international organizations.

2.5.5 Air traffic flow management should be based on principles of partnership to meet ATM expectations, by means of collaborative decision-making between:

- a. Central units for air traffic flow management (ATFMC)
- b. Flow Management Units (FMU/FMP)
- c. Airspace users – general aviation, air carriers, the military
- d. Aerodrome community

2.5.6 Air navigation service providers and air operators should share data when coordination agreement has been established. Examples include SYNCHROMAX, PROSAT, and TFMS (formerly ETMS)

2.5.7 ATFM shall apply within CAR/SAM States airspace and airports to:

- a. all flights intended to operate or operating as general air traffic and in accordance with instrument flight rules (IFR) and visual flight rules (VFR) except as noted in paragraph 2.5.3 above.
- b. all phases of those flights.

2.5.8 ATFM shall apply to each of the following parties, or to anyone acting on their behalf who may be involved in air traffic flow management activities:

- a. aircraft operators
- b. air traffic service providers
- c. units involved in airspace management
- d. airport operators
- e. the central unit entrusted by Member States with the provision of air traffic flow management services.

Chapter 3: Organization and structure

3.1 It is understood that each State and/or service provider will develop an organizational structure that will meet the needs of the aviation system community. These needs at a minimum should address management and oversight of the following:

- a. Air Traffic Flow Management System
- b. Coordination/exchange of information both internal and external
- c. Provide line authority as to how decisions are implemented
- d. Ensure that mission requirements are met

3.2 Each organization may establish a Line of Authority that will support the mission of ATFM. This may include the following positions of responsibilities:

- a. Manager of Traffic Flow Management System
- b. Flow management unit that provides oversight for a specific geographic region and/or facilities
- c. Flow management positions that are responsible for the day-to-day activities of traffic flow management

Note: Please see **Appendix A** for an example of the Trinidad and Tobago Civil Aviation Authority Flow Diagram of Piarco Flow Management Unit

3.3 Flow Management Unit (FMU)

3.3.1 FMUs monitor and balance traffic flows within their areas of responsibility in accordance with traffic management directives. The FMU is delegated the authority to direct traffic flows and implement approved traffic management initiatives (TMIs) in conjunction with, or as directed by, the oversight authority.

3.4 Personnel requirements for FMU/FMP ATFM

3.4.1 Personnel working in a Centralized ATFM function as well as regional FMU/FMP functions shall require standardized and recurrent training in order to keep pace with an ever changing and fluid environment. A detailed plan of ATFM training in advance shall ensure the optimization of personnel achieving operational efficiency in their respective FMUs/FMPs. This will allow them to successfully face the important changes in their operational environments and allow them to provide the highest achievable level of customer service.

3.4.2 FMP Duties may include:

- a. Create and distribute plan of action after consultation with designated facilities and customers
- b. Gather all relevant information such as weather, delays, NAVAID/radar shutdowns, runway closures, TELCO outages, computer malfunctions, and procedural changes affecting air traffic facilities. This may be accomplished through various means available; e.g., teleconference, email, internet.
- c. Analyze and distribute all data.
- d. Record in a designated log a full description of all TMIs (e.g., ground delay programs, ground stops, miles-in-trail) which may include, but not limited to, start and stop times, facilities/operations affected, and justification.

- e. Coordinate procedures with all stakeholders.
- f. Create a structure for dissemination of information; e.g., ATFM webpage.
- g. Conduct daily teleconferences as needed.
- h. Monitor/review the flow management system, make adjustments where necessary, and cancel when no longer required.

Chapter 4: Demand, Capacity and Impact Analysis Planning Process

4.1 In order to balance demand with capacity, it is necessary to determine the airport and airspace capacity. Once these capacities are established, steps can be taken to monitor and evaluate air traffic demand and implement measures (e.g., TMIs) for achieving equilibrium in the system.

4.2 The following example provides a general concept of the steps involved regarding ATFM pre-event planning/actions and post-event analysis. Please see **Appendix B** ATFM flow chart analysis.

a. **Determine Capacities**

Review/assess airport/ATC sector capacities for accuracy.

Note: See Guidelines for the Calculation of Airport and ATC Sectors for the CAR/SAM Regions.

b. **Assess Demand**

Determine what forecasted demand will be for a specified time frame, 15-minute period(s), hour(s), shift, etc.

c. **Analyze and Compare**

Analyze and compare demand and capacity levels and time frames where demand is projected to exceed declared capacity.

Tool/technology for the analysis process

Manual computation or automated methodologies such as SYNCHROMAX, TFMS, PROSAT can be used to facilitate the demand/capacity analysis process. (See **Appendix D**).

d. **Communicate situational information**

Communicate situational information to facilities/stakeholders via available means utilizing Collaborative Decision Making (CDM) methodology. (See **Appendix E** regarding a model for CDM structure).

e. **Determine the action required to mitigate demand imbalance**

After gathering information and soliciting input, determine appropriate TMI needed for situation.

f. **Disseminate TMI information**

Inform stakeholders of TMI planned to mitigate the situation. This can be accomplished via telephone and/or automation.

g. **Monitor the situation**

Examine the situation periodically in order to ensure the applied TMIs are mitigating the situation. If necessary, re-evaluate and make the appropriate adjustments.

h. **Conduct post analysis of event**

Afterwards, perform post-event analysis to determine the effectiveness of the TMIs and catalog best working practices.

Chapter 5: Traffic Management Initiatives (TMI)

5.1 TMI are techniques used to manage air traffic demand according to system capacity. Some TMIs must be considered as control instructions or procedures. The determination is based on the size of the event, the coordination process, and the event duration.

5.2 Purpose

5.2.1 TMIs are important techniques for managing the air traffic system when they are coordinated and applied properly. TMIs are applicable when it is necessary to manage fluctuations in the air traffic demand, but they do cause an impact to the customers. It is important to consider this impact and implement only the initiatives that are necessary for maintaining the integrity of the system. Therefore, traffic management personnel should employ the least restrictive methods available in order to minimize delays.

Note: In certain instances it may be necessary to apply combinations of TMIs in order to maintain system integrity and still employ the least restrictive measures; e.g., miles-in-trail with holding in lieu of ground stopping aircraft.

5.3 Types of TMIs

<u>Name</u>	<u>Description</u>
Airborne holding	<p>Holding of aircraft is a commonly utilized TMI especially when anticipated due to volume, weather, outages etc. When airborne holding is forecasted, AT facilities and customers can make appropriate adjustments and alert personnel as to the reasons and length of holding.</p> <p>Airborne holding is normally done when the operating environment supports holding and the conditions are expected to improve shortly; this ensures aircraft are available to fill the capacity at the airport.</p>
Altitude	<p>Utilized to segregate different flows of traffic, or to distribute the number of aircraft requesting access to a specified geographic region.</p> <p>a. Capping: Term to indicate aircraft will be cleared to an altitude lower than their requested altitude until they are clear of a particular airspace. Capping may apply to the initial segment of the flight or for the entire flight.</p> <p>b. Tunneling: Term to indicate traffic will be descended prior to the normal descent point at the arrival airport to remain clear of an airspace situation; e.g., holding. Capping and Tunneling are techniques commonly used to keep aircraft from entering busy and complex sectors and still permitting them to depart with minimal delays.</p>
Fix balancing	<p>Assigning an aircraft a fix other than that in the filed flight plan in the arrival or departure phase of flight to equitably distribute demand.</p>
Ground delay programs (GDP)	<p>A GDP is a TM process administered by the FMU; when aircraft are held on the ground in order to manage capacity and demand at a specific location, by assigning arrival slots. The purpose of the program is to support the TM mission and limit airborne holding. It is a flexible program and may be implemented in various forms depending upon the needs of the air traffic system.</p>

<u>Name</u>	<u>Description</u>
Ground stops (GS)	<p>GS is a process that requires aircraft that meet specific criteria to remain on the ground. Since this is one of the most restrictive methods of traffic management, alternative initiatives should be explored and implemented if appropriate. GSs should be used:</p> <ul style="list-style-type: none"> a. In severely reduced capacity situations (below most user arrival minimums, airport/runway closed for snow removal, or aircraft accidents/incidents); b. To preclude extended periods of airborne holding; c. To preclude sector/center reaching near saturation levels or airport grid lock; d. In the event a facility is unable or partially unable to provide ATC services due to unforeseen circumstances; and e. When routings are unavailable due to severe weather or catastrophic events.
Miles-in-trail (MIT)	<p>The number of miles required between aircraft that meet a specific criteria. The criteria may be separation, airport, fix, altitude, sector, or route specific. MIT are used to apportion traffic into manageable flows, as well as to provide space for additional traffic (merging or departing) to enter the flow of traffic.</p>
Minutes-in-trail (MINT)	<p>The number of minutes required between successive aircraft. It is normally used in a non-radar environment, or when transitioning to a non-radar environment, or when additional spacing is required due to aircraft deviating around weather.</p>
Reroutes	<p>Reroutes are ATC routings other than the filed flight plan. They are issued to:</p> <ul style="list-style-type: none"> a. Ensure aircraft operate with the “flow” of traffic. b. Remain clear of special use airspace. c. Avoid congested airspace. d. Avoid areas of known weather where aircraft are deviating or refusing to fly.
Sequencing programs	<p>These programs are designed to achieve a specified interval between aircraft; they may be software generated or determined by ATFM personnel. Different types of programs accommodate different phases of flight.</p> <ol style="list-style-type: none"> 1. Departure Sequencing Program (DSP) - Assigns a departure time to achieve a constant flow of traffic over a common point. Normally, this involves departures from multiple airports. 2. En route Sequencing Program (ESP) - Assigns a departure time that will facilitate integration in the en route stream. This is accomplished by instructing an air traffic control tower to call the traffic management unit for release -- “Call For Release.” 3. Arrival Sequencing Program (ASP) - Assigns fix crossing times to aircraft destined to the same airport.

5.4 **TMI approval authority**

5.4.1 The designated FMU/FMP for each Service provider and/or State is the approval authority for all TMIs that impact their airports, TMAs, and en route airspace system.

5.5 **TMI processing**

5.5.1 Prior to implementation, the FMU/FMP responsible for ATFM oversight must identify the need for a TMI, examine alternative options, and develop a justification for the TMI. The FMP must be prepared to discuss and coordinate the proposed TMI with the receiving facility prior to implementation. FMPs must continuously monitor and evaluate the TMI and make the necessary adjustments, including cancellation and notification in a timely and effective manner.

Chapter 6: COLLABORATIVE DECISION MAKING PROCESS (CDM)

6.1 CDM has evolved into a philosophy or a collaborative approach of how to conduct business. It brings together operators, government, private industry, military, and academia, for the purpose of improving ATFM decision making through enhanced information exchange, data sharing, and improved automated decision support tools.

6.2 As the aviation community continues to evolve, States and/or service providers will be required to keep pace with increasing demand levels, expanding capacities, and technological advances. As a result of these challenges, a new sense of partnership will be required by all stakeholders who either directly or indirectly contribute to the overall well being and success of the aviation industry.

6.3 This new partnership will combine the talents and experiences of all individuals which will facilitate the harmonization and globalization of the world's airspace system.

6.4 Collaborative decision making (CDM) is a methodology that brings service providers and system stakeholders together for the purpose of improving air traffic flow management decisions.

6.5 CDM is a key element to maximizing airport and air operations because it considers all coordination elements between air navigation service providers such as flow management units (FMUs) and recipients of these services such as aircraft and airport operators. CDM includes stakeholders participating in the planning process by sharing information such as aircraft position, predictions, weather forecast, traffic forecast, and in general anything that would contribute to the efficient operation of a regional air space system.

6.6 CDM Objectives

6.61 The CDM concept seeks to improve air traffic flow and airport capacity management by reducing delays and foreseeing events through improved resource management.

6.6.2 These objectives include but are not limited to:

- a. Providing up-to-date information in real time to all stakeholders, thus ensuring a more accurate prediction of events and better capacity utilization, supported by a collaborative decision-making process.
- b. Transferring information for decision-making between stakeholders.
- c. Requiring that all system stakeholders function in an equitable manner for the betterment of the system.
- d. Exchanging information among the relevant parties in charge of aircraft flight planning and operations to increase system capacity, and thus improving:
 1. Operations quality and stability
 2. Offering reliability and predictability
 3. traffic synchronization amongst stakeholders
 4. And air space organization which is critical for maximizing capacity and enhancing system safety.

6.6.3 CDM participants should consider utilizing all available electronic means and tools that allow the analysis of various traffic scenarios in order to more effectively achieve the balancing of demand and capacity.

Note: Global experience has shown that teleconferences and electronic information exchanges are the recommended mechanisms for active participation throughout the System. However, each State/Service Provider may utilize whatever means are available to foster the sharing of information.

6.6.4 CDM implementation allows system participants to optimize their decisions in collaboration with others, by learning about their preferences, constraints, and the real and foreseen situation.

6.6.5 Decision-making within the CDM framework is facilitated by the exchange of accurate and timely information, aiming to adjust procedures, mechanisms and tools for better system performance.

6.6.6 The CDM concept consists of the following basic elements:

- a. Information exchange.
- b. Weather conditions.
- c. Sequencing before departure.
- d. Adverse conditions.
- e. Up-to-date flight information.
- f. Flight scheduling.
- g. Airport Master Plan.
- h. General Contingency Plans.
- i. State aircraft operation planning (military, law enforcement and other).

6.7 CDM Structure

6.7.1 Developing a CDM organization within each State and/or Service Provider is essential in order to achieve the benefits that this model offers. The flexibility is that it takes into consideration any communication venues that already exist, and does not require expending valuable resources, and can be tailored to meet the local regional needs as determined.

6.7.2 For example, Service Providers can begin with engaging the stakeholders as follows:

- a. Scheduling regular (e.g., quarterly, monthly, weekly) meetings
- b. Pre-establishing agenda items that are of mutual concern
- c. Discussing how tactical decisions will be managed, shared, and disseminated
- d. Establishing CDM participants and entering a memorandum of understanding (MOU) which stipulates guidelines in areas such as information distribution, rules and regulations, and how shared leadership is accomplished.
- e. Developing sub-work groups which fall under the direct leadership and guidance of the CDM organization and are specifically tasked with developing solutions.

6.8 Conclusions

6.8.1 As with any collaborative endeavor, each participant should realize that this will require a level of sacrifice, commitment and a sense of what is best for the greater whole and/or system.

6.8.2 Participant must be willing to share:

- a. Responsibility
- b. Resources
- c. Accountability
- d. Mutual goals
- e. Mutual trust

6.8.3 And as a direct result of these efforts, participants can generally expect to realize:

- a. More effective communications
- b. Increased information exchange
- c. More effective decision making
- d. Better solutions to ATFM problems

6.8.4 It is well accepted that regardless of the technological advances made in the aviation industry, CDM will require a culture change, team work approach, and be an integral part of how the future is shaped.

Chapter 7: Coordination

7.1 Coordination of traffic management information

7.1.1 It is understood that there exists different levels of traffic flow management oversight within the CAR/SAM regions. The concept is for each Service Provider to assign responsibility within their respective FIR for collecting, disseminating, monitoring, and providing oversight of TMIs. This methodology would ensure that applicable information is shared by all Service Providers and customers in a timely and efficient manner.

7.1.2 Examples of applicable information include: Tactical level information such as capacities, demand, imbalances, airport conditions and anything that would impact their respective system. This list is not all inclusive and will depend on the good judgment of each facility.

7.1.3 A typical traffic management hierarchy model may consist of the following:

- a. Control towers (TWR) coordinate with Approach Control Facilities (APP).
- b. Approach Control Facilities (APP) coordinate with an Air Control Center (ACC).
- c. Air Control Centers coordinate with ATFM authority.
- d. ATFM authority would be responsible for dissemination within their respective region.

Note: The purpose of this coordination methodology is to establish a protocol for each level of the organization to be informed of timely and accurate information. It is fully realized that this as an organizational model and can be modified to meet the needs of each specific situation.

Note: For standardization, it is desirable that the States develop and/or modify letters of agreement (LOA) which describe this coordination.

7.2 Exchanging ATFM Information

7.2.1 Air Traffic Service (ATS) and/or ATFM Service Providers in adjacent FIRs should establish schedules and regular telephone conferences, as required, to meet their specific operational needs. The purpose of these conferences is to share and disseminate information to air traffic facilities and customers for making tactical adjustments as required.

7.2.2 It is recommended that the following three methods be utilized:

- a. Scheduled telephone conferences. These consist of a pre-coordinated time when FMUs establish a conference amongst themselves to exchange information.
- b. Tactical telephone conferences. These are non-scheduled teleconferences which are conducted on a real-time tactical level to make adjustments.
- c. Automated Web Pages. ATFM service providers may create web pages with relevant ATFM information, as described in this paragraph. The purpose of the web pages is to share applicable system information for everyone to access and to minimize workload. As a minimum, the web pages may include:
 1. TMI's such as ground stops, delay programs, etc.
 2. Runway configuration
 3. Runway/airport capacities
 4. Weather
 5. Outages

6. Delay information
7. Airport closures
8. Miscellaneous

7.3 **Operations plan**

7.3.1 The operations plan may take into consideration the terms of balancing demand and capacity, ATFM initiatives, special operation requirements, special events (such as Carnival, World Cup) and any other events that may arise. The purpose is to tactically and/or strategically develop an outlook for the applicable airspace system that the aviation community can use as a planning forecast. Specific items that may be used are similar to the web page and allow the aviation community to provide input into the development of this plan. For example, an FMU would canvass applicable Air Traffic facilities and customers on how best to resolve system impacts.

7.3.2 Special operations may be defined as air operations conducted by State aircraft or for humanitarian activities. It is implied that each State and/or service provider may define special operations as needed.

7.4 **Implementing, adjusting, coordinating, and canceling of TMIs**

7.4.1 It is recommended that States and/or service providers develop an internal operations manual for their respective facilities describing the above-mentioned actions. For example:

- a. Implementing TMIs could be accomplished through established means such as telephone calls, web pages, or any other available method.
- b. Constant monitoring would be required for making the appropriate adjustments.
- c. Cancellation of TMI's would be required when no longer needed or when system balance is achieved regarding demand and capacity related issues. It is important for all system users to be informed of canceled initiatives so that adjustments can be accomplished.

7.5 **Civil/military Coordination**

7.5.1 It is recommended that States and/or service providers develop a letter of agreement (LOA) with their military customers that describes how military special use airspace can be utilized when not in use and/or during peak civilian periods in order to increase efficiency.

Chapter 8: Common ATFM Message Terminology - General

8.1 The primary goal of these guidelines is to develop standard terminology and phraseology for the exchange of ATFM telephone messages. The information contained herein is intended to reflect the current use of plain language and provide a basis for harmonization.

8.2 This includes the concept of modular and structured ATFM messages and define the components as who, what, where, when and why.

8.3 This is important because, at present, there is no module regarding how ATFM restrictions should be achieved by Service Providers. As with any communication model, it is the responsibility of both parties (sender and receiver) to ensure that the message is understood correctly and can be applied as requested.

8.4 It should be recognized that once information is exchanged regarding a restriction, it is considered MANDATORY unless otherwise coordinated.

8.5 ATFM Message Components

8.5.1 Each message should have five components that contain plain language elements and when combined provide a complete ATFM message.

8.5.2 This section breaks down the five message components.

WHO: This identifies the parties involved. Who is transmitting and receiving the message.

Examples: CGNA THIS IS COLOMBIA FMU

CCFMEX THIS IS ATCSCC

WHAT: This identifies the objective to be achieved.

Examples: REQUEST 30 MILES IN TRAIL

REQUEST 5 MINUTES IN TRAIL

WHERE: This identifies the location of the ATFM objective to be achieved. It is often preceded by a modifying clause, indicating what aircraft or traffic the restriction will apply to. The modifying clause and the location combination are used to construct the “where” component.

Examples: FOR ALL AIRCRAFT LANDING EL DORADO
INTERNATIONAL AIRPORT

FOR ALL TRAFFIC LANDING HOUSTON
INTERCONTINENTAL AIRPORT

WHEN: This identifies the time and/or duration of the ATFM objective to be achieved.

Examples: FROM NOW UNTIL 1700 UTC

FROM 2000 UTC TO 2130 UTC

WHY: This identifies the reason for the ATFM objective:

Examples: DUE TO SEVERE WEATHER OVER
 EL DORADO INTERNATIONAL AIRPORT

 DUE TO A LONG-RANGE RADAR OUTAGE

The following is an example of a complete message:

CGNA THIS IS COLOMBIA FMU. REQUEST 30 MILES IN TRAIL FOR
ALL AIRCRAFT LANDING EL DORADO INTERNATIONAL AIRPORT
FROM NOW UNTIL 1700 UTC DUE TO SEVERE WEATHER OVER EL
DORADO INTERNATIONAL AIRPORT

Amendment

The amendment of an ATFM message should include similar elements but with additional modifiers. These modifiers may include:

- a. CHANGE
- b. AMEND
- c. REDUCE
- d. INCREASE
- e. DECREASE

Example: GUAYAQUIL FMP THIS IS LIMA FMP, REDUCE YOUR MILES-IN-TRAIL
TO JORGE CHAVEZ INTERNATIONAL AIRPORT FROM 30 MILES-IN-TRAIL TO 20
MILES-IN-TRAIL FROM 1400 UTC TO 1700 UTC DUE TO IMPROVING WEATHER
CONDITIONS AT JORGE CHAVEZ INTERNATIONAL AIRPORT

Cancellation

The cancellation of an ATFM message should contain a canceling word or phrase. It is normally not necessary to state the reason for the cancellation. A canceling word or phrase may include:

- a. CANCEL
- b. RESUME
- c. RESUME NORMAL
- d. RELEASE

Example: CARACAS FMP THIS IS GEORGETOWN FMP, CANCEL THE
GROUND STOP FOR TIMEHRI CHEDDI JAGAN INTERNATIONAL AIRPORT
DUE TO THE RUNWAY NOW OPEN.

Cancellation messages should also identify which message is being cancelled because several restrictions could be in place at one time.

ATTACHMENT A

EXPLANATION OF TERMS

The development of this document is based on the understanding of important terms and expressions that are described below:

Stakeholders involved in ATFM - The ATFM stakeholder community includes the organizations, bodies or entities which could participate, collaborate and cooperate in the planning, development, utilization, regulation, operation, and maintenance of ATFM system.

Among them are:

Aerodrome Community - The air traffic control authorities, aerodrome authorities, commercial, military, and general aviation operators, 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.

Airspace Providers - Refers, in general terms, to Contracting States/Territories in their capacity as airspace owners with the legal authority to permit or deny access to their sovereign airspace. The term may also be applied to organizations of the State assigned responsibility for establishing the standards and guidelines for use of the airspace.

Airspace users - Refers to the commercial, military, and general aviation operators that utilize the sovereign airspace of States/Territories/Organizations.

ATM service providers - All of the organizations and personnel (e.g., controllers, engineers, technicians) involved in the provision of ATFM services to airspace users.

Military aviation - Refers to the personnel, aircraft, and equipment of military organizations that serve a vital role in the security of States/Territories.

International Civil Aviation Organization (ICAO) - Considered the only international organization in position to efficiently coordinate the implementation activities of global ATM.

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 ATC authority.

Air Traffic Management (ATM) - A service which comprises airspace management, air traffic flow management, and air traffic services.

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

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

Air Traffic Volume - The number of aircraft within a defined airspace or aerodrome movement area in a given period of time.

Capacity (for ATFM purposes) - The maximum number of aircraft that can be accommodated in a defined airspace or aerodrome (throughput) in given period of time.

Declared Capacity (for ATFM purposes) – A measure of the ability of the ATC system or any of its subsystems or operating position to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specified portion of airspace in a given period of time taking into account weather, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of the controller responsible for the airspace.

Regional ATFM Center - A flow management unit responsible for the provision of air traffic flow management across multiple area control centers.

Collaborative Decision Making - an operating philosophy and the associated technologies that enable traffic managers and aviation industry representatives to respond in a timely manner to constraints in the airspace system.

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

Efficiency - The ratio of the cost of ideal flight to the cost of procedurally constrained flight.

Flow Management Unit (FMU) - FMUs monitor and balance traffic flows within their areas of responsibility in accordance with traffic management directives. The FMU is delegated the authority to direct traffic flows and implement approved TMIs in conjunction with, or as directed by the oversight authority.

Flow Management Position (FMP) - A position established in an appropriate air traffic control unit to ensure the necessary interface between the local ATFM functions and other FMUs and/or a centralized ATFM unit.

Homogeneous ATM area - An airspace with a common ATM interest, based on similar characteristics of traffic density, complexity, air navigation system infrastructure requirements and other specified considerations, wherein a common detailed plan will foster the implementation of ATFM.

Main Traffic Flow - The concentration of a significant volume of air traffic on the same, or similar, flight trajectories.

Routing area - An area that encompasses one or more major traffic flows, defined for the purpose of developing a detailed plan for the implementation of ATM systems and procedures.

Traffic Management Initiatives - Techniques used by traffic managers to balance air traffic demand with available capacity.

ATTACHMENT B

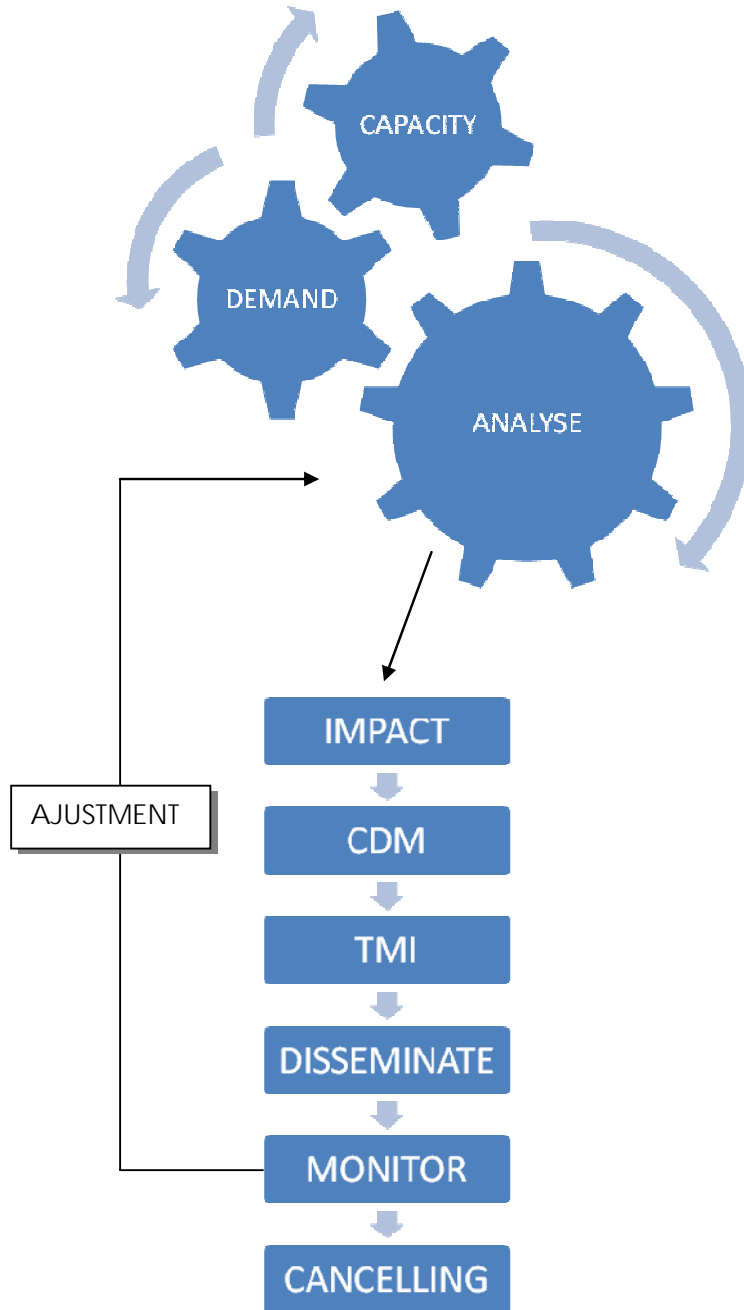
LISTA DE ACRÓNIMOS/ LIST OF ACRONYMS

ACC	Centro de control de área	Area control centre
AFTN	Red de telecomunicaciones fijas aeronáuticas	Aeronautical fixed telecommunication network
AIP	Publicación de Información aeronáutica	Aeronautical information publication
AIS	Servicio de información aeronáutica	Aeronautical information service
ANP	Plan de navegación aérea	Air navigation plan
ANS	Servicios de navegación aérea	Air navigation services
ANSP	Proveedor de servicios de navegación aérea	Air navigation service provider
AO	Explotador de aeronave	Aircraft operator
APP	Oficina de control de aproximación	Approach control facility
AAR	Régimen de aceptación del aeropuerto	Airport Acceptance Rate
ADR	Régimen de salida del aeropuerto	Airport Departure Rate
ATC	Control de tránsito aéreo	Air traffic control
ATFM	Gestión de afluencia del tránsito aéreo	Air traffic flow management
ATM	Gestión del tránsito aéreo	Air traffic management
ATS	Servicios de tránsito aéreo	Air traffic services
CAA	Administración de aviación civil	Civil aviation authority
CAR/SAM	Regiones Caribe y Sudamérica	Caribbean and South American Regions
CATFM	Dependencia central de gestión de afluencia del tránsito aéreo	Centralised air traffic flow management unit
C/BA	Análisis de costo-beneficio	Cost/benefit analysis
CDM	Toma de decisiones en colaboración	Collaborative Decision Making
CNS/ATM	Comunicaciones, navegación y vigilancia/gestión del tránsito aéreo	Communications, navigation, and surveillance/air traffic management
CTA	Area de control	Control area
FDPS	Sistema de procesamiento de datos de vuelo	Flight data processing system
FIR	Región de información de vuelo	Flight information Region
FMP	Puesto de gestión de afluencia	Flow management position
FMU	Dependencia de gestión de afluencia	Flow management unit
FPL	Plan de vuelo	Flight plan
GREPECAS	Grupo regional CAR/SAM de planificación y ejecución	CAR/SAM regional planning and implementation group
IATA	Asociación del Transporte Aéreo Internacional	International Air Transport Association
IFALPA	Federación Internacional de Asociaciones de Pilotos de Línea Aérea	International Federation of Air Line Pilots' Associations
IFATCA	Federación Internacional de Asociaciones de Controladores de Tránsito Aéreo	International Federation of Air Traffic Controllers' Associations
LOA	Carta de acuerdo	Letter of Agreement

MET	Servicios meteorológicos para la navegación aérea	Meteorological services for air navigation
NOTAM	Aviso a los aviadores	Notice to airmen
OACI/ICAO	Organización de Aviación Civil Internacional	International Civil Aviation Organization
PANS ATM	Procedimientos para los servicios de navegación aérea – Gestión de tránsito aéreo	Procedures for Air Navigation Services –Air traffic management
PIRG	Grupo regional de planificación y ejecución	Regional planning and implementation group
PROSAT	Pronóstico de saturación	PROSAT
RNAV	Navegación de área/Area Navigation - RNAV Route: Ruta de navegación de área	Area navigation route
RNP	Performance de navegación requerida	Required navigation performance
SID	Salida normalizada por instrumentos	Standard instrument departure
STAR	Llegada normalizada por instrumentos	Standard instrument arrival
SYNCHROMAX	SYNCHROMAX	SYNCHROMAX
TBD	A ser determinado	To be determined
TELCON	Tele-conferencia	Telephone conference
TFMS	Sistema de gestión de la afluencia del tránsito (previamente, ETMS)	Traffic Flow Management System (previously called ETMS)
TMA	Área de control terminal	Terminal control area
TMC	Coordinador de la gestión del tránsito	Traffic Management Coordinator
TMI	Iniciativa de gestión del tránsito	Traffic management initiative
TWR	Torre de control	Control tower
WSO	Oficina del Servicio Meteorológico	Weather Service Office
WWW	Red mundial	World Wide Web

APPENDIX B

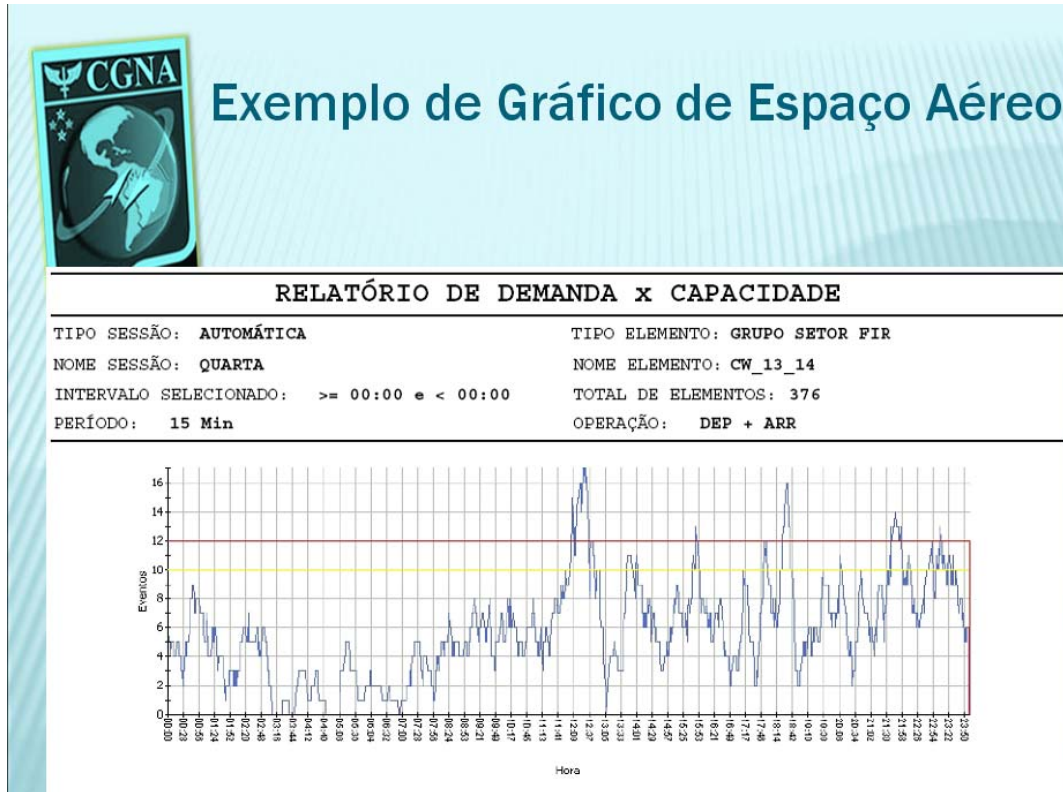
FLOW CHART ATFM ANALYSES



APPENDIX C

Screen Shots of ATFM Tools in use in the CAR/SAM Regions

Synchromax
Brazil



PROSAT
Mexico

PROSAT

Pronóstico de Saturación de Tráfico

40	CHP242	MHTP	E732	0126	
39	MZA302	KMIA	A320	0124	
38	AMX304	KMAA	MD83	0123	
37	AMX227	MMCS	E737	0122	
36	CHP312	MMVA	E732	0120	
35	MZA070	MMHY	A319	0118	
34	TA03149	MMLO	AT45	0117	
33	MZA402	MMPR	A320	0116	
32	AMK465	MMGL	MD88	0114	
31	AFR438	LFFG	E744	0113	
30	MXA139	MMHY	A319	0112	
29	AAL481	KDFW	MD83	0108	
28	AMX111	MMCS	E737	0106	
27	VRG8670	SCBR	E744	0105	
26	MZA622	MMVR	A319	0104	
25	MXA710	MMHY	A319	0103	
24	JAL012	CFVR	E744	0102	
23	LCD402	MMUN	MD82	0101	
22	AAL2199	KFIA	E737	0059	
21	GNT777	MMUN	A319	0058	
20	CHP255	MMGL	E732	0057	
19	MZA672	MMUN	A319	0055	
18	XCOFF	MMPR	E727	0053	
17	AMX944	MMHY	MD82	0051	
16	LCD405	MMGL	E733	0050	
15	MZA405	MMGL	A300	0048	
14	MZA745	MMTR	A319	0047	
13	CBF7926	MMMB	F100	0045	
12	AMX267	MMPK	MD81	0044	
11	BAW243	EGGL	E744	0043	
10	AMX707	MMTC	MD82	0042	
9	MXA019	MMHY	A320	0041	
8	MXA135	MMMM	A320	0038	
7	AMX125	MMGL	MD82	0039	
6	AMX131	MMGL	MD88	0038	
5	AMX315	KPRK	E737	0037	
4	MZA901	MMHO	E752	0035	
3	AAL2177	KFIA	A306	0034	
2	CHP205	MMGL	E732	0031	
1	KLM685	KHMA	E744	0030	

01:30	MMGA225	MMOX	A319	0129	
	TA0621	MMMM	AT45	0128	
01:25	CHP242				
	MMGA303				
	MMGA304				
	MMK227				
01:20	CHP312				
	MMGA070				
	TA03149				
	MMGA402				
01:15	AMK465				
	AFR438				
	MMGA139				
01:10					
	AAL481				
01:05	MMK211				
	VRG8670				
	MMGA622				
	MMGA710				
	JAL012				
	LCD402				
01:00	AAL2199				
	GNT777				
	CHP255				
00:55	MMGA672				
	XCOFF				
00:50	MMGA944				
	LCD405				
	MMGA405				
	MMGA745				
00:45	CBF7926				
	AMX267				
	BAW243				
	AMX707				
	MMGA019				
00:40	MMGA135				
	MMGA125				
	MMGA131				
	MMGA315				
	MMGA901				
	AAL2177				
00:35	MMGA205				
	MMGA001				
	AAL2177				



SCT

Man Del TX Dale
Mod [id*] xx

ACM
00:38:50
30-May-06
42 Estimados

Borrar
Marcar

PROSAT #1

Pronóstico de Saturación = 2 Hrs.
(pendiente 4 Hrs.)
no SSL's

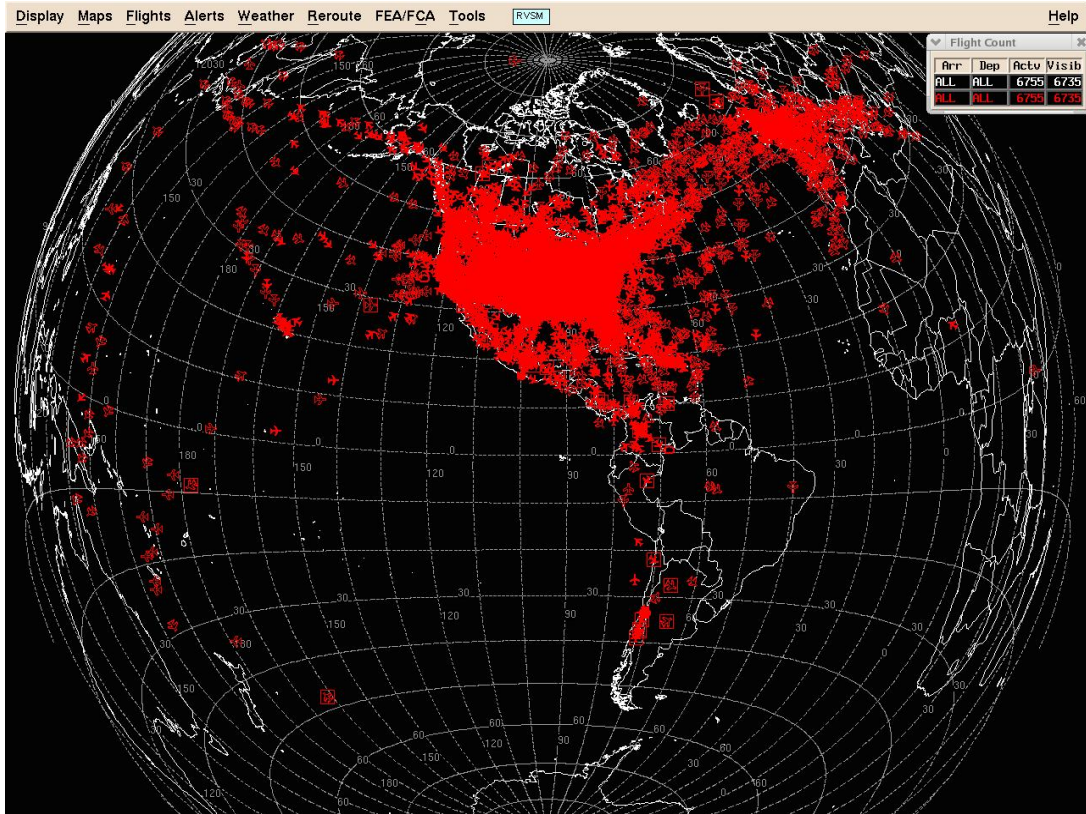
Atenas

Precaución	Saturación	Miles/Tics
8	9	5

02:29	0	04:28	0
02:15	0	04:15	0
02:14	0	04:14	0
02:00	0	04:00	0
01:59	0	03:59	0
01:45	0	03:45	0
01:44	0	03:44	0
01:30	0	03:30	0
01:29	10	03:29	0
01:15	10	03:15	0
01:14	10	03:14	0
01:00	10	03:00	0
00:59	10	02:59	0
00:45	10	02:45	0
00:44	12	02:44	0
00:30	0	02:30	0

Traffic Flow Management System (TFMS)

- United States
- Mexico
- COCESNA
- Colombia
- Chile



APPENDIX D

**INTERNATIONAL OPERATIONS
PLANNING TELCON FORMAT**

- _____ Greeting and introduction
xxxxZ planning telcon, working from advisory xxx
Covering the timeframe from xxxx UTC to xxxx UTC

- _____ Common Weather Products – working from
 - 1) the ICAO Area “A” Prog Chart, valid xxxx UTC for (Date)
 - 2) the ICAO Area “A” IR Satellite photo, xxxx UTC for (Date)

- _____ Planning discussion -- Work from south to north then from the Caribbean to the Pacific (east to west)
 - Significant weather and atmospheric conditions
 - Thunderstorm activity
 - Turbulence
 - Volcanic ash clouds

 - Terminal discussion
 - For select aerodromes:
 - Airport/Sector Capacities
 - Projected terminal demand
 - Aerodrome constraints, such as construction projects or NAVAID outages

 - Anticipated traffic management initiatives (TMIs)
 - Expanded miles-in-trail
 - Potential airborne holding
 - Potential ground stops

 - Enroute discussion
 - Enroute constraints, such as frequency outages or NAVAID outages
 - Route discussion and issues
 - Anticipated TMIs
 - Expanded miles-in-trail
 - Potential airborne holding

- _____ Additions to the plan, including any pertinent tactical updates.

- _____ Stakeholder input, comments, and questions

- _____ Next International Planning Telcon: xxxxZ