International Civil Aviation Organization
CAR/SAM Regional Planning and Implementation Group (GREPECAS)
Fifteen Meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/15)
Río de Janeiro, Brasil, 13 – 17 October 2008

Agenda Item 3: Regional air navigation planning and implementation issues
3.6 Report of the ATM/CNS/SG/6 Meeting

REPORT OF THE SIXTH MEETING OF THE ATM COMMITTEE

(Presented by the Vice-President of the ATM Committee)

SUMMARY

This working paper contains a summary of the outcome of the Sixth Meeting of the ATM Committee, which adopted a series of Draft Conclusions that are submitted for consideration by the GREPECAS/15 meeting.

References:

- Report of the ATM/CNS/SG/6 meeting.
- Report of the ACG/7 meeting.

STRATEGIC OBJECTIVE: D – EFFICIENCY

1. Introduction

1.1 The ATM Committee reviewed the work done by the CAR/SAM Regional Monitoring Agency (CARSAMMA) and the Scrutiny Group (GTE) regarding safety assessment three years after the implementation of RVSM in the CAR/SAM Regions, as well as the reports on large height deviations (LHD). It also reviewed the work of the various ATM Committee Task Forces.

1.2 The Committee reviewed the ATM and SAR deficiencies and outstanding GREPECAS conclusions/decisions and the reorganization of the work programme of the ATM Committee. The report of the Sixth Meeting of the ATM Committee is available in the Item 2 of the Sixth Meeting of the ATN/CNS/SG in the in the ICAO web page**.** The ATM Committee formulated four (4) draft conclusions, as shown in the **Appendix** to this working paper for consideration by the Meeting.

Safety assessment of the CAR/SAM Regions airspace after three years of RVSM application

1.3 The Meeting reviewed both the technical risk (affected by reliability and accuracy of the avionics within the aircraft) and the operational risk (affected by the human being). These are the main factors to carry out a safety assessment in the Reduced Vertical Separation Minimum (RVSM) airspace.

1.4 The Meeting noted that the total risk was due to the fact that the approximately 93% of LHDs are caused by errors in ACC-unit-to-ACC-unit transfer messages (M errors) and negative transfer received from transitioning ATC unit (N errors). These kinds of errors cause LHD events regardless of the vertical separation applied, and are not caused by RVSM operation.

1.5 The technical risk estimated three years post-implementation of the RVSM is 0.093×10^{-9}. This estimate satisfies the agreed TLS value of no more than 2.5×10^{-9} fatal accidents per aircraft flight hour due to the loss of a correctly established vertical separation standard of 1000 ft. The evaluation of the technical risk increases for the CAR/SAM Regions due to the air traffic growth was carried out due to annual growth rates of 8% a year until 2017. The forecast shows that the technical risk will be well below TLS limit of 2.5×10^{-9} until 2017.

1.6 The total vertical collision risk due to a combination of technical height-keeping errors and operational errors, evaluated in number of fatal accidents per flight hour, is above the acceptable level. For the CAR Region it is equal to 12.3×10^{-9}, for the SAM Region 34.9×10^{-9}, and for the CAR/SAM Regions 28.9×10^{-9}. In order to reduce the risk values, corrective actions are necessary to eliminate M and N type errors.

1.7 The Meeting agreed that it is necessary to supersede GREPECAS Conclusion 13/61 - *Measures to reduce operational errors in the ATC coordination loop between adjacent ACCs* in order to update it keeping the ATC coordination loop between adjacent ATS Prevention Programme and additional measures associated to this prevention programme. Therefore, the Meeting formulated Draft Conclusion ATM/6/1 - *Measures to reduce operational errors in the ATC coordination loop between adjacent ACCS.*

1.8 Likewise, the Meeting concluded that if M and N errors are not caused by RVSM operation but by common transferring ATC procedures from one ATC unit to the other and by lack of coordination by the transferring ATC Unit, it would be suitable that the SASP analyze the methodology used for safety assessment, and therefore the Meeting formulated Draft Conclusion ATM/6/2 - *Review of the methodology used for safety assessment.*

Data on Technical Vertical Deviation

1.9 The Meeting considered that an effort should be made to enhance methodology of data collection on technical vertical deviations to show that the Altimetry System Error (ASE) for RVSM-approved aircraft remains steady. This task can only be carried out with the implementation of a monitoring programme of the aircraft altimetry system performance at least every two years, or after a 1000 flight hours interval per aircraft, whichever occurs first.

Altimetry System Monitoring

1.10 The CAR/SAM Regions should establish a programme for implantation of monitoring units for the verification of aircraft altimetry system. This programme should be composed of a system of independent monitoring units (AGHME) installed in strategic positions in areas of higher traffic flow density. The objective is to monitor the largest number of aircraft for verification of stability of the altimetry system error (ASE) and to check if the technical risk remains compatible with the agreed TLS of 2.5×10^{-9}.

1.11 Participants noted that the Scrutiny Work Group Meetings were very important since for the first time the LHD reports were evaluated and validated by experts that had the purpose of identifying the trends of errors and indicating points of conflict between the boundaries of the Flight Information Regions of the Caribbean and South American States. The CARSAMMA and the Scrutiny Group (GTE) have scheduled a new series of courses/meetings in order to improve the States participation in LHD analysis, which is foreseen to result in the enhancement of ATS safety levels in the CAR/SAM Regions.

Performance Based Navigation (PBN)

1.12 The Meeting noted that two seminars for the CAR/SAM Regions were carried out in Lima (17 to 20 June 2008) and Santo Domingo (23 to 26 June 2008). These seminars provided feedback for the attendees on the concepts and implementation processes presented in the ICAO PBN Manual (Doc 9613). The participation of all stakeholders in the PBN implementation process at the PBN Seminars was beyond the initial expectations. The latest information on the seminars and PBN in general can be found at www.icao.int/pbn.

1.13 The Meeting recalled that Volume II of the new ICAO PBN Manual contains technical details on "Navigation Specifications" with standardized, harmonized airworthiness and operation requirements for several RNAV and RNP operations; navigation specifications for the use of APV procedures based on Baro-VNAV; as well as detailed recommendations for pilot and controller training. Doc 8168 (PANS-OPS), Volume II, establishes the criteria for development of Baro-VNAV procedures.

1.14 The Meeting recalled that the PBN Roadmap for the CAR/SAM Regions was approved by GREPECAS/14 through Conclusion 14/46 - *CAR/SAM PBN Roadmap*, encouraging States/Territories/International Organizations to adopt and apply the referred PBN Roadmap.

1.15 In view of the above, the Meeting reviewed the CAR/SAM PBN Roadmap and considered that there is no prevision for implementation of a SBAS system in the CAR/SAM Regions in the short term for the implementation of APV-1 and APV-2 procedures, therefore the only choice for non precision approach procedures implementation with vertical guidance are Baro-VNAV procedures. Therefore the Meeting deemed appropriate to insert the following new paragraphs in Chapter 7 of said document:

7.3.3.1 Approach procedures for PBN should be implemented as approach procedures with vertical guidance (APV) utilizing Baro-VNAV for runways either as the primary approach or as a back-up for precision approaches for all instrument runway, based on the RNP APCH or RNP AR APCH navigation specifications.

7.3.3.2 PBN implementation plan provisions for implementation of approach procedures with vertical guidance (APV) shall include all runway ends serving aircraft with a maximum certificated take-off mass of 5700 kg or more.

Note.- PBN manual, Volume II, Attachment A contains the Specifications for utilizing Baro-VNAV in conjunction with RNP APCH.

1.16 Consequently, according with ICAO PBN Manual, the Meeting agreed to include the abovementioned paragraphs and minor editorial changes in the PBN Roadmap. The updated PBN roadmap is available at the NACC and SAM Offices web sites

1.17 The Meeting recalled that GREPECAS requested the States/Territories/International Organizations to develop their own action plans based on these ATM performance objectives. The updated PBN Performance Objectives are included in the Terms of Reference of the ATM Committee, that will be discussed in WP/18.

1.18 PBN implementation planning in the CAR/SAM Regions was practically completed with the approval of the CAR/SAM PBN Roadmap. The main PBN task will be the optimization of ATS routes in the upper airspace and the harmonization of PBN implementation, taking into account the need to avoid multiple ATC procedures and operational approval processes.

1.19 The Meeting, in accordance with Assembly Resolution 36/23, and in order to provide guidance to the States/Territories/International Organizations prepared a national PBN implementation plan model for en-route, terminal area and approach (TMAS) shown in Attachment 2 to the Appendix to this Working Paper. In view of the above, the Meeting adopted Draft Conclusion ATM/6/3 - *National PBN Implementation Plans.*

PBN Training

1.20 The Meeting was of the opinion that in PBN implementation, training is of core importance and considered that civil aviation administrations should provide greater support for regular training in the following areas: instrument procedures design, airspace planning, safety assessment, airworthiness and operators approval.

1.21 The Meeting noted the core information on the implementation of RNP10, 50 NM lateral separation and associated operational policies in the WATRS airspace. The Meeting considered that this information is very useful as reference material in the preparation of national regulations for RNP 10 approval of aircraft and operators. The approval guidance material is included in the FAA WATRS website:
(http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/enroute/oceanic/)

Strategic Lateral Offset Procedures (SLOP)

1.22 In accordance with State letter AN1311 1.6-04185, *"Revised guidelines on the use of strategic lateral offsets"* the Meeting recognized that ICAO Strategic Lateral Offset Procedures (SLOP) of Doc 4444 may improve safety in the CAR/SAM Regions and concurred to incorporate them into the Regional Supplementary Procedures (Doc 7030), for their application in the airspace not covered by ATS surveillance systems (i.e. radar, ADS-B, etc.). To this end, the Meeting adopted Draft Conclusion ATM/6/4 - *Adoption of Strategic Lateral Offset Procedures (SLOP).*

Air Traffic Flow Management (ATFM)

1.23 The Meeting noted that common methodologies of application for the CAR/SAM Regions are required for the establishment of the aerodrome acceptance rate (AAR); traffic management initiatives to balance demand and capacity; and procedures to evaluate the effectiveness of Air Traffic Flow Management (ATFM) measures.

1.24 It was also recognized the need to prepare a model for determining Aerodrome Capacity, as well as a method for the determining ATC sector capacity and providing guidance material for a harmonized application by the CAR/SAM Regions States/Territories/International Organizations. Based on the current information systems and the operational needs, the Meeting considered appropriate to continue to collect, define and propose structure of the information systems for ATFM implementation of the CAR and SAM Regions.

ATM automation

1.25 Among the main operational problems noted by the Meeting for ATM automation, duplicate flight plans (FPL) and errors in transmission of FPL data were two issues that must be addressed by the States/Territories. Taking into account the impact of operational deviations in flight plan data exchange (FPL) coordination between adjacent ACCs, the Meeting considered that CAR/SAM States, Territories and International Organizations should:

a. report and document duplicate FPL and errors in the transmission of FPL data to the adjacent facility and/or operator, as appropriate, within 24 hours of becoming aware of such an occurrence;
b. apply appropriate Safety Management System (SMS) measures to investigate, track and apply appropriate mitigation measures;
c. coordinate results, as appropriate, of the investigation and/or mitigations with the adjacent ACC/operator;
d. forward tracking information and corrective actions to the ICAO Regional Offices for processing and follow-up; and
e. ICAO should act as a focal point for data collection and oversee the mitigation activities within the CAR/SAM regions.

1.26 The Meeting noted that several States/Territories/International Organizations are performing surveillance/radar data exchange through bilateral agreements improving and homologating the traffic situation in the Region, which will allow better radar and non-radar surveillance data source availability and improving accuracy, availability and safety of ATS services provision.

1.27 Bearing in mind the foregoing considerations and the regional strategy, the Meeting concluded that several States/Territories/International Organizations may achieve ATM automation, in stages I, II and III, and therefore urged them to reflect the necessary activities in their respective action plans in line with the regional strategy agreed by GREPECAS.

ATM Deficiencies

1.28 Following Conclusion ASB 8/2 the ATM Committee requested to the States/Territories to carry out necessary arrangements with their respective National Coordinator to update the GREPECAS Air Navigation Deficiencies Database (GANDD) carry out a risk assessment of each "U" using the ICAO SMS methodology for the risk assessment.

Issues Related to the Organization of the ATM Committee

1.29 In accordance with GREPECAS Conclusion 14/51 it was recalled that the dateline to finish reorganization of the ATM Committee work programme is end of 2009. The performance objectives were adopted as the ATM Committee work programme, in line with Draft Decision ATM/CNS/6/1 – *New CNS/ATM Subgroup*, of the ATM/CNS Subgroup. The Terms of Reference of the ATM Committee are included in the Appendix of WP/18.

1.30 The reorganization of the ATM work programme is consistent with the *Global Air Navigation Plan* (Doc 9750) and the ICAO vision as established in the *Global Air Traffic Management Operational Concept* (Doc 9854). Tasks of the ATM performance objectives will facilitate quantifying the cost/benefit relationship and therefore ensure the success of their implementation. The progress and achievements of all related tasks included in the performance objectives will be reviewed and measured so as to ensure timely reports on the ATM regional work for GREPECAS, the ANC and ICAO Council.

1.31 Note was taken that, in light of ATM/CNS/SG restructuring, the Meeting deemed appropriate to improve the work methodology and foster further coordination of the work through the use of teleconferences.

ATM System Perspectives

1.32 The Meeting recognized the expectations of the ATM community and that the Performance Based Approach can be used to better meet ATM expectations as well as improving the performance of service providers. The identification of expectations with regard to the flight operations, airspace/airport use and air navigation services are: safety, security, environmental impact, cost effectiveness, capacity, flight efficiency, flexibility, predictability, access and equity, participation and collaboration, and interoperability.

Performance Measurement

1.33 The Meeting recognized that the performance-based approach require that when designing, planning, implementing and operating a global air navigation system, a performance measurement analysis is also recommended. When following-up an action plan, while avoiding costly processes of data collection and analysis, performance measurement should focus on proactive results on the air navigation improvements and environmental benefits that result from work programmes.

1.34 The Meeting deemed appropriate that stakeholders participate to ensure specific results in relation to information sharing on economic and management performance. Implementations should include performance measurement in one of the following areas: safety, quality of service (such as capacity, delay and flight efficiency), productivity and cost-effectiveness.

1.35 To this end, simple and relevant indicators should be used to measure performance implementation. An example is RVSM implementation, which reduced fuel burn with economic benefits, and also resulted in the reduction of CO2 emissions on a regional and global basis.

2. **Suggested action**

2.1 The Meeting is invited to take note of the information provided concerning the Sixth Meeting of the ATM Committee of the ATM/CNS Subgroup, and approve the Draft Conclusions shown in the Appendix to this working paper.

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APPENDIX

DRAFT CONCLUSIONS FORMULATED BY THE 6TH MEETING OF THE ATM/COMMITTE

DRAFT
CONCLUSION ATM/6/1 MEASURES TO REDUCE OPERATIONAL ERRORS IN THE ATC COORDINATION LOOP BETWEEN ADJACENT ACCS

That, taking into account the impact of operational errors in the ATC coordination loop between adjacent ACCs on air operations safety:

a) CAR/SAM States/Territories/International Organizations apply on an urgent basis, among other measures, the error in the coordination loop among adjacent ACCs described in Appendix B to this part of the Report (***Attachment 1*** *to this Appendix*), in order to reduce LHD caused by errors in traffic coordination messages between ATC units, to an acceptable level of safety;

b) CAR/SAM States/Territories/International Organizations gradually implement the interface for data exchange among ATC units; and

c) ICAO coordinate, provide assistance, and make a follow-up on the implementation of these corrective measures.

DRAFT
CONCLUSION ATM/6/2 REVIEW OF THE METHODOLOGY USED FOR SAFETY ASSESSMENT

That ICAO review the methodology used for the assessment after the RVSM implementation safety considering the fact that errors type M and N identified and used to perform this assessment may be independent of RVSM implementation.

DRAFT
CONCLUSION ATM/6/3 NATIONAL PBN IMPLEMENTATION PLANS

That in order to initiate PBN implementation and in accordance with Resolution 36/23, CAR/SAM States/Territories:

a) develop their PBN national implementation plans by December 2009 and present them to the corresponding Regional Offices;

b) consider to use as guidance material the PBN action plans models, presented in Appendix B to this part of the Report (***Attachment 2*** *to this Appendix*); and

c) designate a Point of Contact who will coordinate PBN implementation activities in his/her State/Territory.

DRAFT
CONCLUSION ATM/6/4 ADOPTION OF STRATEGIC LATERAL OFFSET PROCEDURES (SLOP)

That, recognizing that Strategic Lateral Offset Procedures SLOP may provide enhancements to safety in the CAR/SAM Regions, ICAO take the necessary measures to initiate the amendment to Doc 7030, based on PANS ATM (Doc 4444), for the application of SLOPs in areas where route separations be of at least 30 NM and no ATS surveillance systems coverage exist (radar, ADS-B, etc.)

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ATTACHMENT 1 TO THE APPENDIX

ERROR PREVENTION PROGRAMME IN THE COMMUNICATIONS BETWEEN ADJACENT ACCs

There are many initiatives that can be pursued to prevent operational errors from occurring. However, there are five primary areas, which can directly contribute to its prevention: **communications, phraseology, supervision, teamwork, and ATC proficiency**. In an effort to accomplish the goal of reducing communication errors between adjacent Area Control Centres and thus reduce or minimize the occurrence of large-height deviations, the following objectives should be included in the prevention programme:

The ATS authority shall:

a) identify individual, procedural, and/or equipment deficiencies used in air traffic services;

b) promptly correct individual, procedural, and/or equipment deficiencies which affect coordinations with adjacent and ATS units. This can be achieved through:
   - guidance on procedures to be followed;
   - implementation of read-back/hear-back programmes;
   - training in the filling of LHD forms;
   - increase and/or closer monitoring of ATCOs performance;
   - immediate coordination programme after a re-authorization or change in flight level;
   - changes in procedures and/or corrections/amendments of equipment.

c) communicate performance expectations to ATS supervisors and controllers;

d) ensure the ATS unit maintains a summary of and have information letters on operational errors, causal factors and trends, and incorporate them into training;

e) monitor and evaluate voice recordings (all ATS operational personnel);

f) take initiatives to improve communications among all ATS personnel to create an atmosphere conducive to sharing information;

g) exercise strict monitoring in ATC units;

h) ATS supervisors should:
   - communicate performance expectations to controllers, stressing the importance of operational control position discipline, awareness, teamwork, the use of proper phraseology, proper coordination procedures, control position relief briefings and utilization of a position relief checklist;
   - take prompt follow-up actions when controller performance does not meet with expectations;

- inform on individual and team accountability, and the consequences for not meeting expectations;
- provide efficient and consistent oversight of the ATS unit operation, and use effective resource management to ensure proper and timely assignment of personnel to promote the safe, orderly, and expeditious handling of air traffic;
- ensure that distractions and noise levels in the ATS unit are kept at a minimum;
- require all personnel to maintain a high degree of professionalism, teamwork, control position discipline, and awareness at all times in the ATS unit environment; and require that each controller knows, applies, and adheres to the appropriate requirements in the performance of his/her operational duties and responsibilities;
- promote an open flow of communications with all ATS personnel, allowing them to provide input to programme;
- place emphasis on hear-back/read-back errors during team meetings.

i) ATC personnel should:

- apply read-back/hear-back procedures when carrying out ATC coordination;
- keep ATS supervisors advised of traffic problems and equipment limitations;
- make suggestions for ATS unit improvements and/or prevention of operational errors;
- maintain situational awareness;
- extend the extra effort to assist busier control position(s);
- continuously review their own operating techniques and ATS unit procedures to effect the highest quality of performance;
- promptly report all ATS incidents to the operational supervisor or other appropriate ATS authority for proper follow-up investigation;
- utilize memory aids.

VOICE RECORDING EVALUATIONS

Voice recording reviews should be conducted to ensure proper phraseology, good operating practices, and adherence to the standards set forth in ICAO provisions, and national/local directives and practices. Voice recording reviews should be conducted as follows:

a) the ATS unit should ensure that voice recording reviews are conducted at least semi-annually on all ATS operational personnel;

b) the ATS supervisor should review the voice recording, document comments and develop an action plan for documenting performance deficiencies; and

c) the ATS supervisor and the controller should review and discuss the voice recording.

Actions suggested as short term solution

a) That States, authorities and International Organizations continue their excellent compliance with the LHD requirements to report CARSAMMA on a monthly basis, and

b) That States, authorities and International Organizations distribute a copy of category "M", Error messages in ATC unit to ATC unit in transference messages and category "N", messages ("No ATC unit transference message was received"), received from transitioning ATC-unit LHD reports only to the adjacent ACC involved in addition to CARSAMMA.

c) When a trend is identified from shared reports, the States, Territories, and International Organizations shall share information and shall meet on a bilateral basis to develop a solution to the cause of the identified LHD.

d) Since some ACCs adjoin international oceanic airspace, ICAO NACC and SAM Regional Offices are requested to advise the corresponding adjacent ICAO regional Offices (EUR/NAT, WACAF) that said LHD report will be forthcoming from the adjacent ACC and urge positive interaction with reporting CAR/SAM unit.

Supported suggested actions as a medium term solution:

a) In an effort to eliminate the largest contributing LHD error category "M", the solution is to implement a quality management programme based upon safety management concepts outlined in Annex 11 amendment 44.

b) The "*Progressive implementation of ATS interfacility data communications (AIDC)*" will enhance the safety of the airspace and would reduce category "M" error. However, it is a medium term project incurring a large expense and hereby encourages that the CAR/SAM Regions States begin arrangements to submit to the World Bank an application for sufficient monies to enhance such implementation systems. The Meeting recalled that the AIDC is seen within the Automation Task Force Program and therefore is not required another action at this point

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ATTACHMENT 2 TO THE APPENDIX

SEAMLESS ATM SYSTEM

REGIONAL PLANNING PROCESS

The regional planning process shall be conducted in accordance with the global plan initiatives (GPIs) of the Global Plan (Doc 9750) and the ICAO vision for an integrated ATM system, harmonized and interoperable, as established in the Global ATM Operational Concept (Doc 9854).

The objective is to achieve the maximum level of inter-operability and harmonization among sub-systems for a seamless and interoperable regional ATM system for all users during all phases of flight, complying with agreed levels of safety, providing optimum economic operations, to be environmentally sustainable and to fulfil national aviation security requirements.

The planning should be developed based on clearly defined performance objectives. The planning horizon should be focused on the strategies of development, activities or main tasks for two periods – that of less than 5 years (short-term) and 6 to 10 years (medium-term). Some already identified tasks to be analyzed beyond this period may be included if they conform to ICAO ATM requirements**.**

ATM PERFORMANCE OBJECTIVES

The performance objectives for regional ATM work programmes should be developed with performance based approach that best reflects the necessary activities needed to support regional ATM system implementation.

During its life cycle, the performance objectives may change in a dynamic manner depending on the ATM system's evolution; therefore, these should be coordinated with and available to all interested parties within the ATM Community in order to achieve timely communication throughout the implementation process. The establishment of collaborative decision making processes (CDM) ensures that all stakeholders are involved in and concur with the requirements, tasks and timelines.

The following sections describe aspects pertaining to the performance objectives and required changes, and how these changes foster harmonized improvements throughout the regional ATM system.

Benefits

The ATM implementation strategies should provide a group of common benefits for all stakeholders and be achieved through the operational and technical activities planned in each performance objective. These benefits should be in accordance with the ICAO strategic objectives.

Identification of work

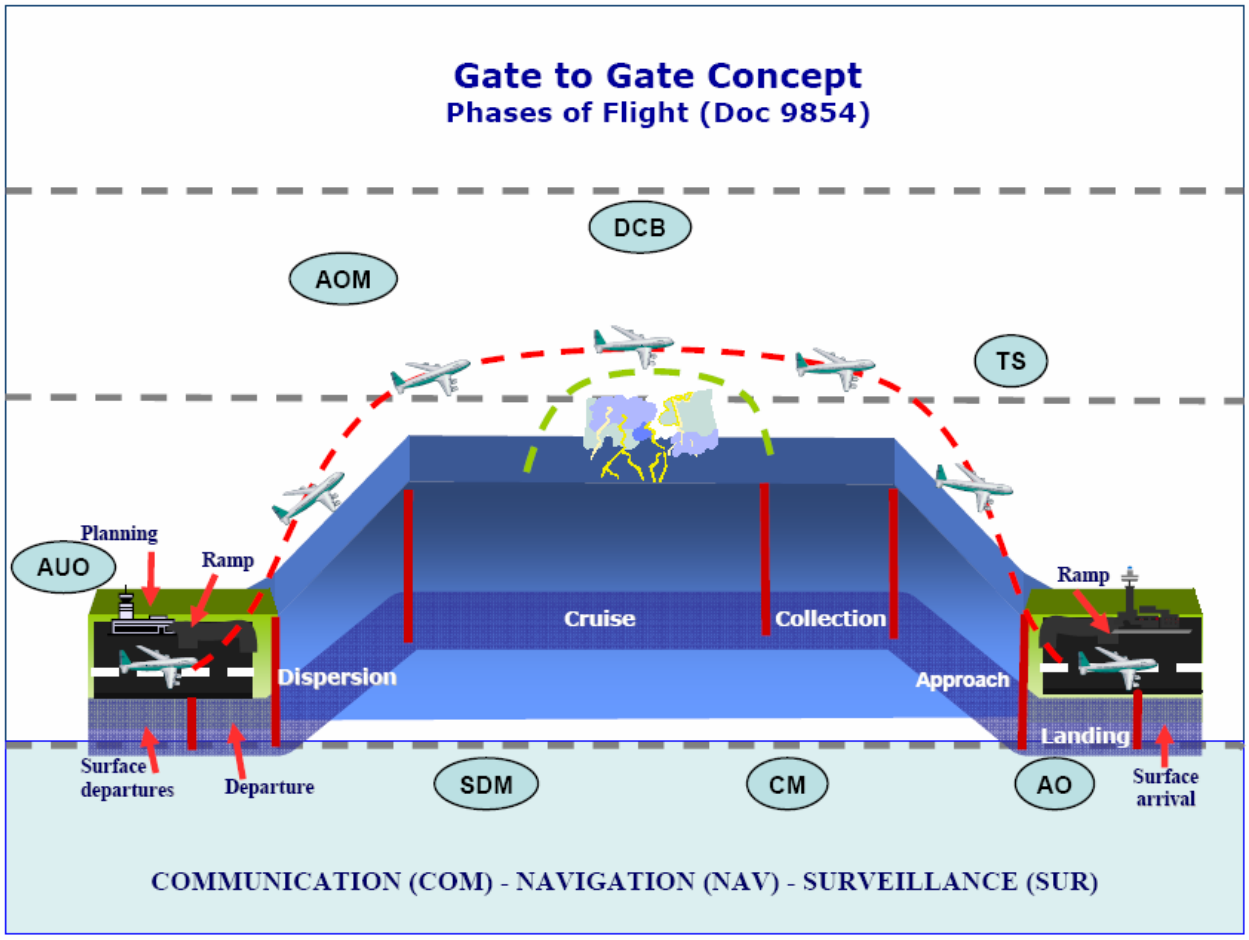
Each strategy or set of activities should be identified with associated components of the ATM system when describing the tasks. According to the Doc 9854, the designators for ATM components are as follows:

- **AOM** — Airspace organization and management
- **DCB** — Demand and capacity balancing
- **AO** — Aerodrome operations
- **TS** — Traffic synchronization
- **CM** — Conflict management
- **AUO** — Airspace user operations
- **ATM SDM** — ATM service delivery management

Each ATM system component pertains to tasks and activities related to phases of air operations (en-route, terminal and airport), capacity management, airspace management including its flexible use and aeronautical information management.

The infrastructure includes the ground technical systems and capacity required to support operations such as communications, navigation and surveillance, data processing, inter-operability of systems, information management system and spectrum management, including both civil and military systems.

The following diagram shows the ATM components in relation to the phases of flight:



Work Programmes

ATM evolution requires a clearly defined progressive strategy including tasks and activities which best represent the regional and national planning processes in accordance with the global planning framework. The goal is to obtain a harmonized regional implementation evolving toward a seamless global ATM system.

For this reason, it is necessary to develop short and medium term work programmes, focusing on the necessary changes to the system in which a clear work commitment will be carried out by the parties involved.

The regional work programmes should define additional tasks and activities, maintaining a direct relation with ATM system components such as airspace organization, civil-military coordination, human factors, aeronautical regulations, operational safety systems management and environmental protection, among others.

The referenced framework for regional activities should also include the coordination of activities with military authorities who play an important role in helping to ensure that the best use is made of the available airspace resources by all airspace users while still safeguarding national security.

The following principles should be considered when developing work programmes:

- The work should be organized using project management techniques and performance-based objectives in alignment with the strategic objectives of ICAO. The work programmes should be in accordance with the progress, characteristics and regional implementation needs.

- All activities involved in accomplishing the performance objectives should be designed following strategies, concepts, action plans and roadmaps which can be shared among States to align the regional work with the fundamental objective of achieving interoperability and seamlessness to the highest level.

- The planning of activities should include optimizing human resources, as well as encouraging dynamic use of electronic communication between States such as the Internet, videoconferences, teleconferences, e-mail, telephone and facsimile. Additionally, it should be ensured that resources will be efficiently used, avoiding any duplication or unnecessary work.

- The new work process and methods should ensure that performance objectives can be measured against timelines and the regional progress achieved can be easily reported to the Air Navigation Commission and to the ICAO Council.

Status

The status is mainly focused on monitoring the progress of the implementation activity as it progresses toward a specific completion date. The status of the activity is defined as follows:

■**Valid**	the feasibility and benefits of an activity has been confirmed, work has been initiated but the activity itself has not been finalized.
■**Completed**	implementation of the activity has been finalized by the involved parties.
■**Tentative**	the feasibility and benefits of an activity is being investigated or developed.

A tentative status indicates a potential activity; normally this activity will not be included in the regional planning documents unless it is an ICAO defined requirement.

Relationship between Performance Objectives and Global Plan Initiatives

The 23 GPIs provide a global strategic framework and are designed to contribute to achieving the regional performance objectives and to support the logical progression of regional implementation work programmes.

Each performance objective should be referenced to the pertinent GPIs. The goal is to ensure that the evolutionary work process will be integrated into the global planning framework

NATIONAL ACTION PLANS

States shall develop their own national action plans reflecting the specific activities or tasks along with the expected benefits to be obtained and the date by which each one should be completed according to its own needs and based on the regionally-agreed performance objectives. States should submit their national action plans to the ICAO regional Offices so they may report regional achievements to the Council of ICAO.

The activities should include the necessary detailed actions to successfully achieve the national performance objectives, relating these activities with the short and medium term regionally-agreed performance objectives.

National plans should identify the individual parties responsible for achieving the objectives as well as a means for monitoring and eventually reporting progress on the actions to ICAO. The responsibilities and time-tables should be clearly defined so that the involved parties are aware of their commitments throughout the planning process.

Additionally, national action plans should include adequate means to provide information on implementation progress achieved such as through a periodic reporting process. This facilitates senior management levels' efforts to prioritize the actions and resources required. The same information provided to ICAO will allow feedback and assistance to be provided specific for each Region as they work to achieve a Global ATM system.

PBN APP Action Plan GPI 1, 12, 16, 21, 23				
1	**Airspace Concept**	**Start**	**End**	**Remarks**
1.1	Establish and prioritize Strategic Objectives (Safety, Capacity, Environment, etc)			
1.2	Analyse aircraft fleet navigation capacity operating in the Airport			
1.3	Analyse communication, ground navigation (VOR, DME) and surveillance for navigation specification and reversionary mode compliance			
1.4	Design Instrument Approach Procedure (RNP APCH/APV Baro-VNAV or RNP AR), based on the strategic objective of the airspace concept. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
2	**Develop Performance Measurement Plan**			
2.1	Prepare Performance Measurement Plan, including gas emission, safety, efficiency, etc.			
2.2	Conduct Performance Measurement Plan			
3	**Procedure safety assessment**			
3.1	Determine which methodology shall be used to evaluate procedure safety, depending on the navigation specification. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
3.2	Prepare a data collection programme for airspace safety assessment			
3.3	Prepare preliminary procedure (s) safety assessment			
3.4	Prepare final procedure (s) safety assessment			
4	**Establish collaboration decision making (CDM) process**			
4.1	Coordinate planning and implementation needs with Air Navigation Service Providers, Regulators, Users, aircraft operators and military authorities			
4.2	Establish implementation date			
4.3	Establish the documentation format of CAR/SAM RNAV/RNP Website			

PBN APP Action Plan GPI 1, 12, 16, 21, 23				
4.4	Report planning and implementation progress to the corresponding Regional Office			
5	**ATC Automated Systems**			
5.1	Evaluate the PBN implementation in the ATC Automated Systems, considering the Amendment 1 to the PANS/ATM (FPLSG).			
5.2	Implement the necessary changes in the ATC Automated Systems			
6	**Aircraft and operator approval**			
6.1	Be aware of the national implementation programme and of the required navigation specifications			
6.2	Analyse aircraft approval requirements, aircrew and operator approval requirements for the navigation specifications to be implemented, as contained in the ICAO PBN Manual			
6.3	Publish the national regulations to implement the required ICAO navigation specifications			
6.4	Approval of aircraft and operators for each type of procedure and navigation specification			
6.5	Establish and keep updated a record of approved aircraft and operators			
6.6	Verify operations with a continuing monitoring programme			
7	**Standards and procedures**			
7.1	Evaluate regulations for GNSS use, and if such were the case, proceed to its publication.			
7.2	Develop and publish AIC notifying PBN implementation planning			
7.3	Publish AIP Supplement including applicable standards and procedures			
7.4	Review Procedural Manuals of the ATS units involved			

PBN APP Action Plan GPI 1, 12, 16, 21, 23			
7.5 Update Letters of Agreement between ATS units, if necessary			
7.6 Provide procedures to accommodate non-approved RNAV/RNP aircraft, when applicable			
7.7 Conduct ATC simulations to identify the workload/operational factors, if necessary.			
8 Training			
8.1 Develop a training programme and documentation for operators (pilots, dispatchers and maintenance)			
8.2 Develop training programme and documentation for Air Traffic Controllers and AIS Operators			
8.3 Develop training programme to regulators (aviation safety inspectors)			
8.4 Conduct training programmes			
8.5 Hold seminars oriented to operators, indicating the plans and the operational and financial benefits expected			
9 Decision for implementation			
9.1 Evaluate operational documentation availability (ATS, OPS/AIR)			
9.2 Evaluate the percentage of approved aircraft and operations (mixed equipage concerns)			
9.3 Review safety assessment results			
10 System Performance Monitoring			
10.1 Develop post-implementation APP operations monitoring programme			
10.2 Execute post-implementation APP operations monitoring programme			
Pre operational implementation date			

PBN APP Action Plan GPI 1, 12, 16, 21, 23			
Definitive implementation date			

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ATS Routes Optimization Action Plan GPI 1, 4, 5, 7, 8, 10, 11, 12, 16, 21,23			
	Start	**End**	**Remarks**
1 Airspace Concept			
1.1 Establish and prioritize Strategic Objectives (Safety, Capacity, Environment, etc)			
1.2 Collect air traffic data to understand airspace traffic flows in a particular airspace.			
1.3 Analyse navigation capability of the fleet			
1.4 Analyse communication, ground navigation (VOR, DME) and surveillance for navigation specification and reversionary mode compliance.			
1.5 Optimise the airspace structure, by reorganising the network or implementing new routes based on the strategic objective of the airspace concept. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
2 Develop Performance Measurement Plan			
2.1 Prepare Performance Measurement Plan, including gas emission, safety, efficiency, etc.			
2.2 Conduct Performance Measurement Plan			
3 Airspace safety assessment			
3.1 Determine which methodology shall be used to evaluate airspace safety and ATS routes spacing, depending on the navigation specification. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
3.2 Prepare a data collection programme for airspace safety assessment			
3.3 Prepare preliminary airspace safety assessment			
3.4 Prepare final airspace safety assessment			

ATS Routes Optimization Action Plan GPI 1, 4, 5, 7, 8, 10, 11, 12, 16, 21,23			
	Start	**End**	**Remarks**
4 Establish collaboration decision making (CDM) process			
4.1 Coordinate planning and implementation needs with Air Navigation Service Providers, Regulators, Users, aircraft operators and military authorities			
4.2 Establish implementation date			
4.3 Establish the documentation format of CAR/SAM RNAV/RNP Website			
4.4 Report planning and implementation progress to the corresponding Regional Office			
5 ATC Automated Systems			
5.1 Evaluate the PBN implementation in the ATC Automated Systems, considering the Amendment 1 to the PANS/ATM (FPLSG).			
5.2 Implement the necessary changes in the ATC Automated Systems			
6 Aircraft and operators approval			
6.1 Be aware of the national implementation programme and of the required navigation specifications			
6.2 Analyse aircraft approval requirements, aircrew and operator approval requirements for the navigation specifications to be implemented, as contained in the ICAO PBN Manual			
6.3 Publish the national regulations to implement the required ICAO navigation specifications			

ATS Routes Optimization Action Plan GPI 1, 4, 5, 7, 8, 10, 11, 12, 16, 21,23			
	Start	**End**	**Remarks**
6.4 Approval of aircraft and operators for each type of procedure and navigation specification			
6.5 Establish and keep updated a record of approved aircraft and operators			
6.6 Verify operations with a continuing monitoring programme			
7 Standards and Procedures			
7.1 Evaluate regulations for GNSS use, and if such were the case, proceed to its publication.			
7.2 Finalize implementation of WGS-84			
7.3 Develop and publish AIC notifying PBN implementation planning			
7.4 Publish AIP Supplement including applicable standards and procedures			
7.5 Review Procedural Manuals of the ATS units involved			
7.6 Update Letters of Agreement between ATS units			
7.7 Develop amendment to the regional documentation, if necessary			
7.8 Provide procedures to accommodate non-approved RNAV/RNP aircraft, when applicable			
7.9 Identify transition areas and procedures, if necessary			
7.10 Conduct ATC simulations to identify the workload/operational factors, if necessary, and report the simulations activities to the ATM Committee.			
8 Training			

ATS Routes Optimization Action Plan GPI 1, 4, 5, 7, 8, 10, 11, 12, 16, 21,23			
	Start	**End**	**Remarks**
8.1 Develop a training programme and documentation for operators (pilots, dispatchers and maintenance)			
8.2 Develop training programme and documentation for Air Traffic Controllers and AIS Operators			
8.3 Develop training programme to regulators (aviation safety inspectors)			
8.4 Conduct training programmes			
8.5 Hold seminars oriented to operators, indicating the plans and the operational and financial benefits expected			
9 Decision for implementation			
9.1 Evaluate operational documentation availability (ATS, OPS/AIR)			
9.2 Evaluate the percentage of approved aircraft and operations (mixed equipage concerns)			
9.3 Review safety assessment results			
10 System Performance Monitoring			
10.1 Develop post-implementation en-route operations monitoring programme			
10.2 Execute post-implementation en-route operations monitoring programme			
Pre operational implementation date			
Definitive implementation date			

PBN TMA and Approach Action Plan GPI 5, 7, 8, 10, 11, 12			
1 Airspace Concept	**Start**	**End**	**Remarks**
1.1 Establish and prioritize Strategic Objectives (Safety, Capacity, Environment, etc)			
1.2 Collect air traffic data to understand airspace traffic flows in the TMA.			
1.3 Analyse aircraft fleet navigation capacity operating in the TMA			
1.4 Analyse communication, ground navigation (VOR, DME) and surveillance for navigation specification and reversionary mode compliance			
1.5 Optimise the airspace structure, by implementing new SID and STARS, based on the strategic objective of the airspace concept. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
2. Develop Performance Measurement Plan			
2.1 Prepare Performance Measurement Plan, including gas emission, safety, efficiency, etc.			
2.2 Conduct Performance Measurement Plan			
3 Airspace safety assessment			
3.1 Determine which methodology shall be used to evaluate airspace safety and routes spacing, depending on the navigation specification. Consider Airspace Modelling, ATC simulations (fast time and/or real time), Live Trials, etc.			
3.2 Prepare a data collection programme for airspace safety assessment			
3.3 Prepare preliminary airspace safety assessment			
3.4 Prepare final airspace safety assessment			
4 Establish collaboration decision making (CDM) process			
4.1 Coordinate planning and implementation needs with Air Navigation Service Providers, Regulators, Users, aircraft operators and military authorities			
4.2 Establish implementation date			
4.3 Establish the documentation format of CAR/SAM RNAV/RNP Website			

PBN TMA and Approach Action Plan GPI 5, 7, 8, 10, 11, 12			
4.4 Report planning and implementation progress to the corresponding Regional Office			
5 ATC Automated Systems			
5.1 Evaluate the PBN implementation in the ATC Automated Systems, considering the Amendment 1 to the PANS/ATM (FPLSG).			
5.2 Implement the necessary changes in the ATC Automated Systems			
6 Aircraft and operator approval			
6.1 Be aware of the national implementation programme and of the required navigation specifications			
6.2 Analyse aircraft approval requirements, aircrew and operator approval requirements for the navigation specifications to be implemented, as contained in the ICAO PBN Manual			
6.3 Publish the national regulations to implement the required ICAO navigation specifications			
6.4 Approval of aircraft and operators for each type of procedure and navigation specification			
6.5 Establish and keep updated a record of approved aircraft and operators			
6.6 Verify operations with a continuing monitoring programme			
7 Standards and Procedures			
7.1 Evaluate regulations for GNSS use, and if such were the case, proceed to its publication.			
7.2 Develop and publish AIC notifying PBN implementation planning			
7.3 Publish AIP Supplement including applicable standards and procedures			
7.4 Review Procedural Manuals of the ATS units involved			
7.5 SID and/or STAR Ground Validation and Flight Inspection/Flight Validation			
7.6 Data Base Validation Requirements/Procedures			

PBN TMA and Approach Action Plan GPI 5, 7, 8, 10, 11, 12			
7.5 Update Letters of Agreement between ATS units			
7.6 Provide procedures to accommodate non-approved RNAV/RNP aircraft, when applicable			
7.7 Conduct ATC simulations to identify the workload/operational factors, if necessary.			
8 Training			
8.1 Develop a training programme and documentation for operators (pilots, dispatchers and maintenance)			
8.2 Develop training programme and documentation for Air Traffic Controllers and AIS Operators			
8.3 Develop training programme to regulators (aviation safety inspectors)			
8.4 Conduct training programmes			
8.5 Hold seminars oriented to operators, indicating the plans and the operational and financial benefits expected			
9 Decision for implementation			
9.1 Evaluate operational documentation availability (ATS, OPS/AIR)			
9.2 Evaluate the percentage of approved aircraft and operations (mixed equipage concerns)			
9.3 Review safety assessment results			
10 System Performance Monitoring			
10.1 Develop post-implementation TMA operations monitoring programme			
10.2 Execute post-implementation TMA operations monitoring programme			
Pre operational implementation date			
Definitive implementation date			

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