INTERNATIONAL CIVIL AVIATION ORGANIZATION
South American Office

Regional Project RLA/06/901

TWENTY SIXTH WORKSHOP/MEETING OF THE SAM IMPLEMENTATION GROUP

(SAM/IG/26)

FINAL REPORT

Virtual Meeting, 20 to 23 September 2021

INDEX

ii-1 PLACE AND DURATION OF THE MEETING

The Twenty-Sixth Workshop/Meeting of the SAM Implementation Group (SAM/IG/26) was held by virtual means (Zoom), Peru, from 20 to 23 September 2021, under the auspices of Regional Project RLA/06/901.

ii-2 OPENING CEREMONY AND OTHER MATTERS

Mr. Fabio Rabbani, ICAO South American Office Regional Director, greeted attending civil aviation authorities and representatives of State and private organizations of the SAM Region. Furthermore, he reiterated his thanks for the continuous support given to the activities of the SAM Regional Office, especially those related to the SAM Implementation Group (SAM/IG).

ii-3 SCHEDULE, ORGANIZATION, WORKING METHODS, OFFICERS AND SECRETARIAT

The Workshop/Meeting agreed to hold its sessions from 08:00 to 14:00 hours, with appropriate breaks.

The sessions from the first to the third day were dedicated to the analysis of the activities and deliverables of the GESEA and GT Interop Groups, as well as the current priorities of air navigation. At the forth day session, a Plenary meeting was formed to validate and/or endorse the deliverables of the above-mentioned Technical Groups, as well as to approve the conclusions of the Meeting.

Mr. Fernando Hermoza, ATM/SAR Regional Officer and Mr. Francisco Almeida, ICAO Regional Officer CNS, served as the Secretariat, and were assisted by Mr. Jorge Armoa, Regional Officer MET/AIM, Mr. Roberto Sosa, Regional Officer ANS/SAFETY, as well as Mr. Javier Vittor REDDIG Administrator.

Likewise, Support was provided by the coordinators and rapporteurs of the GESEA and GT Interop groups and subgroups for the preparation and analysis of documentation.

ii-4 WORKING LANGUAGES

The working languages of the Meeting were English and Spanish.

ii-5 AGENDA

The following agenda was adopted:

Agenda Item 1: ANS context (ATM/CNS) Global and Regional level.

c) Elaboration of Vol. III of the ANP CAR/SAM
d) Status review of conclusions.

Agenda Item 2: Report of activities of the GESEA and Subgroups

e) Review of air navigation priorities in the ATM field

f) ATM implementation. Progress of the Subgroups.
g) Proposed Conclusions
h) Formulation of the 2022 Work Plan

Agenda Item 3: Report of activities and deliverables of the GT - Interop and Subgroups

a) Review of air navigation priorities in the CNS field.
b) CNS Implementation. Progress of the Subgroups.
c) Proposed Conclusions
d) Formulation of the 2022 Work Plan

Agenda Item 4: SAM/IG Conclusions and next actions - Plenary

a) Summary of Sessions
b) Review and approval of Conclusions
c) Approval of the 2022 Work Plan.

Agenda Item 5: Other Business

ii-6 ATTENDANCE

The virtual Meeting was attended by 136 participants of 13 States of the SAM Region (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Paraguay, Peru, Suriname, Uruguay and Venezuela); a State from the North American and Caribbean Region (United States), an agency from the EUR/NAT Region (EASA), an International Organization (IATA), and four companies from the aviation industry (AIREON, ARINC, HUGHES and IACIT). The list of participants is shown in page iii-1.

ii-7 LIST OF CONCLUSIONS [1]

No.	Title of the Conclusion	Page
Conclusion SAM/IG/26-01	Adoption of the ATFM Operations Plan (OPSAM)	4-2
Conclusion SAM/IG/26-02	Adoption of the Guide for the implementation of ATFM in the SAM Region 2022-2026	4-2
Conclusion SAM/IG/26-03	Review of the CNS tables of Vol II of the CAR / SAM Air Navigation Plan and support in the preparation of Vol III of the CAR/SAM ANP, on CNS issues	4-6

[1] The Conclusions are presented in the format requested by the Air Navigation Commission (ANC) through Study Note 8993 (6/11/2015) Progress report of the ad hoc working group in the PIRG and RASG reports (item No. 20036).

LISTA DE PARTICIPANTES / LIST OF PARTICIPANTS

ARGENTINA

1. Adrián Malizia
2. Antonio Gonzalez
3. Cecilia Varela
4. Diego Agüero
5. Diego Gamboa
6. Guillermo Giollo
7. Gustavo Guardia Narvaez
8. Jorge Cornelio
9. Hernán Ibarra
10. Karina Leban
11. Leandro Bauzá
12. Leonardo Costa
13. Lucas Fernández
14. Marcelo Cancinos
15. Marcos Campos
16. Mario Escalante
17. Mauricio Nogara
18. Mercedes Rodriguez
19. Moria Callegare
20. Paola López
21. Patricia Urbano
22. Raúl Drandich
23. Rodrigo Devesa
24. Silvia García
25. Silvia Ruiz
26. Verónica Villarruel

BOLIVIA

27. Andrea Rubin de Celis
28. Arturo Griffiths Torrez
29. Jaime Yuri Alvarez
30. John Apaza
31. Jorge Aldunate
32. Luis Rojas
33. Reynaldo Cusi

BRASIL / BRAZIL

34. André Santos da Rocha
35. Arthur Fernandes Silva
36. Clóvis Fernandes Júnior
37. David Benedictis
38. Diego De Brito
39. Fábio Santos
40. Hebert dos Santos
41. Jose Adao Joba
42. Joaquim Lobo Junior
43. Luis Felipe Ochotorena Fartura
44. Luiz Roberto Barbosa Medeiros
45. Luiz Santos
46. José Izidro Apolinario
47. Wallace Gutemberg
48. Lucio Cavalcante

CHILE

49. Alfonso De la Vega
50. Christian Vergara
51. Francisco Uzieda
52. Héctor Ibarra
53. José Morales
54. Lucio López
55. Patricio Zelada
56. Rodrigo Fajardo

COLOMBIA

57. Angel Carranza
58. Carlos Mayorga
59. Douglas Villamarín
60. Edwar Cepeda
61. Freddy Celis
62. Germán Vélez
63. Joaquín Penagos
64. Myyey Cruz
65. Norbey Rada Chilatra
66. Oscar García
67. Sergio Acosta

ECUADOR

68. Alexander Guncay
69. Alis Villavicencio
70. Arturo Lomas
71. Clemente Pinargote
72. Enrique Bolívar Dávalos
73. Jimmy Sandoval
74. Marcelo Valencia

ESTADOS UNIDOS / UNITED STATES

75. Al O´Neill
76. Raúl Chong
77. Tayloe Lewis
78. Will Turner

GUYANA

79. Rickford Samaroo
80. Roy Sookhoo
81. Sewchan Hemchan

PANAMÁ

82. Agustín Zúñiga
83. Arsenio Bethancourt
84. Carlos Aparicio
85. Daniel de Ávila
86. Iván De León
87. Ivette M. Iturrado
88. Xenia Guardia

PARAGUAY

89. Delia Giménez
90. Tomás Yentzch

PERÚ

91. Ángel Carrera Matias
92. Brenda Céspedes
93. Carlos Yshida
94. Diana Montoya
95. Efrain Flores
96. Eloy Tafur
97. Giuliano Guzmán
98. Hugo Rosado
99. Joel Cordero
100. Johnny Ávila
101. Jorge García
102. Jorge Merino
103. José Mondragón
104. Juan Pablo Portilla
105. Karla Albañil
106. Libio Benites
107. Raúl Anastacio Granda
108. Rocío Ávila
109. Rogelio Núñez
110. Oscar Saavedra
111. Sady Beaumont
112. Sara Siles
113. Tomás Macedo
114. Walter Peceros

SURINAM / SURINAME

115. Jürgen Cicilson
116. Radha Atwaroe Kalawatie
117. Radjan Phalai

URUGUAY

118. Andrés Braida
119. Andrés Yemurenko
120. Gabriel Falco
121. Gabriel Fernández
122. Henry Díaz
123. Juan Carlos Moreira
124. Marcos Vignolo
125. Rosanna Barú

VENEZUELA

126. Kender Ferrer
127. Luis Escobar
128. Sonia Berroterán

AIREON

129. Athayde Frauche
130. Ana Persiani

ARINC

131. Manuel Gongora

EASA

132. Germán Meyer

IACIT

133. Luiz Antonio Castro

IATA

134. Julio de Souza Pereira
135. Raymundo Hurtado (LATAM)

OACI / ICAO

136. Jorge Armoa
137. Fernando Hermoza
138. Francisco Almeida
139. Roberto Sosa
140. Javier Vittor

Agenda Item 1: ANS context (ATM/CNS) at global and regional level

a) Drafting of Vol. III of the CAR/SAM ANP
b) Review of status of conclusions

1.1 Under this agenda item, the following papers were reviewed:

a) WP/1.1 – *Follow-up to conclusions adopted by SAM/IG meetings* (presented by the Secretariat)
b) WP/1.2 – *Drafting of Volume III of the CAR/SAM Regional air navigation plan* (presented by the Secretariat)

Conclusions and decisions adopted by SAM/IG meetings

1.2 The Meeting reviewed the valid conclusions and decisions as well as outstanding activities of the workshops/meetings of the SAM Implementation Group (SAM/IG), as shown already updated in **Appendix A** to this agenda item. The list of conclusions and activities include:

a) tasks to be carried out and/or the corresponding conclusion in the areas under analysis;
b) specific tasks leading to the accomplishment of the main task;
c) expected results of each task;
d) completion dates;
e) parties responsible for their implementation;
f) members who will support the task; and
g) status of implementation of the task and, when so required for better understanding, an explanatory note on the status of implementation.

1.3 The Meeting also completed the table contained in **Appendix B** to this agenda item, which lists the tasks to be undertaken by States, in order to follow up their implementation.

Drafting of Vol. III of the CAR/SAM ANP

1.4 It was noted that the PPRC/5 meeting (Mexico City, 16-18 July 2019) had been informed that ICAO Headquarters was working on a standard template for Vol. III of the regional air navigation plans. The aforementioned meeting approved Conclusion PPRC/05/10 "Development of Volume III of the CAR/SAM e-ANP and drafting of national air navigation plans", aimed at coordinating efforts for the development of Vol. III of the CAR/SAM e-ANP and updating of national air navigation plans.

1.5 In the second half of 2020, a number of workshops and seminars were held in the SAM Region for the dissemination of the GANP planning methodology, the management of performance indicators and metrics, as well as the practical use of the e-ANP Vol. III template provided by ICAO Headquarters.

1.6 Since April 2021, the GREPECAS Secretariat has been providing "Assistance for the development and management of the CAR/SAM ANP Vol. III", with activities aimed at the following objectives:

a. To provide instructions on the use of the CAR/SAM ANP Vol. III template by CAR/SAM States when completing the tables and texts of the CAR/SAM ANP, Vol. III.

b. To standardise the understanding and practical application of the six-step approach towards performance-based planning, as stipulated in the GANP, by air navigation experts of the CAR/SAM States when completing the tables in Vol. III.

c. To supplement the use of the GANP tools, the AN-SPA, the performance dashboard, etc.

d. To formulate a new GREPECAS project for management of Volume III that will facilitate implementation of the stipulated ASBU elements and measure regional performance.

e. To make an orderly transition of the plans and activities under the RPBANIP and the SAM-PBIP to Vol. III of the CAR SAM ANP.

1.7 Volume III will be developed by the representatives of the GREPECAS States, assisted by the ICAO NACC and SAM Regional Offices. To this end, a series of teleconferences, seminars and other on-line activities would be scheduled. State counterpart staff should be authorised to coordinate the drafting of Volume III with all stakeholders within the administration.

Report by Chile

1.8 The Secretariat referred to information paper IP/2.5 "Report on the progress made by Chile in GESEA and INTEROP TF activities", describing the progress made by Chile in relation to each valid conclusion listed in **Appendix A**, and its participation in the SAM/IG technical groups.

1.9 The Meeting welcomed Chile's initiative to address the issues under Item 1 in a single paper, and instructed the Secretariat to consider the possible application of this format for future meetings. The aforementioned information paper IP/2.5 was presented in detail under agenda items 2 and 3.

APPENDIX A

STATUS OF IMPLEMENTATION OF CONCLUSIONS AND/OR TASKS EMANATING FROM SAM/IG MEETINGS
(Updated SAM/IG/26, September 2021)

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
1. Implementation of performance-based navigation (PBN) in the SAM Region							
1-1	**Conclusion SAM/IG/14-6: Projects and/or action plans for PBN redesign of the main South American TMAs** That SAM States: a) send the Project and/or Action Plans for PBN redesign of the main TMA(s) selected by their Administration, in order to complete the SAM PBN Project that is contained in Appendix J to this part of the Report, to the SAM Regional Office by 31 December 2014; b) send the corresponding updates to the aforementioned Project and/or Plans to the SAM Regional Office as soon as possible, so as to ensure harmonisation of activities under the SAM PBN Project.	Determination of the selected air spaces to be optimized with the implementation of PBN	Indicate the selected airspace for redesign or optimisation Report updates	SAMI/IG/25	STATES	RO/ATM	**VALID** NOTE: SAM/IG/24 considered to transfer the activities of this conclusion to GESEA. It is deemed necessary to develop SAM Airspace Concept. SAMIG25; Argentina reports in progress
1-2	**Conclusion SAM/IG/21-01: Objectives of PBN implementation harmonized at regional and interregional level** That SAM States, organisations, users, and stakeholders double efforts to meet regional and interregional performance-based air navigation implementation goals, based on GREPECAS projects, and contemplating the strengthening of national PBN implementation plans so that they include performance indicators and the use of recognised project management tools and methods.	Updating of regional PBN action plans and State action plans. Follow-up to PBN implementation and specific assistance to States.	PBN implementation plans implemented	SAMI/IG/26	STATES	RO/ATM	**VALID** NOTE: SAM/IG/24 considered to transfer the activities of this conclusion to GESEA. It is deemed necessary to develop SAM Airspace Concept. SAMIG25; Argentina reports in progress

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
1-3	**Conclusion SAM/IG/25-04 Adoption of the Regional guide on the implementation of PBN visual runway procedures** SAM States adopt the Regional guide on the implementation of PBN visual runway procedures developed by GESEA and, on this basis, approve national regulations on the implementation of these procedures.	Adopt the Regional Guidance on PBN procedures for visual runway implementation	Deliver the national regulation on implementation of PBN procedures for visual runway	As soon as possible	STATES	RO/ATM	**VALID**
1-4	**Conclusion SAM/IG/25-05 Studies on RNAV visual flight procedures - RVFP** The GESEA SG2 conduct studies on the implementation of RNAV visual flight procedures (RVFP), in order to have available a harmonised regional guide aligned with ICAO provisions	Deliver studies	Studies on RNAV Visual flight procedures - RVFP	No later than October 2022	GESEA	RO/ATM	**VALID**
2. Contingency plans and air space efficiency							

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
2-1	**Conclusion SAM/IG/23-04: Procedure to be applied in case of radioactive clouds or accidental release of radioactive material** That the civil aviation authority and/or ATS authorities, in coordination with meteorological authorities and/or meteorological watch offices, implement procedures related to the production of SIGMETs in order to: a) Ensure that their ATS/MET cooperation agreements include the exchange of information on radioactive material in messages exchanged between ATS and MET units; b) Foresee training for ATS staff on procedures related to receiving information from the London VAAC concerning radioactive material; c) Coordinate the inclusion of the accidental release of radioactive material or the presence of radioactive clouds in their contingency plans.	Develop and sign ATS MET cooperation agreements, including information related to radioactive material in exchange messages	ATS MET cooperation agreements signed.	SAM/IG/26	States	RO/ATM RO/MET	**VALID** SAM/IG/25: Chile has implemented Information comes from VAAC Buenos Aires. Bolivia has implemented, see IP 5.1 Argentina; Implemented.
2-2	**Conclusion SAM/IG/21-02: Consolidation of the implementation of 40NM longitudinal separation minima between adjacent FIRs in the SAM Region and promotion of the Action Plan for the implementation of a 20NM separation** That SAM States take action and apply procedures in the ACCs to consolidate the implementation of 40NM longitudinal separation minima and give priority to the execution of the action plan for the implementation of standard 20NM separation minima between adjacent FIRs in SAM continental airspace.	Follow-up to the implementation of the 40NM separation, follow-up to the Action Plan for the implementation of 40 NM separation, follow-up to the Action Plan for the implementation of 20NM minima, and specific assistance to States.	Implementation of 20NM longitudinal separation minima in continental airspace.	SAM/IG/25	STATES	RO/ATM	**VALID** NOTE: SAM/IG/24 considered to transfer the activities of this conclusion to GESEA. It is deemed necessary to develop SAM Airspace Concept. *NOTE.- The conclusion was relocated as part of Item 2, airspace efficiency* SAMIG/25 Argentina reports in progress

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
2-3	**CONCLUSION SAM/IG/25-01 Implementation of strategic direct routing - EDE** SAM States analyse the guidance material prepared by the GESEA SG1 on the strategic direct routing (EDE) concept, which has been made available to the administrations, and coordinate with IATA and international airlines, as well as with adjacent States, for its implementation.	Follow up EDE implementation Fuel savings analysis, supported by airlines.	Delivery of AIC and/or SUP AIP by the states, on EDE	As soon as possible	States Airlines IATA	RO/ATM GESEA	**VALID**
2-4	**CONCLUSION SAM/IG/25-02 Adoption of the guidelines of the SAM ATS contingency framework plan (MCATS/SAM) and alignment of national plans** States adopt the guidelines of the SAM ATS Contingency Framework Plan developed by GESEA and start harmonising their national ATS contingency plans, so that the documentation required for regional activities on contingency plans and letters of ATS agreement, tentatively scheduled for 2021, may be available on a timely manner.	Follow up ATS contingency planning harmonization	Delivery of National ATS Contingency Plans harmonized to MCATS	No later than 15 April 2021	States Airlines IATA	RO/ATM GESEA	**VALID**
2-5	**CONCLUSION SAM/IG/25-03 Activities for the development of the SAM ATM/CNS contingency framework** States support GESEA activities towards a second stage of the MCATS, with a view to developing guidance material for a "SAM ATM/CNS Contingency Framework Plan".	Prepare document for a harmonized implementation of ATM/CNS National Contingency Plans, with interfaces to AIM, MET, Airports, etc. services duly in line with neighbouring States, even if applicable, with CAR states.	ATM/CNS contingency Plan Framework Plan for SAM	No later than October 2023	GESEA	RO/ATM	**VALID**

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
3. **Standards and procedures for performance-based navigation operations approval (NIL)**							
4. ATFM implementation							
4-1	**Conclusion SAM/IG/24-01:** ATFM services implemented in the SAM States provide for the development of the Daily Plan - PDA and coordinated the means and procedures for distribution or publication in repositories or websites on a regular basis, designating its focal points responsible for implementing this initiative. In addition, an agile procedure for developing ATFM Regional Teleconferences is studied and defined, with the goal of progressively achieving a daily periodicity.	Develop PDA, coordinating its dissemination with SAM regional ATFM dependencies and CAR if applicable. Sign or update ATFM agreement letters to formalize the exchange and its processes. Study media for ATFM teleconferences	PDA exchanged between SAM region dependencies and CAR if applicable	SAM/IG/ 26	States / ATFM Focal Points	RO/ATM	**VALID** SAM/IG/25, Chile executing in progress. Argentina has implemented.
4-2	**Conclusion SAM/IG/23-01: Implementation of ATFM measures in accordance with Doc 9971, and coordination in case of ATS contingencies** **That,** SAM States prioritise the provision of the following for their ATS and ATFM services: a) Strengthen the functions of the flow management positions (FMPs) or units (FMUs), providing them with the prerogatives for coordinating and supporting ATS services; b) Define the profile and skills of the ATFM staff, and provide programmes for initial and recurrent training for the Staff; c) Mandate that ATFM measures are strictly based on the Doc. 9971 to face situations generating capacity/demand imbalance, especially in cases of ATS capacity degradation caused by unforeseen events; d) Establish instructions and supervision H24, ensuring that ATFM measures has the less impact for international flights, and all ATFM measures are agreed with adjacent ATFM or ACC dependencies;	To meet the provisions of ICAO Doc 9971 and the SARPs contained in Annex 11	Support to ATFM and ATC	SAM/IG/25	States	RO/ATM	**VALID** SAM/IG/25, Argentina executing in progress. Chile, executing in progress. Coming soon, publication of National ATFM manual.

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
	e) Mandate the correct application of the ATFM process, from the ATM planning phase to the phase of operations analysis and performance control; and f) Exclude the use of NOTAM of Flow Control to deal with situations of demand/capacity unbalance, with the only exception of the initial response that an ACC may require in the first 12 hours of ATS contingency.						Chile has excluded the use of Flow Control NOTAM, indicated in item f)
4-3	**CONCLUSION SAM/IG/26-01 Adoption of the ATFM Operations Plan (OPSAM)** States adopt the ATFM Operations Plan (OPSAM) and provide for the ongoing participation of their ATFM services in the sharing of data for the Regional Dashboard of indicators and BRISA operational teleconferences. At the same time, each State should encourage the participation of airlines, airports and users in OPSAM.	Adjust ATC and airport capacity to the gradual increase in demand, and contribute to the recovery and sustainability of the air transport system at regional and global level in the new projected scenario. Also, to reinforce the use of KPIs in ATFM and ATM in general.	OPSAM plan implemented and generating KPIs.	SAMIG/29	States	RO/ATM	**ADOPTED SAMIG 26**
4-4	**CONCLUSION SAM/IG/26- 02 Adoption of the Guide on the implementation of ATFM in the SAM Region 2022- 2026** The States adopt the Guide for the implementation of ATFM in the SAM Region 2022-2026, harmonised with the objectives of regional integration of this service and taking into account the implementation phases and deadlines foreseen.	SAM States to implement national or crossborder ATFM services that are suited to the air traffic flow managed by their ATS services and that duly contribute to the solution of demand/capacity imbalances in the Region.	State following guidance of the document and reaching Phase IV of implementation.	December 2025	States	RO/ATM	**ADOPTED SAM/IG/26**
5. Operational implementation of new ATM automated systems and integration of the existing systems							

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
5-1	**Conclusion SAM/IG/25-06 Approval of the ATM/FPL Roadmap and of the format for acknowledgment (ACK) and rejection (REJ) of flight plans and associated messages** That States: a) Approve the ATM/FPL Roadmap and the format for acknowledgment (ACK) and rejection (REJ) of flight plans and associated messages; and b) Adopt the guidelines and procedures of the ATM/FPL Roadmap.	Adoption of the ATM/FPL roadmap by states	- Roadmap implemented - Mitigate the occurrence of errors and duplication /multiplicity of flight plans, also providing feedback to the originators of FPLs and associated messages.	SAM/IG/27	States	RO/CNS RO/ATM GT Interop	**VALID**
5-2	**Conclusion SAM/IG/21-03: Activities required in the AIDC pre-operational phase to reduce migration times to the operational phase** That SAM States currently in the AIDC pre operational phase, in order to reduce time in this phase and migrate to the operational phase: a) operate AIDC for a period of time to obtain the skills required for use thereof; b) monitor AIDC operation, recording errors made during the reporting, coordination and transfer stages; c) conduct statistical measurements based on the results of b), in order to identify the most frequent errors; d) based on the results of c), take the necessary action to mitigate errors; and **e)** report the results obtained in c) and d) and disseminate the lessons learned at events, teleconferences and AIDC implementation meetings of the SAM Region, so that they may serve as a reference for other AIDC implementations.	Follow-up and coordination via teleconferences and meetings	AIDC operational connection completed	December 2019	States	RO/CNS and RO/ATM	**VALID** On 18 August 2018, operational AIDC was established between Lima ACC - Guayaquil ACC and also between Iquique ACC–Lima ACC SAM/IG/25, Chile has implemented. Argentina executing in progress.
5-3	**Conclusion SAM/IG/23-03: Adaptation of AMHS terminals of aeronautical meteorology users** That, pursuant to the standard requiring the	To meet the provisions of amendment 78 to ICAO Annex 3	Perform the tests and submit results	SAM/IG/26	SAM Region States	ICAO SAM Office	**VALID**

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
	implementation of the exchange of OPMET messages in IWXXM GML format by 5 November, States should: a. Adjust AMHS terminals of aeronautical meteorology users so that they may transmit and receive OPMET messages in IWXXM GML format b. Implement the necessary AMHS interconnections in order to facilitate the transmission and reception of OPMET messages in IWXXM GML format **c.** States in a position to do so should conduct OPMET message exchange trials in IWXXM GML format						SAM/IG/25 Argentina executing in progress.
5-4	**Conclusion SAM/IG/25-07 Implementation of Space-based ADS-B under a regional technical cooperation project** That the Secretariat: a) Consult Trinidad and Tobago on their interest in participating in a potential regional implementation of Space-based ADS-B, together with Chile and Panama, initially; b) Initiate the procedures, together with the Technical Cooperation Bureau (TCB), to enable the contracting of the service through Regional Project RLA/03/901; and c) Organise an ad-hoc group under Regional Project RLA/03/901, with those States interested in participating in the regional implementation of Space-based ADS-B, for the drafting of the necessary documents for a potential contracting of the service.	Provide States that expressed interest in the implementation of ADS-B Satellite support necessary for the procurement of the service.	Support concerned states and coordination with TCB ICAO	No later than SAMIG/26	RO/CNS	Panama, Chile, Trinidad and Tobago and other interested states.	**VALID**
5-5	**Conclusion SAM/IG/26-03 Revision of the CNS tables of Vol. II of the CAR/SAM Air Navigation Plan and support in the elaboration of Vol. III of**	Update the information of Vol. II of the CAR/SAM Air Navigation Plan and support the elaboration	ANP CAR /SAM; Vol. II Update and Vol. III elaborated	SAM/IG/29	States	RO/ATM	**ADOPTED SAM/IG/26**

No.	Task to be developed	Specific tasks	Deliverables	Completion date	Responsible party	Members supporting the task	Status of implementation
	the ANP CAR/SAM, on the CNS topics a) The CNS/ANP Subgroup, activated at the SAM/IG/26 Meeting, will carry out the revision of the CNS tables contained in Vol. II of the CAR/SAM Air Navigation Plan, referring to the information of the SAM States and provide support in the elaboration of Vol. III of the ANP CAR/SAM, on the CNS topics; b) The Secretariat circulates a letter to SAM States nominating participants in the CNS/ANP Subgroup; and **c)** SAM States nominate representatives in sufficient numbers to perform the tasks assigned to the CNS/ANP Subgroup.	of ANP CAR/SAM Vol. III, concerning CNS Planning aspects.					

Updated FH September 2020

APPENDIX B

FOLLOW-UP TO THE CONCLUSIONS AND PENDING TASKS OF SAM/IG MEETINGS

(Updated SAM/IG/26 – September 2021)

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
Conclusion SAM/IG/13-9 - IATA safety event indicators for SAM States Encourage States to develop, jointly with operators, Secretariat and other ATM community stakeholders deemed relevant, the methodology allowing the use of the data on safety events and indicators registered by airlines through IATA, in order to identify and mitigate any potential risk to operations, setting goals, priority areas and action plan.	YES	O/G	O/G	YES	YES	YES	YES		NO	NO	O/G	NO	N/A	YES	Bolivia: First contact made with IATA Person in contact is Mr. Julio Pereira. Brazil: Contact continue with IATA to access data. From this meeting Colombia will contact M. Pereira to access the information on safety events and indicators registered by airlines trough IATA. Paraguay expressed interest. Guyana will contact Mr. Pereira for information. Peru: teleconference will be schedule with IATA to get information.
Conclusion SAM IG/14-18 - Exception in the insertion of alternate aerodromes That: a) Airlines operating to the United States that will apply exceptions to the insertion of the alternate aerodrome, insert "ZZZZ" in box 16 of the FPL and specify ALTN//NIL in box18. **b)** States include such procedures in the respective AIPs.	a) YES b) YES	a) NO b) O/G	YES	a)O/G b) O/G	b)O/G	a) YES b) YES	b)O/G	b)O/G	a) YES b) YES	b)O/G	a) O/G b) O/G	b)O/G	N/A	b)NO	The recommendation of the NAM/CAR/SAM AIDC/4 meeting of April 2018 also promotes the implementation of the exception. SRVSOP LAR 121.2585 and ICAO Annex 6 provide for the exception when filling the ALTN DEST

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															Bolivia will not apply LAR 121.2585. ICAO will be notified through correct channels. Argentina is publishing the application in its AIP, as reported at the SAMIG/21. SAM/IG/23 informed; Panama does not apply the procedure. SAMIG/25 Argentina has implemented. Chile reports conclusion in the process of implementation. (NI 2.5 SAM/IG/26) Peru: has been managing the inclusion of the exception in the AIP PERU in the AIP amendment of the year 2022.
Conclusion SAM/IG/16-01: **Model amendment to the letter of operational agreement on AIDC between two centres** That SAM States, when implementing AIDC between adjacent ATS units, make the corresponding amendments to the letters of operational agreement using as a model the amendment to the letter of operational agreement between the Lima ACC and the Guayaquil ACC for the operation of AIDC, shown in Appendix A to this agenda item.		N/A	O/G	O/G	YES	YES	O/G	O/G	YES	O/G	YES	N/A	O/G	O/G	At present, the model amendment to the letter of operational agreement on AIDC is being used by Colombia, Ecuador, Panama and Peru. The remaining States will use it when their operational letters of agreement are amended to include AIDC. Panama and Colombia have already an agreement.

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															Guyana has capability and has started arrangements with Piarco and proposes begin conversation with Brazil. SAMIG26. Argentina AIDC Implementations Temporarily Suspended
Conclusion SAM/IG/18-01: PANS-OPS recommendations for harmonising instrument procedures in the SAM Region That SAM States implement and apply, as soon as possible, the recommendations of the PANS-OPS group, shown in Appendix B* to this part of the report, with a view to harmonising instrument procedures and the associated processes, and enhance safety.	O/G	O/G	O/G	YES	YES	YES			O/G	YES	YES	O/G	O/G	YES	*See information in PANS-OPS workshop States to report on implementation of conclusions at SAM/IG/19 The objectives of the conclusion are being met. Follow-up being conducted in SAM/IG/19 table. Table was updated at SAMIG/21. Brazil: New identification IAC RNP, A-RNP, Minimum altitudes in SIDs O/G. Chile reports progress in: updating and homologation in transition altitude in all TMAs. Optimization of arrival flows at TMA Santiago. Change of three conventional airways by RNAV 5

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
Conclusion SAM/IG/21-01: Regional and interregional harmonised PBN implementation goals That SAM States, organisations, users, and stakeholders double efforts to meet regional and interregional performance-based air navigation implementation goals, based on GREPECAS projects, and contemplating the strengthening of national PBN implementation plans so that they include performance indicators and the use of recognised project management tools and methods.	O/G	O/G	O/G	YES	YES	O/G		O/G	O/G	YES	O/G	O/G	O/G	YES	Brazil: Implementations of PBN and new Airspace Concepts (CEA) are carried out in the SIRIUS Program of DECEA. There are CEA projects until 2030. Peru: This task is addressed through the activities of GESEA. It is recommended to migrate this conclusion to GESEA. Venezuela inserted indicators Send conclusion to GESEA for asses feasibility of migrating task to GESEA' PTA.
Conclusion SAM/IG/21-02: Consolidation of the implementation of 40nm longitudinal separation minima between adjacent FIRs in the SAM Region and promotion of the action plan for the implementation of a 20NM separation That SAM States take action and apply procedures in the ACCs to consolidate the implementation of 40NM longitudinal separation minima and give priority to the execution of the action plan for the implementation of standard 20NM separation minima between adjacent FIRs in SAM continental airspace.	O/G	YES		O/G	N/A	YES		YES	YES	YES	O/G	YES	YES	YES	Bolivia cannot implement 20nm separation minima with its current communications system. Brazil: has implemented CNS requirements that allow 20NM to be applied with adjacent continental FIRs. However, it is not possible to apply 20NM in all cases because there are adjacent States that do not accept transfer with 20 NM. SAMIG/26. Peru, Separation of 40NM is applied in the transfer of control with the

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															ACC Guayaquil, Bogotá and Amazónico. It does not apply with ACC La Paz. It does not apply with ACC Iquique / Santiago Oceanic because they are ocean routes. Tests with Ecuador to implant 20NM in VAKUD: TBD Ecuador will fix date on ATSRO/10 meeting, for testing with Peru in VAKUD 20NM Colombia: Under current conditions the separation of 20NM cannot be implemented, CNS requirements are being reviewed. Guyana has implemented 40 NM with all its adjacent ACC and proposes coordination to implement 20 NM. Chile reports development of vHF communications improvement plan prior to the implementation of this conclusion. Panama already has it established with Cenamer Suriname implemented 40NM separation with Guyana /Amazonico and is planning the implementation of

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															20NM in the near future.
Conclusion SAM/IG/21-03: **Activities required in the AIDC pre-operational phase to reduce migration times to the operational phase** That SAM States currently in the pre-operational phase of AIDC, in order to reduce time in this phase and migrate to the operational phase: a) operate AIDC for a period of time to obtain the skills required for the use thereof; b) monitor AIDC operation, recording errors made during the reporting, coordination and transfer stages; c) conduct statistical measurements based on the results of b), in order to identify the most frequent errors; d) based on the results of c), take the necessary action to mitigate errors; and **e)** report the results obtained in c) and d) and disseminate the lessons learned at events, teleconferences and AIDC implementation meetings of the SAM Region, so that they may serve as a reference for other AIDC implementations.	O/G	N/A	O/G O/G O/G O/G	YES YES YES O/G	O/G O/G O/G O/G	YES YES YES YES YES	N/A	O/G O/G O/G O/G	YES YES YES O/G O/G	O/G	YES YES YES YES YES	N/A	N/A	YES YES YES YES YES	Brazil, Chile, Colombia, Ecuador, Panama and Peru have activities to sign operational letters of agreement Brazil: Studies for implementation in the proposed format continue. JUN/2022 SAMIG26. Peru was one of the first to include the treatment of problems due to duplicity, multiplicity and errors, the use of the flight plan format. At the last meeting on AIDC organized by ICAO, Peru reported on the lessons learned from its pre-operational phase with the Amazon and previously with other states with which they are currently in the operational phase. SAM/IG/26: Venezuela; began pre-operational tests with ACC Barranquilla Guyana will begin tests between local ATS and will propose tests with Brazil. Argentina: AIDC implementations temporarily suspended

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
Conclusion SAM/IG/23-04: Procedure to be applied in case of radioactive clouds or accidental release of radioactive material That the civil aviation authority and/or ATS authorities, in coordination with meteorological authorities and/or meteorological watch offices, implement procedures related to the production of SIGMETs in order to: a) Ensure that their ATS/MET cooperation agreements include the exchange of information on radioactive material in messages exchanged between ATS and MET units; b) Foresee training for ATS staff on procedures related to receiving information from the London VAAC concerning radioactive material; Coordinate the inclusion of the accidental release of radioactive material or the presence of radioactive clouds in their contingency plans.	O/G	YES		YES	YES	O/G			NO	NO	YES YES O/G	N/A		NO	SAMIG/25: Chile has implemented Information comes from VAAC Buenos Aires. Bolivia has implemented Argentina is reviewing letters of agreement between the ANSP and SMN. Brasil: Regulation was published (ICA 105-17). SAMIG26. Peru has implemented coordination procedures in the ATS/MET agreements relating to radioactive material, however coordination with the Peruvian Institute of Nuclear Energy is still underway to include the issue in the State Contingency Plans Guyana has implemented - LoA signed between ANSP and Hydrometeorological Office

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
Conclusion SAM/IG/24-01: Procedures to elaborate and disseminate Daily Plan, PDA, and development of ATFM Teleconferences.	YES		YES	YES	YES	YES					YES				SAMIG 26. Chile informs that it is sending a PDA to ATFM recipients in the region, in accordance with the agreement established in Subgroup 3 ATFM of GESEA. In the same way, Chile participates in the South American Tactical Pre Briefing ATFM, BRISA, every Tuesday, where all the ATFM dependencies of the region participate and under a standardized format
Conclusion SAM/IG/25-01 Implementation of strategic direct routing - EDE SAM States analyse the guidance material prepared by the GESEA SG1 on the strategic direct routing (EDE) concept, which has been made available to the administrations, and coordinate with IATA and international airlines, as well as with adjacent States, for its implementation.	O/G	O/G	O/G	YES	O/G	YES			YES	NO	YES	O/G		YES	ARGENTINA adapting the scenario SAMIG26. Brazil: EDE implemented in the FIRs of Recife and Amazonia, and the implementation in the Brasilia and Curitiba RIS is under study. SAMIG.26 Chile reports implementation of Strategic Direct Routing in the upper airspace of the Antofagasta FIR and the Santiago FIR Ecuador. – Published AIP part ENR 1.10 Panamá executing EDE in FIR PERU. By SUP AIP 01/2021 (01.06.2021) direct strategic routing (EDE) was implemented in the

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															upper oceanic airspace of the FIR Lima. SAMIG26. The ATS routes within FIR Montevideo have a direct and efficient configuration. In addition, we are subject to the implementation process of the Baires TMA, which may affect the airspace of the MONTEVIDEO FIR.
Conclusion SAM/IG/25-02 Adoption of the guidelines of the SAM ATS contingency framework plan (MCATS/SAM) and alignment of national plans States adopt the guidelines of the SAM ATS Contingency Framework Plan developed by GESEA and start harmonising their national ATS contingency plans, so that the documentation required for regional activities on contingency plans and letters of ATS agreement, tentatively scheduled for 2021, may be available on a timely manner.	O/G	O/G	YES	O/G	YES	O/G			OG	YES	O/G	NO	O/G	YES	ARGENTINA will include the State Contingency Plan in section ENR 1.15, which will be published by Supplement to AIPel 7 October. of 2021. In turn, it elaborated the regulatory requirements regarding the Cont. Plans, which are subject to approval. Brazil: Implemented. Ecuador. LOAs continue to be developed with SKBO, MPTO Peru: is complying with the established work plan, including coordination meetings for the harmonization of contingency plans

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
Conclusion SAM/IG/25-04 Adoption of the Regional guide on the implementation of PBN visual runway procedures SAM States adopt the Regional guide on the implementation of PBN visual runway procedures developed by GESEA and, on this basis, approve national regulations on the implementation of these procedures.	O/G	O/G	Parcial	YES	O/G	NO			YES	NO	YES	N/A	N/A	NO	Argentina: "In development of applicable regulations, and planned dissemination to the aeronautical community". No scheduled date. Brazil: DECEA applies different operational minimums (OCH 1000ft VIS 5000m) until obtaining a better experience. It has implemented these procedures in 3 AD of Brazil. Chile reports national regulations in application: "Criteria and requirements to implement and carry out RNAV (GNSS) approaches on visual flight runways at aerodromes outside controlled airspace". The document in the process of being updated will incorporate indications from the Regional Guide. Ecuador: has not identified the need to implement PBN procedures. Panamá has published 4 RNAV Visual (VRFP) PERU. PBN procedures have been implemented on the visual runways of the following aerodromes:

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															Arequipa (2014) Cajamarca (2010) Chiclayo (2021) Jauja (2017) Juliaca (2010) Piura (2012) Pucallpa (2012) Tacna (2013) Trujillo (2013) Tumbes (2012) Jaen (2016)
Conclusion SAM/IG/25-06 Approval of the ATM/FPL Roadmap and of the format for acknowledgment (ACK) and rejection (REJ) of flight plans and associated messages That States: a) Approve the ATM/FPL Roadmap and the format for acknowledgment (ACK) and rejection (REJ) of flight plans and associated messages; and b) Adopt the guidelines and procedures of the ATM/FPL Roadmap.	O/G	O/G	O/G	a)O/G b)O/G	YES	O/G			NO	NO	a)YES b)YES		O/G	YES	Argentina: a and b) NO in the short term Regulations in development: It is contemplated to incorporate in the Regulations of General Procedures that applies to the ARO Dependencies, a document still in the process of approval Brazil: Studies for implementation in the proposed format continue. JUN/2022. Chile reports in the installation phase AMHS user terminals with automated ACK and REJ capacity. Ecuador has signed agreements with airlines for FPL presentation by AMHS, in addition, it has published this procedure in ENR 1.10

Conclusion/Task	ARG	BOL	BRA	CHI	COL	ECU	FGY	GUY	PAN	PAR	PER	SUR	URU	VEN	REMARKS
															In Panama it runs manually. Peru: approved the ATM/FPL roadmap, has implemented the ACK and REJ format, has developed an action plan for the fulfillment of the phases and staff training.
Conclusion SAM/IG/26-01 Adoption of the ATFM Operations Plan (OPSAM)															**NEW SAMIG/26**
Conclusion SAM/IG/26-02 Adoption of the Guide for the implementation of the ATFM in the SAM Region 2022- 2026															**NEW SAMIG/26**
Conclusion SAM/IG/26-03 Revision of the CNS tables of Vol II of the CAR/SAM Air Navigation Plan and support in the elaboration of Vol III of the ANP CAR/SAM, on CNS topics															**NEW SAMIG/26**

Reviewed SAMIG26 FHH

Agenda Item 2: Report on activities of GESEA and its Subgroups

a) Review of air navigation priorities in the ATM field
b) ATM implementation. Progress made by the subgroups
c) Draft conclusions
d) Formulation of the 2022 Work Plan

2.1 Under this agenda item, the following papers were discussed:

a) WP/2.1 – *Activities of the GESEA/SG1 - Airspace planning* (presented by the Secretariat)
b) WP/2.2 – *Concept of operations for efficiency and capacity in SAM airspace (CONOPS)* (presented by the Secretariat)
c) WP/2.3 – *2022–2026 Roadmap. Performance-based optimisation of SAM airspace* (presented by the Secretariat)
d) WP/2.4 – *Activities of the GESEA/SG2 - PANS OPS* (presented by the Secretariat)
e) WP/2.5 – *Activities of the GESEA/SG3 - ATFM* (presented by the Secretariat)
f) WP/2.6 – *ATFM service implementation guide for the SAM Region - 2020-2025* (presented by the Secretariat)
g) WP/2.7 – *SAM ATFM operations plan* (OPSAM**)** (presented by the Secretariat)
h) WP/2.8 – *Implementation of the concept of vertical sectorisation in Brazil* (presented by Brazil)
i) WP/2.10 – *Situation of ATFM in Peru* (presented by Peru)
j) WP/2.11 – *Actions taken by Peru to optimise air traffic flow management through the use of key performance indicators* (presented by Peru)
k) WP/2.12 – *Regulations related to the ATS contingency plan* (presented by Uruguay)
l) WP/2.13 – *Opportunity for improvement of the SAM ATS contingency framework plan (MCATS/SAM)* **(**presented by Argentina)
m) WP/2.14 – *Airspace optimisation in Brazil* (presented by Brazil)
n) IP/2.1 – *Progress made in the implementation of ATFM in Argentina* (presented by Argentina)
o) IP/2.2 – *ATM performance indicators - SISCEAB performance-based management activities* (presented by Brazil)
p) IP/2.3 – *Action plan to replace duplicate points* (presented by Brazil)
q) IP/2.4 – *Implementation of direct routes in Brazil* (presented by Brazil)
r) IP/2.5 – *Report on the progress made by Chile in GESEA and INTEROP TF activities* (presented by Chile)
s) IP/2.6 – *Use of RNAV on conventional routes and procedures* (presented by the Secretariat)
t) IP/2.7 – *Implementation of CPDLC* (presented by Uruguay)
u) IP/2.8 – *Report on Ecuador's activities in GESEA and the INTEROP TF* (presented by Ecuador)
v) IP/2.9 – *Status update of the BAIRES TMA redesign project* **(**presented by Argentina).

Note.- The sequential number WP/2.9 was not assigned.

2.2 The coordinators and members of SG1 Airspace Planning, SG2 PANS OPS, and SG3 ATFM presented the progress of their work and new deliverables, and formulated draft conclusions to support their next actions for airspace optimisation and implementation of improvement elements linked to

GANP operational threads. Likewise, States presented proposals to improve GESEA processes and reported on their progress.

Activities of SG1- Airspace Planning

Implementation of strategic direct routing (EDE)

2.3 The status of implementation of EDE in the South American Region is shown in **Appendix A** to this part of the report.

2.4 In this regard, the experts discussed several aspects that had been identified in EDE tests or tactical applications, linked to flight plan management with inclusion of DCT and the AIDC function in the ACCs concerned.

2.5 Emphasis was made on the importance of sharing these experiences and continuing close coordination in testing, especially between EDE focal points in each State and IATA. ATM system manufacturers also needed to be considered.

2.6 In order to support the early implementation of the GANP FRTO - DCT, it was deemed of utmost importance that States implement or expand the use of strategic direct routing, based on the guidance provided through letter LN3/24.1 - SA5266 Lima, dated 11 September 2020. In this regard, the Meeting requested the participation of all States in the tests, the dates of which would be established in coordination with the Secretariat and IATA.

ATS contingency plans

2.7 The GESEA/SG1/2 meeting discussed the status of the contingency plans in the SAM Region and agreed that the project should be conducted in 4 phases:

a) Phase 1 - Drafting of the Contingency Framework Plan for the SAM Region (completed);
b) Phase 2 - Development of a new version of national contingency plans based on the Contingency Framework Plan for the SAM Region, with no obligation to coordinate with neighbouring States.
c) Phase 3 - Standardisation and updating of contingency plans in the SAM Region, with mandatory coordination between neighbouring States and updated letters of operational agreement.
d) Phase 4 - Drafting of the regional ATS contingency plan.

2.8 Regarding phase 2, the ATC Contingency TF was expected to consider the most appropriate place to publish the ATS contingency plans. Likewise, States were expected to develop their contingency plans based on the Framework Plan by September 2021, for publication on 4 November 2021.

2.9 Taking into account that the standardisation of procedures to be applied by pilots is an important part of the new contingency plans, it was expected that IATA would develop a card with the standard procedures and disseminate the information to airlines by 4 November 2021.

2.10 SG1 discussed initiatives by Argentina and Uruguay to improve contingency plan management. Note was taken of the need to keep them up-to-date with respect to periodic changes in ATS routes, and to harmonise them at the level of ATS letters of agreement. It also discussed the need to amend State regulations in certain cases to facilitate plan management. Mention was made of initiatives underway,

for example, that related to LAR 211. It was agreed that the cited TF should address these issues in its forthcoming activities.

2.11 The Meeting approved the activities proposed for 2022 to support the harmonisation of State ATS contingency plans.

SAM airspace operational concept (EC/SAM CONOPS)

2.12 The GESEA/SG1/2 meeting (27-29 April 2021) received the draft developed by the CONOPS TF for its comments and contributions. Based on the comments received, the CONOPS TF rapporteur and the Secretariat consolidated the document and a meeting of the TF was held and the draft was approved.

2.13 The Meeting discussed the EC/SAM CONOPS (see WP/2.2 presented by the Secretariat) which is aligned with the new four-layer concept of the GANP, specifically, the second "global technical" layer, acknowledging the groups of threads deployed in the ASBU methodology, namely the operational threads that, in turn, are supported by the information and technology/CNS services threads.

2.14 Accordingly, the EC/SAM CONOPS does not replace Vol. III of the CAR/SAM ANP, but rather facilitates the understanding of the methodology of Doc 9883, adopted in the GANP, by ATM experts and planners, who in turn contribute to the formulation of Vol. III activities.

2.15 It was deemed appropriate to define a new period of application for the CONOPS, 2022-2026. The document would continue to receive inputs and updates since the regional and global aviation and industry scenarios were not yet fully defined with respect to COVID-19.

2.16 The Meeting did not comment on the EC/SAM CONOPS and agreed that, as an ATM technical document to be adopted by States to guide service planning, the draft should be circulated by letter to the Administrations for final input and feedback.

2022–2026 Roadmap: Performance-based optimisation of SAM airspace

2.17 The GESEA/SG1/2 meeting (27-29 April 2021) took note of the draft developed by the designated TF, with a view to providing comments and inputs to the EC/SAM CONOPS. Based on the comments received, the Meeting addressed the development of a 2022-2026 Roadmap: Performance-based optimisation of SAM airspace, based on the studies on the aforementioned CONOPS. The Roadmap replaces the PBN CONOPS, originally developed in 2016 (see WP/2.3 presented by the Secretariat).

2.18 The Meeting made no comments on the Roadmap and, in order to be consistent with the process chosen for the EC/SAM CONOPS, agreed that the draft be circulated by letter to the Administrations for final input and feedback on regional implementation timelines and metrics proposed in the document.

Optimisation of regional routes 2021-2022. Implementation of RNAV-5

2.19 The Secretariat informed the Meeting that there were currently only 23 conventional regional ATS routes, based on the publication of the AIP AMDT of 9 September 2021 on the elimination of 6 regional conventional routes, through agreements reached by Argentina, Chile, Paraguay and Uruguay. The publication had the support of Brazil regarding the tripartite TMA airspace in Foz do Iguaçu.

2.20 Likewise, note was taken of actions taken by Brazil to correct two inadvertently duplicated RNAV-5 designators in the CAR Region. Routes UN401 and UN548 would be implemented in the Atlantico FIR as of 4 November 2021.

2.21 It was noted that there were activities to be carried out in several States concerning RNAV 5 in the lower airspace and conventional domestic ATS routes.

2.22 It was noted that the two SG1 activities scheduled for this year to optimise airspace planning in the Region had to be postponed due to the pandemic. The drafting of regional guidance material on planning regulations and the workshop for airspace planners to be carried out with the support of Brazilian experts would be included in the 2022 work plan.

TMA airspace optimisation

2.23 The Meeting agreed that TMA optimisation work should be carried out jointly by SGs 1, 2 and 3, taking into account that it would involve airspace planning/management as well as regional standardisation of the PANS OPS criteria applied in the SAM Region. Subgroup coordinators and the Secretariat would coordinate the integration of these activities.

Reduction of conventional longitudinal separation from 40 to 20 NM and reduction of longitudinal separation with ATS surveillance to 10 NM

2.24 Regarding the reduction of longitudinal separation, both conventional and with ATS surveillance, the Meeting agreed to include this activity in the SG1 work programme, to enable implementation monitoring.

Activities of SG2 - PANS OPS

Follow-up to PBN implementation in the SAM Region (Resolution A-37/11)

2.25 An analysis was made of the information provided by the ICAO iSTARS application database, which monitors the status of implementation of ICAO Assembly Resolution A-37/11. Compliance reached 88.5%, based on 192 thresholds implemented out of 217 international runway thresholds.

Implementation of PBN procedures for visual flight runways

2.26 Work on this matter started in accordance with the publication and use of the Regional guide on the implementation of PBN procedures for visual runways, approved by SAM/IG/25. Regarding progress made at regional level, mention was made of the publication by Brazil of AIC N21/21 dated 7 June of this year, enabling the publication of RNP APCH IFP for visual runways at SBSV, SBIL and SBAG aerodromes.

2.27 **Appendix B** to this part of the report contains the regional planning table for these procedures.

Studies on RNAV visual flight procedures (RVFP)

2.28 In this regard, SG2 agreed to establish a task force (TF) on a "Study for a regional RVFP guide" to address the issue and analyse the feasibility of implementing RVFP in specific cases where RNP APCH or RNP AR procedures, or even PBN to visual runway were not effective or did not meet operational requirements.

2.29 The Meeting agreed that this Task Force could start its activities in the third quarter of this year. The Secretariat was tasked with coordinating a first work meeting, at the earliest possible date.

Optimisation of flight procedures with application of RF legs

2.30 As reported by the SRVSOP through CA91-013, which clarified the conditions for the application of RF (radius-to-fix) legs in RNP APCH and RNP AR procedures for certified operators, the States agreed on the need to further the revision or redesign of IFP procedures with inclusion of RF legs, to obtain shorter and more efficient approach paths, as well as fuel and emission savings.

2.31 Examples of NM reduction in instrument approaches were discussed. In addition, various uses were described, including SIDs, which significantly improved efficiency of operations.

2.32 In order to promote their implementation, the task force (TF) on "Implementation of RF legs" was created to generate joint, collaborative work. Note was taken of the publication of RNP APCH IACs with RF LEG procedures for SBGO and SBJH aerodromes in Brazil.

TMA airspace optimisation

2.33 A presentation was made on the status of the BAIRES TMA project, which was expected to start operating by the end of 2022.

2.34 An analysis was made of the vertical sectorisation project in the Brasilia FIR, which divided airspace into FL350/FL360, in order to generate a better flow and reduce the complexity of airspace sectors, without negatively affecting safety. Thus, more flights would pass through the same portion of airspace, monitored by different controllers, depending on their altitude, thus significantly increasing airspace capacity. The following implementations were foreseen in the Recife, Amazonica and Curitiba FIRs.

IFP procedures in overlay mode

2.35 During the GESEA/SG2/2 meeting (virtual, 17-19 May 2021), in response to a query from the delegation of Peru, an analysis was made of the status of the Region regarding IFP procedures with PBN, known as "overlay" procedures.

2.36 ICAO had circulated a proposal of amendment to Doc 8168, Volumes I and III, on the use of RNAV on conventional routes and procedures. The proposal included the use of FMS/RNAV systems in situations where the aircraft was not equipped with the necessary receiver for conventional radio navigation aids (for example, ADF /NDB).

2.37 It was noted that, in order to ensure safety, the use of FMS/RNAV systems for this purpose should be supervised by the State, and the operator should obtain the corresponding authorisation. SG2 would monitor this information, and, if necessary, schedule specific studies and activities.

Activities of SG3 - ATFM

2.38 Having identified a series of requirements for a more integrated and robust ATFM in the near future, GESEA agreed on the creation of a third subgroup, approving the revised ToR at the GESEA plenary meeting held on 22 June 2021.

2.39 Subsequently, three GESEA/SG3 meetings were held in 2021 for the purpose of developing the deliverables set out in the paragraphs below.

ATFM Operations Plan (OPSAM)

2.40 Work was carried out on the development of an ATFM Operations Plan (OPSAM) with the objective of defining actions that would allow, during the recovery phase of operations in the SAM region, to adjust ATC and airport capacity to the gradual increase in demand and contribute to the recovery and sustainability of the air transport system at regional and global level in the new foreseen scenario, prioritising projects currently underway in the GESEA and in the States aimed at improving ATC and airport performance, following timetables and delivery dates. The OPSAM is contained in **Appendix C** to this part of the report.

2.41 This mechanism included the creation of a DASHBOARD (link shown below) with a single database format to enable the exchange of demand information and also support the establishment of two ATFM SAM operational teleconferences (BRISA), one pre-tactical and one strategic/post-operational.

https://app.powerbi.com/view?r=eyJrIjoiNDczYzMxY2EtM2RhZi00ZDY4LWFmZjMtNmI5MTFmNjM5MjY2IiwidCI6IjI2MjI4ZGNhLTcwZDMtNDkxNy04MjMzLTA4M2FjMzY1NWE5MSJ9

2.42 The DASHBOARD already contained the schedules of cargo and passenger air transport flights of Argentina, Brazil, Chile, Colombia and Peru and was ready to be used by States to organise the BRISAs. Nevertheless, SG3 concluded that work should continue with a view to adding more functionalities.

2.43 Regarding the pre-tactical BRISA, it was inspired by the bilateral initiative of Argentina and Brazil, already been in place between the two States since 6 July 2021. Panama, Colombia, Peru, Venezuela and Chile have joined the initiative. Other States will join upon completion of internal adjustments to start the activities foreseen in the demand and capacity monitoring process set forth in Chapter 5 of OPSAM.

2.44 With respect to strategic and post-operational BRISA, considering that OPSAM will enter into force 30 days after its approval date, the first teleconference was scheduled for the last Thursday of October (28/10/2021). The Secretariat was in charge of coordinating the convening of ATFM units as well as airlines and users.

2.45 Peru presented the progress made in the management of ATFM indicators, based on GANP KPIs and other indicators formulated to meet its own needs, with the purpose of assessing efficiency and optimising operations at the Jorge Chavez Airport, while impacting on its ATS services. The Meeting

welcomed the progress made by the Peruvian team, and encouraged States to join the Dashboard and BRISA tasks that allowed the staff involved to improve their data and indicator management skills.

2.46 It was reported that the daily dissemination of ATFM Daily Plans (ADPs), via mail and/or web by six SAM States, continued on a timely basis. Ecuador and Peru had made improvements to their deliverables.

2.47 In view of the above, draft conclusion SAM/IG/26-01, **Adoption of the ATFM Operations Plan (OPSAM)** was formulated and approved by the Plenary, as set out in the report on agenda item 4.

Guide on the implementation of the ATFM service in the SAM Region

2.48 During the SAM/IG/24 meeting (Lima, 4-8 November 2019), Draft 1.0 of the Guide on the implementation of the ATFM service in the SAM Region was presented, noting that the text required further input from the States. The document was only available in Spanish.

2.49 This aforementioned draft had been fully updated and reviewed by GESEA/SG3, through the ATFM DOCS TF. The rapporteur was Mr. Jorge Cornelio (Argentina) supported by Ms. Brenda Céspedes (Peru). See **Appendix D** to this part of the report.

2.50 This document provided guidance to SAM States for the implementation, in the first instance, of national or cross-border ATFM services commensurate with the air traffic flow handled by their ATS services, and that responded appropriately to the solution of demand/capacity imbalances.

2.51 In this sense, the document adopted the guidelines of the ATFM Operational Concept for the CAR/SAM Regions, aiming at harmonised and fully interoperable implementation between the two Regions and, in the future, between the SAM and APAC and WACAF Regions.

2.52 The Meeting considered that the Guide should henceforth be considered as a first version for amendment control, applicable for the period 2022-2026.

2.53 In view of the above, draft conclusion SAM/IG/26-02, **Adoption of the Guide on the implementation of ATFM in the SAM Region 2022-2026** was formulated and approved by the Plenary, as set out in the report on agenda item 4.

Manual on calculation of runway and ATC sector capacity

2.54 The Manual on calculation of runway and ATC sector capacity is a document to be used by SAM States for the implementation of a common methodology for calculating ATC runway and sector capacity. Taking into account that the Guide on the implementation of ATFM in the SAM Region was completed, SG3 would review the aforementioned calculation manual.

Formulation of the 2022 Work Plan

2.55 Accordingly, the GESEA coordinator and the Secretariat outlined the 2022 Work Plan to be submitted to the consideration of the Plenary (fourth day of the meeting) through a working paper, which was sent by e-mail to the delegates and posted on the website of the Meeting. The approved **2022 Work Plan** is shown under agenda item 4.

Information presented

2.56 Argentina and Peru reported on the status of the ATFM service. Brazil presented the progress made with respect to performance indicators, the programme for the elimination of duplicate ICARD points and the implementation of direct routes in its airspace.

2.57 Ecuador and Chile presented summarised information on their progress in the GESEA groups and also in the Interop TF (see also agenda item 3 below). Emphasis was made on the format of the information paper presented by Chile, which linked its report to each of the valid conclusions listed in the SAMIG/25 report. See paragraph 1.8 under agenda item 1.

2.58 Uruguay reported on the implementation of CPDLC, now in the pre-operational phase in the Montevideo FIR. It was estimated that the system would start the operational phase in oceanic airspace by April 2022.

2.59 The Meeting considered this information as an excellent development, and highlighted the efforts of the administrations and of ATM staff, taking into account the work constraints imposed by the pandemic. The information papers are available at the website of the Meeting.

2.60 On the second day of the Meeting, Crystal Kim, of the ICAO HQ Airspace Management and Optimisation Section, made a detailed presentation on the tasks being carried out in relation to the FICE (Flight and Flow for a Collaborative Environment - FF-ICE) module, included in the GANP Information threads. This was of interest to ATM and CNS experts of GESEA and its contributory bodies and the Interop TF.

2.61 Note was taken of improvements made to the ICAO technical document on ATS data link applications (Doc 9694), which led to its division into two separate documents: the GOLD Manual on ground-air data link (Doc 10037), and the other manual--under preparation--to address ground-ground data link. This would enhance the framework for harmonised implementation of AIDC.

2.62 Furthermore, an analysis was made of amendments being made to Doc 9965 (FF-ICE), which would now have two volumes. Accordingly, enablers were being generated for FICE implementation, covering blocks 0 and 2 of the ASBU framework. The Meeting acknowledged Ms. Kim for her presentation and renewed its commitment to continue working on the implementation of AIDC in the Region, and maintain in contact with ICAO to exchange implementation experiences. The presentation is available on the website of the Meeting.

APPENDIX A

EDE implementation in SAM Region

- Argentina. – The Baires TMA is in the process of implementation, which is expected to affect the airspace of several FIRs neighboring Ezeiza, therefore, the issue of EDE implementation has not been defined yet.
- Bolivia. – The progress in the implementation of the ATS surveillance service in the La Paz FIR was reviewed, with the expectation that the coverage of VHF pilot-controller communications will also be extended, foreseeing that with the fulfillment of these technical conditions, the EDE will be able to be implemented.
- Brazil. – The EDE is implemented in the Recife and Amazonica FIRs, and implementation in the Brasilia and Curitiba FIRs is being studied. The respective AIP documentation was shared with the Coordination and Secretariat (ENR 1.9 AIR TRAFFIC FLOW MANAGEMENT AND AIRSPACE MANAGEMENT) which will be uploaded to the meeting file and/or GESEA cloud. Same for States to be mentioned below.
- Chile. – It was informed the publication of AIC NR 19 - 28 OCT 2020. Basically the EDE will be applied to a oceanic airspace portion. The Supplement is expected to be incorporated into the AIP Colombia.
- Colombia.- It was reported the publication of the SUP AIP A64 / C86, 04 NOV 2020. Some limitations originated due to the location of the Palanquero military zone near Bogota were detailed.
- Ecuador. – Has published in AIP as part of ENR 1.10. The recent tests carried out with Peru, COCESNA and IATA were reviewed, having determined how to implement pseudo-points at 50 NM from the FIR limit so that the flight plan is processed, as well as aspects of the EST and CDN messages. A summary of the test results is presented in Appendix C.
- Panama. – It was mentioned that there is a tactical application for direct flight for a long time. The conditions that apply have been published in AIP ENR 1.8-1.
- Peru. - Through AIP 01/21 Supplement, as of June 1, 2021, the concept of strategic direct routing - EDE (ASBU FRTO B0 / 1 - Direct routing / DCT) was implemented in the upper oceanic airspace of the Lima FIR. In a first stage, the entry and/or exit to/from the DTS space of the Lima FIR must be done through travel points published in the AIP Peru. Recently, LATAM has expressed the intention of conducting a test flight from Santiago directly to Los Angeles, for which the EDE/DCT concept would be used, however, part of the proposed route would fly over unassigned offshore airspace, called NO FIR, therefore, the waypoint located in the NO FIR space would be outside the work area of the RDP / FDP of the Lima ACC ATM system. In this regard, LATAM has been requested to send test flight plans in order to verify their processing by the ATM system.
- Uruguay. – It was stated that all the SID/STAR procedures and ATS routes within the Montevideo FIR have a direct and very efficient configuration. The option of publishing specific information in AIP was analyzed, in a way that facilitates the knowledge of the airlines for the presentation of flight plans originating in Montevideo, which could access the EDE application in neighboring FIR spaces. In addition, we may have more information that will be subject to the implementation process of the Baires TMA, which is expected to affect the airspace of the MONTEVIDEO FIR.
- Venezuela. – A SUP AIP C03-A03 / 21 was published on AIRAC dated May 2021. It was considered to carry out EDE tests on AIDC and ATS surveillance between Venezuela and Brazil, since they use the same Sagittarius technology in ACC. At present the AIDC is in pre-operational tests with ACC Barranquilla. Waiting for SAGITARIO software update by ATECH company.

PBN procedures to visual runways - Projects and implementation

State	Projects	Notes
Argentina	SAWH- Ushuaia SAZY –San Martin SAVE – Esquel	
Bolivia	SLTJ – Tarija SLCH- Cochabamba SLLP – La Paz *	*PBN a RWY 28, foreseen to be implemented in January 2022
Brazil	SBIL –Ilheus * SBSV –Salvador* SBAG – Angra dos Reis* SBCH – Chapecó SBTE - Teresina SWPI – Parintins SBTV- Terravista SWLC- Rio Verde SBUG- Uruguayana SBUF- Paulo Alfonso SBTG- Tres Lagoas SNBR- Barreiras SWGN - Araguaina	*Implemented June 2021 54 more letters are planned by 2023
Chile	---	It applies its own regulation to implement CAT A and B aircraft. The application will be studied in SCAR - Arica RWY20
Colombia	SKPV- Providencia SKTL –Tolú SKGP – Guapi*	* In force since 17 June 2021
Ecuador	---	* Application will be assessed for SEQM – Quito International
Paraguay	---	
Panama	MPMG – Marcos Gelabert	
Peru	Arequipa - RWY 28 VISUAL RNP RWY28 (AR) – LATAM (tailored) Cajamarca – RWY 34 VISUAL RNP RWY34 (AR) – AIP PERÚ Chiclayo – RWY19L VISUAL (calle de rodaje empleada como	Implemented 2014 Implemented 2010 Implemented 2021

State	Projects	Notes
	pista) RNP RWY19L (AR) – SUP AIP PERÚ	
	Jaen – RWY 12 VISUAL RNP RWY34 (AR) – LATAM (tailored)	Implemented 2016
	RNP RWY16 (AR) – LATAM (tailored)	Implemented 2016
	RNP RWY34 (LNAV/VNAV) – VIVA AIR (tailored)	Implemented 2018
	Jauja – RWY31 VISUAL RNP RWY31 (AR) – LATAM (tailored)	Implemented 2017
	Juliaca – RWY 12 VISUAL RNP RWY12 (AR) – LATAM (tailored)	Implemented 2010
	RNP RWY12 (AR) – VIVA AIR (tailored)	Implemented 2019
	RNP RWY12 (AR) – SKY AIRLINES (tailored)	Implemented 2020
	Piura – RWY01 VISUAL RNP RWY01 (LNAV/VNAV) – AIP PERÚ	Implemented 2012
	Pucallpa – RWY20 VISUAL RNP RWY20 (LNAV/VNAV) – LATAM (tailored)	Implemented 2012
	Tacna – RWY 20 VISUAL RNP RWY20 (AR) – LATAM (tailored)	Implemented 2013
	Trujillo – RWY20 VISUAL RNP RWY20 (AR) – AIP PERÚ	Implemented 2013
	Tumbes – RWY 14 VISUAL RNP RWY14 (AR) – LATAM (tailored)	Implemented 2012
Uruguay	---	
Venezuela	SVRS – Los Roques	

APÉNDICE C / APPENDIX C

Plan de Operaciones ATFM para la Región SAM (OPSAM)

(AVAILABLE IN SPANISH ONLY)

GESEA | Grupo de Estudio e Implantación del Espacio Aéreo SAM

Plan de Operaciones ATFM para la Región SAM (OPSAM)

Versión 1.0
Septiembre 2021

CONTROL DE CAMBIOS

Versión	Fecha	Descripción	Secciones afectadas	Aprobación
1.0	23/09/2021	Versión draft del GESEA	Todas	SAM/IG/26

Tabla de Contenido

1 INTRODUCCIÓN

1.1 Contexto General

Con la declaración de pandemia COVID-19 por la Organización Mundial de la Salud (OMS), el 11 de marzo de 2020, varios Estados declararon el cierre de sus fronteras y, en consecuencia, de sus aeropuertos para operaciones internacionales y, en algunos casos, nacionales.

Todas las Regiones de la OACI han sido impactadas por las medidas sanitarias que se impusieron para el control del COVID-19. La contracción de la industria es significativa a nivel global. Se estima que, aproximadamente en el 2024-2025, se podría estar recuperando los índices registrados en diciembre del 2019 sobre pasajeros embarcados, operaciones e ingresos de las aerolíneas, aeropuertos y los ANSP. Es crucial que la industria pueda normalizar su actividad lo más pronto posible, de modo que se restablezca la conectividad aérea que impulsa en la Región SAM el crecimiento del comercio, negocios y turismo, y aporta una parte significativa del PBI, generando numerosos puestos laborales. Además, es crucial que el proceso de toma de decisión en colaboración sea fortalecido, con miras a buscar soluciones inmediatas y de corto plazo, que puedan apoyar a la recuperación de la aviación sudamericana.

Debido a la emergencia sanitaria del COVID19, se reconoce que se ha generado un nuevo escenario en la aviación mundial. Se calcula que en el año 2020 el número de pasajeros transportados a nivel mundial ha decrecido en 60%. Ello conlleva a un fuerte impacto económico para toda la industria y afecta a los proveedores ANSP debido a la reducción significativa del número de operaciones aéreas.

La comunidad ATM se concentra en apoyar la reactivación del transporte aéreo en general, así como restablecer la conectividad de la Región SAM. A la vez, se busca retornar a la tendencia de crecimiento sostenible del transporte aéreo regional previo a la pandemia y, para ello, es necesario disponer el apoyo de un sistema regional de navegación aérea sin costuras, de alto rendimiento, así como más seguro, robusto y resiliente. Esta iniciativa, por lo tanto, apunta a restablecer la conectividad aérea de la Región.

En este contexto, la Oficina Regional Sudamericana de la OACI organizó una serie de actividades como parte de los esfuerzos de coordinación regional para enfrentar juntos como Región de manera armonizada y organizada esta pandemia. Entre las actividades, se realizó la Reunión Virtual de Directores de Aviación Civil, la cual concluyó en la necesidad de que se preparen

los lineamientos para una Estrategia Regional de Respuesta del Transporte Aéreo Internacional de la Región SAM con miras a promover una respuesta ordenada, armonizada, progresiva y segura.

Consecuentemente, fue aprobado el documento **Marco Estratégico SAM en respuesta al COVID-19** que se presenta como una compilación de mejores prácticas y experiencias de esta situación que continuamente cambia. El citado Marco Estratégico será considerado por cada Estado de acuerdo con sus realidades y Planes diferentes. Ver el documento publicado en el siguiente Link:

https://www.icao.int/SAM/SECURITY-FACILITATION/COVID-19/Pages/COVID19-StrategicFramework.aspx

El Marco Estratégico SAM en respuesta al COVID-19 establece cuatro fases de la reactivación:

a) Fase 1 - Reacción Inmediata de todo el sistema de aviación ante el cierre de fronteras y de las operaciones aéreas;
b) Fase 2 - Reinicio de operaciones cumpliendo estrictamente con las recomendaciones de las autoridades de salud para generar la confianza del público viajero gestionando de forma efectiva los riesgos de transmisión;
c) Fase 3 - Recuperación hasta que se retome los niveles previos a la crisis sanitaria; y
d) Fase 4 - Generación de resiliencia en el sistema.

En línea con el área de focalización de una reactivación ordenada, el marco estratégico SAM comprende algunas acciones inmediatas y pone más énfasis en las fases de reinicio de operaciones y recuperación por intermedio de acciones en las siguientes áreas: **seguridad operacional; medidas sanitarias; seguridad de la aviación y facilitación; y económica y financiera.**

La seguridad operacional incluye todas las áreas del sistema de aviación que velan por la Seguridad Operacional y la Capacidad y Eficiencia del Transporte Aéreo de la Región. Esto incluye, pero no se limita, a las áreas de licencias al personal (PEL), aeronavegabilidad (AIR), operaciones de aeronaves (OPS), servicios de navegación aérea (ANS/ATM), aeródromos (AGA), comunicaciones/navegación (CNS), información aeronáutica (AIM), entre otras. Actualmente, los aspectos de seguridad operacional están siendo atendidos en conjunto por parte de los SSP de los Estados, el SRVSOP a nivel regional y los aspectos de capacidad y eficiencia por los proyectos del GREPECAS.

El presente Plan de Operaciones ATFM para la Región SAM, en adelante denominado OPSAM, fue desarrollado esencialmente para abordar los retos de la recuperación que encara la Región, representando un documento complementario para el área de seguridad operacional del Marco Estratégico SAM en respuesta al COVID-19, con enfoque en los temas de capacidad y eficiencia de la navegación aérea de la región. A su vez, el OPSAM se encuentra alineado con el Documento 9971 de la OACI y con la Guía para Implantación del Servicio ATFM en la Región SAM 2020-2025, por ende, se prevé que la aplicación del OPSAM, incluso más allá de las Fases de recuperación y resiliencia, fortalecerá a las unidades ATFM de la Región y favorecerá la integración regional del servicio, a través del conjunto de iniciativas que se describen en el presente documento.

1.2 Objetivo

El objetivo del OPSAM es la estructuración de acciones que permitan, durante la fase de recuperación:

a) ajustar la capacidad ATC y Aeroportuaria al aumento gradual de la demanda, a través de las siguientes medidas:
   i. definición de un mecanismo para monitorear la demanda y los posibles limitadores de capacidad;
   ii. optimización del espacio aéreo para que las restricciones que generalmente existen debido a la alta demanda se suspendan temporalmente, o incluso se eliminen, según el nuevo escenario;
   iii. buscar la viabilidad de ejecutar los perfiles de vuelo óptimos planificados por los usuarios; y
   iv. mantenimiento de índices de retraso en niveles adecuados, dependiendo de la demanda y posibles restricciones de capacidad.
b) contribuir con la recuperación y sostenibilidad del sistema de transporte aéreo a nivel regional y global en el nuevo escenario proyectado, priorizando proyectos actualmente en curso en el GESEA y en los Estados, que tengan como objetivo mejorar el desempeño ATC y Aeroportuario, siguiendo los cronogramas y entregas.

1.3 Alcance

Este Plan se aplica a las Regiones de Información de Vuelo (FIR) de la Región SAM, que cubren las principales áreas de control terminal y aeropuertos.

1.4 Validez y actualización

El presente Plan entra en vigor 30 días después de su fecha de aprobación, actualizándose periódicamente, cuando sea necesario, y con vigencia inicial hasta el 31 de diciembre de 2022, y puede cancelarse o extenderse según el estado de la recuperación del sistema de transporte aéreo a nivel regional y mundial.

2 ABREVIATURAS

Los acrónimos utilizados en este Plan tienen los siguientes significados:

ACC	-	Centro de Control de Área
AIP	-	Publicación de Información Aeronáutica
AIS	-	Servicio de Información Aeronáutica
AMHS	-	Sistema de Tratamiento de Mensajes ATS
APP	-	Control de Aproximación
ATC	-	Control de Tránsito Aéreo
ATFM	-	Servicio de Gestión de Flujo de Tránsito Aéreo
ATM	-	Gestión de Tránsito Aéreo
ATS	-	Servicio de Tránsito Aéreo
BRISA	-	Teleconferencia Operacional ATFM SAM
CCO	-	Centro de Control Operacional de las Aerolíneas
CDM	-	Toma de Decisiones en Colaboración
CGNA	-	Centro de Gestión de Navegación Aérea
COVID	-	Coronavirus
FIR	-	Región de Información de Vuelo
FMC	-	Célula de Gestión de Flujo
FPL	-	Plan de Vuelo Presentado
FRTO	-	Free Route Airspace
FUA	-	Uso Flexible del Espacio Aéreo
GESEA	-	Grupo de Estudio e Implantación del Espacio Aéreo SAM
IAF	-	Fijo de Aproximación Inicial
IATA	-	Asociación Internacional de Transporte Aéreo
MCATS/SAM	-	Plan Marco para Contingencias ATS de la Región SAM
NOTAM	-	Información para aviadores
OACI	-	Organización de Aviación Civil Internacional
PDA	-	Plan Diario ATFM
RRSM	-	Mínimas de separación reducidas entre aeronaves que utilizan la misma pista
SID	-	Salida Normalizada por Instrumentos
STAR	-	Llegada Normalizada por Instrumentos
TMA	-	Área de Control Terminal

3 ESCENARIO INICIAL

Poco después de la declaración de pandemia de COVID-19, el GESEA empezó, a través de sus grupos contribuyentes y participación de representantes de los Estados SAM y de IATA, las acciones detalladas a continuación para optimizar los vuelos en las fases de salida, ruta y llegada en las principales áreas terminales (TMA) para satisfacer el nuevo escenario de demanda con la mayor eficiencia posible.

3.1 Optimización de Ruta

EL GESEA ha identificado que la implantación inicial del concepto de Enrutamiento directo estratégico (EDE), alineado al módulo/elemento FRTO B0/1- Direct Routing de la Sexta Edición del GANP, puede incrementar la eficiencia de las operaciones aéreas en el presente escenario de flujos reducidos de aeronaves en la Región, sin requerir costos en equipamiento ni procesos de entrenamiento complejos.

La implementación del EDE en la fase de recuperación deber ser sencilla, basada en los puntos de notificación/waypoints/radioayudas publicadas. Los Estados pueden utilizar los modelos de suplemento AIP que fueron elaborados por el GESEA, bajo las características de cada espacio aéreo. Además del objetivo de proporcionar ahorro de combustible a los usuarios, la implementación del EDE en esta fase será utilizada como forma de ganar experiencia en la aplicación del concepto, en un momento de baja demanda de tránsito aéreo en función de la COVID-19.

La mencionada implantación se basa en la presentación en el aeropuerto de origen de planes de vuelo que consideran, de manera predecible, trayectorias directas entre puntos significativos publicados, incluyendo los de ingreso/salida de las regiones de información de vuelo (FIR), conllevando a la reducción de la distancia volada.

Por ende, al momento de planificar el vuelo con segmentos más cortos, la aerolínea puede definir una menor dotación de combustible en la aeronave apuntando a optimizar el parámetro de carga útil y de consumo, así como reducir las emanaciones de CO2 en la atmosfera.

El GESEA ha desarrollado un material de orientación para implementación del EDE, denominado “Estudios para implantar Enrutamiento Directo Estratégico (EDE)”, el cual fue aprobado por la Reunión SAM/IG/25 (Virtual, 02 – 04 de noviembre 2020) junto a otras iniciativas que se mencionan más adelante, según se presenta en el Informe disponible en el siguiente link:

https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2020-RLA06901-SAMIG25#Informe Final

Este estudio fue circulado a los Estados/Territorio por medio de la carta LN3/24.1 – SA5266, del 11 de septiembre de 2020 y se propuso la implantación del concepto EDE para el 5 de noviembre de 2020, si es viable y existen las condiciones operacionales para los Estados.

En este sentido, en la presente fecha, los siguientes Estados ya han implementado en alguna medida el concepto EDE: Brasil, Chile, Colombia, Ecuador, Guyana, Perú y Venezuela.

4 ESCENARIO PARA LA RECUPERACIÓN

Después de adoptadas las acciones inmediatas de optimización del espacio aéreo enumeradas en el Capítulo anterior lo antes posible, es necesario estructurar nuevas acciones destinadas a la recuperación de las operaciones, un escenario desafiante debido a su dinamismo y falta de precedentes. Dichas acciones deberían permitir adaptar la capacidad ATC y Aeroportuaria al aumento gradual de la demanda y contribuir a la recuperación y sostenibilidad del sistema de transporte aéreo a nivel nacional, regional y mundial en el nuevo escenario proyectado.

En cuanto a la adecuación de la capacidad ATC y Aeroportuario al aumento gradual de la demanda, las acciones detalladas a continuación permiten:

a) definir un proceso para monitorear la demanda y los posibles limitadores de capacidad;
b) optimizar el espacio aéreo para que las restricciones que generalmente existen debido a la alta demanda se suspendan temporalmente o incluso se eliminen de acuerdo con el nuevo escenario;
c) buscar la viabilidad de ejecución de los perfiles óptimos de vuelo planificados por los usuarios; y
d) mantener las tasas de retraso en niveles adecuados de acuerdo con la demanda y las posibles restricciones de capacidad.

Con respecto a la contribución a la recuperación y sostenibilidad del sistema de transporte aéreo a nivel nacional, regional y global en el nuevo escenario proyectado, es necesario priorizar proyectos que tengan como objetivo mejorar el desempeño del ATC y de las operaciones aeroportuarias, siguiendo cronogramas y entregas. Entre los proyectos que se detallan a continuación, destacamos que el GESEA y sus grupos contribuyentes, con la participación de la

industria, hacen uso de un entorno colaborativo y cooperativo y, en consecuencia, representan sus requerimientos**.**

4.1 Optimización de Ruta

El mantenimiento de la optimización de ruta lograda en la fase inicial, mencionada en el capítulo anterior, se llevará a cabo durante el mayor tiempo posible frente al aumento gradual de la demanda, así como se buscará mantenerlas y ampliarla, ya bajo la implementación del elemento FRTO B0/1 del ASBU.

En entornos de alta demanda/complejidad, la viabilidad de mantenerse las rutas directas deberá ser evaluada caso por caso, aplicándose, de ser necesario, el concepto de ***rutas preferentes***, dando prioridad a aquellas que brinden el mayor beneficio a los usuarios, considerando el volumen de tránsito y la reducción de la distancia recorrida. En este sentido, pueden ser necesarios ajustes en las rutas publicadas y/o sectorización del ACC/APP, entre otras medidas.

4.2 Optimización en Llegadas y Salidas

El mantenimiento de la optimización de las llegadas y salidas logradas (véase el capítulo anterior) se llevará a cabo durante el mayor tiempo posible debido al aumento gradual de la demanda a través de las rutas tácticas estandarizadas. Del mismo modo, se analizará la viabilidad de utilizar dichas rutas de forma permanente, en momentos de baja demanda.

4.3 Mínimas de separación reducidas entre aeronaves que utilizan la misma pista (RRSM)

La implementación de mínimas de separación reducidas entre aeronaves que utilizan la misma pista (RRSM), bajo la normativa del Doc. 4444, inciso 7.11, podrá proporcionar las condiciones adicionales para una mayor eficiencia en las operaciones de aterrizaje y despegue, contribuyendo a la reducción del número de esperas en vuelo, reducción del tiempo de TAXI OUT y mayor capacidad de pista.

4.4 Programa de reducción de ocupación de pista y optimización de separación entre aeronaves

El programa para reducir el tiempo de ocupación de la pista y optimizar la separación entre aeronaves en la aproximación final, entre despegues y entre aproximaciones/despegues es una

iniciativa que depende de la actualización de información en el AIP, la realización de una campaña propia y monitoreo de indicadores de desempeño operacional.

La implementación del programa puede proporcionar un aumento en la eficiencia operativa, contribuyendo a la aplicación de la separación mínima de 3NM en la aproximación final, mayor capacidad de pista, menor número de esperas en vuelo y menor tiempo de TAXI OUT.

La experiencia en algunos aeropuertos de la región puede contribuir al inicio de la implementación en otros aeropuertos, como una iniciativa del GESEA, para contribuir a la aplicación de las siguientes mínimas de separación (respetados los criterios de separación para estela turbulenta):

- Separación mínima de 5NM, con un despegue intercalado;
- Separación de 3NM entre aproximaciones sucesivas; y
- Separación de 1 minuto entre despegues sucesivos.

4.5 Nuevo Concepto de Espacio Aéreo en TMA

Un nuevo concepto de espacio aéreo para las principales TMA de la región SAM debe tener como objetivo aumentar la eficiencia y capacidad del espacio aéreo y reducir su complejidad, para absorber la demanda actual y futura. El concepto PBN deberá ser utilizado como importante herramienta para nuevos conceptos de espacio aéreo. Sin embargo, otros factores deben ser considerados, tales como: Utilización plena de las herramientas ATC/vigilancia, SID omnidireccionales, flexibilidad operativa en momentos de baja demanda, etc.

4.6 Capacidad de Pista

Se deberá buscar la maximización del uso de la infraestructura aeroportuaria, incluyendo la capacidad de pista en los principales aeropuertos de la Región SAM, con miras a contribuir con la recuperación y sostenibilidad del sistema de transporte aéreo a nivel nacional, regional y global. Aunque no hay congestión en algunos aeropuertos, los valores pronosticados contribuirán a una aceptación más eficiente de los vuelos en intervalos de menos de 15 y 5 minutos.

4.7 Sectorización

La sectorización ATC es esencial para garantizar la capacidad ATC necesaria para la eficiencia operacional con el uso de rutas directas. La sectorización puede ser horizontal o vertical, dependiendo del escenario operacional específico. El objetivo es aumentar la capacidad de sectores

ATC específicos del espacio aéreo en ruta y TMA, reduciendo la distancia/tiempo de vuelo, el número de esperas en vuelo, la necesidad de medidas ATFM y aumentando la fluidez del espacio aéreo.

4.8 Procedimientos RNP APCH para pistas visuales

La implantación de procedimientos RNP APCH para pistas visuales aumentará la seguridad operacional y la eficiencia en aeropuertos con infraestructura limitada, favoreciendo la accesibilidad y conectividad aérea en los Estados SAM.

La seguridad operacional se beneficiará de las aproximaciones estabilizadas hasta un punto en el que el piloto pueda aterrizar de forma segura, así como las trayectorias IMC establecidas de acuerdo con las mejores prácticas internacionales, reducirán el riesgo de "Vuelo Controlado al Terreno" (CFIT) y Pérdida de Control en Vuelo (LOC-I).

La eficiencia operativa se puede incrementar mediante la aplicación de un procedimiento que permita a la aeronave descender con seguridad a altitudes más bajas, aumentando la accesibilidad y reduciendo el número de vuelos alternados y aproximaciones frustradas.

La implementación de procedimientos RNP APCH para pistas visuales podrá basarse en la Guía Regional para la implementación de procedimientos PBN para señales pistas visuales, aprobada en el Informe de la reunión SAM/IG/25.

4.9 Planes de Contingencia ATS

Con miras a atender al requerimiento de resiliencia ATS, el GESEA ha desarrollado una estrategia de actualización y armonización de los planes de contingencia ATS SAM en cuatro fases:

a) Fase 1 - Elaboración del Plan Marco de Contingencia para la Región SAM (MCATS/SAM), el cual fue aprobado en Reunión SAM/IG/25;
b) Fase 2 - Elaboración de una nueva versión de planes nacionales de contingencias en base al Plan Marco de Contingencia para la Región SAM, sin la necesidad obligatoria de coordinación con los Estados Vecinos.
c) Fase 3 - Estandarización y actualización de los planes de contingencia en la Región Sudamericana, con coordinación obligatoria entre los Estados Vecinos y cartas de acuerdo operacional actualizadas.
d) Fase 4 - Elaboración del Plan Regional de Contingencia ATS.

La fase 1 ya fue concluida y aprobada por la reunión SAM/IG 25 (CONCLUSION SAM/IG/25-02 - Adopción de orientaciones del Plan Marco para Contingencias ATS de la Región SAM (MCATS/SAM) y alineación de Planes Nacionales).

Los objetivos principales del MCATS son:

a) Proporcionar un marco de respuestas de contingencia con el que los Estados de la Región SAM puedan garantizar la continuación controlada de las operaciones de aeronaves en las UIR/FIR afectadas durante los eventos de contingencia, incluyendo el flujo entre las FIR no involucradas;
b) Garantizar respuestas oportunas, armonizadas y adecuadas a todos los eventos que pueden resultar en la interrupción de la prestación del ATS, o en los que esté involucrado el ATS, interrumpiendo, por consiguiente, el movimiento normal de aeronaves;
c) Brindar un mayor grado de certeza a los usuarios del espacio aéreo y aeródromos durante las operaciones de contingencia; y
d) Facilitar la armonización de Planes entre Estados /Territorios /Organizaciones en el límite común de las Regiones CAR/SAM.

Con relación a la fase 2, se espera que los Estados SAM concluyan la elaboración de nuevos planes de contingencia ATS, basados en el MCATS/SAM, en septiembre 2021, con la publicación en el AIP, versiones inglés y español, en noviembre de 2021. A partir de la finalización de la fase 2, se espera que los Estados SAM cuenten con planes de contingencia armonizados con el MCATS/SAM, contribuyendo con la resiliencia del sistema durante la fase de recuperación, por ende serán publicados procedimientos de operaciones de vuelo armonizados por todos los Estados SAM (auto transferencia y TIBA, entre otros).

Con relación a la fase 3, se prevé que los planes de contingencia sean armonizados entre los Estados vecinos, permitiendo la actualización de las cartas de acuerdo operacionales entre los ACC.

La fase 4 tendrá como objetivo la elaboración del Plan Regional de Contingencia ATS, para el caso de contingencia simultanea de dos o más ACC.

5 MONITOREO DE DEMANDA Y CAPACIDAD

El monitoreo de demanda y capacidad está basado en el desempeño de los sectores ATC y de los aeropuertos con el objetivo de identificar su saturación (desbalances) y adoptar acciones de optimización de la capacidad.

La **perspectiva de rendimiento** en los sectores ATC se basa en el mayor valor de la demanda de tránsito aéreo esperada y las aperturas planificadas/máximas de los sectores ATC. Para cada dependencia ATC, la dependencia ATFM evalúa si las aperturas planificadas/máximas de los sectores ATC son suficientes para satisfacer la demanda esperada:

a) si las aperturas planificadas de los sectores ATC son suficientes, no hay necesidad de actualizar los planes de capacidad;
b) si las aperturas planificadas de los sectores ATC no son suficientes, pero las aperturas máximas de los sectores ATC son suficientes, las dependencias ATC revisarán las aperturas planificadas en términos de las aperturas máximas de los sectores ATC; y
c) si las aberturas máximas en los sectores ATC no son suficientes, será necesario tomar medidas para mitigar el impacto.

La **perspectiva de desempeño** en los aeropuertos se basa en el mayor valor de la demanda de tránsito aéreo esperado y en los valores de capacidad, considerando las restricciones existentes o planificadas para el período. En este análisis, la dependencia ATFM debe tener en cuenta:

a) la relación entre la demanda esperada de operaciones de aterrizaje y despegue en el aeropuerto de interés y la capacidad disponible del aeropuerto;
b) las principales restricciones aeroportuarias que pueden afectar la capacidad; y
c) las posibilidades de desequilibrios entre la capacidad y la demanda en el aeropuerto, especificando el día y la hora, cuando ocurra.

Para cada posible desbalance identificado en el análisis, se requieren soluciones de mitigación, que son propuestas a las dependencias ATFM o ATC, aeropuertos o usuarios del espacio aéreo. En este sentido, las medidas para optimizar la capacidad del espacio aéreo y de los aeropuertos de interés incluyen:

a) apertura del sector ATC:
   - aperturas planificadas de sectores ATC

- máximas aperturas posibles de sectores ATC

b) reducciones de capacidad en sectores ATC, durante la recuperación;

c) disponibilidad de refuerzo para el equipo de operaciones;

d) información adicional (por ejemplo, disponibilidad de infraestructura técnica, otras restricciones a destacar, etc.); y

e) eventos especiales e implementaciones.

5.1 Análisis estratégico

El análisis estratégico tiene como enfoque definir la demanda proyectada y comparar con la capacidad disponible, permitiendo identificar posibles desbalances y proponer soluciones de mitigación.

La demanda proyectada es definida considerando los datos de programación de vuelos de transporte aéreo de carga y pasajeros y el pronóstico de demanda de otros operadores aéreos. La capacidad disponible es definida considerando las restricciones de infraestructura o personal durante el período considerado.

El análisis estratégico tiene como objetivo proponer medidas ATFM para el nivel pre-táctico, ayudar a la administración de los horarios de servicio de las dependencias ATC y proporcionar información a los aeropuertos para que sean considerados en la gestión de la capacidad aeroportuaria. En el caso específico de las dependencias ATC, el enfoque inicial del análisis es la escala de refuerzo. Sin embargo, la información proporcionada puede contribuir a la preparación de la escala mensual.

5.2 Análisis pre-táctico

El análisis pre-táctico tiene como enfoque actualizar los datos de demanda proyectada y de capacidad puestos a disposición por el nivel estratégico y reevaluar las medidas sugeridas.

La demanda proyectada en nivel pre-táctico es definida considerando los datos de plan de vuelo, de programación de vuelos de transporte aéreo regular de carga y pasajeros y el pronóstico de la aviación general y militar. La capacidad disponible es definida considerando las restricciones de infraestructura o personal durante el período considerado.

El análisis pre-táctico tiene como producto final el PDA, que debe ser desarrollado para el nivel táctico, incluyendo:

a) Informaciones importantes, por ejemplo, eventos programados (Copa América, G20, etc.), huelgas y días festivos con incremento en el flujo de pasajeros, entre otros;
b) Informaciones relevantes de carácter ordinario, como por ejemplo, cierres de pista, inspección en vuelo, impactos en la capacidad y NOTAMS, entre otros;
c) Informaciones de meteorología; y
d) Medidas ATFM programadas.

5.3 **Análisis Post-operaciones**

El análisis post-operaciones tiene en cuenta el comportamiento del sistema en vista de la demanda procesada y debe comparar la demanda proyectada en el análisis estratégico y la operación que realmente ocurrió, con el objetivo de trabajar con los usuarios para mejorar los mecanismos, así como consolidar las mejores prácticas y lecciones aprendidas durante este proceso. Gradualmente se debe incorporar indicadores claves de desempeño, alienados con el GANP, relacionados al tiempo de taxi y vuelo, así como el consumo de combustible y emisiones CO2.

5.4 Teleconferencia operacional ATFM SAM

Las teleconferencias operacionales ATFM SAM (BRISA) son establecidas con el objetivo de dar soporte al OPSAM, promoviendo el intercambio de informaciones esenciales en los niveles estratégico, pre-táctico y post-operaciones entre los Estados de la región SAM:

a) BRISA – Estratégico y Post-operaciones:
   i. Tipo: Virtual;
   ii. Periodicidad: Mensual;
   iii. Duración: 60 min (mínimo) – 90 min (máximo);
   iv. Contenido:
      - Análisis Post-operaciones;
      - Análisis Estratégico; y
      - Visión general de la demanda por parte de las aerolíneas y aeropuertos.
   v. Perfil de los involucrados:
      - Estados con estructura ATFM: nivel estratégico y post-operaciones o supervisores de las dependencias ATC, conforme el caso;

- Estados sin estructura ATFM: controladores de tránsito aéreo de las principales unidades ATC; y
- Aerolíneas y aeropuertos: Dependencias de planificación de itinerarios.

b) BRISA – Pre-táctico:

i. Tipo: Virtual;

ii. Periodicidad: Semanal;

iii. Duración: 30 min (mínimo) – 60 min (máximo)

iv. Contenido:

- Análisis pre-táctico:
  a) Informaciones importantes, por ejemplo, eventos programados (Copa América, G20, etc.), huelgas y días festivos con incremento en el flujo de pasajeros, entre otros;
  b) Informaciones relevantes de carácter ordinario, por ejemplo, cierres de pista, inspección en vuelo, impactos en la capacidad y NOTAMS, entre otros;
  c) Informaciones de meteorología; y
  d) Medidas ATFM programadas.

v. Perfil de los involucrados:

- Estados con estructura ATFM: nivel pre-táctico y táctico o supervisores de las dependencias ATC, conforme el caso; y
- Estados sin estructura ATFM: controladores de tránsito aéreo de las principales unidades ATC.

5.5 Proceso de Monitoreo

El proceso para monitorear la demanda y los posibles limitadores de capacidad en los niveles estratégico, pre-táctico y post-operaciones para los principales pares de ciudades de la región SAM está establecido en la Tabla 1 siguiente;

Tabla 1 – Proceso de monitoreo de demanda y capacidad

Actividades	Periodicidad	Enfoque(1)	Responsable
Programación de vuelos de transporte aéreo de carga y pasajeros.	Mensual Entregas hasta 5 días hábiles antes de BRISA – Estratégico y Post-operaciones	Datos del mes siguiente	Estados
Pronóstico de demanda de otros operadores aéreos	Mensual Entregas hasta 5 días hábiles antes de BRISA – Estratégico y Post-operaciones	Datos del mes siguiente	Estados
Análisis estratégico	Mensual Para presentar en el BRISA – Estratégico y Post-operaciones	Datos del mes siguiente	Estados
Análisis post-operaciones	Mensual Para presentar en el BRISA – Estratégico y Post-operaciones	Datos del mes anterior	Estados
BRISA – Estratégico y Post-operaciones	Mensual Ultimo jueves del mes a las 1300 UTC	Datos del mes siguiente y del mes anterior	Estados
Análisis pre-táctico	Semanalmente Para presentar en el BRISA – Pre-táctico	Siguientes 7 días Desde miércoles hasta martes de la próxima semana	Estados
BRISA - Pre-táctico	Semanalmente todo martes a las 1300 UTC	Siguientes 7 días Desde miércoles hasta martes de la próxima semana	Estados

(1) Para los efectos de las actividades previstas en el proceso de seguimiento de la demanda y capacidad, el inicio y el final de la semana seguirán la estandarización utilizada en las temporadas IATA, siendo el primer día de la semana el domingo y el último día el sábado. A la vez, se indicará el número de semana del año (de 1 a 52) en el análisis de datos.

Los principales pares de ciudades de la región SAM, así como los productos generados en las actividades detalladas en la Tabla 1 se encuentran disponibles en el link siguiente:

https://app.powerbi.com/view?r=eyJrIjoiNDczYzMxY2EtM2RhZi00ZDY4LWFmZjMtNmI5MTFmNjM5MjY2IiwidCI6IjI2MjI4ZGNhLTcwZDMtNDkxNy04MjMzLTA4M2FjMzY1NWE5MSJ9

APPENDIX D

GUIDE FOR THE IMPLEMENTATION OF ATFM IN THE SAM REGION 2021-2025

INTERNATIONAL CIVIL AVIATION ORGANIZATION
SOUTH AMERICAN REGIONAL OFFICE

GUIDE FOR THE IMPLEMENTATION OF ATFM IN THE SAM REGION 2021-2025

Version 1

September 2021

GUIDE FOR THE IMPLEMENTATION OF ATFM IN THE SAM REGION

2021 – 2025

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CHANGE CONTROL

Version	Date	Change	Pages
Version 1	23 September 2021	Adopted by SAMIG26	

CONTENTS

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.

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.

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.

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.

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/Curitiba 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.

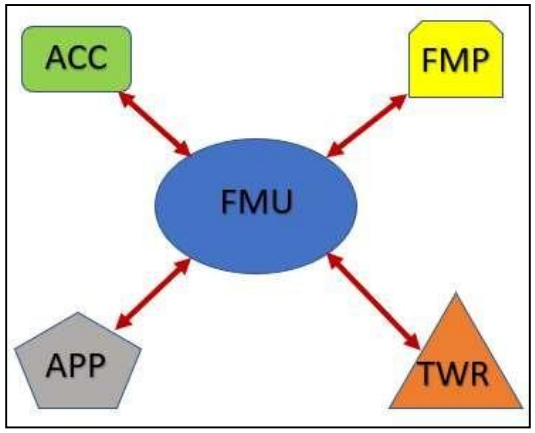

Figure I. National ATFM concept

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.

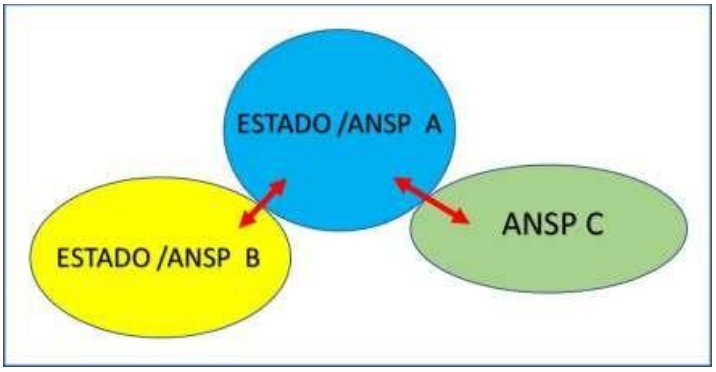

Figure II. Cross-border ATFM concept

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.

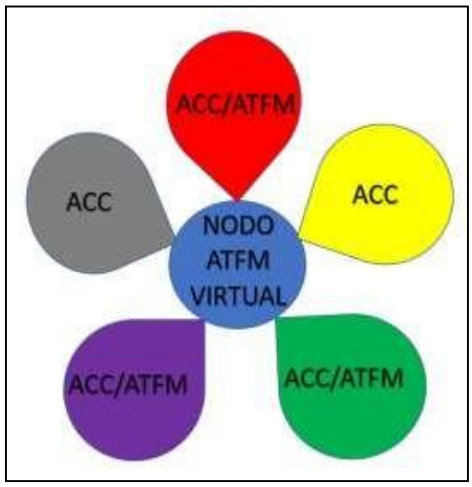

Figure III. Multi-nodal cross-border ATFM concept

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)

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)

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)

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

ICAO GANP PORTAL

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	FRTO-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

This element will ensure:

- 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.

It will require implementation ATFM/ATC systems related to provision, processing and presentation of ATFM messages.

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

Tactical-During ops

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

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.

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:

- 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

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

Phone coordination is reduced.

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

ATFM data presentation and scenario management are new data streams.

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.

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

Manual process is semi-automated.

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 pre-dominant 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 Considerations

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

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

Evolution	NOPS-B0/3 - Network Operation Planning basic features

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 dalay 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

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.

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.

Finally, ATFM has the capability to electronically notify the participating airspace users of the chosen trajectory that they are expected to fly.

Description

CTOP works as follows:

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

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

NOPS-B1/2	Enhanced Network Operations Planning	Operational

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 Considerations

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

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 | Strategical | 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.

PLANNING LAYERS

OPERATIONS

Strategical | Pre-tactical | Tactical-Pre ops

Departure | En-route | Arrival

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	FRTO-B1/1 - Free Route Airspace (FRA)
Relation-operational need	FRTO-B1/2 - Required Navigation Performance (RNP) routes
Relation-operational need	FRTO-B1/3 - Advanced Flexible Use of Airspace (FUA) and management of real time airspace data
Relation-operational need	FRTO-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	FRTO-B0/1 - Direct routing (DCT)
Relation-operational need	FRTO-B0/2 - Airspace planning and Flexible Use of Airspace (FUA)

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

Type of Dependencies	ASBU Element
Relation-operational need	RSEQ-B1/1 - Extended arrival metering

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

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

Target time adherence by AUs and ANSPs.

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

Target time to be presented to affected users.

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

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

AUs and ANSPs to process and comply with target times.

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

1 Contents

2. Acronyms

TBD

3. References

(1) https://en.wikipedia.org/wiki/Performance_indicator

(2) https://www.thebalancecareers.com/key-performance-indicators-2275156

(3)https://esieduc.org/la-importancia-los-indicadores-desempeno-la-gestion-una-empresa/

(4)https://www.gantabi.com/2018/02/20/los-indicadores-kpi/

(5) https://vilmanunez.com/indicadores-kpi/

(6) https://ext.eurocontrol.int/lexicon/index.php/Main_Page

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).
Mesurement 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: • 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: 1. Exclude non-scheduled departures 2. Categorize each scheduled departure as on-time or not At aggregated level: 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).
Mesurement 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	Size of the ATFM slot window. Variant 1: the period between 5 minutes before and 10 minutes after the CTOT. Variant 2: the period between 5 minutes before and 5 minutes after the CTOT.
Data Requirement	For each departing IFR flight subject to an ATFM regulation: • Calculated Take-Off Time (CTOT) • Actual take-off time (ATOT)
Data Feed Providers	Airports, ATFM service
Formula / Algorithm	At the level of individual flights: 1. Exclude flights not subject to an ATFM regulation 2. Categorize each departing flight as compliant with its ATFM slot window or not At aggregated level: 3. Compute the KPI: number of compliant departures divided by total number of departing flights subject to an ATFM regulation
References & Examples of Use	• 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.
Mesurement Units	% excess distance
Operations Measured	The planned en-route distance, as selected during the preparation of flight plans.
Variants	Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace. 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.
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	A '*Measured area*' is defined for which the KPI is computed. For example, a State. A '*Reference area*' is defined as a (sub)regional boundary considered, containing all '*Measured areas*', for example States within the same ICAO Region. Departure terminal area proxy: a cylinder with 40 NM radius around the departure airport. Destination terminal area proxy: a cylinder with 40 NM radius around the destination airport (variant 1). For variant 2 the radius is 100 NM.
Data Requirement	For each flight plan: • 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*' (Points X) • Planned distance for each NX portion of the flight

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: 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)

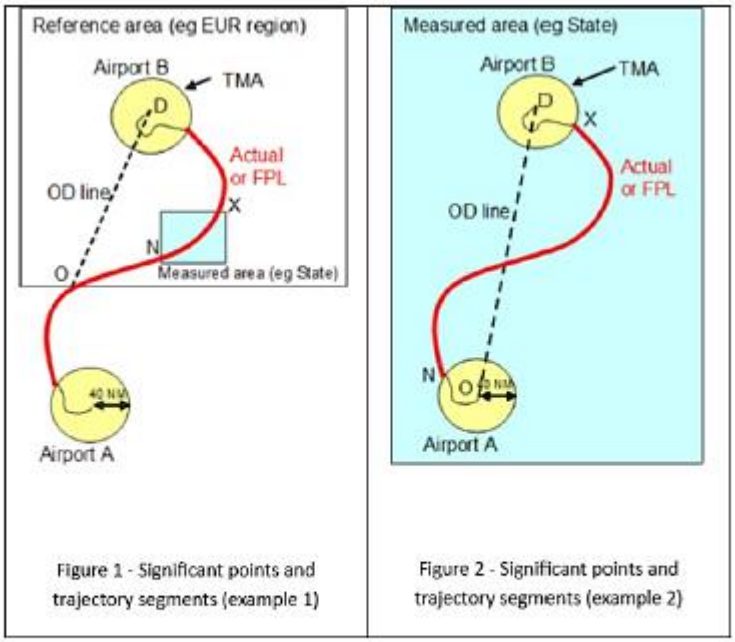

Figure 1 - Significant points and trajectory segments (example 1)

Figure 2 - Significant points and trajectory segments (example 2)

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.
Mesurement Units	% excess distance
Operations Measured	The actual distance flown by flights in en-route airspace.
Variants	Variant 1, using a 40 NM cylinder around the departure and destination airport as the start/end of en-route airspace. 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.
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	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). The KPI is also typically used to estimate the excess fuel consumption and associated emissions (for the Environment KPA) attributed to horizontal flight inefficiency.
Parameters	Identical to the parameters of the 'Filed Flight Plan en-Route Extension' KPI.
Data Requirement	For each actual flight trajectory: • 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	• 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
Definition	ATFM delay attributed to flow restrictions in a given en-route airspace volume
Mesurement 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: 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: 4. Compute the KPI: sum of ATFM delays divided by number of IFR flights crossing the airspace
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)

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.
Mesurement 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	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 • Airport or terminal 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: 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 At aggregated level: 4. Compute the KPI: sum of ATFM delays divided by number of arrivals at the airport
References & Examples of Use	• 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)
Mesurement Units	% of scheduled flights
Operations Measured	IFR arrivals of scheduled airlines
Variants	Variant 1A – % of arrivals within ± 5 minutes of scheduled time of arrival Variant 1B – % of arrivals delayed ≤ 5 minutes versus schedule Variant 2A – % of arrivals within ± 15 minutes of scheduled time of arrival Variant 2B – % of arrivals 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: 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	On-time threshold (maximum positive or negative deviation from scheduled arrival time) which defines whether a flight is counted as on-time or not. Recommended values: 5 minutes and 15 minutes.
Data Requirement	For each arriving scheduled flight: • Scheduled time of arrival (STA) or Scheduled in-block time (SIBT) • Actual in-block time (AIBT)
Data Feed Providers	Schedule database(s), airports, airlines and/or ANSPs
Formula / Algorithm	At the level of individual flights: 1. Exclude non-scheduled arrivals 2. Categorize each scheduled arrival as on-time or not At aggregated level: 3. Compute the KPI: number of on-time arrivals divided by total number of scheduled arrivals
References & Examples of Use	• 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:

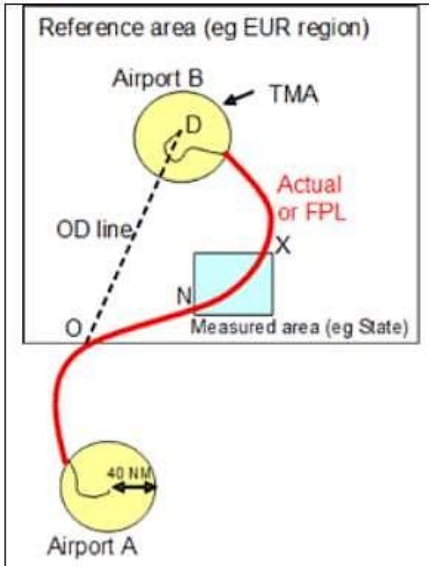

Figure 1 - Significant points and trajectory segments (example 1)

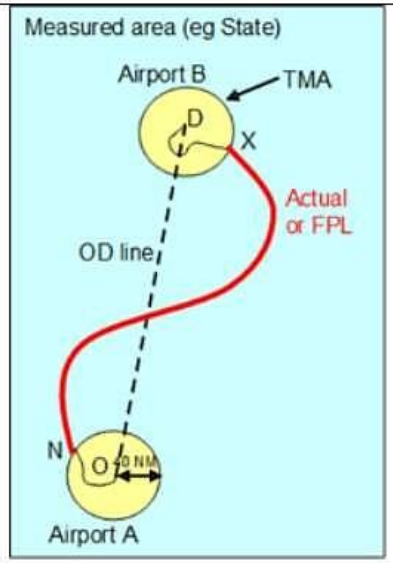

Figure 2 - Significant points and trajectory segments (example 2)

			A	B	C	D = A - B	E = C - B
CallSign	**Origen**	**Destino**	**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= Demoras ATFM en minutos/ TOTAL VUELOS IFR = 78 minutos /19 vuelos = 4.10 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

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

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APPENDIX E – ATFM TERMINOLOGY AND COMMUNICATIONS

CONTENTS

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

Acronym	*Term*	*Definition*
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

Acronym	*Term*	*Definition*
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:

Flight event times	*Scheduled*	*Flight plan*	*ATFM measure*	*ATFM system estimate*	*Actual*
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:

Circumstance	*Phraseology*
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 (*time*)
Change to CTOT resulting from a slot revision.	REVISED CTOT (*time*)
CTOT cancellation resulting from a slot cancellation.	CTOT CANCELLED, REPORT READY
Flight suspension until further notice.	FLIGHT SUSPENDED UNTIL FURTHER NOTICE, DUE (*reason*)
Flight de-suspension.	SUSPENSION CANCELLED, REPORT READY
Start-up requested too late to comply with the given CTOT.	CTOT EXPIRED, REQUEST A NEW CTOT

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

APPENDIX F - IMPLEMENTATION OF ATFM SLOTS

CONTENTS

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
NEWRTE	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
- 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	**SAM: slot allocation message** Sent to AOs/ATC 2 hours before the last EOBT received. 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.	Sent to AOs/ATS 2 hours before the last EOBT received. AOs/ATCs must comply with CTOT.
- TITLE SRM - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0925 - NEWCTOT 1037 - REGUL XXXX -COMMENT CLDT 100303 1237 - TAXITIME 0010 - REGCAUSE XXXX	**SRM: slot revision message** Submitted to AOs/ATC to approve or confirm any revisions to a CTOT after issuance of the initial SAM. This message can be used to indicate an increase or reduction of a delay.	The SRM notifies of a significant slot change. AOs/ATC must comply with the NEWCTOT.
- TITLE SLC - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0925 - TAXITIME 0010	**SLC: Slot cancellation message** Sent to AO / ATC to notify that a flight that has received a CTOT is no longer subject to a restriction.	The flight can depart without restriction unless a new message is received later.

- TITLE FLS - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0815 - TAXITIME 0010	**FLS: Flight suspension message** 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. The flight will enter suspension mode on the ATFM website.	The flight must be suspended in order to become active again via the ATFM website.
- TITLE DES - XXXX ABC123 - ADEP XXXX - ADES XXXX - EOBD 100303 - EOBT 0815 -COMMENT CLDT 100303 1015 -TAXITIME 0010	**DES: Flight de-suspension message** Sent to AO / ATC to cancel the suspension, a SAM will be sent as well.	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.

Agenda Item 3: Report of activities and deliverables of the Interop TF and Subgroups

a) Review of air navigation priorities in the CNS field
b) CNS Implementation. Progress of the Subgroups.
c) Proposed Conclusions
d) Formulation of the 2022 Work Plan

3.1 At the beginning of the third working day, an EASA representative made a presentation on the EU-LAC APP (America and Caribbean Aviation Partnership Project) and the EU-Latin America & Caribbean cooperation in the field of Air Navigation Services (ANS).

3.2 La The EASA presentation is available at the following link:

https://www.icao.int/SAM/Documents/2021-RLA06901-SAMIG26/SAMIG26_%20P7%20EASA%20Intro.pdf

3.3 Under this agenda item, the following papers were reviewed:

a) WP/3.1 - *Activities carried out in the GT INTEROP Subgroups* (presented by the Secretariat)
b) WP/3.2 - *Work Plan 2022 of the GT INTEROP* (presented by the Secretariat)
c) WP/3.3 - *Progress report of the GT Interop and Subgroups in Argentina* (presented by Argentina)
d) NI/3.1 - *Peru's progress in ATM/FPL Sub-group* (presented by Peru)
e) NI/3.2 - *Inclusion of the Date of Flight (DOF) field for the Acceptance message format - ACK* (presented by Peru)

3.4 The Meeting analyzed the following matters:

Review of air navigation priorities in the CNS field.

3.5 The participants were informed that the air navigation priorities in the CNS field are: operational implementation of the ATS Inter-Unit Data Communication (AIDC) between the planned automated control centers, adoption of the measures indicated in the ATM/FPL Roadmap for the mitigation of errors and duplication of flight plans, the definitive implementation of the ATS Message Routing System (AMHS) in the new context of Aeronautical Messaging and migration of all AFTN users (human and automated), implementation of Space-based ADS-B (SB ADS-B) through a Regional Technical Cooperation Project, using the SAM Region Digital Network (REDDIG II) as a platform for the distribution of surveillance information and adaptation of the systems used by users of aeronautical meteorology to the new IWXXM format.

CNS Implementation. Subgroups Advances

3.6 Under this agenda item, the main deliverables provided by the activated subgroups, as well as the progress achieved to date, were pointed out.

ATM/AIDC Subgroup

3.7 On 26 February, 2021, AIDC tests were carried out between ACC Barranquilla - ACC Kingston and ACC Bogotá - ACC CENAMER, to verify whether there were still CRC errors, found in tests previously carried out.

3.8 During the tests, it was found that the CRC errors no longer occurred, even when the routing of the messages was changed via the COM Centers in Lima and Panama. The personnel of the ACCs involved recognized that other adjustments in the automated systems (database) are necessary for the perfect functioning of the AIDC communication.

3.9 On 4 May, 2021, a teleconference was held with the participation of representatives of Brazil, Colombia, Venezuela, the Subgroup Rapporteur, an EASA representative, and the automated centers manufacturers (Atech and Indra), to discuss the establishment of the AIDC connections of the ACC Barranquilla - ACC Maiquetía, ACC Bogotá - ACC Maiquetía and ACC Amazónico - ACC Maiquetía.

3.10 Regarding the AIDC connections of the ACCs of Colombia and Venezuela, it was reported that the problems presented in the ABI Message (fields 13 and 16) were solved, through an adaptation carried out by Atech in the ACC Maiquetía system, in order to accept one or two line breaks for the information in these fields. However, other adjustments related to the systems database were detected and would be implemented.

3.11 During the Second Workshop/Meeting of the Interop TG Subgroups (GT INTEROP/2 - Virtual, from 9 to 13 August, 2021) the States representatives updated the information on the progress of AIDC implementation. **Appendix A** to this part of the Report presents a summary of the information provided.

ATM/FPL Subgroup

3.12 The Meeting took note of the seminars held with the support of EASA's EU-LAC APP Project (America and Caribbean Aviation Partnership Project) on 29 to 31 March, 2021 and 1 to 3 June, 2021, when the topic of regional centralization of flight plan management was discussed with the presentation of the functions of the Network Manager system, by representatives of Eurocontrol.

3.13 During these seminars, other initiatives were presented, such as the automated systems being implemented in Brazil (DECEA) and in Central America (COCESNA).

3.14 The Meeting deliberated on the proposal made by Ecuador to include one more element to the acceptance message (ACK) defined in the ATM/FPL Roadmap. The element to be included would be the flight date (DOF - Date of Flight), in order that there is a better correlation and correspondence with the flight plan presented by the air operator.

3.15 In this regard, the Meeting agreed to adopt the proposal presented by Ecuador. The necessary changes in the ATM/FPL Roadmap will be made by the Rapporteur of the subgroup and the Secretariat will circulate the new version of the document among the participants.

CNS/AMHS Subgroup

3.16 The Meeting was informed that, on 26 April, 2021, the pre-operational tests (POT) were concluded and the interconnection of the COM AMHS Centers of Caracas (Venezuela) and Piarco (Trinidad & Tobago) was established, through REDDIG II.

3.17 In the period from 17 to 21 May, 2021, the Advanced AMHS Course was virtually held, with the participation of personnel from 11 member States of the Regional Project RLA/06/901 (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Panama, Paraguay, Peru, Uruguay and Venezuela).

3.18 In the period from 25 to 27 May, 2021, the Second Workshop/Meeting of Supervisors/Operators of COM AMHS Centers of the SAM Region was carried out, with the participation of 54 representatives of 13 States of the SAM Region (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Panama, Paraguay, Peru, Suriname, Uruguay and Venezuela), 3 representatives from EASA and 2 officers from the SAM Office.

3.19 During the event, the States presented the progress in the preparation and approval of their contingency plans for the COM AMHS Centers; they discussed the standardization of the information to be entered in the AMC database (AMHS Address Management Center of EUROCONTROL); they discussed updating the AMHS routing tables; and received information on topics related to the COM AMHS Centers, such as the implementation of the new OPMET Regional Bank in Brasilia, the increasingly frequent use of direct exchange of aeronautical information (database to database), using new formats for this exchange (AIXM, FIXM and IWXXM) and the basic fundamentals of the SWIM Concept.

3.20 At the GT INTEROP/2 Workshop/Meeting, the CNS/AMHS Subgroup participants took note of the progress of AMHS implementation. So far, 26 of the 28 intraregional interconnections have already been implemented, only subtracting the interconnections of the Montevideo COM Center with the Brasilia and Ezeiza COM Centers. **Appendix B** to this part of the Report presents the status of AMHS implementation in the SAM Region.

3.21 Brazil has reported that it has already carried out successful tests between the COM Centers in Brasilia and Lisbon, but the operational activation was affected due to the pandemic. It was highlighted that the establishment of this interconnection provides a second route for the European continent, which currently only has the Brasilia - Madrid interconnection, via the CAFSAT network.

CNS/SUR Subgroup

Seminars/Workshops on ADS-B implementation

3.22 The Meeting took note that in the beginning of 2021, seminars/workshops on ADS-B implementation were held from the perspective of an Air Navigation Service Provider and two manufacturers from the aeronautical application systems industry.

3.23 In the period from January 26 to 29, 2021, in coordination with the NACC Office, the FAA gave a workshop on ADS-B, which was attended by 250 people from 24 NAM/CAR States and 10 SAM States. Other participants connected from Europe and Africa.

3.24 As a final recommendation, the event identified opportunities for improvement that States can implement in their current and future surveillance projects, optimization in the use of ADS-B data to support the implementation of the different ASBU elements and taking into account future technology.

3.25 Also, coordinated by the NACC Office, two virtual workshops were held on surveillance technologies (ADS-B and WAM/MLAT), on 10 February, 2021 with the Thales company and on 17 February, 2021 with the Indra company.

Space-based ADS-B Implementation through a Regional Technical Cooperation Project

3.26 The Meeting was informed of the progress made in relation to Conclusion RCC/25-7 Space-based ADS-B Implementation through a Regional Technical Cooperation Project, which is an initiative that has the interest of two States of the SAM Region (Chile and Panama) and a State of the CAR Region (Trinidad & Tobago).

3.27 Within the framework of the Regional Technical Cooperation Project RLA/03/901, an Ad-hoc Group was created, made up of Chile, Panama and Trinidad & Tobago, to carry out the analyzes and prepare the documents necessary for the implementation.

3.28 TCB (Technical Cooperation Bureau) has provided the information and costs that an implementation would involve through the Regional Technical Cooperation Project RLA/03/901 (REDDIG). Likewise, a draft of technical specifications was prepared and circulated for review by the 3 States interested in the implementation of Space-based ADS-B.

3.29 The interested States are evaluating the administrative costs charged by ICAO and the draft technical specifications, a definition being awaited to give continuity to the process.

3.30 During the Workshop/Meeting GT INTEROP/2, the Aireon company presented a new specific proposal for an implementation through an ICAO Technical Cooperation Project. Below is a summary of the proposal:

1) The previous cost of USD 275,000.00 for each *Service Delivery Point*, would be reduced to USD 125,000.00 with 2 to 3 States participating in the Regional Project. If more than 3 States participate in the Project, the cost would drop to USD 50,000.00 for each SDP implemented.
2) The cost of the surveillance information for a 5-year contract would be according to the following table:

Service Volume	ICAO Prices (2021)	Prices 2022
High Density/Sole Source	$42	$44
Low Density/Sole Source	$21	$22
Low Density/ Augmenting existing surveillance/ Contingency	$8.5	$9
Medium Density/ Augmenting existing surveillance/ Contingency	$5.25	$5.50
High Density/ Augmenting existing surveillance/ Contingency	$3.15	$3.30
Ultra High Density/ Augmenting existing surveillance/ Contingency	$1.05	$1.10

3) The company would provide free 2 users of Aireon's situational awareness *display* in each State participating in the Project and one user for the SAM Regional Office.

4) One year (free) of information from the SAM Region for ATFM purposes.
5) The company provides (free of charge) 50 NM of adjacent airspaces for ATS planning purposes. This easiness would solve surveillance data exchange issues, once the ANSP that contracts the services has the information from the adjacent centers close to its area of responsibility, increasing situational awareness.

3.31 During SAM/ IG/26, a representative from COCESNA made a presentation on the implementation process of Space-based ADS-B (SB ADS-B) in the Pacific oceanic part of the CENAMER FIR, highlighting the operational benefits, security and strategic.

MET/IWXXM Subgroup

3.32 The Meeting took note of the holding of two important events related to the adoption of the new IWXXM format for meteorological messages: *Workshop on the OPMET International Bank of Brasilia*, and *Seminar/Workshop on adapting Aeronautical Meteorology Systems to the new IWXXM format*.

3.33 The first event was held virtually, from 13 to 14 April, 2021, with the aim of familiarizing MET and CNS staff with the facilities and functionalities of the Brasilia OPMET Data Bank, and as a final result, the training of - at least- 2 MET technicians and 2 CNS technicians from the AMHS area of each State with knowledge of the IWXXM formats of OPMET messages, in support of their implementation, as well as the data quality control procedures of the referred Bank.

3.34 After holding the Workshop on the OPMET International Bank of Brasilia, the SAM Office organized the Seminar/Workshop *on adapting Aeronautical Meteorology Systems to the new IWXXM format*, virtually, from 18 to 19 May, 2021.

3.35 At this event, the following topics were presented:

- General Purpose of OPMET Messages in IWXXM format;
- IWXXM Implementation Guide for the MET Panel;
- Infrastructures necessary for the exchange of OPMET Messages in IWXXM format; and
- Progress of the States of the SAM Region in the implementation of the IWXXM format.

3.36 The Secretariat informed that as soon as it receives from Brazil (DECEA) the Interface Control Document (ICD) and the guidelines for connection, via webservice, to the new system of the OPMET International Bank of Brasilia, it will be circulated to the States of the SAM Region.

3.37 Likewise, the Meeting learned that, during the Workshop/Meeting GT INTEROP/2, the Rapporteur of the Subgroup informed that tests were carried out between the OPMET Regional Banks of Brasilia and Brussels, with satisfactory results so far. Testing will continue during the second half of 2021.

Proposed Conclusions

Activation of a new Subgroup of the GT Interop

3.38 The Meeting deliberated on the formation of a new subgroup with the responsibility of supporting the review of the information contained in Vol II of the CAR/SAM Air Navigation Plan, as well as providing support in the preparation of Vol III of the CAR/SAM ANP, on CNS issues.

3.39 In this sense, a conclusion proposal was prepared for approval at the Plenary Meeting and presented in Agenda Item 4 of this report.

Formulation of the 2022 Work Plan

3.40 The Meeting deliberated on the activities to be carried out in 2022, with the support of resources from the Regional Technical Cooperation Project RLA/06/901. In Item 4 of this report, the 2022 Work Program of the Interop TF is presented.

APPENDIX A

REGIONAL IMPLEMENTATION OF AIDC

ARGENTINA
As a result of the errors detected, the implementation of the AIDC is temporarily suspended by disabling the AIDC fields in the ACCs, until the problems can be solved to achieve the interconnections with the adjacent ACC. Work is under way on a process of updating automated ATM systems and AMHS systems.

BOLIVIA
The implementation of the AIDC in the Thales system is planned for 2022. A new AMHS system will also be purchased. From that moment on, it will be possible to start tests with the adjacent ACC.

BRAZIL
AIDC interconnection with Lima ACC in pre-operational phase. Pending solution by Atech of the problem of the LRM/62, as well as verify the format of the ABI message that is sent to Lima ACC regarding the information of fields 10 and 18 referring to equipment of the aircraft.
AIDC interconnections at the domestic level 100% implemented.

CHILE
AIDC interconnection between Iquique ACC and Cordoba ACC in test. AIDC interconnection at the domestic level is 100% implemented, except with the Santiago ACC and Oceanic airspace. Pending update of the Thales system of Santiago ACC to interconnect it with the adjacent ACC at the national level, and with Lima ACC at the international level.

COLOMBIA
AIDC interconnections implemented with Guayaquil ACC and Lima ACC.
AIDC interconnections at the domestic level between Bogota ACC and Barranquilla ACC and domestic APPs with independent ATM system.
Locally there are some LRM/57 problems (possibly because the adjacent ACC or APP has assumed the tracks in advance, or the coordination was done manually before the AIDC performed it automatically). Pending completion of local training.
Interconnection with Panama ACC operational, but no Letter of Agreement was signed due to ATM problems outside the AIDC.
Interconnection with CENAMER ACC pending CDN solution.
Successful tests with Kingston simulator. Kingston's operational ATM system (Thales) is being updated.
Pre-operational tests with Maiquetia's system (SAGITARIO) in process, awaiting update of Maiquetia's system by ATECH.
The interconnection with Amazon ACC is pending completion.
Colombia has organized several documents and other information concerning the implementation of AIDC in a *share point* and makes it available to other States.

ECUADOR
AIDC interconnections implemented with Lima ACC, Bogota ACC and CENAMER ACC.

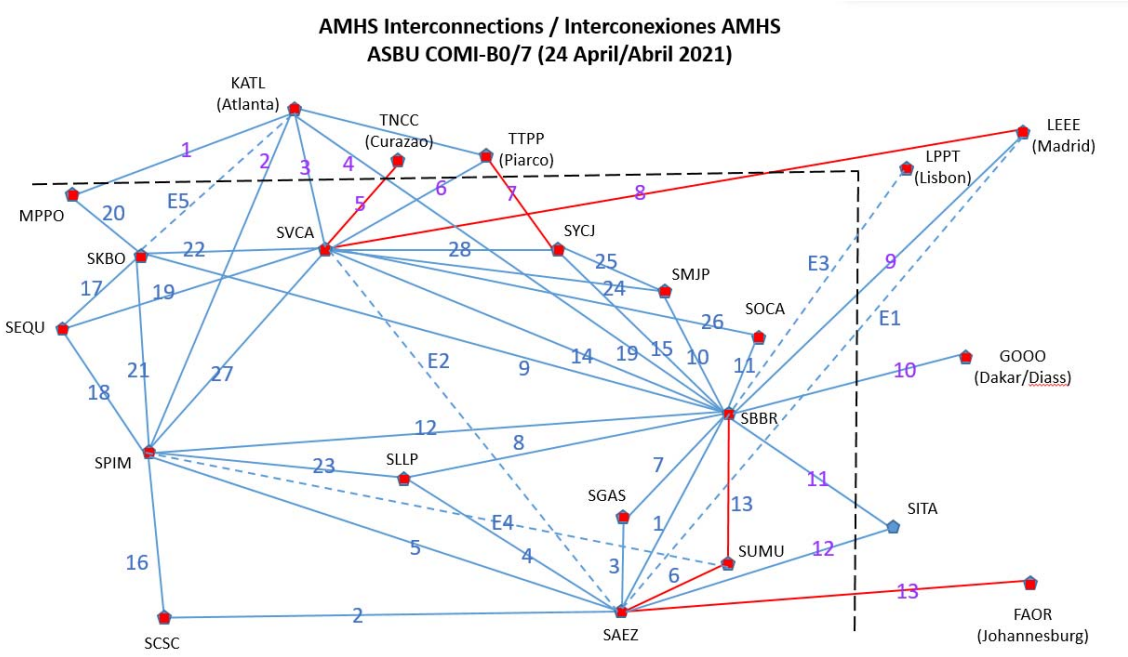
PANAMA
AIDC interconnection with Barranquilla ACC operational. Letter of Agreement needs to be signed.

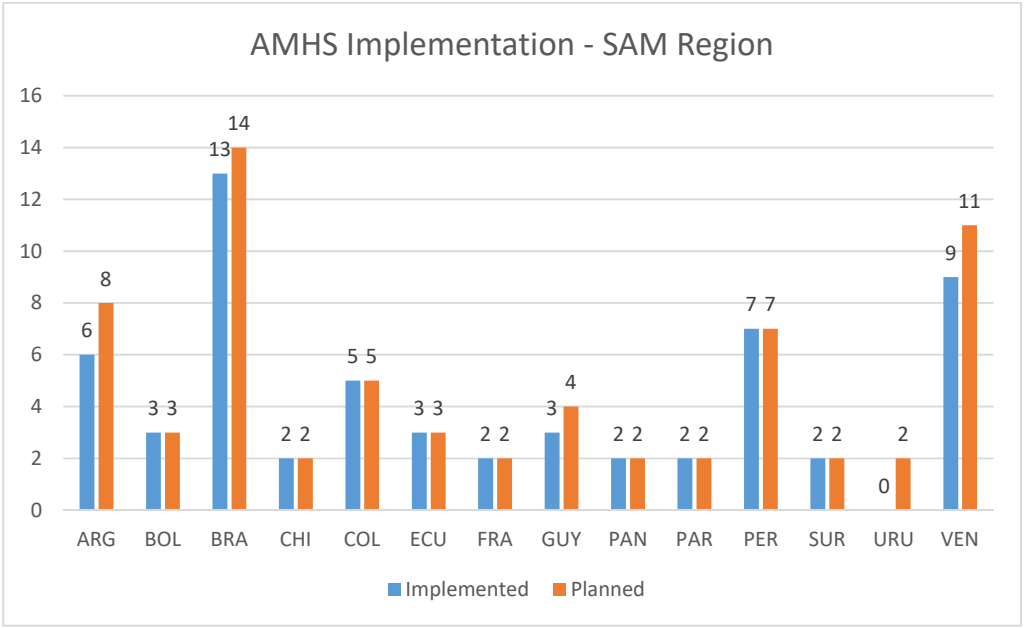
PARAGUAY
The implementation of the SARGITARIO system in Asunción was impacted by the pandemic. Once the implementation of the system is completed, the AIDC tests with the adjacent centers will be started.

PERU
AIDC interconnections implemented with Guayaquil ACC, Bogota ACC and Iquique ACC.
The interconnection with the Amazon ACC continues in the pre-operational phase. Successful tests in the SPIM-SBAZ direction. In the SBAZ-SPIM direction, there is an apparent incompatibility between the ABI message sent by the SAGITARIO system to the Indra system of Lima ACC, referring to Field 10 (Equipment). It is in the process of being analyzed. SAGITARIO LRM message processing pending (continues to send LRM/62 for any errors). The representative of ATECH stated that a new version will be provided in the second half of 2021, with the solution of these points.
Interconnection with Santiago ACC (Oceanic) continues suspended waiting the modernization of the Thales system of Santiago.

VENEZUELA
It is in pre-operational tests with the Barranquilla FIR. Fixed problem with the receipt of the ABI message and another error has been detected indicated by both INDRA and SAGITARIO systems, such as LRM/62. Another test is planned and it is also pending that ATECH update the SAGITARIO software, scheduled for this second half of 2021, which would facilitate the determination and solution of this error.

APÉNDICE B / APPENDIX B





Agenda Item 4: SAM/IG conclusions and next actions - Plenary

a) Summary of Sessions
b) Review and approval of Conclusions
c) Approval of the 2022 Work Plan

4.1 Under this Agenda item, the SAM/IG Meeting, formed in Plenary, analyzed the following notes:

a) WP/4.1 - *Analysis and summary of the GESEA group and formulation of conclusions for consideration by the SAM/IG/26 plenary* (presented by the Secretariat)
b) WP/4.2 - *2022 Working Plan* (presented by the Secretariat)
c) WP/4.3 - *Deliverables of the Interop TF and proposals for conclusions* (presented by the Secretariat)

4.2 The Meeting formed in plenary, with the participation of the Air Navigation Directors and/or their representatives, received from the Secretariat executive summaries of the two groups formed: GESEA and GT Interop.

4.3 At the same time, it was agreed that the 2022 Work Plan for GESEA and the Interop TF, consider the uncertainty regarding travel limitations and administrative aspects that would affect the execution of face-to-face meetings/workshops at the Regional Office.

4.4 The Secretariat was in charge of coordinating the calls for the activities at least three (03) months in advance, taking into account the expected scenario that allows the execution in face-to-face mode. Planning, therefore, will be carried out based on tentative dates, which could be rescheduled.

4.5 Likewise, the Secretariat will analyze for each event in particular the possibility of adding virtual means or teleconferences during face-to-face Meetings, when part of the convened States cannot transfer their participants to the Regional Office, specifying that the viability of said means would depend on the format and objectives of each event and on the resources available in terms of information technology, personnel, etc.

Conclusions on GESEA matters

4.6 The deliberations and topics presented by the GESEA were reported, as well as the characteristics and content of the deliverables prepared by the SG1, SG2 and SG3 subgroups. These issues are detailed in Agenda Item 2 of the report.

4.7 In this regard, two Conclusions were approved, as detailed below.

CONCLUSION SAM/IG/26-01	**Adoption of the ATFM Operations Plan (OPSAM)**
That: The States adopt the ATFM Operations Plan (OPSAM) and provide for the permanent participation of their ATFM services in the sharing of data for the Regional Dashboard of indicators and the BRISA operational teleconferences. At the same time, that the participation in the OPSAM of airlines, airports and users be encouraged in each State.	**Expected impact:** ☐ Political / Global ☐ Inter-regional ☒ Economic ☒ Environmental ☒ Technical/Operational
Why: To adjust ATC and Airport capacity to the gradual increase in demand, and contribute to the recovery and sustainability of the air transport system at a regional and global level in the new projected scenario. Likewise, to reinforce the use of KPI indicators in the management of ATFM and ATM in general.	
When: Immediately	**Status:** Adopted by SAM/IG/26
Who: ☐ Coordinators ☒ States ☒ ICAO Secretariat ☐ ICAO HQ ☐ Others: Users/Industry	

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CONCLUSION SAM/IG/26-02	**Adoption of the Guide for the implementation of ATFM in the SAM Region 2022-2026**
That: The States adopt the Guide for the implementation of ATFM in the SAM Region 2022-2026, in a harmonized manner with the regional integration objectives of said service and considering the implementation phases and expected deadlines.	**Expected impact:** ☐ Political / Global ☐ Inter-regional ☒ Economic ☒ Environmental ☒ Technical/Operational
Why: For the SAM States to implement national ATFM or cross-border ATFM services that are adapted to the magnitude of the air traffic flow that their ATS services manage, and that respond correctly to the solution of imbalances in the demand/capacity in the Region.	
When: Immediately	**Status:** Adopted by SAM/IG/26
Who ☐ Coordinators ☒ States ☒ ICAO Secretariat ☐ ICAO HQ ☐ Others: Users/Industry	

2022 Work Plan on GESEA matters

4.8 In accordance with the aforementioned conclusions, and addressing the matters analyzed by GESEA, in accordance with its terms of reference, and to facilitate the implementation of SAM/IG air navigation, the 2022 Work Plan was analyzed.

4.9 After the deliberations, the work plan for the year 2022 was approved, requesting the Secretariat that it be presented for consideration and endorsement of RCC/15 of RLA/06/901, which will meet in December 2021, according to the following Table:

Activities	Objectives / Deliverables	Tentative Dates
Plenary Meeting GESEA	• Organization of the implementation of concepts according to deliverables of 2021 Subgroups. • Review and adjustments of the PTA. • Monitoring of activities.	Virtual, 9 to 11 March
GESEA SG1 Meeting Airspace Planning	• Continuation of scheduled studies. • Monitoring of implementation and optimization activities	Virtual, 30 March to 1 April
GESEA SG2 Meeting PANS OPS	• Continuation of scheduled studies. • Monitoring of activities for the implementation of operational elements of the APTA module and optimization of TMA.	Virtual, 6 to 8 April
GESEA SG3 Meeting ATFM	• Continuation of scheduled studies. • Monitoring of implementation and optimization activities of the ATFM service.	Virtual, 25 to 27 April
Workshop/Meeting on data management and ATFM regional indicators	• Standardization of ATFM data. • Analysis of demand forecasts and indicators. • Power BI application for Regional and national analysis.	Lima, 18 to 22 July
Workshop/Meeting on Methodology for ATFM Capactiy Calculation	• Application of the updated Calculation Manual. • Planning activities for measurement (or update) of capacity in the Region.	Lima, 22 to 26 August
Preparation of regional guide material on airspace planning regulations.	• Material on the formulation of projects for airspace implementation/optimization of airspace.	Lima, 5 to 16 September
Workshop for Airspace Planners.	• At least one planning specialist per Member State trained in airspace design and organization techniques - ASM	Mission: Lima, 10 to 14 October Workshop: Lima, 17 to 21 October

SAMIG/27 Air navigation implementation priorities considered in GREPECAS programs, VOL III Regional ANP and Regional initiatives.	• Continue with the activities of implementation, execution and optimization under the GESEA studies. • Sign the latest LOA ATS and Harmonize contingency plans • Action plans derived from the CONOPS South American airspace efficiency - capacity and elements of VOL III of the ANP.	Lima, 23 to 27 May
SAMIG/28 Air navigation implementation priorities considered in GREPECAS programs, VOL III Regional ANP and Regional initiatives.	• Follow-up • Continue with the activities of implementation, execution and optimization under the GESEA studies. • Sign the latest LOA ATS and Harmonize contingency plans • Action plans derived from the CONOPS South American airspace efficiency - capacity and elements of VOL III of the ANP.	Virtual, 19 to 22 September
1st Workshop/Meeting on optimization of ATS coordination and SAM/ATS/ATFM Contingency Plans - SAM SUR.	• Regional harmonization based on MCATS • Update operational letters of agreement between States, including ATS Contingency Plans and including ATFM. Subscription of Agreements. • Promote the implementation of the minimum separation of 20 NM in continental space.	Lima, 2 to 6 May
2nd Workshop/Meeting on optimization of ATS coordination and SAM/ ATS/ATFM Contingency Plans - SAM NORTH.	• Regional harmonization based on MCATS • Update operational letters of agreement between States, including ATS Contingency Plans and including ATFM. Subscription of Agreements. • Promote the implementation of the minimum separation of 20 NM in continental space.	Lima, 6 to 10 June
Workshop/Meeting on Flexible Use of Airspace (FUA) and Civil - Military Cooperation in the ATM.	• Analysis for the implementation of the operational element FRTO-B0/2. • Dissemination and analysis of the new ICAO document 10088.	Lima, 7 to 11 November

Conclusions on matters of the Interop TF

4.10 The deliberations and topics presented by the Interop TF were reported, as well as the characteristics and content of the deliverables prepared by the ATM/AIDC, ATM/FPL, CNS/AMH, CNS/SUR and MET/IWXXM subgroups. These issues are detailed in the Agenda Item 3 of the report.

Review and approval of Conclusions

4.11 As indicated in point 3.39 of Agenda Item 3 of this report, the Meeting approved the following conclusion:

<table>
<tr><td colspan="2">Conclusion SAM/IG/26-03</td><td>Review of the CNS tables of Vol. II of the CAR/SAM Air Navigation Plan and support in the preparation of Vol. III of the CAR/SAM ANP, on CNS issues</td></tr>
<tr><td colspan="2">That:
a) The CNS/ANP Subgroup, activated at the SAM/IG/26 Meeting, review the CNS tables contained in Vol. II of the CAR/SAM Air Navigation Plan, referring to the information of the SAM States and provide support in the preparation of Vol. III of the CAR/SAM ANP, on CNS issues;

b) The Secretariat circulate a letter to the SAM States for them to nominate participants of the CNS/ANP Subgroup; and

c) The SAM States nominate representatives in a sufficient number to carry out the tasks assigned to the CNS/ANP Subgroup.</td><td>Expected impact:

☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Technical/Operational</td></tr>
<tr><td colspan="3">Why:
Update the information in Vol. II of the CAR/SAM Air Navigation Plan and provide support in the preparation of Vol. III of the CAR/SAM ANP, which concerns CNS planning aspects.</td></tr>
<tr><td colspan="2">When: Immediately</td><td>Status: Adopted by SAM/IG/26</td></tr>
<tr><td colspan="3">Who:
☒ Coordinators ☒ States ☒ ICAO SAM Secretariat ☐ Others:</td></tr>
</table>

2022 Work Plan on GT Interop matters

5 Under this agenda item, the Meeting discussed the 2022 Work Plan of the Interop TF.

5.1 After the deliberations, the work plan for the year 2022 was approved, requesting the Secretariat to present it for consideration and support at the RCC/15 Meeting of the Regional Technical Cooperation Project RLA/06/901, according to the following Table:

Activities	Objectives / Deliverables	Tentative Dates
Activities for the preparation of VOL III of the CAR/SAM ANP	Preparation of VOL III, participation of all SAM and CAR States. Use of the AN SPA, and filling out forms and template.	TBD Multiple meetings in virtual mode
SAM/IG/27 Air navigation implementation priorities considered in GREPECAS programs, VOL III Regional ANP and Regional initiatives.	Continue with the implementation, execution and optimization activities under the GESEA and GT Interop studies. (5 days)	Lima, 23 to 27 May, 2022
SAM/IG/28 Air navigation implementation priorities considered in GREPECAS programs, VOL III Regional ANP and Regional initiatives.	Continue with the implementation, execution and optimization activities under the GESEA and GT Interop studies. (4 days)	Virtual, 19 to 22 September
GT INTEROP/3 Third Workshop/Meeting of the GT Interop Subgroups.	Provide a meeting to the participants of the Interop GT Subgroups, to consolidate the previous work carried out, with the objective of finalizing the products and deliverables that will be presented to the SAM Region Implementation Group (SAM/IG). (4 days)	Virtual, 14 to 17 March, 2022
COM AMHS/3 Third Workshop/Meeting of Supervisors/Operators of COM AMHS Centers of the SAM Region	This is an event for the exchange of information and experiences between the supervisors/operators of the COM AMHS Centers of the SAM Region. Review of routing tables. Review of Contingency Plans. (4 days)	Lima, 21 to 24 February, 2022
Advanced AMHS Course	Training aimed at technical and operational staff who maintain and operate the AMHS system and that are involved in the implementation of AMHS interconnections. (5 days)	Virtual, 15 to 19 August, 2022

Agenda item 5: Other business

5.1 Under this agenda item, the following papers were reviewed:

a) WP/5.1 – *Result of the safety assessment of SAM RVSM airspace* (presented by the Secretariat)
b) WP/5.2 – *Workshop/meeting on flexible use of airspace (FUA) and civil-military cooperation in ATM (presented by the Secretariat*)

Result of the airspace safety assessment

5.2 The Meeting reviewed the conclusions of the twenty-first meeting of the Scrutiny Group (GTE/21) held in August this year, which analysed the monitoring results during the period January-December 2020. See the report of the meeting at:

https://www.icao.int/SAM/Pages/ES/MeetingsDocumentation_ES.aspx?m=2021-RLA06901-IIGTINTEROP&t=1

5.3 Regarding SAM FIRs, a vertical risk of 2.04667 x 10^{-9} was obtained, and although this risk value was below the TLS of 5.0 x 10^{-9}, it was higher than the average risk calculation for the CAR/SAM Regions.

5.4 When analysing the risk value for each FIR, four flight information regions of the SAM region were identified as having a risk level above the TLS. The trend in LHD types had remained the same since 2016, with those with code "E - Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors" accounting for 95% of total safety occurrences in the CAR/SAM Regions.

5.5 The analysis revealed that some of these code "E" occurrences had flight plans as their root cause. Some States noted that there were still difficulties in processing some flight plans, especially for aircraft flying direct from point to point, because, since their flight plan did not include the FIR entry point, the system did not process it correctly, generating a chain of events leading to a coordination error between FIRs.

5.6 The experience in the analysis of RVSM airspace monitoring data has shown that the implementation of information exchange technology such as AMHS and AIDC, or the exchange of radar surveillance signals to improve coverage had a significant impact on the reduction of LHDs, mainly those related to the "E" code, thus improving airspace safety by reducing coordination errors.

5.7 The States and the Secretariat reiterated their commitment to prioritise the coordination of actions to improve flight plan management, the use of AIDC and other mitigations to reduce LHD occurrences to 'zero'at each identified hotspot.

Flexible use of airspace (FUA) and civil-military coordination in ATM

5.8 The Meeting assessed the need to request the support of RLA/06/901 to hold in 2022 a workshop/meeting on flexible use of airspace (FUA) and civil-military cooperation in ATM. Doc. 10088 -

Manual on Civil-Military Cooperation in Air Traffic Management, issued in 2021, provides information and guidance to the relevant aviation authorities on the establishment of a civil-military cooperation and coordination framework, aimed at improving and optimising airspace management and use, as well as ensuring and strengthening trust between the civil and military sectors.

5.9 The Guidelines for the implementation of the flexible use of airspace (FUA) concept in the South American Region were issued in April 2012. This material needs to be reviewed and updated in light of new documentation produced by ICAO.

5.10 It was agreed that the holding of a workshop/meeting on flexible use of airspace (FUA) and civil-military cooperation in ATM would allow SAM States to conduct a joint analysis of ICAO documentation and provide feedback for the drafting of a regional guide on this matter. The initiative was included in the 2022 Work Plan.

CNS matters

5.11 Regarding the Interop TF, the Secretariat noted that a NAM/CAR/SAM workshop on the ICAO position at the International Telecommunication Union (ITU) 2023 World Radio Conference (WRC-23) would be held on 20 October 2021 (UIT).

5.12 At this event, participants would have the opportunity to discuss the WRC-23 agenda items and other frequency management issues with CNS officers from Headquarters (Montreal) dealing with aeronautical frequency spectrum management (FSMP).

5.13 On this issue, the IATA representative expressed concern about interference to on-board systems (radio altimeter), due to the implementation of mobile communication systems (5G). In this regard, the Secretariat stressed the importance that aeronautical authorities in each State participate in discussions with the telecommunications regulatory bodies or agencies, in order to protect aeronautical service systems from interference.

Information presented

5.14 A presentation was made on the technical activities of Hughes Aerospace in the field of PANS OPS design, in-flight validation and safety assessment. The presentation is available on the website of the Meeting.