



Agenda

Item 2: Report of activities of the GESEA and Subgroups

ATFM SERVICE IMPLEMENTATION GUIDE FOR THE SAM REGION 2020 – 2025 (DRAFT 2.0)

(Presented by the Secretariat)

SUMMARY	
This working paper presents the results of the activity aimed at preparing the guide (draft version 2.0) for the implementation of the ATFM service in the SAM Region 2020 – 2025.	
References:	
<ul style="list-style-type: none"> • ICAO Doc 9750 Global Air Navigation Plan (Sixth Edition). • ICAO Doc 4444, Air traffic Management, Sixteenth Edition. • ICAO Doc 9971, Manual de Gestión Colaborativa de la Afluencia de Tránsito Aéreo (Third edition). • Concepto Operacional (CAR/SAM ATFM CONOPS 2019-2024). • ASIA/PACIFIC Framework for a Collaborative Air Flow Management. • CANSO Implementing Air Traffic Flow Management and Collaborative Decision Making ICA 100-22, Serviço de Gerenciamento de Fluxo de Tráfego Aéreo, 2018, DECEA. • SAMIG/24 meeting report • Meeting GESEA/SG3 ATFM summary 	
ICAO strategic objectives:	<i>B – Air navigation capacity and efficiency</i>

1. Introduction

1.1 As part of the actions carried out through Project RLA/06/901, with regard to the programme for the implementation of ATFM, the mission of two ATFM specialists, with the aim of developing a **Guide for the implementation of the ATFM service in the SAM Region**, including methodologies for the preparation of a PDA, ATFM unit manual post operation report, as well as the ATFM terminology/communication and performance indicators (KPIs) according to the best practices of the region.

1.2 During SAM/IG/24 (Lima, 04-08 November 2019) draft 1.0 of the Guide was presented, defining that the text required greater contributions from the States. Also, the document was only available in Spanish.

1.3 The 1.0 draft has been the subject of a complete update and review by GESEA/SG3, through the GT DOCS ATFM. The rapporteur was Mr. Jorge Cornelio (Argentina), supported by Ms. Brenda Cespedes (Peru), delivering the text presented in the **Appendix** to this note.

2. **Analysis**

2.1 The Guide for the implementation of the ATFM service in the SAM Region was drafted to providing a regional framework for the correct and harmonic implementation of the ATFM service.

2.2 This document is a guide for SAM States to implement, in the first instance, national or cross-border ATFM services that are well suited to the scale of air traffic flow handled by their ATS services, and that can duly respond to demand/capacity imbalances. These two types of services shall provide the basis for medium-term implementation of multi-nodal cross-border ATFM, while in the case of cross-border ATFM, they shall facilitate the ATFM service interface between States located along the boundaries of the SAM and CAR Regions.

2.3 In this sense, the document follows the guidelines of the ATFM Concept of Operations for the CAR/SAM regions, aiming at a harmonised and fully interoperable implementation between both Regions and, in the future, among SAM and APAC and WACAF.

2.4 The document recognises the progress of ATFM in Brazil since 2007, and subsequently its development in other SAM States as a result of the initiatives of the Bogotá Declaration since 2013. It therefore analyses the current situation and proposes an action plan to further develop ATFM intra-regionally, without losing sight of the inter-regional sphere, based on the integrated efforts of the States.

2.5 ICAO Doc 9971 states that, in its initial application, ATFM needs not involve complicated processes, procedures or tools. The basic objective of ATFM is to collaborate with system stakeholders and to communicate operational information to airspace users, air navigation service providers and other stakeholders in a timely manner.

2.6 This document, in its future versions, will be expanded, adjusted and refined as practical experience is acquired from its operational implementation and its supporting technology.

3. **Suggested actions**

3.1 The Meeting is invited to take note and examine the information presented, and to:

- a. Examine and provide feedback on the content of the ATFM service implementation Guide – Draft 2-0 presented as Appendix to this working paper;
- b. analyze the training processes that would be required to implement the Guide; and
- c. if consensus is reached, approve the Guide for its application in the SAM Region.



**INTERNATIONAL CIVIL AVIATION ORGANIZATION
SOUTH AMERICAN REGIONAL OFFICE**

**GUIDE FOR THE IMPLEMENTATION OF
ATFM IN THE SAM REGION
2020-2025**

Draft 2.0

September 2021

**GUIDE FOR THE IMPLEMENTATION OF
ATFM IN THE SAM REGION
2020 – 2025**

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1. DEFINITIONS

For purposes of this document, the following definitions apply:

Flow control. Measure taken by an ATC body to adjust demand immediately due to an unexpected capacity-demand imbalance.

Flow management unit (FMU). A working unit established in an appropriate air traffic control facility to provide ATFM service for a specific set of ATS units, and to ensure the necessary interface between the local FMU and neighbouring FMUs with respect to air traffic flow management.

Air traffic management (ATM). The dynamic, integrated management of air traffic and airspace including air traffic services, airspace management and air traffic flow management--safely, economically and efficiently--through the provision of facilities and seamless services in collaboration with all parties and involving airborne and ground-based functions.

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 utilised to the maximum extent possible and that the traffic volume is compatible with the capacities declared by the appropriate ATS authority.

Air traffic flow and capacity management (ATFCM). Service that optimises the relationship between system capacity and air traffic demand, maximising the use of available capacity in order to ensure optimal air traffic flow.

ATFM measure. Procedures adopted to maximise the use of declared capacities and/or adjust traffic flow in a given portion of an airspace, along a given route, or at a given aerodrome so as to maintain demand-capacity balancing (DCB).

ATFM slot. Time slot allocated by the FMU to make use of a capacity resource with the objective of guaranteeing the use of that resource for an authorised period of time.

Flow management position (FMP).

A position established within specific ATS units, responsible for day-to-day ATFM activities.

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.

2. ACRONYMS

ACC	Area control centre
A-CDM	Airport collaborative decision-making
ADAP	Aviation Data and Analysis Panel
ADP	ATFM daily plan
ADS-B	Automatic dependent surveillance — Broadcast
AFTN	Aeronautical fixed telecommunication network
AIM	Aeronautical information management
AIP	Aeronautical information publication
AMAN	Arrival manager
ANSP	Air navigation service provider
APP	Approach control service
ASBU	Aviation system block upgrade
ASM	Airspace management
ATC	Air traffic control
ATCO	Air traffic controller
ATFM	Air traffic flow management
ATM	Air traffic management
ATS	Air traffic services
AU	Airspace user
CDM	Collaborative decision-making
CFMU	Central flow management unit
CGNA	Centro de Gerenciamento da Navegação Aérea (Air navigation management centre)
CHG	Change message
CLDT	Calculated landing time
CNS/ATM	Communications, navigation, and surveillance/air traffic management
CNL	Flight plan cancellation message
COBT	Calculated off-block time
CTO	Calculated time over
CTOT	Calculated take-off time
DCB	Demand-capacity balancing
DEP	Departure message
DLA	Delay message
DMAN	Departure manager
ELDT	Estimated landing time
EOBT	Estimated off-block time
EST	Estimate message
ETD	Estimated time of departure
ETO	Estimated time over
ETOT	Estimated take-off time
FDP	Flight data processor
FIR	Flight information region
FMP	Flow management position
FMU	Flow management unit
FPL	Filed flight plan
GANP	Global air navigation plan
GDP	Ground delay program
GNSS	Global navigation satellite system
GSt	Ground stop
IFR	Instrument flight rules
KPI	Key performance indicator

LoA	Letter of agreement
MDI	Minimum departure interval
MET	Meteorology
MINIT	Minutes-in-trail
MIT	Miles-in-trail
MoU	Memorandum of understanding
NOPS	Network operations
NOTAM	Notice to airmen
PNNA	National air navigation plan
PBN	Performance-based navigation
SUB	Slot swapping
SWIM	System-wide information management
TAF	Aerodrome forecast
TFM	Traffic flow management
TMA	Terminal control area
TS	Thunderstorm
TTOT	Target take-off time
TWR	Control tower
VAAC	Volcanic ash advisory centre

3. REFERENCE DOCUMENTS

The following ICAO documents are related to the PBN concept:

- Doc 9750 - Global air navigation plan (6th edition).
- Doc 4444 - Air traffic management (15th edition, 7th amendment).
- Doc 9971 - Manual on collaborative air traffic flow management (3rd edition).
- Concept of operation (CAR/SAM ATFM CONOPS 2019-2024)
- ASIA/PACIFIC Framework for a Collaborative Air Flow Management
- CANSO Implementing Air Traffic Flow Management and Collaborative Decision Making

4. EXECUTIVE SUMMARY

This document is a guide for SAM States to implement, in the first instance, national or cross-border ATFM services that are well-suited to the scale of air traffic flow handled by their ATS services, and that can duly respond to demand/capacity imbalances. These two types of services shall provide the basis for medium-term implementation of multi-nodal cross-border ATFM, while in the case of cross-border ATFM, they shall facilitate the ATFM service interface between States located along the boundaries of the SAM and CAR Regions.

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States.

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This document, in its future versions, will be expanded, adjusted and refined as practical experience is gained from its operational implementation and its supporting technology.

5. INTRODUCTION

5.1 Objectives of the document

This document aims to meet the following objectives:

- a) Incorporate the concepts of Doc 9971, third edition, 2018, into South American regional ATFM planning;
- b) Support SAM States in the consolidation of safe, interoperable and efficient ATFM services, which adequately mitigate capacity/demand imbalances in intra-regional air navigation structures;
- c) Promote the creation of operational scenarios that facilitate the gradual expansion of airport infrastructure and/or CNS/ATM systems, as appropriate, to close the demand/capacity gaps; and
- d) To lay the foundations for the implementation of the NOPS module of the GANP, according to the elements foreseen in the CAR/SAM eANP.

5.2 ICAO ATFM conceptual framework

Air Traffic Flow Management (ATFM) enables efficient and effective air traffic management (ATM). It contributes to the safety, efficiency, cost-effectiveness and environmental sustainability of an ATM system.

It is also an important enabler of global interoperability in the air transport industry. It is important to recognise that, over time, two sets of events will occur simultaneously:

- a) local ATFM implementations around the world will shape a regional and later a global ATFM; and
- b) globally standardised ATFM processes will be put in place.

5.2.1 The ATFM service

The level of an ATFM service required in a given context will depend on a number of factors that are discussed in this guide. An ATFM service is established to enable air navigation service providers to deliver the required service efficiently, based on existing and planned operational requirements. A properly designed and implemented ATFM service provides ATM performance benefits, and enables the organisation, processes, training and automation activities to be tailored to meet operational needs.

This guide describes the main regional objectives of ATFM, which include: assisting air traffic control to

maximise the use of its airspace and capacity; formulating ATFM measures, as necessary, to maintain a safe, orderly and seamless air traffic flow; and laying the foundation for a multi-nodal and centralised implementation of ATFM.

A key to the successful implementation of an ATFM service is to achieve good coordination among aviation stakeholders. ATFM is envisaged as a collaborative decision-making process in which aerodrome operators, ANSPs, airspace users and other stakeholders work together to improve the performance of the ATM system. It is also envisaged that such coordination will take place within a flight information region (FIR), among several FIRs, and ultimately among ICAO Regions.

ATFM implementations were initially intended to manage air traffic demand at times and places where it exceeded the capacity of air traffic control services in a safe, orderly and seamless manner, not only by ensuring that ATC capacity is optimised and utilised to the maximum extent possible, but also by aligning traffic demand with ATC capacity.

ATFM is generally required whenever airspace users face constraints in their operations and in areas with high traffic flow. Firstly, ATFM should be considered in the strategic phase, through strategic planning of airspace utilisation; secondly, in the pre-tactical phase, where meteorological factors, among other variable constraints, are assessed and mitigation plans are taken into consideration; and thirdly, in the tactical phase, which includes the period of flight of the aircraft.

Given the global nature of air traffic today, and the need for effective management at international level based on collaboration of all stakeholders in order to achieve the best possible results, all States and ANSPs should consider the implementation of some form of ATFM, among the following options: ATFM at the national level, cross-border ATFM, multi-nodal regional ATFM and centralised ATFM.

ATFM and its applications should not be restricted to one State or FIR because of its far-reaching effects on traffic flow elsewhere. Doc 4444, PANS-ATM, recognises this important fact and states that ATFM should be implemented on the basis of a regional or, if appropriate, multilateral air navigation agreement.

The high relevance of the effects of ATFM and its impact on a wide range of stakeholders make it essential to establish a supporting regulatory framework. The notion of a regulatory framework, in the context of this handbook, should be understood as a set of rules and principles governing key aspects of ATFM provision and ensuring the involvement of all relevant stakeholders in an appropriate manner.

5.2.2 Objectives of ATFM service

The objectives of ATFM are to:

- a) enhance the safety of the ATM system by ensuring the delivery of safe traffic densities and minimising traffic surges;
- b) ensure optimal air traffic flow in all phases of a flight operation by balancing demand and capacity;
- c) facilitate collaboration among system stakeholders to achieve an efficient flow of air traffic through multiple airspace volumes in a timely and flexible manner that supports the achievement of AU activity or mission objectives and provides optimal operational options;
- d) balance the legitimate, but sometimes conflicting, requirements of all AUs, thereby promoting equitable treatment;
- e) reconcile the resource constraints of the ATM system with economic and environmental priorities;
- f) facilitate, through collaboration with all stakeholders, the management of constraints, inefficiencies and unforeseen events that affect the system's capacity to minimise the negative impacts of disruptions and changing conditions; and
- g) facilitate the achievement of a seamless and harmonised ATM system while ensuring

compatibility with international developments.

5.2.3 ATFM service principles

The ATFM principles are to:

- a) optimise available airport and airspace capacity without compromising safety;
- b) maximise operational benefits and global efficiency while maintaining agreed levels of safety;
- c) promote coordination and collaboration in a timely and effective manner among all affected stakeholders;
- d) foster international collaboration leading to an optimal and seamless ATM environment;
- e) recognise that airspace is a common resource for all users and ensure equity and transparency, taking into account security and defence requirements;
- f) support the introduction of new technologies and processes that increase the capacity and efficiency of the system;
- g) increase the predictability of the system, for ANSPs and AUs;
- h) help to maximise economic efficiencies and returns, and support other sectors of the economy such as business, tourism and cargo transport; and
- i) continuously make progress to support the ever-changing aviation environment.

5.2.4 ATFM service benefits

The benefits of ATFM cover various areas of the ATM system:

a) Operational:

- increased safety of the ATM system;
- increased operational efficiency and predictability of the system through CDM processes;
- effective capacity and demand management through data analysis and planning;
- enhanced situational awareness among stakeholders and coordinated and collaborative development and implementation of operational plans;
- improved punctuality and reduction of fuel consumption, among other operating costs of AUs;
- effective management of irregular operations and effective mitigation of system constraints and consequences of unforeseen events; and
- provision of post-operational data on traffic movement;

b) For society:

- improved quality of air travel and information provided to the travelling public;
- increased economic development through efficient and cost-effective services for the projected higher levels of air traffic;
- reduction of aviation-related greenhouse gas emissions; and
- mitigation of the effects of unforeseen events and reduced capacity situations by

coordinating effective and rapid solutions for recovery from them.

5.3 Collaborative decision-making (CDM)

A process focused on how to decide on a course of action between two or more community members. Through this process, ATM community members share information related to that decision and agree on and apply the CDM approach and principles. The overall goal of the process is to improve the performance of the ATM system as a whole while balancing the needs of individual ATM community members.

The planning and implementation of cross-border and regional ATFM requires new levels of collaborative decision-making among stakeholders. While current ATFM/CDM processes and ATFM systems are oriented towards local or national demand-capacity balancing, the maturation of ATFM systems and expansion across national borders will lead to a multilateral CDM decision-making environment with complementary individual objectives.

Briefing sessions and operational conferences

ATFM/CDM must enable the efficient exchange of operational and strategic information for all stakeholders, ensuring strategic cooperation to achieve ATM objectives and ensuring the optimisation of air traffic flows throughout the region. In this regard, stakeholders must exchange information through ATFM teleconferences, selecting communication methods that maximise the value and content of the information and minimise the time and workload required. The purpose of the conferences is to share and disseminate information to the various air traffic units so that they can make any necessary tactical adjustments.

ANSPs, based on their operational concept, must decide on the methodology to be used for ATFM teleconferences. For mature, large and complex airspaces, it may be necessary to conduct tactical teleconferences in addition to scheduled teleconferences. For less crowded airspaces, teleconferences can be conducted less frequently, for example once a week.

The operational requirement will define and drive the frequency of teleconferences. The following methods of communication are given as an example:

- a) Scheduled telephone (or Internet) conferences: This consists of establishing a time or times when the ATC/ATFM units will hold a daily operational conference to exchange ATFM information.
- b) *Ad hoc* telephone (or Internet) conferences: This consists of an unscheduled ATFM teleconference held at the tactical level, in real time, in order to make necessary operational adjustments, for example in the case of evolving weather events.
- c) Automated website or operational ATFM information system. ATFM service providers create a website or information system containing relevant ATFM information. The objective is to share information about the ATM system in order to create a common situational awareness and minimise the workload.

ATFM/CDM participants

Challenges in establishing a framework for the implementation of ATFM include establishing seamless, easy to understand and flexible procedures as well as compliance, participation and demonstration of proven benefits to train and encourage information sharing among stakeholders.

Stakeholders in ATFM/CDM teleconferences are divided into:

- Required participants: ATFM or FMU units, area control centres (ACCs) that are not represented by an FMU, and any TMA or tower that has significant constraints. The participation of support areas, especially the meteorological service, is recommended.
- Optional participants: airspace users (representatives of commercial operators, general aviation and State aviation (military, police and customs aircraft)), airport operators, military organisations, and other aviation stakeholders.

6. ATFM PLANNING FOR THE SAM REGION

6.1 ATFM in the Global Air Navigation Plan (GANP)

The evolution of ATFM, like ATM, is covered and described in the *Global Air Navigation Plan (GANP)* (Doc 9750) and in the Aviation System Block Upgrade (ASBU).

The guiding principles of "first come, first served" and "equitable access to airspace" have traditionally been of great importance to ATM systems, and continue to underlie the rationale for many ATM systems. However, the global ATM system is evolving to incorporate into its guiding principles useful outcomes related to overall system efficiency, the environment and operating costs.

In line with this evolution, the ATFM service must be further developed and incorporate a different logic, whereby the "more capable" aircraft benefit from enhanced capabilities and services in order to achieve optimal ATM system performance. Similarly, the concept of equitable access to airspace can be considered in a longer time scale, rather than the short-term "first come, first served" model. These aspects are gradually being taken into account in both ATM and ATFM.

Consequently, both the ATFM service and ATM as a whole will be substantially modified in the coming years, as both systems evolve to improve capacity and operational efficiency in order to meet the growing needs of civil aviation.

Appendix A shows an extract from Doc 9750, sixth edition, approved by the ICAO Council in 2019, detailing the elements of the NOPS module in its Block 0, including purpose, capabilities, description, human factor considerations, planning layers, enablers, and proposed KPIs. The text of this appendix is presented in the original English language, considering that the official translation of the document is not yet available.

6.2 ATFM background in the SAM Region

GREPECAS determined that the implementation of air traffic flow management (ATFM) would help to ensure optimal air traffic flow and reduce delays on the ground and in the air and thus avoid overloading the air traffic system. This is achieved by balancing demand and system capacity in order to maintain a safe, orderly and expeditious traffic flow.

In view of the above, GREPECAS approved in 2007 the CAR/SAM ATFM Concept of Operations for the CAR/SAM Regions (CAR/SAM ATFM CONOPS), which reflects the expected order of events and should assist and guide planners in the design and gradual implementation of an ATFM system.

By virtue of Conclusion 14/149, GREPECAS adopted the ATFM CONOPS and requested States to establish a work programme to enable the implementation of the ATFM CONOPS.

In this sense, within the framework of Project RLA/06/901, an ATFM implementation group for the SAM Region was established with the aim of executing actions to implement ATFM in the Region.

In 2013, the Bogotá Declaration was signed by all the SAM States, where they committed to the achievement of the regional goals for the year 2016, that is, *"100% of area control centres (ACCs) providing air traffic flow management (ATFM) services"*.

In 2014, ICAO published the second edition of the Manual on Collaborative Air Traffic Flow Management - Doc 9971, which introduced new concepts for CDM and ATFM. In 2018, the Third Edition of Doc 9971 was published with three sections, respectively for CDM, ATFM and A-CDM.

In October 2020, the GREPECAS PPRC/5 approved the revised version of the CAR/SAM ATFM CONOPS.

6.3 Forecasts: Trends and global and regional situation

Due to the severe impact of COVID-19, there is a very evolving framework for projecting the five-year period, since it depends on the duration and magnitude of the pandemic, the containment measures taken by States, the degree of user confidence, and the conditions of the global economy.

The ICAO Aviation Data and Analysis Panel (ADAP) approved in July 2021 a set of traffic forecasts for the 32-year horizon (2018-2050), considering different scenarios for the evolution of post-COVID-19 operations. According to this work, operations in the SAM Region will grow, but at a lower rate than globally.

For example, for intra-SAM routes, the cumulative annual passenger growth forecast is between 2.2 and 3.2%, depending on the scenario, while the world average would be between 2.9% and 4.2%. In the cargo market, the work indicates a growth for Latin America and the Caribbean between 0.8 and 1.5% per year, compared to 2.6% to 4.2% for the world average. See ADAP Tables at:

<https://www.icao.int/sustainability/Documents/post%20covid%20forecasts%20scenarios%20tables.pdf>

Demand-capacity balancing

During the period 2020-2021, the hubs of the Region show a reduction in airport capacity (runways and aprons) induced by sanitary measures (social distancing, disinfection of facilities and aircraft, limitations in boarding lounges, etc.) that require an increase in the separation between departure/arrival of aircraft, while extending turnaround times for airlines.

Atypically, there are capacity-demand imbalances in a period marked by a significant reduction in air operations. This capacity-demand imbalance would be of a temporary nature in view of global efforts to make vaccines available, leading to the assumption that airport measures would be phased out.

For 2022-2023, a balanced airport capacity and ATC scenario is expected with respect to the number of air operations.

It should also be noted that, by the end of 2019, before the pandemic, several hub airports and terminal control areas of the SAM Region had some demand-capacity imbalances, such as the Sao Paulo TMA/Curitaba FIR and the Buenos Aires, Bogota, Lima, Santiago and Panama TMAs. The ATFM services implemented were being operationally and technically consolidated, and in some cases moving

towards more efficient cross-border collaborative processes. The aforementioned imbalances could gradually reappear starting in 2022-2025 as air connectivity recovers in several States. Before this happens, it is imperative to optimise and strengthen the provision of ATFM services at regional level.

To respond to future recovery and growth, the capacity/demand balance in the Region must be maintained, together with increases in efficiency, flexibility and predictability, while ensuring that there are no adverse effects on safety and with due consideration of environmental aspects. The air navigation system must be resilient to service disruptions and the resulting temporary loss of capacity.

6.4 Types of ATFM implementation

6.4.1 Introduction

In its initial applications, ATFM does not require complicated procedures or tools. The goal is to collaborate with system stakeholders and provide timely operational information to airspace operators and ATC providers. In the initial implementation of ATFM, this can be achieved through point-to-point telephone calls to exchange relevant weather information, system constraints, and other operationally important data. Examples include the transmission of information on runway closures, volcanic activity and rerouting. Major benefits can be obtained with the implementation of the initial ATFM service levels.

In more advanced applications, ATFM requires continuous analysis and monitoring of traffic flows, regular coordination between traffic management units, and dynamic application of ATFM measures. This involves the development, maintenance and use of flight plan databases, visual displays of electronic flight data, and teleconferencing systems.

Because ATFM is a cooperative process, it is always improving, growing and changing, with a view to meeting the operational requirements of stakeholders as a whole. Therefore, the establishment of a joint decision-making community is an important key to the long-term success of ATFM.

The following is a description of the types of ATFM, as well as their key components or guidelines, which will serve as a guide for States/ANSPs in its implementation. The SAM States, taking into account the demand/capacity imbalance and the severity of the imbalance, must implement the type of ATFM that meets the objectives set out in 5.2.2 of this Guide, in accordance with their national air navigation plan.

6.4.2 National ATFM

A State/ANSP may initially implement ATFM/CDM at the national level by involving a number of flights calculated by the State, with the objective of efficient implementation of the service. The implementation of the service includes both domestic and international flights within its jurisdiction. Experience and best practices show that the participation of a significant number of flights in the implementation of an ATFM measure, for example, a GDP, is required in order to harness its operational advantages and to achieve the expected efficiency.

The implementation of this national ATFM may initially apply to domestic flights, but at an advanced stage could also cover international flights entering its jurisdiction. However, in order to obtain a more efficient service, the participation of one or more adjacent States in the application of ATFM measures may be required, in which case it would be appropriate to assess the maturity of the system through the implementation of a cross-border ATFM concept.

6.4.2.1 Key components of the national ATFM

System capacity and functionality

- ANSPs independently manage demand/capacity at their own airports and airspaces.
- Domestic and international traffic operating within the national jurisdiction is subject to ATFM measures.
- ANSPs and stakeholders have the means to communicate and collaborate consistently throughout the implementation of ATFM.
- Stakeholders conduct CDM through various communication methods.

Specific capacity and demand forecasting

- An accurate demand forecast must be made by manual input or via an automated data source (for example, FDP, telecommunications (AFTN), or space-based ADS-B of flight progress).
- Airspace capacity is pre-determined, but may be modified by various contingencies.

Assess alternatives, initiate/modify ATFM measures

- Aircraft operators manage the delay assigned to flights due to the application of ATFM measures.
- Information on ATFM slots as well as on the ATFM measures assigned (for example, GDP through CTOT) should be readily available to all stakeholders.

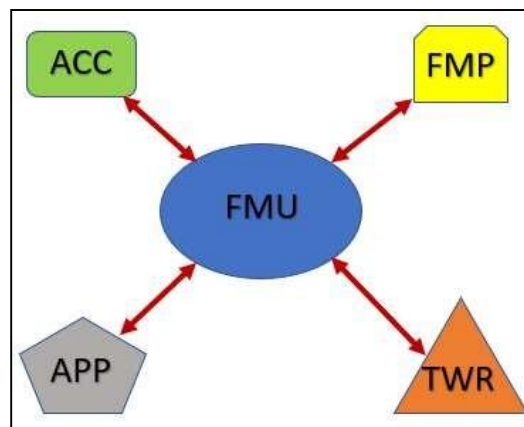


Figure I. National ATFM concept

6.4.3 Cross-border ATFM

In case an ANSP needs, in order to obtain a more efficient service, that one or more adjacent States be included in its ATFM measures, the implementation of a cross-border ATFM concept would be required, as shown in Figure II. This concept can be applied intra-regionally, among SAM States, and inter-regionally among SAM States and States of adjacent Regions (for example, Panama and Jamaica). It is not envisaged that a State could do this implementation in isolation.

6.4.3.1 Key components of cross-border ATFM

Acceptance of a regional ConOps

- Stakeholders agree to adopt a cross-border concept independently of the concepts adopted in their area of jurisdiction.
- The States concerned commit themselves to plan and assign resources for the implementation of cross-border ATFM/CDM.
- The ANSPs concerned, airport operators and aircraft operators agree on a common set of procedures for all.
- Provide for continuous training of all stakeholders on the benefits, both qualitative and quantitative, of ATFM/CDM implementation.

Cross-border ATFM ConOps

- ANSPs have an independent ATFM system.
- ANSPs implement ATFM, even if adjacent States have not done so.
- ANSPs independently manage the demand/capacity of their own resources.
- In order to obtain the participation of a number of flights calculated by the State, regional and international flights and overflights must be included in the ATFM measures.
- ANSPs agree that flights departing from their airspace into the adjacent airspace of another ANSP with a cross-border ATFM will respect the ATFM measures issued, such as the calculated take-off time (CTOT) or the calculated time over (CTO).
- ANSPs, airport operators and aircraft operators should agree on a common set of departure, landing and en-route procedures.
- Participating ANSPs commit to develop their individual capabilities and implement ATFM in accordance with ICAO guidelines.
- Stakeholders are, as far as possible, interconnected through an information exchange network (such as Internet interfaces or SWIM-based communication networks).
- Provide for continuous training of stakeholders on the qualitative and quantitative benefits related to the evolution of ATFM/CDM.

Specific capacity and demand forecasting

- Demand must be accurately forecast by means of manual entry or an automated data source (for example, FDP, telecommunications (AFTN), or space-based ADS-B of flight progress).
- Airspace capacity is pre-determined; however, it may be modified as a result of various contingencies.

Assess alternatives, initiate/modify ATFM measures

- Information on ATFM slots as well as on assigned ATFM measures (for example, GDP through CTOT) should be readily available to all interested parties.
- Aircraft operators manage the delay assigned to flights due to ATFM measures.
- Aircraft operators conduct CDM with airport operators regarding ground delays.

A regional concept may, in the future, allow aircraft operators to distribute a scheduled delay over different stages of the flight; be it in the aircraft stand, on the surface (between stand and take-off), or en route. This ability given to aircraft operators to distribute this type of delay will provide additional operational flexibility, achieving the same result.

One of the benefits of cross-border ATFM is system-wide capacity-demand balancing. This approach improves safety and optimises the efficiency of airports and available airspace.

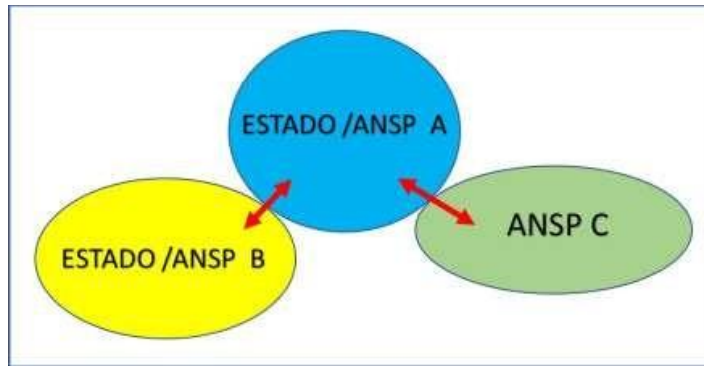


Figure II. Cross-border ATFM concept

6.4.4 Centralised regional ATFM

Doc 9971 states that, in an ideal scenario, the ATFM service for a given region would be provided by a centralised ATFM organisation supported by local FMUs. In many regions of the world, however, a single ATFM organisation may not be feasible for political and institutional reasons. Consequently, the application in the SAM Region of the centralised regional ATFM concept could be feasible in the long term, depending on the level of integration of ATM systems of the States, and on the evolution of technological enablers.

The objectives of ATFM are described in Part II, Chapter 1, Section 1.3, Doc 9971, third edition, 2018. At the regional level, ATFM is conducive to increasing the efficiency and effectiveness of ATM in the area of responsibility of more than one ANSP in a given region or sub-region.

Regional/sub-regional implementation of ATFM should be considered in cases where national actions do not address existing difficulties, or if corrective actions go beyond the area of responsibility of a single ATFM centre.

While each local ATFM unit retains the discretion to decide on the type of measures it wishes to implement when demand exceeds capacity, it is essential that ATFM units share the same view on the situation, and that the impact of measures required by a local ATFM unit is collectively assessed at regional or sub-regional level. The CDM can be used to involve relevant stakeholders in the decision to implement the necessary ATFM solutions in their region.

In view of this, regional ATFM does not differ in its basic principles from national ATFM, as it is based on transparency, information exchange and collaboration. The only difference is in the number and variety of stakeholders.

6.4.5 Multi-nodal cross-border ATFM

In order to overcome the difficulties of establishing a centralised regional ATFM unit, certain States have decided to implement multi-nodal cross-border ATFM based on national resources and international cooperation. In such a case, several States/ANSPs in a given region implement and operate ATFM systems that impact on several FIRs/airspace sectors/aerodromes (probably in more than one State), as shown in Figure III below.

Under this concept, each ANSP operates an independent virtual ATFM/CDM node supported by an interconnected information exchange framework.

In view of this, air traffic flows are efficiently managed on the basis of a common set of principles agreed among the participating ANSPs and airports. A node composed of the ANSP and its corresponding aerodromes allows demand and capacity to be managed through adjustments of the calculated landing times (CLDT) of aircraft, which result in calculated take-off times (CTOT) for specific aircraft at the

airport of departure.

Each ANSP achieves a balance between demand and capacity in its own area of authority. If ATFM measures require the involvement of regional and international flights, flows will be managed through agreed coordination procedures.

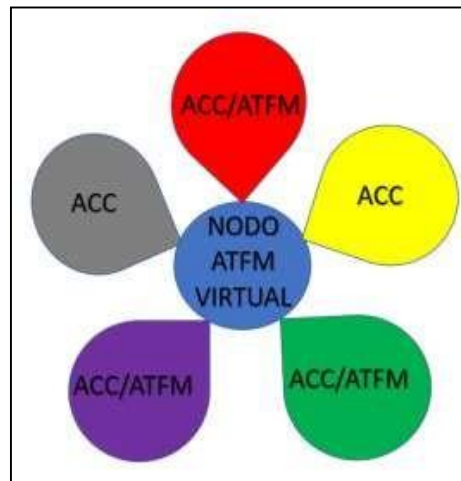


Figure III. Multi-nodal cross-border ATFM concept

6.4.5.1 Key components of the multi-nodal cross-border ATFM

Multi-nodal cross-border ATFM ConOps

- ANSPs have an independent ATFM system.
- ANSPs independently manage the demand/capacity of their own resources.
- Participating ANSPs commit to develop essential information-sharing agreements.
- Stakeholders are, as far as possible, interconnected through an information exchange network (such as internet interfaces, SWIM communication network, etc.).
- Harmonised and integrated data exchange among all stakeholders in the multi-nodal network.

Specific capacity and demand forecasting

- An accurate demand forecast must be made by manual input or via an automated data source (for example, FDP, telecommunications (AFTN), or space-based ADS-B of flight progress).
- Airspace capacity is pre-determined; however, it may be modified by various contingencies.

Assess alternatives, initiate/modify ATFM measures

- Information on ATFM slots as well as on assigned ATFM measures (for example, GDP through CTOT) should be readily available to all interested parties.
- Aircraft operators manage the delay assigned to flights due to ATFM measures.
- Aircraft operators conduct CDM with airport operators regarding ground delays.

6.5 Interoperability

This document has considered the ATFM initiatives undertaken by several States in the SAM Region to balance demand and capacity within their airspaces. However, it must be recognised that interoperability is the key to improving flow performance across the SAM Region.

Interoperability must be understood as a very high state of interweaving of systems, procedures and practices to ensure not only a regionally harmonised ATFM service, but also the effective and complementary operation of other systems that are part of the air traffic management chain.

It is vital that all systems and processes use common information, terminology and matching communication protocols to ensure common understanding and optimal results. Of particular importance is the interoperability of the ATFM, airport collaborative decision-making (A-CDM), arrival manager (AMAN) and departure manager (DMAN) systems.

7. REGIONAL STRATEGY

Based on the experience of other ICAO Regions, and due to the heterogeneous situation of SAM States in terms of development of ATFM service capability, a regional phased strategy is formulated.

SAM States, taking into account the development of their ATFM capabilities and the existence of demand/capacity imbalances of certain severity, shall develop their respective implementation plan, in accordance with the CAR/SAM e-ANP, and taking into account the considerations of their national air navigation plan (NANPs).

The ATFM phases and foreseen deadlines are as follows:

- ATFM phase I (capacity/demand and baseline) - in progress
- ATFM phase II:
 - ATFM phase II-A (national basic) - in progress
 - ATFM phase II B (national operational) - in progress and to be implemented by **States before 31 December 2022.**
- ATFM phase III (cross-border) – **to be implemented by States before 31 December 2023.**
- ATFM phase IV (multi-nodal cross-border) – **to be implemented by States before 31 December 2025.**

In order to achieve the implementation of the cross-border ATFM concept, SAM States should have previously achieved all the competencies set out for phase II-B.

The implementation of Phases II-B, III and IV must have strategic objectives that express the desired standards and the corresponding key performance indicators (KPIs). It is essential to understand the concept of performance measurement as an advance over implementation measurement as this new concept contemplates the analysis of the efficiency of the result obtained.

The key stages in the identification of KPIs are:

- Have a predefined business process (BP).
- Have requirements for BPs.
- Have a quantitative/qualitative measurement of results and a comparison with the established objectives.
- Investigate variations and adjust processes or resources to achieve short-term objectives.

A healthy process for identifying and implementing key performance indicators includes the requirement that managers and other contributors regularly review the measures. This adjustment process requires the time and diligence of all parties. Appendix B shows information on KPIs applied to the NOPS B0 module of the GANP concerning ATFM.

7.1	ATFM phase I (capacity/demand and baseline)
-----	---

In this phase, States/ANSPs will be obliged to carry out two types of measurements to generate a baseline:

- **First: Capacity and demand analysis**

States/ANSPs shall implement a runway capacity calculation programme for their airports as well as for their airspace (terminal areas and ATC sectors). The SAM Region has a Runway and ATC Sector Capacity Calculation Manual to guide these initiatives.

- **Second: 3 to 5-year demand growth forecast for air operations** in selected airports and airspaces.

States/ANSPs that, after having made their respective capacity measurements and checked them against the prevailing demand, do not identify any imbalances, shall update the forecasts every 3 years with respect to air traffic evolution (covering at least a 36-month period).

These States will continue to conduct capacity measurements every 12 months to ensure that air traffic evolution is proceeding as predicted.

If the forecast results foresee the generation of imbalances (DCB) during the period under assessment, they should choose to implement the competencies of ATFM phase II -A.

7.2	ATFM phase II-A (national basic)
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In this phase, the States/ANSPs will be responsible for developing and implementing the following elements:

- **ATFM regulations**

States/ANSPs shall have national regulations in place for the implementation of the ATFM service based on the objectives outlined in this document.

In addition, they shall have manuals on ATFM operating procedures for the airspaces in which the service is provided. Appendix C contains references for the development of an ATFM Unit Operating Manual.

- **ATFM systems**

States/ANSPs will ensure that FPL and ATS message distribution systems and operational processes are analysed and, where necessary, modified to ensure that FPL, CHG, DEP, DLA and CNL messages are originated, distributed and processed in accordance with the requirements of ICAO Doc 4444, PANS-ATM.

States/ANSPs shall endeavour to ensure that they are published in all relevant AIPs, specifying that, except where necessary for operational or technical reasons, the FPL shall be submitted not less than 1 hour before the EOBT.

- **Pre-tactical phase**

States/ANSPs shall prepare an ATFM Daily Plan (ADP) containing a capacity and demand analysis, including: the expected configuration of the airport(s), as well as the airspaces where ATFM service is planned to be provided, expected traffic demand, weather forecast, known or foreseen capacity constraints, and ATFM measures to be implemented so that system capacity is not exceeded.

Appendix D contains references for developing an ATFM Daily Plan, as well as the daily post-operations report.

This ADP shall include as a minimum:

- Planned ATFM measures;
- Meteorological, CNS and airport infrastructure information;
- Hours when demand is expected to be highest;
- Any other relevant information (restricted areas, public holidays, etc.).

The ADP shall be distributed to stakeholders via: AFTN and/or websites and/or e-mail and/or other available means.

States/ANSPs shall implement the CDM methodology among all stakeholders, and share all relevant updated information. Appendix E contains references for the use of ATFM terminology and communications.

- **Tactical phase**

Tactical ATFM must be implemented so that traffic flows and capacities are managed in real time, whether or not the measures suggested/programmed in the ADP are adopted. Changes and/or adaptations to the measures published in the ADP must be made to ensure that only those that are absolutely necessary are applied.

The measures adopted will preferably be those that entail the least possible impact according to the operational scenario. Thus, minutes-in-trail, miles-in-trail, ground delay programmes or any other ATFM measure will be applied, provided that the measure considered most appropriate by ATFM operators (and, if feasible, other participants) to address demand/capacity imbalances or to mitigate potential disruptions is applied.

Where possible, aircraft must not be subject to more than one tactical ATFM measure per flight. In addition, ATFM measures should generally only be applied for long enough so that demand does not exceed capacity. Frequent application of ATFM measures may indicate an imbalance between capacity and traffic demand that should, if possible, be addressed in a more strategic manner.

- **Post-operational phase**

The accuracy and effectiveness of capacity/demand analyses, the drafting and distribution of the ADP should be verified by comparison with observed operational results through the daily post-operations report and, if discrepancies are found, corrective actions will be taken as necessary.

7.3	ATFM phase II-B (national operational)
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In this phase, States/ANSPs, in addition to the implementation of the elements outlined in Phase II A, will, to the extent possible, pursue the following objectives:

- **ATFM systems**

States/ANSPs will ensure that ATFM, AMAN/DMAN and A-CDM systems are integrated through the use of common procedures, terminology and communication protocols to ensure complementary operations.

- **Capacity improvement**

States/ANSPs shall seek optimisation of airspace capacity through standardisation of procedures, use of optimised ATC separation techniques, and reduced runway occupancy at all airports where ATFM service is provided and in the associated terminal area airspace.

Where demand requires, and using a performance-based approach, improvements to the terminal area ATS routing structure, including CCO/CDO, should be implemented to reduce pilot and ATC workload, and to allow for better use of aircraft capacity to comply with ATFM measures.

- **Tactical capacity, monitoring, and demand analysis**

States/ANSPs shall implement a dynamic update of capacities and demands for the airport, as well as for the airspace in which ATFM service is provided, based on flight plan information, ATS messages, NOTAMs and other available sources.

- **Pre-tactical phase**

States/ANSPs shall implement an ADP (see Phase IIA) for all airports where ATFM service is provided and the associated terminal area airspace. In addition, the CDM methodology must be implemented, allowing for the exchange of all relevant information among stakeholders, providing continuous availability of information and established procedures for ATFM teleconferences.

- **Tactical phase**

States/ANSPs will be responsible for implementing the use of ATFM slots for both departures and arrivals as a tactical measure to balance demand/capacity and ensure efficient use of airspace. Attachment F provides guidance for their harmonised implementation. In case implementation is not possible, States/ANSPs shall bring on the implementation of the GDP to allow for close coordination among stakeholders prior to aircraft departure.

In addition, States/ANSPs will be responsible for implementing a weather service capable of providing short-term or real-time forecasts of convective weather activity at the airport(s), as well as for the airspace(s) in which ATFM service is provided.

- **Post-operational phase**

States/ANSPs shall implement a system for analysis and management of discrepancies in daily post-operations reports and their corrective actions.

7.4

ATFM phase III (cross-border)

In this phase, cross-border States/ANSPs will share all relevant ATFM information, in accordance with ATFM terminology and communication, which will include:

- ADP, dynamically updated demand and capacity data for airports, as well as for airspaces served by ATFM.

- ATFM slot information (modification, cancellation, or suspension and exchange thereof) for all flights subject to ATFM measures, including CTOT, CTO and CLDT information.
 - Cross-border States/ANSPs will conduct automated monitoring of compliance with ATFM slots.
 - States/ANSPs will be responsible for achieving full interoperability of interconnected cross-border systems: ATFM, A-CDM, AMAN, DMAN, ATM.
- Cross-border post-operations analysis

States/ANSPs shall develop procedures and agreements to ensure post-operations analysis of cross-border ATFM, including recommendations from airspace users, airport operators, ATS and other ATFM units. Daily post-operations analysis conferences must be held, supplemented, where necessary, by conferences convened to assess the results of ATFM measures in response to abnormal or extraordinary situations.

The results of the post-operations analysis must be used to plan improvements in ATFM service, the airspace and other ATS.

7.5	ATFM phase IV (multi-nodal cross-border)
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States/ANSPs will designate at least one node to be incorporated as an integral part of a multi-nodal cross-border SAM or CAR/SAM network.

In this phase, the multi-nodal cross-border network will share all relevant ATFM information, in accordance with the use of ATFM terminology and communication, including:

- ADP, dynamically updated demand and capacity data for airports, as well as for airspaces served by ATFM.
 - ATFM slot information (modification, cancellation, or suspension and exchange thereof) for all flights subject to ATFM measures, including CTOT, CTO and CLDT information.
 - Nodes will conduct automated monitoring of compliance with ATFM slots.
 - States/ANSPs will be responsible for achieving full interoperability of interconnected cross-border systems: ATFM, A-CDM, AMAN, DMAN, ATM.
- Post-operations analysis

States/ANSPs shall develop procedures and agreements to ensure post-operations analysis of multi-nodal ATFM, as appropriate, including recommendations from airspace users, airport operators, ATS and other ATFM units of the CAR and other Regions (APAC, WACAF, etc.). Periodic post-operations analysis conferences must be held, supplemented, where necessary, by conferences convened to assess the results of ATFM measures in response to abnormal or extraordinary situations.

The results of the post-operations analysis must be used to plan improvements in ATFM service in the SAM or CAR/SAM Regions, in airspace, and the other ATS, as appropriate.

8. ATFM HUMAN FACTORS

8.1 ATFM personnel

Based on regional experiences in ATFM service implementation, it is critically important that the staff designated to perform ATFM functions be exclusively dedicated to it. It is very beneficial to schedule a gradual implementation until 24-hour service is reached. In addition, in order to form multidisciplinary teams, staff joining ATFM units must have experience in one of the following services: ATS, CNS, AIM, MET, among others. Consideration must be given to the need for statistics and information technology staff to manage indicators and traffic data.

In order to achieve this objective, States/ANSPs shall establish policies to recruit and retain personnel for ATFM services that recognise the importance of providing the necessary resources, in recognition of the important functions entrusted to these services.

States/ANSPs must recall that the operational, economic, and even social benefits of ATFM implementation, such as: increased safety, increased operational efficiency through effective capacity/demand management leading to reduced fuel consumption among other operating costs of AUs, as well as effective mitigation of system constraints and consequences of unforeseen events, improved quality of air travel and information provided to the travelling public and also reduction of aviation-related greenhouse gas emissions, etc., far outweigh the investment required for ATFM service implementation, with a very favourable cost/benefit ratio.

8.2 ATFM training requirements

An ATFM service should be staffed with personnel who possess the appropriate knowledge and information regarding the ATM system they support, as well as the potential impact of their work on air navigation safety and efficiency. To this end, in line with their training policies, States and ANSPs should establish fundamental training plans for ATFM personnel on the importance of the required degree of availability, continuity, accuracy and integrity of the services provided.

In addition to staff in the ATFM unit itself, staff in other units/areas/entities should be aware and have a thorough understanding of the ATFM services provided and their specific roles and responsibilities in this process. Units where ATFM is applied or has a direct impact, and where consequently staff should be trained, include:

- a) ATC;
- b) aircraft operators;
- c) pilots;
- d) airport operators;
- e) service providers and users in the military sector; and
- f) regulatory bodies (CAAs or their counterparts).

The ATFM service is provided with different levels of responsibility, each having its own training requirements. These levels cover the management and supervision of operations, as well as the planning and implementation of the service, including essential support staff. In addition, various support functions, CDM and ATM, should be taken into account when formulating the training requirements.

9. CONTINGENCY PLAN

States/ANSPs, when developing their contingency plans, must include ATFM measures for ATS contingencies, based on procedures for dealing with ATS system disruption. The objective of these ATFM measures is to ensure the safe and orderly movement of air traffic despite adverse conditions. This part of the plan must be included in the operational procedure manuals of the ATFM unit.

The ATFM measure plan should contain at least:

- Description of possible ATS system failures (communication failure in the ATS unit, failure of surveillance systems, significant impact on human resources, unplanned aerodrome closure, airspace closure, etc.);
- ATFM procedures and measures to be applied;
- Recovery procedures;
- Information on contingency points of contact, including roles and responsibilities;
- Post-contingency notification procedures; and
- Procedures in case of conditions such as, for example: volcanic eruption; impairment of operational personnel; and events taking place in the national territory that could result in a significant increase in post-contingency reporting operations.

Furthermore and strategically, States/ANSPs must develop agreements specifying procedures to be followed by ATFM units in the event of an ATS contingency within the FIR and/or in adjacent FIRs that may affect the provision of services. These agreements must, as a minimum, contain the following information:

- Predetermined temporary capacity data, to deal with contingency situations;
- Reconfiguration of airspace, if applicable;
- ATFM measures to be implemented during the contingency; and if re-routing is applied, a list of available contingency routes, including flight levels, will be included.

During the contingency, and whenever possible, tactical coordination will take place, allowing ATS units/FMUs to coordinate as needed the adoption of measures to mitigate the impact of the contingency. During recovery from the contingency, close coordination is required to increase situational awareness and communication with all ATM stakeholders.

A P P E N D I C E S

APPENDIX A - NOPS MODULE OF GANP 6TH EDITION, ASBU 0

APPENDIX B – ATFM SYSTEM PERFORMANCE MEASUREMENT INDICATORS (KPIs)

APPENDIX C - ATFM UNIT MANUAL

APPENDIX D - DRAFTING OF THE ADP AND POST-OPERATIONS

APPENDIX E - ATFM TERMINOLOGY AND COMMUNICATIONS

APPENDIX F - ATFM SLOT IMPLEMENTATION

**APPENDIX A – GANP 6 ED. NOPS MODULES ASBU
Blocks 0 y 1**

Source Portal GANP ICAO

<https://www4.icao.int/ganpportal/>

<https://www4.icao.int/ganpportal/ASBU/Thread/Pdf?IDs=4&ShowPart1=true&ShowPart2=true>



ASBU ELEMENTS

NOPS B1 B0

Functional Description

Enablers

Deployment Applicability

Performance Impact Assessment

NOPS

NOPS-B0/1

Initial integration of collaborative airspace management with air traffic flow management

Operational

Main Purpose

Introduce ASM/ATFM techniques, procedures and tools for the initial establishment of an integrated collaborative airspace management and air traffic flow and capacity management process applicable to the strategic through to the tactical phases of operations.

New Capabilities

Collaborative airspace planning process is extended by harmonizing the ASM/ATFM rules and procedures for the establishment, allocation and use of airspace structures in response to ATFM requirements.

Description

This element represents the initial step to enhancing the common situational awareness supporting optimum availability of airspace and ATC capacity to meet air traffic demands. It will result in a dynamic/rolling process supporting the enhancement of network operations. It will improve the cross border operations and optimise network operations based on the richest and more accurate information. It requires the implementation of new tools/systems and processes notably:

- ASM/ATFM process for the provision of the airspace use plan;
- Improved ASM/ATFM process for the provision of updated airspace use plan;
- System/tools for provision of airspace plan to ATM network function;
- Improved notification process for the ASM/ATFM purposes;
- Improved accuracy of airspace booking;
- Interoperability between local ASM and ATFM systems.

Maturity Level

Ready for implementation

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Coordination between different airspace planning actors is more efficient and the need for paper/phone coordination is minimised.
2. Does it imply processing of new information by the user? Yes
Integrated airspace planning implies an utilisation of new data stream.
3. Does it imply the use of new equipment? Yes
ASM tool.
4. Does it imply a change to levels of automation? Yes
The manual process of airspace notification is semi-automated.

PLANNING LAYERS

- Strategical
- Pre-tactical
- Tactical-Pre ops
- Tactical-During ops

OPERATIONS

- Departure
- En-route
- Arrival

DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Relation-information need	AMET-B0/1 - Meteorological observations products
Relation-operational need	FRT0-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)

NOPS-B0/2

Collaborative Network Flight Updates

Operational

Main Purpose	Improve ATFM situation awareness in order to facilitate re-routings and coordinated application of ATFM measures.
New Capabilities	Seamless exchange and processing of correlated position information, flight activation status and up to date flight plan information for airborne flights. Such data are required within the Area of Responsibility (AOR) of the ATFM unit, but also within the Area of Interest (AOI) of the ATFM unit for all flights entering the ATFM area.
Description	<p>This element will ensure:</p> <ul style="list-style-type: none"> • Effective interface between ATC and ATFM with regard to deviations from the current flight plan. • Enhanced tactical flow management service based on real-time aircraft position data and flight activation information resulting to more accurate ATFM measures and thus better use of scarce airspace resources. <p>It will require implementation ATFM/ATC systems related to provision, processing and presentation of ATFM messages.</p>
Maturity Level	Ready for implementation

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Manual notification disappeared.
2. Does it imply processing of new information by the user? Yes
ATFM message, CPRs and flight plan proposals are new items that were not previously exchanged.
3. Does it imply the use of new equipment? No
4. Does it imply a change to levels of automation? No

PLANNING LAYERS

Tactical-During ops

OPERATIONS

Departure En-route Arrival

DEPENDENCIES AND RELATIONS

Type of Dependencies

ASBU Element

Relation-information need

AMET-B0/2 - Meteorological forecast and warning products


NOPS-B0/3

Network Operation Planning basic features

Operational

Main Purpose 

The Network Operation Planning provides an overview of the situation from strategic planning through real time operations with ever increasing accuracy up to and including the day of operations by a common situational awareness for all ATFM actors within and adjacent to the ATFM area and allowing network wide demand and capacity balancing.

New Capabilities 

A Network Operations Plan will be accessible online by stakeholders for consultation and update as needed.

Description 

Network Operation Planning is based on enhanced participation in a dynamically updated collaborative planning process. This requires the sharing of the latest flight status and intentions; airport and airspace component, associated demand and capacity balancing measures in a frequently updated plan which is aimed to be realised as target by all actors. The elements and formats of the plan need to be established and harmonized, taking into account the requirements of the users of these plans. It will be possible for them to access and extract data for selected areas to support their operation and, if required, to create their specific operations plan.

Maturity Level 

Ready for implementation

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
2. Does it imply processing of new information by the user? Yes
3. Does it imply the use of new equipment? Yes
4. Does it imply a change to levels of automation? Yes

PLANNING LAYERS

Strategical Pre-tactical Tactical-Pre ops

OPERATIONS

Departure En-route Arrival

DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Relation-information need	AMET-B0/2 - Meteorological forecast and warning products
Relation-information need	AMET-B0/3 - Climatological and historical meteorological products

NOPS-B0/4 Initial Airport/ATFM slots and A-CDM Network Interface **Operational**

Main Purpose	Initial integration of airports into the ATM network function.
New Capabilities	Stakeholders will be able to share relevant airport and flight turnaround information with ATM network function resulting in better predictability and better use of existing capacity whilst considering user preferences and requirements.
Description	<p>The first objective is the A-CDM (Airport Collaborative Decision Making) integration with ATFM via exchanges of specific messages. The second objective is to ensure ATFM slot adherence and limited ATFM slot swapping in order to meet airline demands in line with capacity declarations.</p> <p>Convergence is ensured between airport slots, and flight plans, together with airport slot monitoring processes in order to improve consistency. That will require the deployment of new systems and processes for A-CDM and ATFM slot swapping:</p> <ul style="list-style-type: none"> • ATFM and airports system modules related to data exchanges for A-CDM • Tools for airport and ATFM slot monitoring post-ops
Maturity Level	Ready for implementation
Human Factor Considerations	<p>1. Does it imply a change in task by a user or affected others? Yes Phone coordination is reduced.</p> <p>2. Does it imply processing of new information by the user? Yes ATFM data presentation and scenario management are new data streams.</p> <p>3. Does it imply the use of new equipment? Yes Network Operation planning is a new tool, it might require specialised equipment for data access.</p> <p>4. Does it imply a change to levels of automation? Yes Manual process is semi-automated.</p>

PLANNING LAYERS

- Tactical-Pre ops
- Tactical-During ops

OPERATIONS

- Departure
- Arrival
- Turn-around

DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Relation-operational need	ACDM-B0/1 - Airport CDM Information Sharing (ACIS)
Relation-operational need	ACDM-B0/2 - Integration with ATM Network function

NOPS-B0/5 Dynamic ATFM slot allocation Operational

Main Purpose ? Provision of dynamic departure ATFM slot allocation including Calculated Take-off Time (CTOT) for regulated flights to avoid ATFM congestions.

New Capabilities ? ATM network function to provide the departure ATFM slots, including CTOT for regulated flight to all concerned operational stakeholders. ANSPs/ Airport/ AU to be capable to receive and process CTOT and update Estimated Take-off Time (EOBT) in accordance with the agreed operational procedures.

Description ? The CTOT is defined as a time at which the aircraft shall take-off. CTOT is sent to AU / ATS when a flight becomes regulated (e.g. new flight entering the system, new period of regulation in the system, change of runway in use) at a system parameter time before the last received EOBT. AU/ATS/Airport need to adhere with the CTOT. The calculation of take-off times takes into account the off-block times and an average taxiing time for the runway in use at the airfield concerned.

Maturity Level ? Ready for implementation

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Constrains need to be handled.
2. Does it imply processing of new information by the user? Yes
CTOT and DPI are new items.
3. Does it imply the use of new equipment? No
4. Does it imply a change to levels of automation? Yes
Instead being active user, only monitoring of data exchange and reacting in abnormal situations.

PLANNING LAYERS ?

Tactical-Pre ops

OPERATIONS ?

Departure

DEPENDENCIES AND RELATIONS ?

There are currently no dependencies.

NOPS-B1/1 Short Term ATFM measures Operational

Main Purpose Short Term ATFM Measures (STAM) intends to smooth sector workloads by reducing traffic peaks through short-term applications of minor ground delays, appropriate flight level capping, timing and modalities of ATC re-sectorisation. These measures are capable of reducing the traffic complexity for ATC with minimum curtailing impact on the airspace users.

New Capabilities Stakeholders can optimize capacity throughput by adopting and improving the tactical capacity management procedures with the use of STAM.

Description The rigid application of ATFM measures based on standard capacity thresholds as the predominant tactical capacity measure needs to be replaced by a close working relationship between ANSP, AU and ATM Network function, which monitors both the real demand and the effective capacity of sectors having taken into account the complexity of expected traffic situation.

In order to close the gap between ATC and ATFM, new tools and local operational procedures need to be developed. The aim is to improve the efficiency of the system using flow management techniques close to the real time operations with direct impact on tactical capacity management and tactical action on traffic.

The target of the Short Term ATFM Measures is to replace en-route measures for situations where the capacity is nominal. These measures are capable of reducing the traffic complexity for ATC with minimum constraints for the airspace users. STAM tools and procedures are based on accurate short-term occupancy counts. The tactical capacity management procedures can be supported by the ATFM Tools (system based STAM with the hot-spot detections in the network view, the “what-if” function and capabilities of promulgation and implementation of STAM measures, including CDM). This will require the introduction of:

- Pre-tactical and Tactical Demand Capacity Balancing (DCB) evaluation tools;
- DCB tool based on occupancy counts;
- Enhanced monitoring techniques;
- DCB Coordination tools;
- DCB What-if function;
- DCB Network impact assessment;
- ATFM procedures to enable application of flow management closer to real time.

Maturity Level Standardization

Human Factor 1. Does it imply a change in task by a user or affected others? Yes

Considerations New task for all ATFM actors.

2. Does it imply processing of new information by the user? Yes

STAM measures are new items.

3. Does it imply the use of new equipment? No

4. Does it imply a change to levels of automation? Yes

Reduced need for late and tactical interventions.

PLANNING LAYERS

Tactical-Pre ops

OPERATIONS





En-route Arrival

DEPENDENCIES AND RELATIONS

Type of Dependencies

ASBU Element

NOPS-B1/10 Collaborative Trajectory Options Program (CTOP) Operational

Main Purpose 	Collaborative Trajectory Options Programs are Traffic Management Initiatives (TMI) that allow ATFM to choose the best possible balance between ATFM delay and rerouting by using airspace user provided Trajectory Option Sets (TOS) to mitigate the operational impact of weather or traffic demand airspace constraints.
New Capabilities 	<p>ATFM has the capability to receive and process Trajectory Option Sets (TOS) provided by airspace users. These are ranked trajectories that represent the operator's preference for the trade-off between receiving ATFM delay and routing around airspace constraints.</p> <p>When there is an airspace constraint, ATFM has the flexibility to use the trajectory options provided by all participating operators to optimize the choice between accepting a subset of the flights to use the available airspace capacity, applying ATFM delay to others, and rerouting the remaining traffic around the constraint.</p> <p>Finally, ATFM has the capability to electronically notify the participating airspace users of the chosen trajectory that they are expected to fly.</p>
Description 	<p>CTOP works as follows:</p> <ol style="list-style-type: none"> 1. ATFM creates an airspace boundary and establishes flow control on any air traffic that crosses that boundary. 2. Airspace Users based on the notice of the airspace constraint develop and submit in advance of the issuance of the program, a set of desired reroute options (called a Trajectory Options Set or TOS) that is the operator's preference for routing around the constraint. 3. CTOP uses the preferred options to automatically assign delays or reroutes to flights in order to dynamically manage the demand as conditions change.
Maturity Level 	Standardization
Human Factor Considerations	<ol style="list-style-type: none"> 1. Does it imply a change in task by a user or affected others? Yes 2. Does it imply processing of new information by the user? Yes 3. Does it imply the use of new equipment? Yes 4. Does it imply a change to levels of automation? Yes

PLANNING LAYERS

Pre-tactical | Tactical-Pre ops

OPERATIONS

En-route


DEPENDENCIES AND RELATIONS

Type of Dependencies


ASBU Element

Relation-operational need

FRT0-B1/7 - Trajectory Options Set (TOS)

Main Purpose  The Network Operations Planning needs to be enhanced to achieve collaborative planning with the support of services which can be automated (B2B interfaces/SWIM services).

New Capabilities  Tools and procedures to be deployed to enhance Network Operations planning.

Description  The Network Operations Planning process will be enhanced to continuously provide up-to-date situational information on all components of the network. Furthermore, it will provide access to initial network performance objectives and support to network performance assessment in post-operations.

The required technological platform will use the state-of-the-art technologies for creation of a virtual operations room for the physically distributed network operations, in support of collaborative Network Operations Planning. These interfaces will support the network collaborative dynamic/rolling processes from strategic to real-time operations, including capabilities for online performance monitoring integrated and feeding back into the collaborative network planning.

The information and dialogue tools shall be accessed via different interfaces. Access to information is done in a secure way, tailored according to stakeholders needs and subject to access control rules, so that only those who have an operational need to access particular information are able to do so. A common interface to all stakeholders needs to be developed to enable the collaborative decision-making processes used to build and execute the Network Operations Planning.

The following new features will be introduced:

- Enhanced Network Operations Planning interfaces (B2B/SWIM based);
- Initial steps related to the Network Operations Planning extended functions (crisis management and network disruption);
- Tools for on-line performance monitoring;
- Tools for network impact assessments.

Maturity Level  Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
New role and responsibilities for some ATFM actor.
2. Does it imply processing of new information by the user? Yes
New info stream are handled as impact assessment and crisis management.
3. Does it imply the use of new equipment? Yes
New platform and interfaces are needed.
4. Does it imply a change to levels of automation? Yes
New function were added , those that did not exist before.

PLANNING LAYERS

Strategical | Pre-tactical | Tactical-Pre ops

OPERATIONS


Departure | En-route | Arrival


DEPENDENCIES AND RELATIONS

Type of Dependencies	ASBU Element
Evolution	NOPS-B0/3 - Network Operation Planning basic features
Relation-information need	AMET-B1/3 - Climatological and historical meteorological information
Relation-information benefit	FICE-B2/4 - Flight Data Request Service
Relation-operational benefit	SWIM-B2/1 - Information service provision
Relation-operational benefit	SWIM-B2/2 - Information service consumption

NOPS-B1/3 **Enhanced integration of Airport operations planning with network operations planning** **Operational**

Main Purpose  Integrate the airport operations planning into the network operations planning.

New Capabilities  The airport operations plan will be a single common and collaborative agreed dynamic/rolling plan available to all airport stakeholders. This plan will be integrated with the enhanced network operations planning.

Description  The airport operations plan will contain all data and information related to the different status of planning phases and will be a dynamic/rolling plan, which naturally evolves over time. The integration of airport operations planning within the network operations planning provides a dynamic/rolling picture of the network situation to be used by all operational stakeholders to prepare their plans and their inputs to the network CDM processes.

The data exchanges are based on the subset of B2B/SWIM services that are most widely available to all stakeholders, communicating with local airport A-CDM systems to exchange relevant operational information.

This element is a step prior to the full integration of the airport operations planning to the network operations planning.

Maturity Level  Standardization

Human Factor 1. Does it imply a change in task by a user or affected others? Yes

Considerations Yes, manual coordination is automated.

2. Does it imply processing of new information by the user? Yes

AOP/NOP interfaces contain a full set of new data exchange items.

3. Does it imply the use of new equipment? Yes

In some cases. New modules and interfaces.

4. Does it imply a change to levels of automation? Yes

Reduced need for phone coordination.

PLANNING LAYERS [?](#)

ATM planning Strategic Pre-tactical
Tactical-Pre ops

OPERATIONS [?](#)

Taxi-out Departure Arrival Taxi-in Turn-around

DEPENDENCIES AND RELATIONS [?](#)

Type of Dependencies	ASBU Element
Evolution	NOPS-B0/4 - Initial Airport/ATFM slots and A-CDM Network Interface
Relation-operational need	ACDM-B1/1 - Airport Operations Plan (AOP)
Relation-operational need	NOPS-B1/2 - Enhanced Network Operations Planning
Relation-operational benefit	SWIM-B2/1 - Information service provision
Relation-operational benefit	SWIM-B2/2 - Information service consumption

NOPS-B1/4

Dynamic Traffic Complexity Management

Operational

Main Purpose [?](#) Enhanced traffic complexity assessment by automation.

New Capabilities [?](#) The predicted complexity coupled with traffic demand enables the ATM Network function to take timely action to better address demand and capacity balancing, or request the trajectory changes in coordination with ATC and Airspace Users.

Description [?](#) The rigid application of ATFM measures based on standard capacity thresholds as the pre-dominant tactical capacity measure needs to be replaced by a close working relationship between ANSPs and ATM Network function, which would monitor both the real demand and the effective capacity of sectors having taken into account the complexity of expected traffic situation. The local traffic complexity assessment continuously monitors sector demand and evaluate traffic complexity (by applying predefined complexity metrics) according to a predetermined qualitative scale. It provides support in the determination of solutions in order to plan airspace, sectors and staff to handle the predicted traffic. The local complexity assessment would benefit by receiving processing and integrating the ATM Network function information in order to supplement the local traffic counts with the relevant flight plan data. This will improve the quality of the planned trajectory and further enhance the traffic complexity management.

Maturity Level [?](#) Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes

New task to manage traffic complexity.

2. Does it imply processing of new information by the user? Yes

New stream of data.

3. Does it imply the use of new equipment? Yes

It could be module of existing system or separate system.

4. Does it imply a change to levels of automation? Yes

Mental activates are automated, complexity tool provides additional data to facilitate the traffic de-confliction well in advance.

PLANNING LAYERS ?

Tactical-During ops

OPERATIONS ?

En-route

DEPENDENCIES AND RELATIONS ?

There are currently no dependencies.

NOPS-B1/5

Full integration of airspace management with air traffic flow management Operational

Main Purpose ?

Ensure a continuous, seamless and iterative airspace management and air traffic flow management approach.

New Capabilities ?

Fully dynamic/rolling ASM/ ATFM integration process supporting information collection, processing and sharing with all concerned stakeholders.

Description ?

The full dynamic/rolling ASM/ATFM process focuses on improving airspace planning. It will ensure a continuous, seamless and iterative airspace planning and management/allocation based on airspace requests at any time period within strategic, pre-tactical and tactical ASM levels. It will result in a rolling process, supporting the enhancement of dynamic Network Operations Planning. The real time ASM data exchanges relates to the automated exchange services of ASM data during the tactical phase continuously in real time. ASM information (real-time Airspace Reservation status) is shared between different systems and Stakeholders and communicated to ATFM in the tactical phase.

Several new improvements are introduced as:

- Process/system modules supporting a full rolling ASM/ATFM and dynamic ASM/ATFM process allowing data sharing to all operational stakeholders,
- Process/System changes for initial Collaborative Decision Making (CDM) between ATFM function and the local designated authorities and between neighboring ASM actors.
- ASM information sharing addresses requirements aiming to improve the notification to airspace users based on automated data exchange processes
- Procedural and system modules for exchange of real time airspace status data;
- The Flexible Use of Airspace (FUA) process is improved with more dynamic airspace management enabling dynamic responses to airspace requests (or very short term changes)
- Real-time ASM coordination is further enhanced through "what-if" functionalities and automated support to airspace booking and airspace management.
- Real-time ASM data are exchanged between ASM support systems and ATC system
- Integration and management of ASM real-time data into ANSPs' ATM systems and into AUs flight planning systems;

The full dynamic/rolling ASM/ATFM process will be supported by the sharing of civil-military airspace data and by continuously updating Airspace Reservation information with other demand information among the authorized operational stakeholders in order to enhance the coordination of Cross-Border Operations, and to optimise the whole network operations based on the most timely and correct information. The process is enhanced with "what-if" functionalities enabling a better use of available capacity. ASM real-time data exchanges consisting of pre-notification of activation, notification of activation, de-activation, modification and release of airspace are collected, saved and processed in order to be exchanged between stakeholders and be made available to ATM actors, including Airspace Users (AUs). ATM systems need to be upgraded to exchange real-time ASM data messages containing real time activation status of predefined airspace structures with local ASM support systems and to display airspace status data at the Controller Working Position (CWP).

Maturity Level ?

Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? No
2. Does it imply processing of new information by the user? Yes
Real time ASM data is new data stream.
3. Does it imply the use of new equipment? No
4. Does it imply a change to levels of automation? Yes
Automation increased compared with B0.



DEPENDENCIES AND RELATIONS 

Type of Dependencies	ASBU Element
Evolution	NOPS-B0/1 - Initial integration of collaborative airspace management with air traffic flow management
Relation-operational need	FRT0-B1/1 - Free Route Airspace (FRA)
Relation-operational need	FRT0-B1/2 - Required Navigation Performance (RNP) routes
Relation-operational need	FRT0-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data
Relation-operational need	FRT0-B1/4 - Dynamic sectorization

NOPS-B1/6

Initial Dynamic Airspace configurations

Operational

Main Purpose 	ASM solutions and initial dynamic airspace configurations for ATFM planning, synchronisation of traffic flows and demand/capacity balancing
New Capabilities 	Availability of optimised Airspace solutions/Initial Dynamic Airspace configurations based on traffic demand and dynamic sectors management taken into account for ATFM purposes.

Description ?

This element addresses the following ASM/ATFM improvements:

- Airspace solutions
- Pre-defined airspace configurations
- ANSPs/ ATM Network function data exchanges pertinent to pre-defined airspace configurations

The ASM solutions process is aimed at delivering ASM options/solutions that can help reducing or even alleviate the ATFM measures and address capacity issues identified in any particular area as well as to improve flight efficiency assessing impact on capacity and ensuring the synchronised availability of optimized airspace structures based on traffic demand and dynamic sectors management.

The Airspace configurations are pre-defined and coordinated airspace structures and ATC dynamic sectorisation, to meet the ATFM and airspace needs in terms of capacity and/or flight efficiency. The implementation of pre-defined airspace configuration exchange covers the improvements of ATFM systems, to allow exchange of predefined airspace configurations information.

The decisions required for dynamic sectorisation could benefit from real time exchanges with ATM Network function for ATFM planning, synchronisation of traffic flows and demand/capacity balancing. The notification of Airspace Configurations will be based on automatic flows of information between the different stakeholders supported by the ATM Network function. The airspace configurations and flexible sector configurations are already used when the flows and constraints can be predicted well in advance (e.g. weekend routes or seasonal flows of traffic).

A more efficient and dynamic process involving the ATM Network function, ATC would require new functionalities and procedures and well defined collaborative decision making processes at pre-tactical level. The ANSPs systems needs to support the dynamic sectorisation by dynamic resizing and change of sector shapes and volumes based on pre-defined airspace configurations.

Maturity Level ?

Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Utilisation of pre-defined airspace configuration.
2. Does it imply processing of new information by the user? Yes
Airspace structure and ATC sectorisation are new data information.
3. Does it imply the use of new equipment? No
4. Does it imply a change to levels of automation? Yes
Manual Task are semi-automated.

PLANNING LAYERS ?

Strategical Pre-tactical

OPERATIONS ?

Departure En-route Arrival

DEPENDENCIES AND RELATIONS ?

Type of Dependencies	ASBU Element
Relation-operational need	FRT0-B0/1 - Direct routing (DCT)
Relation-operational need	FRT0-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)


Relation-operational need	FRT0-B0/3 - Pre-validated and coordinated ATS routes to support flight and flow
Relation-operational need	FRT0-B1/1 - Free Route Airspace (FRA)
Relation-operational need	FRT0-B1/2 - Required Navigation Performance (RNP) routes
Relation-operational need	FRT0-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data
Relation-operational need	FRT0-B1/4 - Dynamic sectorization


NOPS-B1/7

Enhanced ATFM slot swapping

Operational

Main Purpose  Improve the Airspace Users driven ATFM slot swapping process

New Capabilities  The swapping of ATFM measure impacted flights within the same ATFM measure will be extended to all ATFM measure impacted flights.

Description  ATFM slot swapping allows Airspace Users (AU) to request a rearrangement of their own flights subject to an ATFM measure in order to better suit their needs. The enhanced ATFM Slot Swapping improves the slot swapping currently used by Airspace Users (AU), by allowing the function to be extended gradually to all airspace users, by re-prioritizing their flights during the pre-departure part of operations. The Enhanced Slot swapping increases flexibility for Airspace Users; and provides a wider range of possibilities, by facilitating the identification of possible swaps for an ATFM Measure impacted flight (through B2B/SWIM-based Network Operations Planning interfaces) and by reducing the rate of rejection of swap requests by refining current processes. The AUs requests for these changes in flight priority will be introduced at the initiative of the AUs themselves, airport authorities or the ATM Network function.

Maturity Level  Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Change of tasks for many ATFM actors.
2. Does it imply processing of new information by the user? Yes
New data stream for slot swapping and airport slot monitoring.
3. Does it imply the use of new equipment? Yes
Change of system and interfaces.
4. Does it imply a change to levels of automation? Yes
Coordination is semi-automated.

PLANNING LAYERS 

Tactical-Pre ops

OPERATIONS 

Departure

DEPENDENCIES AND RELATIONS 

Type of Dependencies


ASBU Element

Evolution	NOPS-B0/4 - Initial Airport/ATFM slots and A-CDM Network Interface
Relation-operational need	NOPS-B1/2 - Enhanced Network Operations Planning
Relation-operational benefit	SWIM-B2/1 - Information service provision
Relation-operational benefit	SWIM-B2/2 - Information service consumption

NOPS-B1/8 Extended Arrival Management supported by the ATM Network function Operational

Main Purpose  ATM Network function contributions to extended Arrival Management.

New Capabilities  Extended Arrival Management information is taken on board by the Network ATM function to improve the quality of the ATFM service.

Description  The ATM Network function involvement in extended Arrival Management process is addressed by this element. It does include the following elements:

- Enhancements of ATFM Planned Trajectory about the accuracy/predictability of estimates to meet the extended arrival management operational requirements;
- Provision of ATFM Planned Trajectory to ANSPs;
- Reception and processing of ANSPs extended Arrival Management info by ATM Network function;
- ATFM assessment tool for extended Arrival Management.

Bilateral agreements need be established between the sectors involved that can be in different ATC units and also in different countries, including the ATM Network function for the notification purposes. The ATFM procedures need to be revised for the management of the extended Arrival Management information.

Maturity Level  Standardization

Human Factor Considerations

1. Does it imply a change in task by a user or affected others? Yes
Propagation of delay further en-route will increase the task for some ATFM actors.
2. Does it imply processing of new information by the user? Yes
AMAN delay is propagated further en-route and the Network function is notified.
3. Does it imply the use of new equipment? No
4. Does it imply a change to levels of automation? Yes
Some ATFM actors got new tasks for the optimisation of arrival traffic flows.

PLANNING LAYERS

Tactical-Pre ops Tactical-During ops

OPERATIONS

En-route Arrival





DEPENDENCIES AND RELATIONS

Type of Dependencies **ASBU Element**

NOPS-B1/9

Target Times for ATFM purposes

Operational

Main Purpose 	Use of Target Times for ATFM purposes including an initial level of arrival sequencing in case of an arrival ATFM measure.
New Capabilities 	Calculation and provision of Target Times by the ATM Network function in addition to CTOT, for the most penalised measure.
Description 	In order to improve the flight predictability at the entry of the congested area, a target time of entry at the congested area (most penalised measure) will be provided by ATM Network function. At this stage, the target times will be applied for ATFM purpose only, including an initial level of arrival sequencing in case of an arrival ATFM measure. The ATM Network function will provide the calculated Target Time (TT) at the most penalising measure reference point in addition to Calculated Take-Off Time (CTOT) to all concerned users. TT will be distributed by data exchanges with the concerned Stakeholders. Stakeholders using TTs should be able to receive, extract and present the target times delivered by ATM Network function. ANSPs have access to the relevant information on flights that are subject to a Target Time to manage these flights as required in accordance with local procedures that need to be developed. The Flight Operating centres should provide Target Times to pilots prior to departure; pilots should endeavour to adhere to the Target Times to the extent possible.
Maturity Level 	Standardization
Human Factor Considerations	<p>1. Does it imply a change in task by a user or affected others? Yes Target time adherence by AUs and ANSPs.</p> <p>2. Does it imply processing of new information by the user? Yes Target time to be presented to affected users.</p> <p>3. Does it imply the use of new equipment? No</p> <p>4. Does it imply a change to levels of automation? Yes AUs and ANSPs to process and comply with target times.</p>

PLANNING LAYERS 

Tactical-Pre ops

OPERATIONS 

En-route | Arrival

DEPENDENCIES AND RELATIONS 

Type of Dependencies

ASBU Element

Relation-operational need

RSEQ-B1/1 - Extended arrival metering

APPENDIX B

INDICATORS FOR PERFORMANCE MEASURING OF ATFM SYSTEMS

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2. Acronyms

TBD

3. References

- (1) https://en.wikipedia.org/wiki/Performance_indicator
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4. Scope of application

The list of indicators detailed in section 7 was drawn up in order to establish a baseline for the subsequent assessment by States of the implementation of the ATFM service, at national and regional level.

Note 1: The Global Air Navigation Plan (GANP) provides a list of key performance indicators (KPIs), linked to the relevant objectives in the catalogue of performance objectives, to set targets through the quantification of objectives for the ATFM service, to be implemented in SAM States.

Note 2: The monitoring of these ATFM key performance indicators (KPIs) must be integrated into, and/or complementary to, the collection and production by the State of air navigation performance data for the monitoring of air navigation implementation and optimisation, within the scope of the SAM eANP Vol. III.

5. Introduction

By definition, an indicator is a measure that shows the status, level, condition or change in something. How are we doing? How are we progressing? or the other way around, sometimes.

It is not necessarily an improvement or an increase in a value. Sometimes we are going backwards and things are deteriorating, so an indicator shows the status or condition of something and it always has meaning in the context of a goal or an objective. So, if you are measuring the achievement of a goal, you are working towards a goal.

An indicator is a measurement of something that is being done. Are you moving towards that goal? How fast and how well are you progressing? Or are you moving in a different direction and getting further away from the goal you want to achieve? So, an indicator is really a measurable tool, a measure that allows you to see how well you are doing and where you are going.

There are certain criteria that are applied when seeking to develop good indicators, which allow us to measure what we are really looking for.

Some of these criteria include being **specific**, so when defining an indicator, the focus should be on a single metric. Sometimes indicators include too many measures, too many metrics and become too complicated and therefore difficult to measure. So, a good indicator is simple and specific and contains only one measure.

Another criterion is **simplicity**. Have a good indicator that measures a simple context that is in line with the needs of the stakeholders and is easy for users to understand. Generally, a good indicator is any measure, any tool that we can give to anybody if it is well defined, and that person who has access

to good data can actually measure it, because it is simple and understandable.

Another criterion is **measurement capability**. Again, there are indicators that are well written, but in fact, they are very difficult to measure because the data is not clearly defined or not available or it is not really clear what we want to measure.

Measurability is another factor to consider when developing indicators.

Indicators must have context and meaning in relation to the goals and objectives; that is, they must be **relevant** to what the organisation or operations are trying to achieve.

Finally, you must verify if the indicator is **achievable** or not. Sometimes, you find indicators that are very well written, but for whatever reason, be it the time period or scope or the availability or lack of data, they are not achievable at that point in time.

6. General concepts of indicators

6.1. Importance

In the permanent search for excellence in the service provided, it is essential to understand the importance of management by means of indicators, as these are the only ones that will permit monitoring of the status of those aspects that are defined as key in a quantifiable and impartial manner. The concept of excellence currently implies the combination of efficiency, competitiveness and profitability.

This requires strategic objectives that express the desired standards. It is essential to understand the concept of performance measurement as an advance over implementation measurement, as this new concept includes the analysis of the efficiency of the result obtained.

The key stages in the identification of KPIs are:

- Have a predefined business process (BP).
- Have requirements for BPs.
- Have a quantitative/qualitative measurement of results and a comparison with the established objectives.
- Investigate variations and adjust processes or resources to achieve short-term objectives.

A healthy process for identifying and implementing key performance indicators includes the requirement that managers and other contributors regularly review the measures. This adjustment process requires the time and diligence of all parties.

When choosing which KPIs will provide the most valuable knowledge, some questions to stay focused include:

- Are these KPIs derived from a valid strategy?
- Are they simple to understand?
- Are they relevant, not only now, but also over time?
- Are they clearly defined?
- Do they accurately reflect the business process?
- Do they involve factors or quantities that the business can fully control or influence?
- Do they focus on improvement?
- Do they provide quick comments?

KPIs are most useful when they reveal trends over time, rather than taking a KPI in isolation. Keeping them accurate, simple and relevant can reward a company with useful insights and guidance.

A properly developed and implemented KPI programme incorporates regular review processes during

which managers and other stakeholders assess the meaning of results. No matter how positive an indicator is, it must be analysed and assessed to repeat or even strengthen performance.

No single KPI number explains how it happened or how to improve. However, a well-defined set of KPIs can include numbers that indicate where conditions deteriorated and how they can be improved. Armed with this knowledge, team members can take action to strengthen the main KPIs and drive better future results.

6.2. Characteristics

A simple way to check whether a KPI can be used correctly or offers meaningful data is to verify it with the SMART filter. Each KPI must have:

S: A specific objective

M: A way to measure progress towards the goal

A: Realistic and attainable objectives

R: Relevance to the business

T: A timeframe that makes sense for the company

Each of the SMART characteristics is equally important and must be fulfilled on an ongoing basis. It is advisable to have strong teams whose main tasks are the development and analysis of indicators. In this way, specialists can always be available to support the processing of data and their subsequent analysis in the context of KPIs or other aspects that require decision-making based on quantitative information.

6.3. Quality of data

It is essential to have data that is consistent and passes quality tests such as: consistency between take-off and landing times, flight identification information, uniformity in the denomination of airlines, airports and any other data that can be taken as a key field in subsequent analyses (for example, that company names are written in the same way).

6.4. Sources of information

There are different sources of information available in the ATM system. Many of them belong to the ANSP, such as those coming from ATM systems, ATFM, surveillance systems or ATS units. However, other information is available from other ATM system stakeholders (airlines, airport concessionaires, etc.). When the decision is made to start measuring a KPI, it is necessary to know not only what will be measured but also where the data will come from. In some cases, it may be necessary to enter into agreements between organisations to ensure the exchange of information, taking into account:

- What information will be exchanged (AOBT, ATOT, etc.)
- In which format the information will be sent (Excel, PDF, dataset, etc.)
- From where and to where will it be sent (email, FTP servers, etc.)
- How often information will be exchanged (real time, daily, weekly, monthly, etc.)
- Other related data (use, confidentiality, etc.)

6.5. Benefits

Benefits of KPI indicators:

- They provide the information the manager needs about each stage of the process.
- They enable more accurate decisions to be made.
- They improve process efficiency and effectiveness.
- Faster, better understood and transparent reporting of results.
- Dashboards for an overview of all available information.
- Constant measurement, sometimes even in real time, in order to act flexibly and quickly to optimise the strategy or process to be implemented.
- Adaptation of the business to the continuous changes in the market, competition, customers, new opportunities, etc.
- Motivation of employees and teams to achieve the established objectives. In addition, by sharing this data and taking their feedback or even decisions into consideration, you will make them feel involved in the process and the strategy.
- Reassurance of investors, directors and other key business stakeholders who do not normally participate in the day-to-day work.

7. The GANP and its relationship with the KPIs

Since 1983, it has been noted that traffic doubles every 15 years, and in recent times there has been a notable increase in the entry of new and different types of air vehicles, directly impacting on the increase in demand. Taking into account that airspace is finite and that it is essential to maintain safety levels and protect the environment, as well as to increase (operational and economic) efficiency, it is necessary to plan for the short, medium and long term through the management of air navigation plans.

With the creation of the ASBU, the concept of performance began to emerge, whereas previously the focus had been on technology. This new edition of the GANP seeks to strengthen this criterion and put it into practice through the application of methodologies for defining clear and measurable objectives, resulting in the generation of indicators that focus on the impact that each result obtained has on the system and guarantee interoperability.

It is therefore essential to follow up on the recording of the data required to create each indicator. It is also essential to have a clear and consistent methodology, as this will enable comparison over time for as long as the indicator is in place. Keeping this as a basis, data can be obtained from different sources, both internal and external, so it will be key to involve all actors of the system.

7.1. KPI for ATFM systems performance measurement

Taking as a reference the series of key performance indicators presented in the GANP, the CAR/SAM Regions, through CONOPS ATFM have agreed, in principle, to use the following indicators as a basis for regional and national measurement of the performance of ATFM systems:

- **KPI 01** Departure punctuality. Percentage of flights departing from the gate on-time (compared to schedule).
- **KPI 03** ATFM slot adherence. Percentage of flights taking off within their assigned ATFM slot (Calculated Take-Off Time Compliance).
- **KPI 04** Filed flight plan en-route extension. Flight planned en-route distance compared to a

reference ideal trajectory distance.

- **KPI 05** Actual en-route extension. Actual en-route distance flown compared to a reference ideal distance.
- **KPI 07** En-route ATFM delay. ATFM delay attributed to flow restrictions in a given en-route airspace volume
- **KPI 12** Airport/Terminal ATFM delay. ATFM delay attributed to arrival flow restrictions at a given airport and/or associated terminal airspace volume.
- **KPI14 Arrival punctuality. Percentage of flights arriving at the gate on-time (compared to schedule)**

In the following **Annex**, a description of mentioned KPIs are included:

8. ATFM management thru KPI

TBD

ANNEX

KPIs description

KPI01	Departure punctuality
Definition	Percentage of flights departing from the gate on-time (compared to schedule).
Measurement Units	% of scheduled flights
Operations Measured	IFR departures of scheduled airlines
Variants	Variant 1A – % of departures within ± 5 minutes of scheduled time of departure Variant 1B – % of departures delayed ≤ 5 minutes versus schedule Variant 2A – % of departures within ± 15 minutes of scheduled time of departure Variant 2B – % of departures delayed ≤ 15 minutes versus schedule
Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This is an airspace user and passenger focused KPI: departure punctuality gives an overall indication of the service quality experienced by passengers, and the ability of the airlines to execute their schedule at a given departure location.
Parameters	On-time threshold (maximum positive or negative deviation from scheduled departure time) which defines whether a flight is counted as on-time or not. Recommended values: 5 minutes and 15 minutes.
Data Requirement	For each departing scheduled flight: <ul style="list-style-type: none">• Scheduled time of departure (STD) or Scheduled off-block time (SOBT)• Actual off-block time (AOBT)
Data Feed Providers	Schedule database(s), airports, airlines and/or ANSPs
Formula / Algorithm	At the level of individual flights: <ol style="list-style-type: none">1. Exclude non-scheduled departures2. Categorize each scheduled departure as on-time or not At aggregated level: <ol style="list-style-type: none">3. Compute the KPI: number of on-time departures divided by total number of scheduled departures

KPI03	ATFM slot adherence
Definition	Percentage of flights taking off within their assigned ATFM slot (Calculated Take-Off Time Compliance).
Measurement Units	% of flights subject to flow restrictions
Operations Measured	The take-off of IFR flights subject to flow restrictions.
Variants	Variants are possible depending on the size of the ATFM slot window.
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI gives an indication of the capability of an airport to contribute to ATFM effectiveness by delivering outbound traffic in a predictable manner to the departure runway, in compliance with assigned ATFM slots.
Parameters	<p>Size of the ATFM slot window.</p> <p>Variant 1: the period between 5 minutes before and 10 minutes after the CTOT.</p> <p>Variant 2: the period between 5 minutes before and 5 minutes after the CTOT.</p>
Data Requirement	<p>For each departing IFR flight subject to an ATFM regulation:</p> <ul style="list-style-type: none"> • Calculated Take-Off Time (CTOT) • Actual take-off time (ATOT)
Data Feed Providers	Airports, ATFM service

Formula / Algorithm	<p>At the level of individual flights:</p> <ol style="list-style-type: none"> 1. Exclude flights not subject to an ATFM regulation 2. Categorize each departing flight as compliant with its ATFM slot window or not <p>At aggregated level:</p> <ol style="list-style-type: none"> 3. Compute the KPI: number of compliant departures divided by total number of departing flights subject to an ATFM regulation
References & Examples of Use	<ul style="list-style-type: none"> • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Slot Tolerance Window (STW) compliance (Single European Sky Performance Scheme) • EDCT Window compliance (US) • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI04 Filed flight plan en-route extension

Definition	Flight planned en-route distance compared to a reference ideal trajectory distance.
Measurement Units	% excess distance
Operations Measured	The planned en-route distance, as selected during the preparation of flight plans.
Variants	<p>Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace.</p> <p>Variant 2, using a 40 NM cylinder around the departure airport and a 100 NM cylinder around the destination airport as the start/end of en-route airspace.</p>
Objects Characterized	The KPI can be computed for any volume of en-route airspace; this implies that it can be computed at State level (covering the FIRs of a State).
Utility of the KPI	This KPI measures the en-route horizontal flight (in)efficiency contained in a set of filed flight plans crossing an airspace volume. Its value is influenced by route network design, route & airspace availability, airspace user choice (e.g. to ensure safety, to minimize cost and to take into account wind and weather) and airspace user constraints (e.g. overflight permits, aircraft limitations). A significant gap between this KPI and the Actual en-Route Extension KPI indicates that many flights are not flown along the planned route, which should trigger an analysis of why this is happening.
Parameters	<p>A '<i>Measured area</i>' is defined for which the KPI is computed. For example, a State.</p> <p>A '<i>Reference area</i>' is defined as a (sub)regional boundary considered, containing all '<i>Measured areas</i>', for example States within the same ICAO Region.</p> <p>Departure terminal area proxy: a cylinder with 40 NM radius around the departure airport.</p> <p>Destination terminal area proxy: a cylinder with 40 NM radius around the destination airport (variant 1). For variant 2 the radius is 100 NM.</p>

Data Requirement	<p>For each flight plan:</p> <ul style="list-style-type: none">• Departure airport (Point A)• Destination airport (Point B)• Entry point in the '<i>Reference area</i>' (Point O)• Exit point from the '<i>Reference area</i>' (Point D)• Entry points in the '<i>Measured areas</i>' (Points N)• Exit points from the '<i>Measured areas</i>' (Points X)• Planned distance for each NX portion of the flight
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Data Feed Providers ANSPs

Formula / Algorithm For the horizontal trajectory of each flight, different parts (trajectory portions) are considered (see Figure 1 for the example of a flight departing outside the 'Reference Area' and overflying a measured State; Figure 2 for the example of a domestic flight within a measured State):

1. The part of the flight which is within the reference area (segment OD). If airports A and/or B are located within the reference area, the points O and/or D are placed on the airport reference point (ARP).
2. The part of the flight for which the State level indicator is computed (between points N and X). If points A and/or B (the airports) are located within the measured State, the points N and/or X are placed on the 40 NM circle (variant 1) around the airport reference point as shown in Figure 2, to exclude terminal route efficiency from the indicator.

Between points N and X, three quantities can be computed: the planned distance (length of flight plan trajectory), the local direct distance (great circle distance between N and X, not required for this indicator), and the contribution of the trajectory between N and X to the completion of the great circle distance between O and D. This contribution is called the "achieved distance". The formula for computing this is based on four great circle distances interconnecting the points O, N, X and D:
$$\text{achieved distance} = [(OX-ON)+(DN-DX)]/2.$$

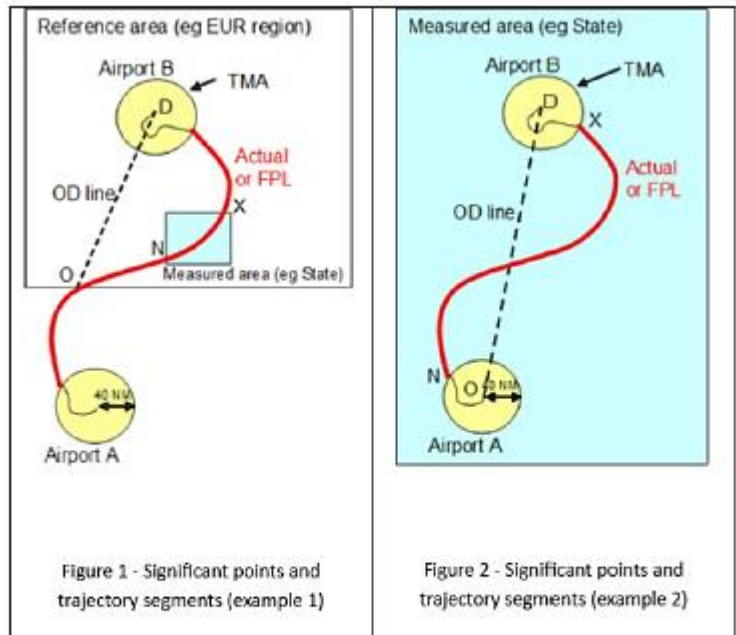
When a given flight traverses multiple States, the sum of the planned distance in each State equals the total planned distance from O to D. Likewise the sum of all achieved distances equals the direct distance from O to D.

The extra distance for a portion NX of a given flight is the difference between the actual/flight planned distance and the achieved distance. The total extra distance observed within a measured area (e.g. a State) over a given time period is the sum of the planned distances across all traversing flights, minus the sum of the achieved distances across all traversing flights.

The KPI is computed as the total extra distance divided by total achieved distance, expressed as a percentage.

References &
Examples of Use

- ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013)
- Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016)
- PRC Performance Review Report (EUROCONTROL 2017)
- European ANS Performance Data Portal
- Single European Sky Performance Scheme
- CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)



Significant points and trajectory segments (examples 1 and 2)

Note. - See examples of KPI04 and KPI05 calculation, at the last part of this Annex (Spanish only)

KPI05 Actual en-route extension	
Definition	Actual en-route distance flown compared to a reference ideal distance.
Measurement Units	% excess distance
Operations Measured	The actual distance flown by flights in en-route airspace.
Variants	<p>Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace.</p> <p>Variant 2, using a 40 NM cylinder around the departure airport and a 100 NM cylinder around the destination airport as the start/end of en-route airspace.</p>
Objects Characterized	The KPI can be computed for a traffic flow or a volume of en-route airspace; this implies that it can be computed at State level (covering the FIRs of a State).
Utility of the KPI	<p>This KPI measures the en-route horizontal flight (in)efficiency as actually flown, of a set of IFR flights crossing an airspace volume. Its value is influenced by route network design, route & airspace availability, airspace user choice (e.g. to ensure safety, to minimize cost and to take into account wind and weather) and airspace user constraints (e.g. overflight permits, aircraft limitations), and tactical ATC interventions modifying the trajectory (e.g. reroutings and 'direct to' clearances).</p> <p>The KPI is also typically used to estimate the excess fuel consumption and associated emissions (for the Environment KPA) attributed to horizontal flight inefficiency.</p>

Parameters	Identical to the parameters of the 'Filed Flight Plan en-Route Extension' KPI.
Data Requirement	<p>For each actual flight trajectory:</p> <ul style="list-style-type: none"> • Departure airport (Point A) • Destination airport (Point B) • Entry point in the 'Reference Area' (Point O) • Exit point from the 'Reference Area' (Point D) • Entry points in the 'Measured Areas' (Points N) • Exit points from the 'Measured Areas' (Point X) • Distance flown for each NX portion of the actual flight trajectory, derived from surveillance data (radar, ADS-B...).
Data Feed Providers	ANSPs, ADS-B data providers
Formula / Algorithm	Identical to the formula/algorithm of the 'Filed Flight Plan en-Route Extension' KPI.
References & Examples of Use	<ul style="list-style-type: none"> • ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

Note. - See examples of KPI04 and KPI05 calculation, at the last part of this Annex (Spanish only)

KPI07	En-route ATFM delay
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Definition	ATFM delay attributed to flow restrictions in a given en-route airspace volume
Measurement Units	Minutes/flight
Operations Measured	The management of (temporary) capacity shortfalls in en-route airspace due to high demand and/or capacity reductions for a variety of reasons, resulting in the allocation of ATFM delay
Variants	None
Objects Characterized	The KPI can be computed for any volume of en-route airspace which participates in the ATFM process.

Utility of the KPI	This KPI is a time aggregation of the ATFM delay generated by flow restrictions which are established to protect a given volume of en-route airspace against demand/capacity imbalances. These flow restrictions (also called ATFM regulations) normally have a delay cause associated with them. This allows the KPI to be disaggregated by cause, which allows better diagnosis of the reasons for demand/capacity imbalances. Typically, the KPI is used to check whether ANSPs provide the capacity needed to cope with demand.
Parameters	None
Data Requirement	For each IFR flight: - Estimated Take-off Time (ETOT) computed from the last filed flight plan - Calculated Take-off Time (CTOT) - ID of the flow restriction generating the ATFM delay - Airspace volume associated with the flow restriction - Delay code associated with the flow restriction
Data Feed Providers	ATFM
Formula / Algorithm	At the level of individual flights: <ol style="list-style-type: none"> 1. Select the flights crossing the volume of en-route airspace 2. Select the subset of flights which are affected by the flow restrictions in this airspace 3. Compute ATFM delay: CTOT minus ETOT At aggregated level: <ol style="list-style-type: none"> 4. Compute the KPI: sum of ATFM delays divided by number of IFR flights crossing the airspace
References & Examples of Use	<ul style="list-style-type: none"> • ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

Note. - See examples of KPI07 calculation, at the last part of this Annex (Spanish only)

KPI12	Airport/Terminal ATFM delay
Definition	ATFM delay attributed to arrival flow restrictions at a given airport and/or associated terminal airspace volume.
Measurement Units	Minutes/flight
Operations Measured	The management of (temporary) capacity shortfalls at and around destination airports due to high demand and/or capacity reductions for a variety of reasons, resulting in the allocation of ATFM delay.
Variants	None
Objects Characterized	The KPI is typically computed for individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This KPI is a time aggregation of the ATFM delay generated by flow restrictions which are established to protect a destination airport or its terminal area against demand/capacity imbalances. If a terminal area covers multiple airports, each individual flight delay is attributed to the corresponding destination airport. These flow restrictions (also called ATFM regulations) normally have a delay cause associated with them. This allows the KPI to be disaggregated by cause, which allows better diagnosis of the reasons for demand/capacity imbalances. Typically, the KPI is used as a proxy to check whether airports and ANSPs provide the capacity needed to cope with demand.
Parameters	None

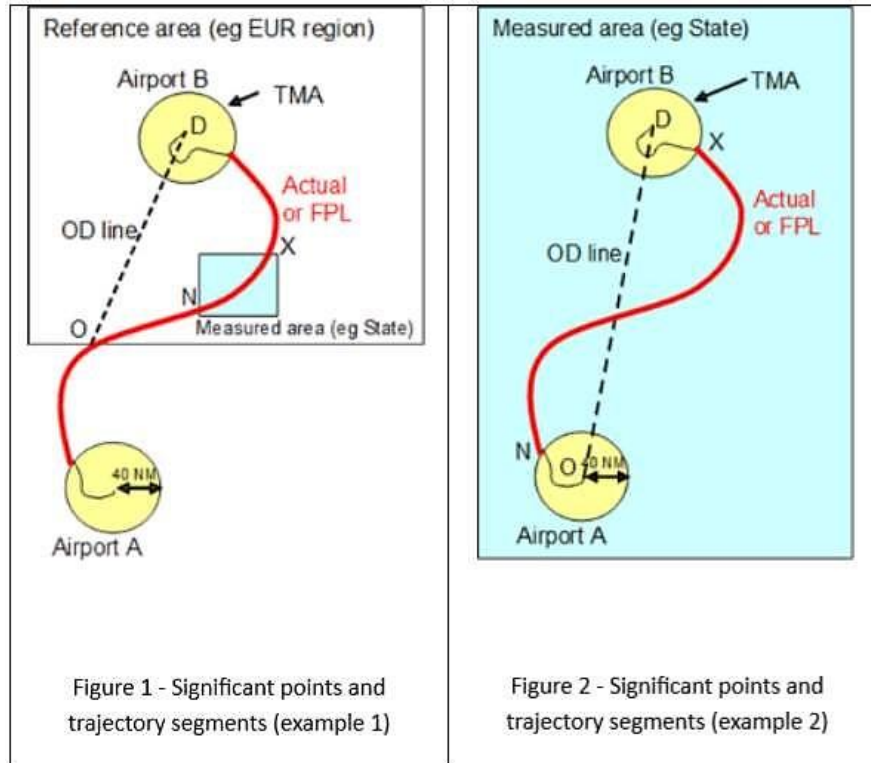
Data Requirement	<p>For each IFR flight:</p> <ul style="list-style-type: none"> • Estimated Take-off Time (ETOT) computed from the last filed flight plan • Calculated Take-off Time (CTOT) • ID of the flow restriction generating the ATFM delay • Airport or terminal airspace volume associated with the flow restriction • Delay code associated with the flow restriction
Data Feed Providers	ATFM
Formula / Algorithm	<p>At the level of individual flights:</p> <ol style="list-style-type: none"> 1. Select the flights arriving at this airport 2. Select the subset of flights which are affected by the flow restrictions at this airport or its terminal airspace 3. Compute ATFM delay: CTOT minus ETOT <p>At aggregated level:</p> <ol style="list-style-type: none"> 4. Compute the KPI: sum of ATFM delays divided by number of arrivals at the airport
References & Examples of Use	<ul style="list-style-type: none"> • ICAO EUR Doc 030 EUR Region Performance Framework Document (July 2013) • PRC Performance Review Report (EUROCONTROL 2017) • European ANS Performance Data Portal • Single European Sky Performance Scheme • CANSO Recommended KPIs for Measuring ANSP Operational Performance (2015)

KPI14 Arrival punctuality	
Definition	Percentage of flights arriving at the gate on-time (compared to schedule)
Measurement Units	% of scheduled flights
Operations Measured	IFR arrivals of scheduled airlines
Variants	<p>Variant 1A – % of arrivals within ± 5 minutes of scheduled time of arrival</p> <p>Variant 1B – % of arrivals delayed ≤ 5 minutes versus schedule</p> <p>Variant 2A – % of arrivals within ± 15 minutes of scheduled time of arrival</p> <p>Variant 2B – % of arrivals delayed ≤ 15 minutes versus schedule</p>

Objects Characterized	The KPI is typically computed for traffic flows, individual airports, or clusters of airports (selection/grouping based on size and/or geography).
Utility of the KPI	This is an airspace user and passenger focused KPI: arrival punctuality gives an overall indication of the service quality experienced by passengers, and the ability of the airlines to execute their schedule at a given destination.
Parameters	<p>On-time threshold (maximum positive or negative deviation from scheduled arrival time) which defines whether a flight is counted as on-time or not.</p> <p>Recommended values: 5 minutes and 15 minutes.</p>
Data Requirement	<p>For each arriving scheduled flight:</p> <ul style="list-style-type: none"> • Scheduled time of arrival (STA) or Scheduled in-block time (SBT) • Actual in-block time (AIBT)
Data Feed Providers	Schedule database(s), airports, airlines and/or ANSPs
Formula / Algorithm	<p>At the level of individual flights:</p> <ol style="list-style-type: none"> 1. Exclude non-scheduled arrivals 2. Categorize each scheduled arrival as on-time or not <p>At aggregated level:</p> <ol style="list-style-type: none"> 3. Compute the KPI: number of on-time arrivals divided by total number of scheduled arrivals
References & Examples of Use	<ul style="list-style-type: none"> • Comparison of ATM-Related Operational Performance: U.S./Europe (September 2016) • China / Europe benchmarking study (CAUC - EUROCONTROL, 2017) • PRC Performance Review Report (EUROCONTROL 2017)

KPI CALCULATION EXAMPLES
(Spanish only)

A. Ejemplo para un vuelo doméstico dentro de un Estado midiendo KPI04 y KPI05:



CallSign	Origen	Destino	A	B	C	D = A - B	E = C - B
			Distancia planificada	Distancia volada (((OX-ON) + (DN-DX)) / 2)	Distancia ideal	Distancia total extra KPI 04	Distancia total extra KPI 05
ARG1833	SAVC	SAEZ	774,1	778,1	773,5	-4	-4,6
ARG1849	SAWE	SABE	1245	1276	1219	-31	-57
ARG1899	SAWC	SABE	1118	1120,3	1116,9	-2,3	-3,4
AUT2597	SAVC	SAZN	411,4	411,6	411,2	-0,2	-0,4
AUT2843	SAWC	SACO	1225	1228,4	1190,7	-3,4	-37,7
ARG1879	SAWH	SABE	1287	1289,8	1285,8	-2,8	-4
ARG1663	SAVE	SABE	812	839,2	777,4	-27,2	-61,8
TOTALES			6872,5	6943,4	6774,5	-70,9	-168,9

Donde:

- A) Distancia Planificada: Longitud de la trayectoria del plan de vuelo.
- B) Distancia Volada: se puede calcular como $[(OX-ON) + (DN-DX)] / 2$. (ver Figura 2) o bien contar con la distancia real volada.
- C) Distancia ideal: trayectoria óptima o recta entre el origen y destino.
- D) Distancia total extra K04 (D): Diferencia entre Distancia Planificado – Distancia Volada (A-B).
- E) Distancia total extra K05 (E): Diferencia entre distancia Ideal – Distancia Volada (C-B).

Calculando el KPI04:

- 1) Se calcula la distancia extra **D**) = Distancia planificada (A) – Distancia alcanzada (B)
- 2) Se realiza la sumatoria de las distancias obtenidas en el punto anterior = **-70,9**
- 3) Se calcula el **KPI04 = Total Distancia Extra (D) / Total Distancia volada (B) = -70,9 / 6943,4 = -1,0%**

El valor obtenido de -1,0% indica que en ese espacio aéreo / flujo, los vuelos están recorriendo una distancia adicional de 1,0% respecto a lo planificado.

Calculando el KPI05:

- 1) Se calcula la distancia extra **E**) = Distancia ideal (C) – Distancia alcanzada (B)
- 2) Se realiza la sumatoria de las distancias obtenidas en el punto anterior = **-168,9**
- 3) **Se calcula el KPI05 = Total Distancia Extra (E) / Total Distancia alcanzada (B) = - 168,9 / 6943,4= -2,4%**

El valor obtenido de -2,4% indica que en ese espacio aéreo los vuelos están recorriendo una distancia adicional de 2,4% respecto a lo ideal.

B.- Ejemplo de cálculo para el KPI07:

Para el sector XXX existe un GDP establecido, en la cual se aplica la medida GDP1 en la cual se asignan CTOT a aquellos vuelos que pretenden sobrevolar el sector.

La siguiente tabla recolecta datos para el cálculo del KPI 07:

Fecha	Callsign	Origen	Destino	CTOT	ETOT	ID de la restricción de flujo que genera la demora ATFM	Volumen del espacio aéreo asociado con la restricción de flujo	Demora ATFM
1/1/2018	VDA2494	SAVC	SCEL	04:05:00	04:00:00	GDP1	XXX	00:05
1/1/2018	ARG1833	SAVC	SAEZ	10:53:00	11:05:00			
1/1/2018	ARG1849	SAWE	SABE	12:47:00	12:30:00	GDP1	XXX	00:17
1/1/2018	ARG1899	SAWC	SABE	12:51:00	12:45:00	GDP1	XXX	00:06
1/1/2018	AUT2597	SAVC	SAZN	14:30:00	14:25:00	GDP1	XXX	00:05
1/1/2018	AUT2843	SAWC	SACO	15:46:00	15:30:00			
1/1/2018	ARG1879	SAWH	SABE	16:11:00	16:00:00	GDP1	XXX	00:11
1/1/2018	ARG1663	SAVE	SABE	16:59:00	17:05:00			
1/1/2018	ARG1919	SAWC	SABE	17:10:00	17:05:00			
1/1/2018	ARG1881	SAWH	SAEZ	18:06:00	17:55:00			
1/1/2018	ANS551	SAVY	SABE	18:31:00	18:30:00			
1/1/2018	AUT2841	SAVC	SABE	18:34:00	18:24:00			
1/1/2018	AUT2835	SAVC	SABE	18:51:00	19:05:00			
1/1/2018	ARG1897	SAVT	SAEZ	18:58:00	19:10:00			
1/1/2018	DSM7748	SAWH	SAEZ	20:38:00	20:35:00			
1/1/2018	AUT2825	SAVT	SABE	20:59:00	20:50:00			

1/1/2018	AUT2831	SAVC	SABE	21:26:00	21:15:00			
1/1/2018	ARG1845	SAWE	SAEZ	22:21:00	22:10:00			
1/1/2018	ARG1891	SAWH	SAEZ	23:04:00	23:00:00			
1/1/2018	ARG1821	SAWC	SABE	23:04:00	23:00:00	GDP1	XXX	00:04
2/1/2018	ARG1837	SAVC	SABE	00:42:00	00:40:00			
2/1/2018	ARG1823	SAVC	SABE	06:18:00	06:15:00			
2/1/2018	ARG1865	SAVT	SABE	10:50:00	11:00:00			
2/1/2018	VDA2484	SAVC	SCEL	11:12:00	11:00:00			
2/1/2018	ARG1833	SAVC	SABE	11:15:00	11:05:00	GDP1	XXX	00:10
2/1/2018	ARG1849	SAWE	SABE	12:33:00	12:30:00	GDP1	XXX	00:03
2/1/2018	AUT2597	SAVC	SAZN	14:49:00	14:25:00	GDP1	XXX	00:24
2/1/2018	AUT2861	SAWH	SACO	15:35:00	15:20:00	GDP1	XXX	00:15

Donde:

- 1) Se seleccionan los vuelos que cruzan el espacio aéreo “XXX” →19 VUELOS. Donde “XXX” es la denominación de un único espacio aéreo.
- 2) De los vuelos obtenidos en la selección anterior, se toman los que están involucrados con la medida ATFM→10 VUELOS
- 3) Columna *Demora ATFM*: De los vuelos involucrados en la selección del paso anterior, se calcula la demora: CTOT menos ETOT. Aquellos vuelos donde el ETOT es posterior al CTOT se consideran no demorados y no se computan los minutos (o se considera que el resultado es 0 – cero minutos de demora).
- 4) $KPI07 = \text{Demoras ATFM en minutos} / \text{TOTAL VUELOS IFR} = 78 \text{ minutos} / 19 \text{ vuelos} = 4.10 \text{ minutos de demora por vuelo.}$

APPENDIX C – ATFM UNIT MANUAL

1. Purpose

The purpose of this appendix is to standardise the operational content of ATFM manuals by providing guidance on the basic contents necessary for the development of an ATFM Unit Manual to achieve the objectives of the service in a harmonised and consistent manner.

2. Contents of the ATFM Unit Manual

The ATFM Unit Manual shall have, as a minimum, the following elements:

1. General

2. Introduction

1. Objective
2. Scope

3. Definitions and abbreviations

1. Definitions
2. Abbreviations and/or acronyms

4. Operational procedures

1. Procedure to declare runway and airspace capacity
2. ATFM phases
 - i. Strategic phase
Description of the procedure for the development of the ATFM Strategic Business Plan.
 - ii. Pre-tactical phase
Description of the procedure for the development of the ATFM Daily Plan (ADP), which will include, at least:
 - ✓ Introduction
 - ✓ ATFM daily plan (ADP)
 - ✓ ADP inputs: meteorological information, CNS system status, airport infrastructure, airspace reservation (military activities, parachuting, etc.), capacity and demand balancing (DCB) analysis, ATFM measures to be implemented.
 - ✓ ADP flowchart
 - ✓ Publication of the ADP
 - iii. Tactical phase
Description of the procedure for completing an appropriate tactical phase, which will include, at least:

- ✓ Introduction;
- ✓ ADP analysis: ADP monitoring and analysis, adjustments, selection of ATFM measures;
- ✓ ADP implementation: Coordination, means of dissemination, recording; and
- ✓ ADP follow-up.

iv. Post-operational phase

Description of the procedure for completing an appropriate post-operational phase, which will include, at least:

- ✓ Feedback: Analysis of compliance with the ADP, ATFM measures implemented, results obtained with respect to the objective sought, recommendations and best practices, as well as other items of interest.

3. ATFM solutions

- 1. Capacity optimisation
- 2. ATFM measures

4. ATFM coordination procedure

5. ATFM messages

- 1. Internal messages
- 2. External messages

6. ATFM terminology and phraseology

- 1. Terminology
- 2. Phraseology

5. ATFM system degradation or failure

- 1. Procedure in case of system degradation
- 2. Procedure in case of service interruption

5. ATFM models

- 1. ADP model
- 2. Daily post-operations report model

**APPENDIX D – DRAFTING OF THE ADP AND POST-
OPERATIONS**

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1. DRAFTING OF THE ADP

1.1 Date of publication

The following illustration shows a sample slide, which should be at the beginning of the ADP, showing the time and date of publication as well as the validity of the ADP in question.

- EXAMPLE:

The slide is enclosed in a blue border and features a light blue gradient background. At the top, the text "FMU XXX: PDA" is displayed in a large, bold, blue font. Below this, a horizontal line separates the title from the publication details. Two small blue airplane icons are positioned on the line, one on the left and one on the right, with horizontal lines extending from them towards the center. Below the line, the text "Publicado: Día 05 de Septiembre de 2019 a las 07:00 Hs UTC" is written in a blue font. Underneath, the text "Vigencia: 07:00 Hs UTC del día 05 de Septiembre de 2019. 03:00 Hs UTC del día 06 de Septiembre de 2019." is also in blue font.

1.2 Demand and airport/area meteorological information

The following illustrations show a model slide in which the forecast demand, meteorological information, CNS NOTAMs and infrastructure for the airport/area in question will be provided by means of a bar chart as follows:

Demand: Taking into account the peak demand of the day, low demand (below 50%) will be highlighted in green, medium demand (between 51% to 80%) in yellow, and high demand (above 81%) in red.

Inferred traffic: Inferred traffic (general aviation) will be that corresponding to each airport or area covered by the slide. It will be obtained and continuously updated based on statistics or other appropriate means.

Meteorological information: Taking into account the information from the last TAF available before publication, aerodrome/area conditions during the morning, afternoon and evening will be estimated.

Green: VMC (more than 5 km visibility and cloud ceiling above 1000 ft). In the event that a weather event is forecast in such a way as to allow conditions to remain VMC, this will be specified above the green box.

Yellow: IMC conditions (less than 5 km visibility and ceiling below 1000 ft--BKN and OVC). The weather phenomenon reducing visibility will be specified above the yellow box.

Red: Aerodrome below the minima.

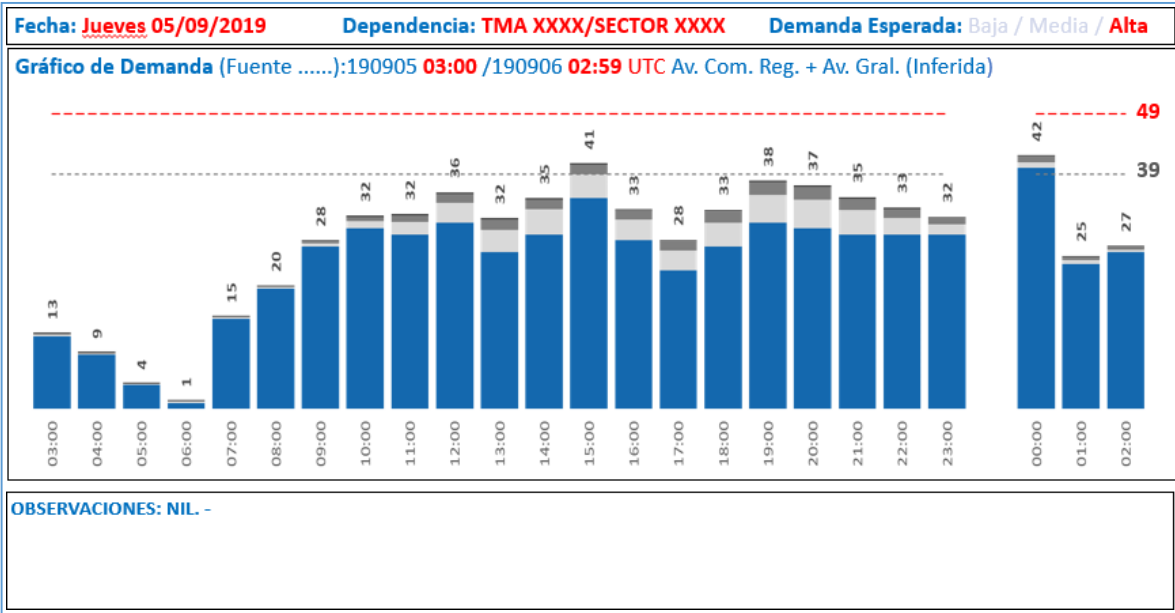
TAF information: The most current TAF before publication will be used. Significant weather phenomena and low visibility will be highlighted in bold. For example: 0113/0119 4000 **SHRA**.

Airport infrastructure and CNS: The NOTAMs of each corresponding airport/area shall be included, taking into account their importance in the normal development of traffic flow.

In the event of any modification in the capacity of the aerodrome/area, whether due to scheduled closure or for any other reason, it shall be reflected in the graph presented (sample airport graph XXXX).

- EXAMPLES:



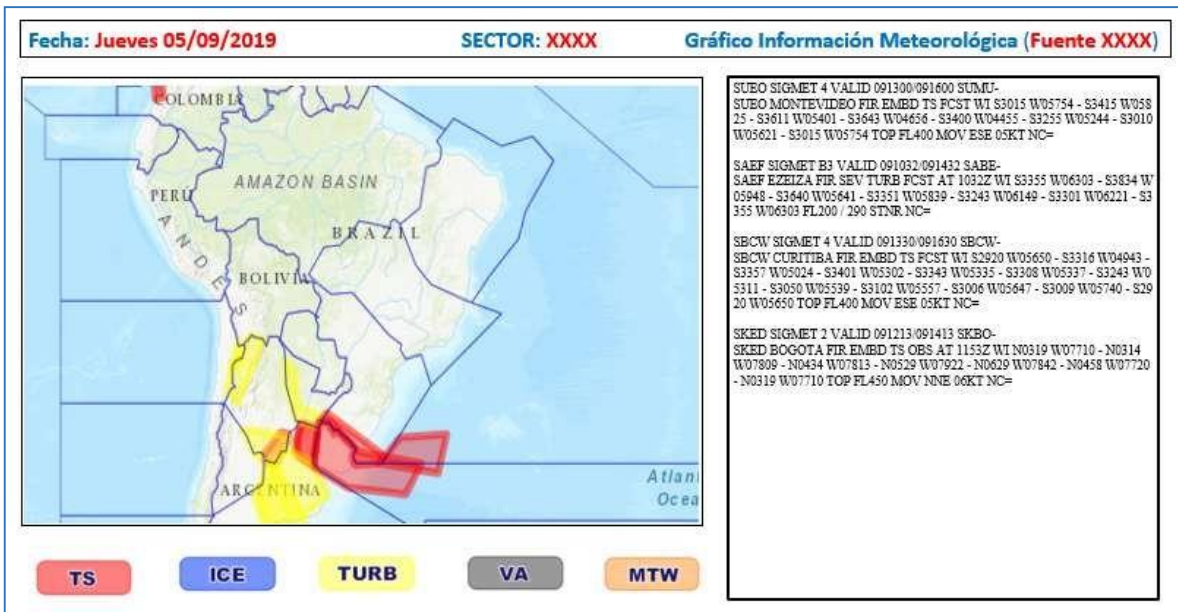


1.3 SIGMET Information

The following illustration shows a model slide in which the latest available SIGMET information provided by the meteorological service for the areas where the ATFM service is provided will be included in text and graphics.

If there is no available SIGMET data, the legend NOSIG will be inserted.

- EXAMPLE:



1.4 Important information

If necessary, slides with relevant and important information for the ATFM service will be added.

- EXAMPLE:



1.5 Measures to be applied

The following illustration shows a sample slide containing information on the ATFM measures to be implemented.

- EXAMPLE:

Medidas ATFM a aplicar por XXXX		Fecha: Jueves 05/09/2019			
Originador	Afectado	Medida ATFM	Inicio (UTC)	Fin (UTC)	Motivo
XXXX	AAAA	MDI 5 MIN	12:00 21:00	14:00 01:00	DEMANDA
XXXX	BBBB	MIT 20 NM ENTRE VUELOS NAC Y ENTRE VUELOS INT/NAC VIA MJZ POINT	10:30	13:30	DEMANDA
XXXX	CCCC	MIT 40 NM ENTRE VUELOS NAC MIT 20 NM ENTRE VUELOS INT Y ENTRE INT/NAC POR GRUPO DE PUNTOS (ELABO/RAXUR-SINAL/LOLAS)	10:30 23:00	14:00 02:00	DEMANDA
XXXX	DDDD	MIT 30 NM ENTRE VUELOS POR GRUPO DE PUNTOS (PAPIX/KUKEN – SARGO)	10:00 23:00	13:00 02:00	DEMANDA
XXXX	EEEE	MIT 40 NM ENTRE VUELOS NAC POR GRUPO DE PUNTOS (VARES – TODES/RIOKA/KORTA)	11:00 17:30	13:00 01:30	DEMANDA
XXXX	FFFF	MINIT 7 MIN ENTRE VUELOS POR GRUPO DE PUNTOS (SANBU/KIMID-PUGLI)	18:30	20:00	DEMANDA

Furthermore, where necessary, a table with ATFM measures imposed by other ATFM units will be included:

- EXAMPLE:

Medidas ATFM externas que afectan a XXXX						Fecha: Jueves 05/09/2019
Originador	Medida ATFM	Inicio (UTC) aaaa mm dd hh:mm	Fin (UTC) aaaa mm dd hh:mm	Rango Horario hh:mm - hh:mm	Motivo	NOTAM O MENSAJE
RRRR	MIT 40 NM	2019-08-31 13:30	2019-09-30 23:59	00:00 – 23:59 (H24)	CNS LIMITATIONS	MSG SVC
MMMM	MIT 30 NM	2019-09-05 11:30	2019-10-06 03:30	11:30 – 03:30	PASSBACK	MSG SVC

2. DRAFTING OF THE POST-OPERATIONS REPORT

2.1 Heading

The following illustration shows a sample slide containing information regarding the date of the post-operations report.

- EXAMPLE:



2.2 Number of foreseen movements

The following illustration shows a sample slide containing information on movements foreseen on the day of operation.

- EXAMPLE:



Amount of traffic foreseen for zzzz

NOTE: The illustration will display the graph(s) of the airport(s) and/or areas that were included in the ADP, primarily where it was anticipated that demand could exceed 80% of capacity or where it actually did.

2.3 Number of foreseen movements

The following illustration shows a sample slide containing CNS and infrastructure developments on the day of the operation

- EXAMPLE:

CNS:

ZZZZ: (NOTAM A4782/19) MET ANEMOMETER RWY 29 U/S FM 1908260029 TO 1909262359.

(NOTAM A4328/19) ILS OM 75.0 MHZ RWY 11 U/S FM 1908011425 TO 1911012359.

(NOTAM A4329/19) NDB LO OC 330 KHZ RWY 11 U/S FM 190801427 TO 1911012359.

TTTT: (NOTAM A4220/19) NDB/LI N 375 KHZ RWY 31 U/S FM 1907270816 TO 1910230230.

Infraestructura:

ZZZZ: (NOTAM A4801/19) TWY C CLSD WIP MAINT FM 1908271100 TO 1910010259.

(NOTAM A3713/19) RWY 17/35 CLSD WIP MAINT FM 1909010300 TO 1910010300

2.4 Meteorology

The following illustration shows a sample slide containing meteorological information on the conditions prevailing on the day of operation at the airport(s) and/or areas mentioned in the ADP.

- EXAMPLE:

Durante el día de la fecha se mantuvieron las condiciones VMC, con cielo mayormente despejado. Los vientos prevalecieron del sector SE, con velocidades no superiores a los 10 nudos.

2.5 ATFM measures applied

The following illustration shows a model slide containing information on ATFM measures actually applied by the FMU on the day of the operation and measures applied by other FMUs that affected the flow within the area of jurisdiction.

- EXAMPLE:

Medidas ATFM que fueron aplicadas por XXXX			Fecha: Jueves 05/09/2019		
Originador	Afectado	Medida ATFM	Inicio (UTC)	Fin (UTC)	Motivo
XXXX	AAAA	MDI 5 MIN	12:00 21:00	14:00 01:00	DEMANDA
XXXX	BBBB	MIT 20 NM ENTRE VUELOS NAC Y ENTRE VUELOS INT/NAC VIA MIJ POINT	10:30	13:30	DEMANDA
XXXX	CCCC	MIT 40 NM ENTRE VUELOS NAC MIT 20 NM ENTRE VUELOS INT Y ENTRE INT/NAC POR GRUPO DE PUNTOS (ELABO/RAXUR-SINAL/LOLAS)	10:30 23:00	14:00 02:00	DEMANDA
XXXX	DDDD	MIT 30 NM ENTRE VUELOS POR GRUPO DE PUNTOS (PAPIX/KUKEN – SARGO)	10:00 23:00	13:00 02:00	DEMANDA
XXXX	EEEE	MIT 40 NM ENTRE VUELOS NAC POR GRUPO DE PUNTOS (VARES – TODES/RIOKA/KORTA)	11:00 17:30	13:00 01:30	DEMANDA
XXXX	FFFF	MINIT 7 MIN ENTRE VUELOS POR GRUPO DE PUNTOS (SANBU/KIMID-PUGLI)	18:30	20:00	DEMANDA

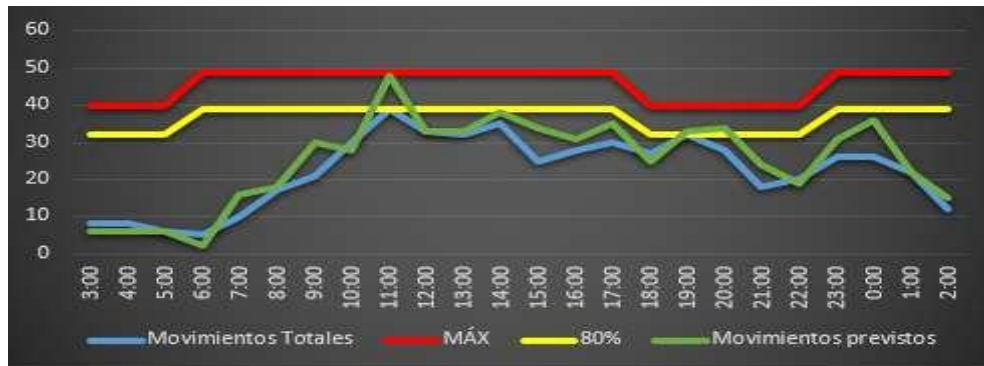
Medidas ATFM externas que afectan/afectaron a XXXX			Fecha: Jueves 05/09/2019			
Originador	Medida ATFM	Inicio (UTC) aaaa mm dd hh:mm	Fin (UTC) aaaa mm dd hh:mm	Rango Horario hh:mm - hh:mm	Motivo	NOTAM O MENSAJE
RRRR	MIT 40 NM	2019-08-31 13:30	2019-09-30 23:59	00:00 – 23:59 (H24)	CNS LIMITATIONS	MSG SVC
MMMM	MIT 30 NM	2019-09-05 11:30	2019-10-06 03:30	11:30 – 03:30	PASSBACK	MSG SVC

2.6 Number of movements

The following illustration shows a model slide containing graphical information of Cartesian coordinates (hours-number of movements/h) to compare the foreseen traffic flow and the traffic flow that actually took place at the airport(s) and/or areas that were included in the ADP, mainly where it was expected that the demand could exceed 80% of capacity or where it actually did.

The graph will contain two lines representing 100% and 80% of the capacity, respectively, of the airport(s) and/or sectors, in addition to capacity fluctuations that may have occurred during the day of operation.

- **EXAMPLE:**



2.7 Hourly capacity

The following illustration shows a model slide containing information about the number of hours and their daily percentage of the airport(s) and/or areas that were included in the ADP, mainly where it was foreseen that demand could exceed 80% of capacity or where it actually did.

- **EXAMPLE:**

CAPACITY	Number of hours	Daily percentage
Number of hours in which the maximum capacity was exceeded	0	0.0%

2.8 Details of movements

- The following illustration shows a model slide containing information on the number of movements/hour that actually took place at the airport(s) and/or areas that were included in the ADP, mainly where it was foreseen that the demand could exceed 80% of the capacity or where it actually did, in addition to any other information deemed necessary (e.g., sanitary flights, official flights, etc.).
- EXAMPLE:

sábado, 1 de junio de 2019					AVIACIÓN GENERAL													AVIACIÓN MILITAR						CRUCES	STAS
Hora UTC	DEMANDA COMERCIAL PREVISTO	DEMANDA GRAL PREVISTA	DEMANDA PREVISTA	MOVIMIENTOS REALES	AVIACIÓN COMERCIAL	AAAA	BBBB	CCCC	DDDD	EEEE	FFFF	OTRO	AAAA	BBBB	CCCC	DDDD	EEEE	FFFF	CRUCES	STAS					
3:00	6	0	6	8	6 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4:00	6	0	6	8	3 DEP ARR	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:00	6	0	6	6	3 DEP ARR	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00	1	1	2	5	3 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	15	1	16	10	5 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8:00	17	1	18	17	13 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	27	3	30	21	10 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	24	4	28	30	16 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	42	6	48	39	22 DEP ARR	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	27	6	33	33	15 DEP ARR	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	28	5	33	32	9 DEP ARR	0	0	0	2	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
14:00	33	5	38	35	19 DEP ARR	0	0	0	5	4	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0
15:00	24	6	34	25	8 DEP ARR	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	24	7	31	28	11 DEP ARR	2	2	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	28	7	35	30	17 DEP ARR	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18:00	19	6	25	27	14 DEP ARR	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1
19:00	29	4	33	32	11 DEP ARR	1	1	0	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
20:00	28	6	34	28	13 DEP ARR	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	18	6	24	18	8 DEP ARR	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22:00	18	1	19	20	8 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
23:00	30	1	31	26	11 DEP ARR	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0:00	35	1	36	26	6 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1:00	22	0	22	22	8 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
2:00	15	0	15	12	11 DEP ARR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	522	77	603	538	493	5	2	30	1	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	7

2.9 Remarks

NIL. -

- This item will include any information that has affected the normal flow of air traffic; otherwise, the legend NIL will be inserted.

APPENDIX E – ATFM TERMINOLOGY AND COMMUNICATIONS

CONTENTS

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1. COMMUNICATION

1. Communication and exchange of operational information among stakeholders in real time is the cornerstone of ATFM. Such exchange can be achieved through a variety of means, including telephone calls, internet conferencing, email messages and electronic data exchange, as well as web page displays. The exchange of information is aimed at improving situational awareness of stakeholders, enhancing operational decision-making, and increasing ATM system efficiency.

2. ATFM COMMUNICATION WITH STAKEHOLDERS

An ATFM unit requires several levels of communication. As a basis for the exchange of information, initially notice to airmen (NOTAM) and AIP supplements could be used to distribute instructions regarding the implementation of ATFM measures. For example, strategic ATFM information on routes and certain ATFM operating procedures could be published as a NOTAM or in the AIP supplement.

As the functionality of an ATFM unit develops, consideration must be given to establishing a communication structure that is more specific to ATFM for reporting ATFM measures and solutions.

For example, in order to inform AUs, the ATFM unit should prepare and distribute the ADP the day before the operation to provide a summary of the planned operations and ATFM measures in its area of responsibility. This would also give the possibility to distribute any specific instructions or communication requirements related to these measures. Such communication should also be updated through amendments to the ADP.

To ensure that this information can be properly used and applied by AUs and other stakeholders, a standard format should be used.

In addition to the drafting and distribution of ADPs, the ATFM unit should exchange ATFM information with others in the unit in order to provide information and guidance.

Such an exchange could be used for the initial publication of changes in runway, ATS route or airspace availability in the area, as well as to expedite new and amended ATFM operating procedures affecting all users.

Exchanges of ADP and ATFM information should be transmitted by agreed means to ATC units, AUs and other stakeholders that wish to be included in the distribution list. Such exchanges should also be facilitated on the websites of related ATFM units.

Each national AIP should include information on specific arrangements for addressing ATFM coordination problems and issues, in the same section as the brief description of the ATFM system. AIPs should also include the telephone numbers of the relevant ATFM units, in case they should be contacted for advice and information.

Note: Refer to Annex 15 - Aeronautical Information Services - Appendix 1, ENR 1.9 "Air Traffic Flow Management and Airspace Management" for information regarding the obligations of States on the publication of ATFM information in their respective AIP.

3. ATFM COMMUNICATION REQUIREMENTS

For consistency, the appropriate authority should ensure that one single entity oversees the dissemination of ATFM information and related measures, and that it is responsible for monitoring, collecting and disseminating this information. Such oversight will ensure that all ANSPs and operational stakeholders share relevant information in a timely and efficient manner. As a best practice, such information should be updated and made available electronically.

3.1 Examples of relevant ATFM information include that relating to:

- a) major aerodromes and their terminal areas:
 - meteorological information (MET) that has an impact on capabilities [for example, winds, runway visual range (RVR), thunderstorms (TS)];
 - aerodrome infrastructure or approach control service (APP) issues that have an impact on routes or capacity;
 - APP areas with capacity constraints, in particular SIDs and STARs;
 - current and foreseen aerodrome runway configurations;
 - airport arrival and departure rates;
 - demand for airport arrivals and departures; and

- applicable ATFM measures and flow management options;

b) en-route airspace:

- MET information with an impact on capabilities (for example, TS);
- en-route sector configurations, capacities and demands;
- infrastructure issues with an impact on route establishment or on capacity; and
- airspace issues with an impact on the establishment of routes or on capacity (for example, reserved airspace);

c) general aspects:

- information on planning conferences of ATFM stakeholders, including work schedules and instructions for participation;
- information on strategic, pre-tactical, and tactical ATFM plans; and
- links to information related to ATFM, in particular on:
 - weather conditions;
 - ACC and APP contact information;
 - letters of agreement;
 - information on routes;
 - operational status of the global navigation satellite system (GNSS);

- NOTAMs; and
- contingency plans.

The ATFM unit will establish specific categories of information in collaboration with stakeholders.

- ATFM units should develop an operations manual to define the role of the relevant facilities in addressing the ATFM measures process. This operations manual should also contain procedures to be followed by AUs, aerodromes and ATC. It should be publicly available and published in accordance with CDM processes. For example, the manual should include provisions for:
 - coordinating and disseminating information related to the implementation of ATFM measures through specific means, such as telephone calls, aeronautical messages, web pages or any other appropriate methods;
 - disseminating information resulting from ongoing monitoring and adjustment of ATFM measures; and
 - disseminating information resulting from the timely cancellation of ATFM measures.

4. COMMUNICATION OF ATFM INFORMATION

AUs and ATFM units must communicate and exchange information for CDM and information dissemination.

In selecting communication methods, consideration must be given to those that maximise the value and content of the information and minimise the time and workload required.

The following methods of communication are given as examples:

- a) scheduled telephone (or web-based) calls. ATFM units hold operational conferences on a regular basis (at least daily) to discuss the operational context and outlook with affected stakeholders. The composition of the list of participants may vary depending on the circumstances. Appendix II-F provides a template for the planning and organisation of such ATFM conferences;

b) *ad hoc* telephone (or internet) conferences. ATFM units hold the necessary operational conferences to discuss the operational context and outlook with affected stakeholders. The composition of the membership is similar to that of the regular conferences and can be increased/adjusted as required in each circumstance. The purpose of *ad hoc* conferences is to ensure collaboration among affected stakeholders and to agree on the timetable and selection of necessary ATFM measures; and

c) automated web page or ATFM operational information system: ATFM units can set up a web page or an information system containing relevant ATFM information (for example, ADP). The objective is to share information on the ATM system to create a common situational awareness and minimise workload.

5. ATFM TERMINOLOGY AND PHRASEOLOGY

In order to promote harmonisation and interoperability of CDM/ATFM systems and procedures, a recommended terminology has been developed on the basis of past ATFM implementations and references to the existing FIXM data dictionary.

The ATFM terminology for flight event times was developed in line with that for airport collaborative decision-making (A-CDM), which is the subject of Part III of this manual. This terminology follows a format based on four characters, the last three of which denote the time of flight (for example, "TOT", representing "take-off time"), while the first character denotes the status associated with the terminology. For example, the character "A" in ATOT represents "actual" take-off time.

The flight event times include the following:

- a) off-block time (OBT): departure of the aircraft from its parking position;
- b) take-off time (TOT): take-off from the runway;
- c) time over (TO): time of overflight over a fix, waypoint or a specific position where air traffic congestion is expected;
- d) landing time (LDT): landing on the runway; and
- e) in-block time (IBT): arrival of the aircraft to its parking position.

Note: This terminology is intended to avoid the use of the terms "departure" or "arrival" for reasons of ambiguity when specifying the time of a "departure" or "arrival" flight event, which takes on different meanings depending on the point of view of the parties involved. For example, an aircraft operator could interpret "actual time of departure" as actual off-block time (AOBT) according to the recommended terminology. However, an air traffic controller might understand "actual time of departure" as actual take-off time (ATOT) according to the recommended terminology.

5.1 General ATFM terminology

<i>Acronym</i>	<i>Term</i>	<i>Definition</i>
AAR	Airport arrival rate	The arrival capacity of an airport, normally expressed in movements per hour.
ADR	Airport departure rate	The departure capacity of an airport, normally expressed in movements per hour.
FCA	Flow constrained area	A sector of airspace where normal flows of traffic are constrained, due to meteorological conditions, military exercises, etc.
FMP	Flow management position	A position that monitors traffic flows and implements or requests ATFM measures to be implemented.
GDP	Ground delay programme	An ATFM measure where aircraft are held on the ground in order to manage capacity and demand in a specific volume of airspace or at a specific aerodrome. In the process, departure times are assigned.
GSt	Ground stop	A tactical ATFM measure taken in reaction to an unpredicted adverse situation, where select aircraft remain on the ground.
MINIT	Minutes in trail	A tactical ATFM measure expressed as the number of minutes between successive aircraft at an airspace boundary point.
MIT	Miles in trail	A tactical ATFM measure expressed as the number of miles between successive aircraft at an airspace boundary point.
SUB	Slot swapping	The ability to swap departure times gives AUs the possibility to change the order of flight departures that should fly into a constrained area

5.2 ATFM terminology for flight event time

<i>Acronym</i>	<i>Term</i>	<i>Definition</i>
SOBT	Scheduled off-block time	The time that an aircraft is scheduled to depart from the parking position.
EOBT	Estimated off-block time	The estimated time that an aircraft will start movement associated with its departure.
COBT	Calculated off-block time	A time calculated and issued by an ATFM unit, as a result of tactical slot allocation, at which a flight is expected to push back/vacate its parking position so as to meet a CTOT, taking into account start and taxi time.
AOBT	Actual off-block time	The time the aircraft pushes back/vacates its parking position (equivalent to airline/handler actual time of departure (ATD) and ACARS = OUT).
CTOT	Calculated take-off time	A time calculated and issued by an ATFM unit, as a result of tactical slot allocation, at which a flight is expected to become airborne.
ETOT	Estimated take-off time	The estimated take-off time, taking into account EOBT plus estimated taxi-out time.
ATOT	Actual take-off time	The time that an aircraft takes off from the runway (equivalent to ATC actual time of departure -ATD).
ETO	Estimated time over	Estimated time at which an aircraft would be over a fix, waypoint or particular location, typically where air traffic congestion is expected.

CTO	Calculated time over	Time calculated and issued by an ATFM unit, as a result of tactical slot allocation, at which a flight is expected to be over a fix, waypoint or particular location. The implementation of this constraint may be carried out through tactical ATC intervention, such as speed control or route extension, or by having the aircraft meet the constrained time through the use of its flight management system RTA function.
CLDT	Calculated landing time	A landing time calculated and issued by an ATFM unit, as a result of tactical slot allocation, at which a flight is expected to land on a runway.
ELDT	Estimated landing time	The estimated time at which an aircraft will touch down on the runway (equivalent to ETA).
ALDT	Actual landing time	Actual time an aircraft lands on a runway (equivalent to ATC ATA –actual time of arrival = landing, ACARS = ON).
SIBT	Scheduled in-block time	The time that an aircraft is scheduled to arrive at its first parking position.
AIBT	Actual in-block time	The time that an aircraft arrives in-blocks (equivalent to aircraft/handler ATA – actual time of arrival, ACARS = IN).

Flight event time ATFM terminology can be mapped to each flight event time, including its status, as specified in the table below:

<i>Flight event times</i>	<i>Scheduled</i>	<i>Flight plan</i>	<i>ATFM measure</i>	<i>ATFM system estimate</i>	<i>Actual</i>
Off-block time (OBT)	SOBT	EOBT	COBT		AOB
Take-off time (TOT)			CTOT	ETOT	ATO
Time over (TO)			CTO	ETO	ATO

Landing time (LDT)			CLDT	ELDT	ALDT
In-block time (IBT)	SIBT				AIBT

5.3 Use of ATFM terminology

One of the objectives of this manual is to develop and promote standard terminology and phraseology for the exchange of ATFM voice and automated messages. The information contained herein is therefore intended to reflect the current use of plain language and provide a basis for harmonisation.

ATFM operations should be conducted in a simple and concise manner, using common language. The use of local or regional colloquial terms or acronyms should be avoided as they could induce confusion.

Note: Coordination with regional stakeholders may impose the use of the English language.

The use of standardised terminology guarantees the uniform delivery of ATFM messages among ATFM units on a global scale. This includes the concept of modular and structured ATFM messages and defines the components as who, what, when, where and why.

As with any communication model, it is the responsibility of both parties (sender and receiver) to ensure that the message is clear, concise, understood correctly and applied as requested.

Each ATFM coordination exchange should have five components (who, what, when, where, why) that contain plain language elements and that, when combined, provide a complete ATFM message.

a) WHO - This identifies the parties involved. Who is transmitting and receiving the message.

Examples: CGNA THIS IS COLOMBIA FMU
CENAMER ACC THIS IS PANAMA ACC
CCFMEX THIS IS ATCSCC
JCAB THIS IS CFMU

b) WHAT - This identifies the objective to be achieved.

Examples: REQUEST 30 MILES IN TRAIL
REQUEST 3 MINUTES IN TRAIL
REQUEST GROUND STOP

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

Examples: WITH IMMEDIATE EFFECT UNTIL 1700 UTC

FROM 2000 UTC TO 2130 UTC

d) 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. Where applicable, ICAO location designators should be used.

Examples: FOR ALL AIRCRAFT LANDING SKBO
 FOR ALL TRAFFIC LANDING HECA
 FOR ALL TRAFFIC FILED VIA B881

e) WHY - This identifies the reason for the ATFM objective:

Examples: DUE TO SEVERE THUNDERSTORMS OVER SKBO
 DUE TO LONG-RANGE RADAR OUTAGE
 DUE TO EXCESS SECTOR DEMAND
 DUE TO AN AIRCRAFT INCIDENT

Exchange example. The following is an example of a complete message:

CGNA THIS IS COLOMBIA FMU. REQUEST 30 MILES IN TRAIL FOR ALL AIRCRAFT
LANDING SKBO WITH IMMEDIATE EFFECT FROM NOW UNTIL 1700 UTC DUE TO
SEVERE THUNDERSTORMS OVER SKBO

Exchange 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 of message amendment:

GUAYAQUIL FMP THIS IS LIMA FMP, REQUEST REDUCTION OF MILES-IN-TRAIL TO
SPIC FROM 30 MILES-IN-TRAIL TO 20 MILES-IN-TRAIL FROM 1400 UTC TO 1700 UTC
DUE TO IMPROVING METEOROLOGICAL CONDITIONS AT SPIC

The cancellation of an ATFM exchange should contain a cancelling word or phrase. Cancellation exchanges should also identify which exchange is being cancelled, because several ATFM measures could be in place at once. Normally, it is not necessary to state the reason for the cancellation. Some examples of a cancelling word or phrase follow:

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

Exchange cancellation example:

CARACAS FMU THIS IS GEORGETOWN FMU, CANCEL THE GROUND STOP FOR GEO DUE TO THE RUNWAY NOW OPEN

5.4 ATFM phraseology

The terminology to be used for communication between the ATC unit and pilots in relation to ATFM operations is shown below:

<i>Circumstance</i>	<i>Phraseology</i>
Calculated take-off time (CTOT) delivery resulting from a slot allocation. The CTOT shall be communicated to the pilot at the first contact with ATC.	CTOT (<i>time</i>)
Change to CTOT resulting from a slot revision.	REVISED CTOT (<i>time</i>)
CTOT cancellation resulting from a slot cancellation.	CTOT CANCELLED, REPORT READY
Flight suspension until further notice.	FLIGHT SUSPENDED UNTIL FURTHER NOTICE, DUE (<i>reason</i>)
Flight de-suspension.	SUSPENSION CANCELLED, REPORT READY
Start-up requested too late to comply with the given CTOT.	CTOT EXPIRED, REQUEST A NEW CTOT

<p>Denial of start-up when requested too late to comply with the given CTOT.</p> <p>(where supported by State regulation or procedure)</p>	<p>UNABLE TO APPROVE START-UP CLEARANCE DUE CTOT EXPIRED, REQUEST A NEW CTOT</p>
<p>Start-up requested too early to comply with the given CTOT.</p>	<p>REQUEST A NEW CTOT</p>
<p>Denial of start-up when requested too early to comply with the given CTOT.</p> <p>(where supported by State regulation or procedure)</p>	<p>UNABLE TO APPROVE START-UP CLEARANCE DUE CTOT (<i>time</i>), REQUEST START-UP AT (<i>time</i>)</p>

APPENDIX F - IMPLEMENTATION OF ATFM SLOTS

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The purpose of this appendix is to standardise ATFM slot allocation procedures by providing guidance in its content for implementation by States in a harmonised manner consistent with the objectives of the ATFM service. It is important to note that this appendix does not address the process of allocation of strategic airport slots that takes place at coordinated airports, but rather the use of ATFM measures based on slots allocated by flow management positions (FMPs) in the provision of ATFM service.

1. ATFM SLOT ALLOCATION PROCESS

The allocation of air traffic control slots, or ATFM slots, aims to balance demand/capacity and regulate traffic flows, in order to achieve full and efficient use of available system capacity. ATFM slot allocation is carried out tactically on the day of operation and replaces the strategic allocation of airport slots.

Aircraft operators will ensure that their crews are informed of and adhere to ATFM slots.

1.1 General

The implementation of ATFM slots can take place in different ways, depending on the need of the implementing State, including:

- Permanent strategic management of ATFM slots at the aerodromes with the highest demand. This could be extended to other aerodromes as required during special events and/or when warranted by traffic demand.
- Tactical ATFM slot management for both departures and arrivals. This could be extended to other aerodromes as required during special events and/or when warranted by traffic demand.

ATFM slots are time periods allocated by the FMU to make use of a capacity resource in order to guarantee the use of that resource, at the authorised time. The FMU provides a calculated take-off time (CTOT) and a calculated off-block time (COBT).

The FMU/FMP through the ATFM operators will execute the processes of receipt of intent to operate, modelling, implementation, and review of ATFM measures, allocation of ATFM slots, exemptions, and slot substitutions.

If an automated ATFM system is in place, the allocation of ATFM slots must be visible via the website. As new flight plans are filed during the day, the ATFM system will allocate unallocated slots to previously unknown flights, which will receive a slot as close as possible to their desired EOBT / EIBT on a first-come, first-served basis.

Through this website, aircraft operators will be able to view their flights and unallocated slots and thus be able to choose the most appropriate one in case a modification is required and thus improve the allocation. The aircraft operator will be able to modify flight data, swap slots between two of its own flights, suspend flights or cancel flights.

1.2 Implementation of slot-based ATFM measures

There are many ATFM measures that can be used to achieve a balance. One of the most effective ATFM measures is a slot-based ATFM measure, such as the Ground Delay Programme (GDP). Slot-based ATFM measures involve the creation of slots and converting these slots into calculated off-block times (COBT) or calculated take-off times (CTOT) from the points of origin.

These time slots must not be mistaken with strategic airport slots, which are normally allocated at the beginning of the season based on the maximum available capacity of an airport.

Slot-based ATFM measures are implemented when actual operational capacities are reduced or not sufficient for the demand at a given time, either due to unforeseen circumstances (for example, adverse meteorological conditions, accidents) or special disruptions (for example, military activities).

1.3 Air traffic control slot

CTOTs (or COBTs) issued for a flight as part of the slot-based ATFM measure become ATC slots. Flights must ensure that they take off (or initiate pushback) within the compliance window set by the FMU. Compliance windows are to be determined by States/FMUs, and may be, for example, -5 minutes and +10 minutes of the assigned ATC slot.

Crews shall plan the departure of their flights so that aircraft are ready to taxi in sufficient time to meet the assigned CTOT, according to the assigned COBT and by contacting the appropriate ATC unit.

Considering taxi time and pushback and engine start time, as determined by the States/FMU for each airport, crews are responsible for adjusting aircraft operation to be at the runway-holding position and ready to take off at the assigned CTOT.

Crews shall inform the appropriate ATC unit in a timely manner, before starting pushback or turbines, when they are unable to comply with the previously assigned COBT/CTOT.

1.3 Arrival and departure slot management

Providing slot management at the arrival and departure ends has a dual objective: to ensure that the aircraft operator has a manageable departure slot, especially when the aircraft is delayed, and to more effectively manage scenarios where there is a high demand for departures.

Due to the risk of saturation, ATFM operators define the general measures for operations at the aerodrome, including both departures and arrivals. The ATFM system will be programmed with an overall aerodrome capacity and then the appropriate mix of arrivals and departures therein will be established. This decision will be made using the CDM methodology and will be carried out with the aeronautical community stakeholders.

The ATFM system will allocate slots according to combined departures and arrivals. This approach will simplify the slot allocation process within the ATFM system and provide the user with a better model of overall aerodrome demand prior to submitting the delay programme. This will help prevent an ATFM operator from submitting a GDP that could result in significant saturation.

1.4 Flight continuity line

By implementing slot management for arrivals and departures, efficiency is gained by knowing the connection between a flight arriving at an aerodrome and the possible subsequent departure slot that the same aircraft has at the aerodrome.

If a GDP delays the arrival of the flight as scheduled, then knowing the connection between arrival and departure times allows the ATFM system to be more efficient in assigning an achievable departure time for the same aircraft. This requires aircraft operators to submit their registration number in the flight plan in field 18 or via the website, if available. The ATFM system uses this aircraft registration number to associate arrival and departure times.

1.5 Slot priority

Complexity is created in the system if multiple slots are allocated to a single aircraft. For example, a flight leaving AD A for AD B requesting to fly through a flow constrained area (FCA) that has an active airspace flow programme and then return to AD A through the same FCA.

In this scenario, the flight would have a departure slot at AD A, an arrival slot at the FCA, an arrival slot at AD B, a departure slot at AD B, another arrival slot at FCA and finally an arrival slot at AD A (6 slots!). Without a slot priority rule, this slot allocation problem could not be solved. The following slot allocation priority is used (in chronological order):

- aerodrome arrival slot
- aerodrome departure slot

1.6 Exceptions

The obvious exceptions to slot management are international flights where ATFM would not be able to communicate controlled departure schedules. International flights, in particular long-haul international flights, would normally be included in the airport's slot data and therefore have a slot. However, these flights would not be available for slot modifications through a revision or compression in the ATFM system.

Likewise, if a web page is available, aircraft in flight are exempt from revisions made in connection with them.

1.7 Slot exchange

The ATFM system will allow aircraft operators to retain their slots to request exchanges. After a given time interval, if an aircraft operator has not placed another flight in a cancelled slot, the slot automatically returns to the group of unallocated slots, and will be available for flight allocation.

Slot substitutions, cancellations, and exchanges are possible through three means: the ATFM website, CDM, and directly through the ATFM operators.

1.8 Allocation stage

At a fixed time before the EOBT of each flight, a slot is allocated to the flight and a slot allocation message (SAM) is sent to the aircraft operators and ATC. Another flight cannot occupy an allocated slot. However, an aircraft operator may update an EOBT, if it is believed that the flight will not be able to comply. In addition, the slot allocated to a flight may be upgraded through the revision process.

1.9 Slot compression process

At certain times during a GDP, it may be convenient to execute a compression. The compression function exchanges delayed flights with unallocated slots to reduce flight delays. This is the semi-automatic mechanism that usually attempts to improve the slot of allocated flights; for a given flight, the actual revision process takes place after the SAM has been issued up to a time parameter before the CTOT. This parameter is linked to the aerodrome of departure.

1.10 Slot exchange procedure

Aircraft operators can submit a change request directly via the ATFS or, preferably, via the ATFM website. The prerequisites are that both flights have their slots issued and that both flights are subject to the same measure. A maximum of one exchange can be made per flight, if the exchange is feasible and does not have a negative effect on the airspace/aerodrome.

Note: Normally, only two flights of the same aircraft operator can be exchanged. Exceptionally, in critical events at airports, slots of two different aircraft operators may be exchanged.

1.11 Aerodrome parameters: Taxi time

Taxi time at aerodromes is an important parameter taken into account in the slot allocation process. The default taxi time is specified for each runway of an aerodrome in the ATFM system database, but can be changed on the day of operation. Changing the taxi time may resolve certain aerodrome operational problems without the need to reduce capacity or request an increase in the slot window beyond that existing around the CTOT.

The taxi time may be modified during a given period of time. A change in taxi time will change all flights that have their EOBT within the period, some slots issued may be recalculated and some SRMs issued at short notice.

Calculating COBT/CTOT:

The ATFM system or the ATFM operator, for the purpose of calculating the COBT, will take into account the allocated ATFM slot, the taxi-out times (XOT), the taxi-in times (XIT) and the en-route time (EET).

Example:

- DEPARTURE SLOT (in case of a departure runway, the regulated resource)

COBT = ATFM departure slot – TAXI-OUT TIME

- ARRIVAL SLOT (in case of an arrival runway, the regulated resource)

COBT = ATFM arrival slot – EET - TAXI-OUT

2 FLIGHT PLANS

The advance EOBT time for aircraft operators to file their non-repetitive flight plans should be standardised in order to provide the FMU with an accurate forecast of potential air traffic demand. The advance filing of flight plans will ensure that the CTOT issued is as close as possible to the EOBT time, taking into account the taxi time.

Aircraft operators must be aware that late filing of a flight plan may result in disproportionate delay. It is in the best interest of aircraft operators to initiate prompt revisions or cancellations, thereby allowing the system to maximise the use of available capacity and minimise delays.

2.1 Duplicated flight plans

These refer to flight plans that were not carried out, that is, flight plans that were not cancelled by the originators, who nevertheless filed another flight plan. It is therefore absolutely essential that the originators of the flight plan:

- Cancel a flight plan as soon as they know that the flight will not take place.
- Cancel an existing flight plan before submitting a replacement flight plan for the same flight.

The existence of multiple flight plans must be avoided at all costs, since it:

- Is presented to ATC as false information.
- Affects the efficiency of the ATFM system.
- Causes unnecessary additional delays to regulated flights.
- Leads to lower ATC capacity utilisation.

3 ATFM MESSAGES

Each ATFM message contains several fields, some of which are mandatory and some are optional. Their number varies according to the type of message. The fields used are summarised below.

FIELD	DEFINITION
ADEP	ICAO indicator for aerodrome of departure
ADES	ICAO indicator for aerodrome of destination
CTOT	Calculated take-off time

EOBD	Estimated off-block day
EOBT	Estimated off-block time
NEWCTOT	Revised CTOT
NEWEOBT	Revised EOBT
NEW RTE	New route
REGUL	Identifier of the restriction imposed (may include more than one)
RESPBY	Last time a response is required
COMMENT	Comment
TAXITIME	Taxi time
REGCAUSE	Restriction caused by
TITLE	Title of message

Examples of ATFM messages

The following tables give examples of all ATFM messages currently in use. A brief description of each message and subsequent actions is included.

Message	Originator and description	Action
<ul style="list-style-type: none"> - TITLE SAM - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0925 - CTOT 1037 - REGUL XXXX -COMMENT CLDT 100303 1237 - COMMENT PR03 - TAXITIME 0010 - REGCAUSE XXXX 	<p>SAM: slot allocation message</p> <p>Sent to AOs/ATC 2 hours before the last EOBT received.</p> <p>ATFM web shows the CTOT. The SAM is used to inform AOs and ATS of the CTOT calculated by the FMU for an individual flight, to which AOs/ATC must adhere.</p>	<p>Sent to AOs/ATS 2 hours before the last EOBT received. AOs/ATCs must comply with CTOT.</p>
<ul style="list-style-type: none"> - TITLE SRM - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0925 - NEWCTOT 1037 - REGUL XXXX -COMMENT CLDT 100303 1237 - TAXITIME 0010 - REGCAUSE XXXX 	<p>SRM: slot revision message</p> <p>Submitted to AOs/ATC to approve or confirm any revisions to a CTOT after issuance of the initial SAM.</p> <p>This message can be used to indicate an increase or reduction of a delay.</p>	<p>The SRM notifies of a significant slot change. AOs/ATC must comply with the NEWCTOT.</p>
<ul style="list-style-type: none"> - TITLE SLC - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0925 - TAXITIME 0010 	<p>SLC: Slot cancellation message</p> <p>Sent to AO / ATC to notify that a flight that has received a CTOT is no longer subject to a restriction.</p>	<p>The flight can depart without restriction unless a new message is received later.</p>

<ul style="list-style-type: none"> - TITLE FLS - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0815 - TAXITIME 0010 	<p>FLS: Flight suspension message</p> <p>Sent to AO / ATC at or after the slot issuance time to suspend a flight due to exceptional conditions or adverse weather conditions or aircraft operator delays.</p> <p>The flight will enter suspension mode on the ATFM website.</p>	<p>The flight must be suspended in order to become active again via the ATFM website.</p>
<ul style="list-style-type: none"> - TITLE DES - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0815 -COMMENT CLDT 100303 1015 -TAXITIME 0010 	<p>DES: Flight de-suspension message</p> <p>Sent to AO / ATC to cancel the suspension, a SAM will be sent as well.</p>	<p>Normally no required action is taken by AO / ATS and if the flight is subject to an ATFM regulation, it will be issued through a CTOT.</p>