



SAM/IG/1  
WP/02  
04/01/08

**International Civil Aviation Organization  
South American Regional Office**

**FIRST WORKSHOP/MEETING OF THE SAM IMPLEMENTATION GROUP (SAM IG/1)  
REGIONAL PROJECT RLA/06/901**

**Lima, Peru, 21 to 25 April 2008**

**Agenda Item 1: Optimization of the ATS routes structure in Terminal and en-route airspace and implementation of performance based navigation (PBN) in the SAM Region.**

**GENERAL ASPECTS OF PROJECT RLA/06/901 ON PERFORMANCE-BASED NAVIGATION**

(Presented by the Secretariat)

**Summary**

Some background information that has been incorporated in Project RLA/06/901 is presented in this working paper, the expected result in PBN issues is identified, once the project is finalized, the initial activities for planning and implementation of PBN in the SAM Region are submitted for consideration of the meeting.

**References:**

- Doc 9750 – Global Air Navigation Plan (Third Edition 2007)
- Project RLA/06/901.

**1 Background**

1.1 As it may be recalled, and according with the Global Air Navigation Plan (Doc 9750), planning will be focused in the group of Global Plan Initiatives (GPIs). These initiatives are options for improvement of air traffic, and as they are implemented, they will result in a direct increase in the performance. Project RLA/06/901 proposes, among others, to provide assistance to States and Organizations participating in the implementation of the following initiatives of the global plan, which shall enable the application of the performance-based navigation (PBN) concept:

GPI-5	Performance-based navigation
GPI-7	Dynamic and flexible management of ATS routes
GPI-10	Terminal area design and management
GPI-11	RNP and RNAV SIDs and STARs
GPI-12	FMS-based arrival procedures
GPI-21	Navigation systems

## 2 Discussion

### Performance-based navigation (PBN)

2.1 A significant number of aircraft have the capacity required for area navigation (RNAV) and the required navigation performance (RNP). These capacities should be further exploited to develop more efficient routes and aircraft paths that are not directly linked to air navigation ground aids. Some RNAV-equipped aircraft are also capable of better meeting runway sequencing requirements, especially through the use of the “required time of arrival” function of the flight management system (FMS).

2.2 The performance-based navigation (PBN) concept, recognises that, when designating operations, a clear distinction must be made between aircraft operations that require an airborne autonomous performance control and alert system and those that do not require it. The global navigation satellite navigation (GNSS)-oriented PBN permits a seamless, harmonious and profitable navigation from departure to final approach, thus resulting in safety, efficiency and capacity benefits. Short-term GNSS applications are aimed at enabling the early introduction of satellite-based area navigation, without the need to invest in infrastructure, using the basic satellite constellations and the integrated multiple-sensor systems on board the aircraft. The use of these systems already provides greater reliability of non-precision approach operations at some airports.

### Situation foreseen upon completion of the project

2.3 The coordinated and homogeneous planning and implementation of performance-based navigation through the use of various initiatives of the global air navigation plan in the CAR/SAM Regions will have been accomplished, together with the exchange of experiences throughout the process, and of information and knowledge through meetings, seminars and other training activities, with a view to the application of the performance-based navigation (PBN) concept, which will translate into greater capacity and efficiency through reduced separation minima, thus benefiting operators that equip their aircraft to meet performance requirements. PBN will also enhance safety, particularly during approach, through a reduction of controlled flight into terrain events.

### Immediate objectives of Project RLA/06/901

2.4 The Project has defined several immediate objectives oriented towards the implementation of a safe, integrated, interoperable, and cost-efficient regional ATM system, within a global safety and interoperability framework that meets the needs of international civil aviation. Immediate objective N° 1 contemplates the development and implementation of ATM and CNS operabilities based on the global air navigation plan initiatives that will lead to the transition from an air traffic management system based on ground systems to another one based on aircraft performance. In this connection, Immediate objective N° 1 contemplates a series of activities oriented to performance-based navigation (PBN) framed within GPIs 5, 7, 10, 11 and 12. For a better ease of reference, these activities are attached as **Appendix A** to this working paper.

2.5 On the other hand, GREPECAS/14, through Conclusion 14/41 has defined and approved ATM Performance Objectives supported by a series of Global Plan Initiatives which includes ATS routes structure optimisation, within the terminal, and en-route airspace and the implementation of RNP approaches which shall enable to obtain benefits in the fields of environment, efficiency and safety. For a better reference, **Appendix B** includes these performance objectives.

3 **Suggested action**

3.1 The meeting is invited to:

- a) Take note of the information provided in this working paper; and
- b) During the implementation of performance-based navigation, take into consideration PBN activities shown in Appendix A to this working paper.

\* \* \* \* \*

**APPENDIX A**

**Immediate Objective N° 1**

<b>Results</b>	<b>Activities</b>	<b>Party responsible for each activity</b>
<p>1.1 Implementation of performance-based navigation (PBN) – (GPIs 5, 7, 10, 11, 12, and 21).</p>	<p>1.1.1. Obtain and complete the information, learning about the current status in the participating States and organisations with respect to:</p> <ul style="list-style-type: none"> <li>a) Available CNS infrastructure, with the corresponding coverage and plans for future facilities;</li> <li>b) Characteristics of available ATM automated systems and future automation plans;</li> <li>c) Aircraft fleet operating in the CAR/SAM ATS route network and its RNAV and RNP capabilities, including capacity for arrival procedures based on the flight management system (FMS) and future plans of the users;</li> <li>d) Airworthiness and operational approval capabilities;</li> <li>e) Airports that might derive operational benefits from the use of RNAV and/or RNP;</li> <li>f) Status of implementation of WGS 84;</li> <li>g) Existing SIDs and STARs connecting international airports to ATS routes;</li> <li>h) Real-time and accelerated simulation of operations;</li> <li>i) Cost-benefit analysis of facilities;</li> <li>j) Safety assessment models;</li> <li>k) Regulation of GNSS use (secondary, primary means)</li> <li>l) Documentation concerning the training of air traffic controllers;</li> <li>m) Terminal control area design and control.</li> </ul> <p>Start up date: week 1 Estimated duration: 2 weeks</p>	<p>ATM, RO</p>
	<p>1.1.2. Analyse the application of GNSS to support all flight stages, including:</p> <ul style="list-style-type: none"> <li>a) The required ground navigation infrastructure for the operations contemplated in current plans, based on the development of system technology;</li> <li>b) En-route operations without using precision values with RNAV-5 (continental airspaces) and with RNP-4 (oceanic airspaces);</li> </ul>	<p>ATM, CNS, RO</p>

	<p>c) TMA operations (RNAV 1) and approaches (RNP 0,3 and RNP AR), with ABAS;</p> <p>d) Operational benefits of using GBAS, taking into account the impact of the implementation of Galileo and the L5 frequency on the GPS, likely implementation dates, and the convenience of including APV operations in the planning. Start up date: week 3 Estimated duration: 2 weeks</p>	
	<p>1.1.3. Develop a model action plan based on the information processed in 1.1.1 and 1.1.2, to be used by the participating States and organisations in the implementation of PBN in TMA and approach, according to the following regional planning:</p> <p>I. Short term (until 2010)</p> <p>a) Terminal area operations, including standard instrument departures and arrivals (RNAV 1 in radar environments with the proper navigation infrastructure and RNP 1 in non-radar environments without the proper DME coverage infrastructure); and</p> <p>b) Instrument flight rule approaches (RNP 0.3 in as many aerodromes as possible and in all international airports, and RNP AR in airports deriving operational benefits).</p> <p>II. Medium term (2011 to 2015)</p> <p>a) Terminal area operations, including standard instrument departures and standard instrument arrivals (extended application of RNAV1/RNP1 and mandatory use of RNAV1/RNP1—exclusionary airspace—in TMAs with greater air traffic density); and</p> <p>b) Instrument flight rule approaches (extended application of RNP 0.3 in as many aerodromes as possible and in all international airports, RNP AR in airports deriving operational benefits, and start-up of the application of GLS procedures).</p> <p>Start-up date: week 5 Estimated duration: 1 week</p>	ATM, OR
	<p>1.1.4. Develop guidelines based on the information processed under 1.1.1, 1.1.2, and 1.1.3, to be used by the participating States and organisations in the</p>	ATM, RO

	<p>implementation of PBN in TMA and approach, including the following main tasks:</p> <ul style="list-style-type: none"> <li>a) Cost-benefit analysis;</li> <li>b) Safety assessment;</li> <li>c) Design of procedures;</li> <li>d) Real-time and accelerated simulation of operations;</li> <li>e) ATC automated systems;</li> <li>f) Training of air traffic controllers;</li> <li>g) Aircraft and operator approval;</li> <li>h) Terminal control area design and management;</li> <li>i) Model regulations for GNSS application (primary, secondary means, operational restrictions, etc.).</li> </ul> <p>Start-up date: week 6 Estimated duration: 4 weeks</p>	
	<p>1.1.5. Develop an action plan based on the information processed under 1.1.1 and 1.1.2 for the implementation of PBN for en-route operations, according to the following regional planning:</p> <p>I. Short term (until 2010)</p> <p>Oceanic airspace RNP 10 and continental airspace RNAV 5.</p> <p>II. Medium term (2011 to 2015)</p> <p>Oceanic airspace RNP 4 and selected continental airspaces RNP 2.</p> <p>Start-up: week 11 Estimated duration: 1 week</p>	<p>ATM, OR</p>
	<p>1.1.6. Prepare a working paper supporting the submission of the model action plan and guidelines for PBN implementation in TMAs and approach, and the action plan for PBN implementation, for consideration and approval.</p> <p>Start-up date: week 11 Estimated duration: 1 week</p>	<p>ATM, RO</p>
	<p>1.1.7 Submit the working paper to the consideration of the corresponding GREPECAS bodies through the established channels.</p>	<p>RO</p>

	<p>Start-up date: to be determined Estimated duration:</p>	
	<p>1.1.8 Make the necessary adjustments or changes to the material mentioned in 1.1.6 based on the comments generated, and update the proposal and working paper for consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	ATM, RO
	<p>1.1.9 Process, edit, and distribute the material, introducing the amendments made by GREPECAS during its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.1.10 Determine and develop the necessary material for PBN implementation for en-route operations, in coordination with the participating States and organisations, taking into account environmental protection methods and procedures, and including the following aspects:</p> <ul style="list-style-type: none"> <li>a) PBN operational concept;</li> <li>b) Cost-benefit analysis;</li> <li>c) Aircraft and operator approval requirements and processes;</li> <li>d) Modification of national norms and airspace regulations;</li> <li>e) RNAV and RNP document formats to be included in the CAR/SAM web;</li> <li>f) Required AICs/NOTAMs and AIP supplements;</li> <li>g) Amendment to Doc 7030 as required;</li> <li>h) Amendments to the corresponding letters of agreement;</li> <li>i) Procedures for pilots and ATC;</li> <li>j) Procedures to accommodate non-RNAV and non-RNP aircraft where applicable;</li> <li>k) Transition procedures, if necessary;</li> <li>l) ATC training;</li> <li>m) Post-implementation follow-up plan.</li> </ul> <p>Start-up date: to be determined Estimated duration:</p>	ATM, CBA, OPS, AIR, RO
	<p>1.1.11 Provide assistance to the participating States and organisations for the implementation of the PBN</p>	ATM, OPS, AIR, RO

	<p>implementation action plan, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined Estimated duration:</p>	
	<p>1.1.12 Prepare a final report on activities performed, including relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	ATM
<p>1.2 Regional implementation of air traffic flow management (ATFM) wherever necessary to improve airspace capacity and operational efficiency -(GPI 6)</p>	<p>1.2.1 Obtain and complete the information, learning about the current status in the participating States and organisations with respect to:</p> <ul style="list-style-type: none"> <li>a) The methods for estimating airport and ATC capacity;</li> <li>b) ATFM procedures for the following phases: <ul style="list-style-type: none"> <li>✓ Airport strategic</li> <li>✓ Airport tactical</li> <li>✓ Airspace strategic</li> <li>✓ Airspace tactical</li> </ul> </li> </ul> <p>Start-up date: week 12 Estimated duration: 1 week</p>	ATM, AGA, RO
	<p>1.2.2 Obtain and complete the information, learning about the current status in the participating States and organisations of the electronic databases required for the ATFM evolutionary phases, in relation to the following aspects:</p> <ul style="list-style-type: none"> <li>a) Flow management data processing and display: <ul style="list-style-type: none"> <li>✓ Flight planning and flight plan processing data (FPL, RPL, etc.);</li> <li>✓ Airspace and airport structure data;</li> <li>✓ Display of the situation in the air;</li> <li>✓ Automatic messages to support decision-making (access to SLOTS, reporting of delays, alternate routes, etc.);</li> <li>✓ Monitoring of the operational status of air navigation infrastructure;</li> <li>✓ Capacity of the airport acceptance regime (AAR);</li> <li>✓ ATC capacity;</li> <li>✓ Air traffic demand;</li> <li>✓ Airspace structure and ATS route network;</li> </ul> </li> </ul>	ATM, AIS, AGA, CNS, MET, RO

	<ul style="list-style-type: none"> <li>✓ Radio navigation aids, radar, etc.;</li> <li>✓ Aircraft performance.</li> <li>b) Surveillance system data (SSR, ADS, etc.);</li> <li>c) AIS/MAP (mapping, ATFM advisories, AIRAC updates, etc.);</li> <li>d) Meteorological information (MET);</li> <li>e) Data for historical and statistical analysis of air operations, meteorology, etc.;</li> <li>f) Communication systems in support of collaborative decision-making (CDM) with: <ul style="list-style-type: none"> <li>✓ Other centralised ATFM systems;</li> <li>✓ Other FMUs and/or FMPs and/or ATS units;</li> <li>✓ Operators and users (airlines, general aviation, State aircraft, etc.);</li> <li>✓ Airport authorities;</li> <li>✓ Meteorological authorities;</li> <li>✓ Aeronautical information services.</li> </ul> </li> <li>g) The necessary communication requirements to effectively support centralised air traffic flow management in its linkage with: <ul style="list-style-type: none"> <li>✓ Other centralised ATFM systems;</li> <li>✓ FMUs, FMPs and/or ATS units involved;</li> <li>✓ Operators and users;</li> <li>✓ Airport authorities;</li> <li>✓ Meteorological authorities;</li> <li>✓ Aeronautical information services;</li> <li>✓ The transmission of ADS and radar data to the ATFM.</li> </ul> </li> </ul> <p>Start-up date: week 13 Estimated duration: 1 week</p>	
	<p>1.2.3 Develop model action plans based on the information processed under 1.2.1 and 1.2.2, to be used by the participating States and organisations for the implementation of:</p> <ul style="list-style-type: none"> <li>a) Airport strategic ATFM;</li> <li>b) Airport tactical ATFM;</li> <li>c) Airspace strategic ATFM; and</li> <li>d) Airspace tactical ATFM.</li> </ul> <p>Start-up date: week 14 Estimated duration: 4 weeks</p>	ATM, RO
	<p>1.2.4 Develop guidelines, based on the information processed in the preceding activities, to be used by the participating States and organisations for the implementation of flow management units (FMUs) or flow management positions (FMPs) and for the incorporation of new procedures applicable to FMUs or</p>	ATM, RO

	<p>FMPs concerning:</p> <ul style="list-style-type: none"> <li>a) Airport strategic ATFM;</li> <li>b) Airport tactical ATFM;</li> <li>c) Airspace strategic ATFM; and</li> <li>d) Airspace tactical ATFM.</li> </ul> <p>Start-up date: week 18 Estimated duration: 4 weeks</p>	
	<p>1.2.5 Develop a model action plan, based on the material processed in the preceding activities, for the implementation of the centralised ATFM in each of the CAR and SAM Regions.</p> <p>Start-up date: week 22 Estimated duration: 1 week</p>	ATM, RO
	<p>1.2.6 Draft a working paper to support the submittal of the action plan for the implementation of the centralised ATFM for consideration and approval.</p> <p>Start-up date: week 23 Estimated duration: 1 week</p>	ATM,RO
	<p>1.2.7 Submit the working paper introducing the plan to the consideration of the corresponding GREPECAS bodies through the established channels.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.2.8 Make the necessary adjustments or changes to the plan based on the comments generated, and update the proposal and the working paper for consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	ATM, RO
	<p>1.2.9 Process, edit, and distribute the plan, introducing the amendments that GREPECAS may have made in the course of its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.2.10 Identify and develop the necessary material for the implementation of the centralised ATFM, in coordination</p>	ATM, CNS, AIS, RO

	<p>with the participating States and organisations, taking into account environmental protection practices and procedures, and including the following aspects:</p> <ul style="list-style-type: none"> <li>a) Cost-benefit analysis;</li> <li>b) Definition of data collection plans;</li> <li>c) Determination of the required automated systems, including performance parameters and the necessary tests and assessments;</li> <li>d) Updating of the CAR/SAM ATFM operational concept, if necessary;</li> <li>e) Drafting of a handbook on common operational procedures for air traffic flow management, including, <i>inter alia</i>, the following aspects: <ul style="list-style-type: none"> <li>✓ Procedures applicable to the strategic, pre-tactical, and tactical phases;</li> <li>✓ Procedures for coordination and teleconferencing with FMUs/FMPs, ATS units, ATFM, users, airports, and other organisations involved;</li> <li>✓ Collaborative decision-making procedures;</li> <li>✓ Methodology to determine airport and ATS capacity;</li> <li>✓ Procedure to keep ATFM databases permanently updated;</li> <li>✓ Procedures for pilots and ATC;</li> <li>✓ Required ATFM messages.</li> </ul> </li> <li>f) Models of the required AICs/NOTAMs and AIP supplements;</li> <li>g) ATFM document formats to be included in the CAR/SAM web;</li> <li>h) Amendment to Doc 7030, if necessary;</li> <li>i) Amendments to the corresponding letters of agreement;</li> <li>j) ATC simulations;</li> <li>k) Harmonisation of applicable ANP requirements;</li> <li>l) ATFM training;</li> <li>m) Contingency plans.</li> </ul> <p>Start-up date: to be determined Estimated duration:</p>	
	<p>1.2.11 Provide assistance to the participating States and organisations for the execution of the ATFM implementation action plan, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined</p>	<p>ATM, OR</p>

	Estimated duration:	
	1.2.12 Draft a final report of the activities carried out, including relevant recommendations.  Start-up date: to be determined Estimated duration:	ATM
1.3 Implementation of communication and surveillance (CNS) capacity improvements for en-route and terminal area operations – (GPIs 6, 7, 9, 17, 18, and 22)	1.3.1 Obtain and complete the information, learning about the current status in the participating States and organisations with respect to:  a) Existing CNS facilities and equipment; b) Regional planning and documentation on existing CNS; c) Aeronautical message handling systems (AMHS); d) Very high frequency data link (VDL) and high-frequency data link (HFDL); e) ATS interfacility data communication (AIDC); f) Automatic dependent surveillance by contract (ADS/C); g) Automatic dependent surveillance by broadcast (ADS/B); h) Multilateration, etc.; i) Communication protocols used.  Start-up date: week 22 Estimated duration: 2 weeks	CNS, ATM, RO
	1.3.2 Analyse the operational scenarios of existing and planned ATS, in order to determine the operational requirements for improving communication and surveillance systems in the short and medium term, as well as other operational requirements to meet future ATM expectations, using, <i>inter alia</i> , the following tools:  a) Aeronautical message handling system (AMHS), b) Very high frequency digital link (VDL), c) ATS interfacility data communication (AIDC), d) Automatic dependent surveillance by contract (ADS/C), e) Automatic dependent surveillance by broadcast (ADS/B), f) Multilateration, etc.  Start-up date: week 24 Estimated duration: 2 weeks	CNS, ATM, RO
	1.3.3 Prepare a cost-benefit analysis of the various options available for communication and surveillance systems, comparing the existing structure with the	CBA, CNS, ATM,RO

	<p>improvement resulting from the implementation of the new systems, also taking into account the existence of two or more technologies to meet the same operational requirement (for example: multilateration or ADS/B).</p> <p>Start-up date: week 26 Estimated duration: 2 weeks</p>	
	<p>1.3.4 Develop a regional interface protocol (IP) addressing implementation plan for ATN applications.</p> <p>Start-up date: week 28 Estimated duration: 1 week</p>	CNS, ATM, RO
	<p>1.3.5 Identify medium- and long-term GNSS implementation requirements to provide support during all flight phases, taking into account:</p> <ul style="list-style-type: none"> <li>a) The results of trials conducted under projects RLA/00/009 and RLA/03/902;</li> <li>b) The status of development of GNSS technology;</li> <li>c) The coordination activities and training programmes required.</li> </ul> <p>Start-up date: week 29 Estimated duration: 1 week</p>	CNS, RO
	<p>1.3.6 Develop a strategy for the implementation of communication, navigation, and surveillance improvements in the CAR/SAM Regions, taking into account the information obtained in the preceding activities.</p> <p>Start-up date: week 30 Estimated duration: 2 weeks</p>	CNS, ATM, RO
	<p>1.3.7 Develop a model action plan, based on the information processed in the preceding activities, to be used by the participating States and organisations in the implementation of improvements to CNS capabilities for en-route and terminal area operations, including the inputs and the programming of the necessary coordination and training activities.</p> <p>Start-up date: week 32 Estimated duration: 1 week</p>	CNS, ATM, RO
	<p>1.3.8 Draft a working paper to support the submittal of the strategy and action plan for the implementation of improvements to en-route and terminal area CNS</p>	CNS, ATM, RO

	<p>capabilities, for consideration and approval.</p> <p>Start-up date: week 33 Estimated duration: 1 week</p>	
	<p>1.3.9 Submit the working paper introducing the strategy and plan to the consideration of the corresponding GREPECAS bodies, through the established channels.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.3.10 Make the necessary adjustments or changes to the strategy and the plan based on the comments generated, and update the proposal and the working paper for their consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	CNS, ATM, RO
	<p>1.3.11 Process, edit, and distribute the strategy and the plan, introducing the amendments that GREPECAS may have generated in the course of their approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.3.12 Follow up on the implementation of CNS facilities and capacity improvements for en-route and terminal area operations in the CAR/SAM Regions, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined Estimated duration:</p>	CNS, RO
	<p>1.3.13 Draft a final report on all the activities carried out, including the relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	CNS, ATM
<p>1.4 Implementation of improvements to aerodrome design and management -(GPIs 13 and 14)</p>	<p>1.4.1 Obtain and complete the information, learning about the current status of international aerodromes in the participating States, including:</p> <ul style="list-style-type: none"> <li>a) Available runways and their characteristics;</li> <li>b) Design and utilisation of the movement area;</li> <li>c) Number, location, and utilisation modality of aircraft parking positions;</li> <li>d) Available handling services;</li> </ul>	AGA, RO

	<p>e) Aircraft arrival and departure procedures; f) Flight scheduling; g) Number of operations during peak hours.</p> <p>Start-up date: week 32 Estimated duration: 2 weeks</p>	
	<p>1.4.2 Develop a model action plan to be used by the participating States and organisations for the implementation of improvements to the design and management of international aerodromes, with a view to:</p> <ul style="list-style-type: none"> <li>a) Using aerodrome resources and ground handling services more efficiently;</li> <li>b) Reducing delays;</li> <li>c) Achieving greater predictability in flight programming;</li> <li>d) Increasing capacity by improving aircraft arrival, parking, and departure procedures;</li> <li>e) Improving coordination among all parties, in order to make efficient use of parking areas;</li> <li>f) Optimising collaborative decision-making processes among ATM service providers, vehicle operators and aircraft operators;</li> <li>g) Optimising the use of the movement area by introducing the necessary structural improvements, such as: <ul style="list-style-type: none"> <li>✓ Additional taxiways;</li> <li>✓ Runways that run parallel to the main runways for two-way traffic;</li> <li>✓ Additional runway exits, including high-speed or fast-exit taxiways;</li> <li>✓ Improved lighting and signs, etc.</li> </ul> </li> <li>h) Sharing key data on flight programming among all stakeholders;</li> <li>i) Optimising surface traffic through improved organisation of ground vehicle movement in the manoeuvring area;</li> <li>j) Reducing runway occupation time, taking into account: <ul style="list-style-type: none"> <li>✓ Airspace user performance;</li> <li>✓ ATS provider performance;</li> <li>✓ Surface area design;</li> <li>✓ Aircraft performance capabilities;</li> <li>✓ Surveillance capabilities;</li> <li>✓ Aircraft spacing;</li> <li>✓ Meteorological limitations;</li> </ul> </li> </ul>	<p>AGA, ATM, RO</p>

	<p>✓ Application of improved procedures to minimise spacing.</p> <p>k) Increasing safety and environmental protection.</p> <p>Start-up date: week 34 Estimated duration: 2 weeks</p>	
	<p>1.4.3 Develop guidelines based on the information processed under 1.4.1 and 1.4.2, to be used by the participating States and organisations for the implementation of international aerodrome design and management improvements that imply increasing capacity and reducing holding times.</p> <p>Start-up date: week 36 Estimated duration: 2 weeks</p>	AGA, ATM, RO
	<p>1.4.4 Draft a working paper supporting the presentation of the model action plan and the guidelines for their consideration and approval.</p> <p>Start-up date: week 38 Estimated duration: 1 week</p>	AGA, ATM, RO
	<p>1.4.5 Submit the working paper to the consideration of the corresponding GREPECAS bodies through the established channels.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.4.6 Make the necessary adjustments or changes to the material mentioned in 1.4.4, based on the comments generated, and update the proposal and the working paper for their consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	AGA, ATM, RO
	<p>1.4.7 Process, edit, and distribute the material, introducing the amendments that GREPECAS may have generated in the course of its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO
	<p>1.4.8 Provide assistance to the participating States and organisations for the implementation of the model action plan, including the programming of the necessary coordination and training activities.</p>	AGA

	<p>Start-up date: to be determined Estimated duration:</p>	
	<p>1.4.9 Draft a final report on the activities carried out, including the relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	AGA, ATM
<p>1.5 Implementation of functional improvements to the provision of aeronautical information services – (GPI 18)</p>	<p>1.5.1 Obtain and complete the information, learning about the current status in the participating States and organisations with respect to aeronautical information services, including:</p> <ul style="list-style-type: none"> <li>a) ATM, RNAV, and RNP requirements;</li> <li>b) Computer-based navigation system requirements;</li> <li>c) Availability of aeronautical information data banks;</li> <li>d) Availability of an automated AIP;</li> <li>e) Availability of electronic information;</li> <li>f) AIS automation plans;</li> <li>g) Implementation of the WGS-84 geodetic reference system.</li> </ul> <p>Start-up date: week 53 Estimated duration: 2 weeks</p>	AIS, RO
	<p>1.5.2 Develop a model action plan, to be used by the participating States and organisations in the implementation of AIS improvements that will:</p> <ul style="list-style-type: none"> <li>a) provide quality-assured and real-time aeronautical information on terrain and obstacles;</li> <li>b) ensure the timely distribution of information;</li> <li>c) facilitate coordination among the various members of the ATM community;</li> <li>d) improve efficiency and safety;</li> <li>e) ensure that all members of the ATM community have the same information when making collaborative decisions;</li> <li>f) improve situational awareness of pilots during en-route, terminal area, and aerodrome operations;</li> <li>g) enable the completion of the implementation of the WGS-84 geodetic reference system;</li> <li>h) increase safety.</li> </ul> <p>Start-up date: week 55 Estimated duration: 2 weeks</p>	AIS, ATM, RO

	<p>1.5.3 Develop guidelines based on the information processed in 1.5.1 and 1.5.2, to be used by the participating States and organisations in the implementation of functional improvements to the provision of aeronautical information services.</p> <p>Start-up date: week 57 Estimated duration: 2 weeks</p>	<p>AIS, ATM, RO</p>
	<p>1.5.4 Draft a working paper supporting the presentation of the model action plan and the guidelines for their consideration and approval.</p> <p>Start-up date: week 59 Estimated duration: 1 week</p>	<p>AIS, ATM, RO</p>
	<p>1.5.5 Submit the working paper to the consideration of the corresponding GREPECAS bodies through the established channels.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>RO</p>
	<p>1.5.6 Make the necessary adjustments or changes to the material mentioned in 1.5.4, based on the comments generated, and update the proposal and the working paper for their consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>AIS, ATM, RO</p>
	<p>1.5.7 Process, edit, and distribute the material, introducing the amendments generated by GREPECAS in the course of its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>RO</p>
	<p>1.5.8 Provide assistance to the participating States and organisations for the implementation of the model action plan, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>AIS</p>
	<p>1.5.9 Prepare a final report on the activities carried out, including the relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>AIS, ATM</p>

<p>1.6 Implantación de mejoras funcionales en la provisión de servicios meteorológicos para la navegación aérea internacional – (GPI-19)</p> <p>1.6 Implementation of functional improvements to the provision of meteorological services for international air navigation – (GPI-19)</p>	<p>1.6.1 Obtain and complete the information, learning about the current status in the participating States and organisations with respect to the meteorological services for international air navigation, including:</p> <ul style="list-style-type: none"> <li>a) ATM requirements;</li> <li>b) World area forecast system (WAFS) requirements;</li> <li>c) The international airways volcano watch;</li> <li>d) Tropical cyclone advisory system requirements;</li> <li>e) Use of data link for the transmission of meteorological information;</li> <li>f) Availability of meteorological information data banks;</li> <li>g) Automation of meteorological systems;</li> <li>h) Availability of electronic information;</li> <li>i) Plans for the automation of aeronautical meteorological services.</li> </ul> <p>Start-up date: week 59 Estimated duration: 2 weeks</p>	<p>MET, RO</p>
	<p>1.6.2 Develop a model action plan to be used by the participating States and organisations for the implementation of improvements to the provision of MET services that will:</p> <ul style="list-style-type: none"> <li>a) Improve the availability of meteorological information in support of a seamless global ATM system;</li> <li>b) Improve the precision, timely distribution, and usefulness of the information produced by world area forecast, international airways volcano watch, and tropical cyclone advisory systems;</li> <li>c) Permit immediate access to real-time global meteorological information;</li> <li>d) Achieve the automation of meteorological systems;</li> <li>e) Assist ATM in the adoption of tactical decisions for aircraft surveillance, air traffic flow management, and flexible and dynamic aircraft routing;</li> <li>f) Increase safety.</li> </ul> <p>Start-up date: week 61 Estimated duration: 2 weeks</p>	<p>MET, ATM, RO</p>

	<p>1.6.3 Develop guidelines, based on the information processed in 1.6.1 and 1.6.2, to be used by the participating States and organisations in the implementation of functional improvements to the provision of meteorological services to international air navigation.</p> <p>Start-up date: week 63 Estimated duration: 2 weeks</p>	<p>MET, ATM ,RO</p>
	<p>1.6.4 Draft a working paper to support the presentation of the model action plan and the guidelines for their consideration and approval.</p> <p>Start-up date: week 65 Estimated duration: 1 week</p>	<p>MET, ATM, RO</p>
	<p>1.6.5 Submit the working paper to the consideration of the corresponding GREPECAS bodies through the established channels.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>RO</p>
	<p>1.6.6 Make the necessary adjustments or changes to the material mentioned in 1.6.4, based on the comments generated, and update the proposal and working paper for their consideration and approval by GREPECAS.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>MET, ATM ,RO</p>
	<p>1.6.7 Process, edit, and distribute the material, introducing the amendments generated by GREPECAS in the course of its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>RO</p>
	<p>1.6.8 Provide assistance to the participating States and organisations for the implementation of the model action plan, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>MET</p>
	<p>1.6.9 Draft a final report on the activities carried out,</p>	<p>MET, ATM</p>

	<p>including the relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	
<p>1.7 Training of at least 30 officials from the CAAs in each topic related to the preceding results.</p>	<p>1.7.1 Develop annual plans for the conduction of courses, seminars, workshops, and other activities that might be required concerning:</p> <ul style="list-style-type: none"> <li>a) Airspace planning;</li> <li>b) Construction of air navigation procedures;</li> <li>c) Airworthiness and operation approval;</li> <li>d) Safety assessment;</li> <li>e) Airspace monitoring;</li> <li>f) Performance-based navigation;</li> <li>g) Planning of air traffic flow management;</li> <li>h) National air navigation planning, incorporating the global ATM operational concept;</li> <li>i) New trends in communication systems;</li> <li>j) New trends in navigation systems;</li> <li>k) New trends in surveillance systems;</li> <li>l) New trends in flight test systems;</li> <li>m) Current and future use of the radio electric spectrum for aeronautical applications;</li> <li>n) Integration of automated systems;</li> <li>o) Other topics that may be required.</li> </ul> <p>Start-up date: September of every year Estimated duration: 2 weeks</p>	<p>ATM, CNS, RO Consultants</p>
	<p>1.7.2 Determine input requirements for organising and conducting each training activity.</p> <p>Start-up date: September of every year Estimated duration: 1 week</p>	<p>ATM, CNS, RO, Consultants</p>
	<p>1.7.3 Determine the costs of the inputs required for each activity, and the budget available for its execution.</p> <p>Start-up date: September of every year Estimated duration: 3 days</p>	<p>TCB</p>
	<p>1.7.4 Draft a working paper to submit the annual training plans and their logistic and financial requirements to the consideration and approval of the Project Coordination Committee.</p> <p>Start-up date: October of every year Estimated duration: 1 week</p>	<p>ATM, CNS, RO, Consultants</p>

	<p>1.7.5 Examine and approve the annual training plans and their requirements.</p> <p>Start-up date: November of every year Estimated duration: 1 day</p>	CCP
	<p>1.7.6 Prepare the information, the teaching material, and the presentations for each approved activity.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	ATM, CNS, Ro, Consultants, Lecturers
	<p>1.7.7 Advise the participating States and organisations about the details of the training activities and the logistic and financial arrangements for their implementation.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	RO
	<p>1.7.8 Nominate the candidates for training activities, and introduce them to the respective ICAO Regional Office.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	CAAs and participant organizations
	<p>1.7.9 Consider the requests for scholarships, and assign them according to the established budgetary provisions.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	RO, TCB Fellowships
	<p>1.7.10 Carry out training activities and assess their results.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	ATM, CNS, RO, Consultants, Lecturers
	<p>1.7.11 Draft a report on the conduction of each activity and its results.</p> <p>Start-up date: according to the annual plan Estimated duration:</p>	ATM, CNS, Consultants

1.8 Adoption of the appropriate multinational arrangements for the establishment and start-up of a regional organisation in charge of the implementation, management, and operation of multinational air navigation facilities.	1.8.1 Learn about the incorporation instruments approved by the States for the establishment of a regional organisation charged with the implementation, management, and operation of multinational air navigation facilities.  Start-up date: week 27 Estimated duration: 1 week	Consultants
	1.8.2 Draft and propose an ICAO regional technical cooperation project document, based on the incorporation instruments of the new organisation, that will permit the establishment and initial operation of the latter.  Start-up date: week 28 Estimated duration: 1 week	TCB, Consultants
	1.8.3 Draft a working paper supporting the submittal of the project document for its consideration and approval.  Start-up date: week 29 Estimated duration: 2 days	Consultants, RO
	1.8.4 Submit the working paper presenting the proposed project document to the consideration of the civil aviation authorities, requesting their comments.  Start-up date: to be determined Estimated duration:	RO
	1.8.5 Make the necessary adjustments or changes to the project document, based on the comments generated.  Start-up date: to be determined Estimated duration:	Consultants
	1.8.6 Submit the final project document proposal to the approval of the corresponding bodies of each State.  Start-up date: to be determined Estimated duration:	RO
	1.8.7 Make arrangements for the implementation of the project as soon as it has been approved by the States concerned.	TCB, RO

	Start-up date: to be determined Estimated duration:	
--	--------------------------------------------------------	--

**ATM PERFORMANCE OBJECTIVES FOR CAR AND SAM REGIONS**

<b>OPTIMIZE THE ATS ROUTE STRUCTURE IN BOTH TERMINAL AND EN-ROUTE AIRSPACE</b>			
<b>Benefits</b>			
<b>Environment</b>	• reductions in fuel consumption;		
<b>Efficiency</b>	• ability of aircraft to conduct flight more closely to preferred trajectories; • increase in airspace capacity; • facilitate utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.		
<b>Strategy</b>			
<b>Short term (2010)</b>			
<b>Medium term (2011 - 2015)</b>			
<b>TASK</b>	<b>DESCRIPTION</b>	<b>START- END</b>	<b>STATUS</b>
<b>AOM</b>	<p><i>En-route airspace</i></p> <ul style="list-style-type: none"> <li>• analyze the en-route ATS route structure and implement all identifiable improvements;</li> <li>• implement all remaining regional requirements (e.g. RNP 10 routes); and</li> <li>• Finalize implementation of WGS-84</li> <li>• monitorear el avance de la implementación</li> <li>• develop a strategy and work programme to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN and, in particular, RNAV/5, taking into account interregional harmonization;</li> </ul> <p><i>In terminal airspace</i></p> <ul style="list-style-type: none"> <li>• develop a regional strategy and work programme for implementation of optimized standard instrument departures (SIDs), standard instrument arrivals (STARs), instrument flight procedures, holding, approach and associated procedures, on the basis of PBN and, in particular RNAV/1 and 2; and</li> <li>• monitor implementation progress</li> </ul>	<p>2005- 2010</p> <p>2008- 2011</p>	
<b>References</b>	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.		

<b>IMPLEMENT RNP APPROACHES</b>			
<b>Benefits</b>			
<b>Efficiency</b>	• <b>Improvements in capacity and efficiency at aerodromes.</b>		
<b>Safety</b>	• <b>Improvements in safety at aerodromes.</b>		
<b>Strategy (2008-2015)</b>			
<b>TASK</b>	<b>DESCRIPTION</b>	<b>START- END</b>	<b>STATUS</b>
<b>AOM</b>	<ul style="list-style-type: none"> <li>development of a regional strategy and work programme for implementation of RNP approaches at aerodromes where aircraft weighing 5700 kg or more are operated, on the basis of the transition plan as follows:            Stage 1 – Evaluate existing procedures, determine compatibility of use with RNAV overlay routes            Stage 2 – Carry out cost benefit analysis and safety assessments of RNAV procedures            Stage 3 – Use existing radar vectoring patterns as the basis for RNAV departure and arrival tracks            Stage 4 – Evaluating and simulation of procedures            Stage 5 – Design stand-alone RNAV procedures            Stage 6 – Training phase            Stage 7 – Publish new procedures and introduce into new service, meet AIRAC dates            Stage 8 – Operational review            Stage 9 – Removal of conventional procedures</li> <li>monitor implementation progress</li> </ul>		
<b>References</b>	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures.		

-----