



**Agenda Item 4: Priorities for the implementation of air navigation and safety improvements**

**b) Priorities for the implementation of air navigation improvements**

**Analysis of implementation priorities and associated goals and metrics for improving the efficiency  
and capacity of air navigation**

(Presented by the Secretariat)

SUMMARY	
<p>This working paper presents the status of implementation of performance-based navigation (PBN), air traffic flow management (ATFM), aeronautical information management (AIM), the interconnection of the ATS message handling service (AMHS), the interconnection of automated systems between adjacent ACCs, and the implementation of domestic IPS (Internet protocol suite) networks, as well as the goals for the period 2014-2016 and the associated metrics.</p>	
References	
<ul style="list-style-type: none"><li>• SAM performance-based air navigation implementation plan (Version 1.3 May 2013);</li><li>• Report of the Eleventh workshop/meeting of the SAM Implementation Group (SAM/IG/11) (Lima, Peru, 13-17 May 2013);</li><li>• Report of the Twelfth workshop/meeting of the SAM Implementation Group (Lima, Peru, 14-18 October 2013); and</li><li>• Report of the Meeting of Air Navigation and Safety Directors of the SAM Region (Lima, Peru, 21-22 October 2013).</li></ul>	
<b>ICAO Strategic Objectives:</b>	<i>A – Safety C – Environmental protection and sustainable development of air transport</i>

**1. Introduction**

1.1 The main ICAO milestones for the next triennium are based on improved efficiency and capacity/demand balancing, without compromising safety and with positive environmental results.

1.2 To this end, the current baseline in key air navigation areas in the Region must be defined in order to measure and manage the progress made by administrations with respect to challenges facing international civil aviation.

1.3 The Meeting of Air Navigation and Safety Directors (Lima, 21-22 October 2013) analysed and approved the priorities, goals, and metrics associated to the implementation of the air navigation efficiency and capacity improvements developed by the SAM/IG/12 meeting. The following implementation priorities were approved: Performance-based navigation (PBN) applied to routes, terminal areas, and approaches; air traffic flow management (ATFM), aeronautical information management (AIM); AMHS interconnection; the interconnection of automated systems (radar data and AIDC), and domestic IPS networks.

## **2. Discussion**

2.1 For each of these implementation priorities, the air navigation directors analysed the current status and the associated goals and metrics, as described below with respect to the different areas:

### **PBN implementation**

2.2 Upon analysing the status of implementation of performance-based navigation (PBN) in the South American Region, note was taken of the status of PBN implementation in the optimisation of routes, terminal areas (TMAs), and instrument approach procedures (IAPs). The meeting also reviewed the goals to be achieved by SAM States during the period 2014-2016.

### **Optimisation of the regional ATS route network (ATSRO)**

2.3 Regarding route optimisation at regional level, it was noted that out of a total of 254 routes that make up the regional ATS route network, 159 (62%) correspond to conventional routes and 95 (38%) to PBN routes.

### **PBN redesign of terminal areas**

2.4 Regarding standard arrivals and departures (STARs and SIDs), the meeting analysed the results of the survey conducted by the Regional Office as well as the information of the State AIPs.

2.5 In this regard, it was noted that, of the 99 international airports of the SAM Region listed in the CAR/SAM Air Navigation Plan (ANP), 1,680 STAR and SID procedures have been designed and published in the SAM Region, of which 878 (52%) are conventional, and 802 (48%) are PBN.

2.6 Likewise, it was noted that regarding continuous descent operations (CDO) and continuous climb operations (CCO) in the PBN STARs and SIDs of the region, no CDOs or CCOs have been published in the respective AIPs, but there are 56 PBN STARs in SBBS (Brasilia) and the 24 PBN STARs in SBRF (Recife) that have been developed using CDO techniques, although they are not indicated as such in the chart.

2.7 The indication of CCOs or CDOs in the SID or STAR chart, due to its importance, is under study by the planning and implementation groups to ensure an improved situational awareness by air traffic controllers and pilots.

### **PBN instrument approach procedures**

2.8 Regarding PBN instrument procedures, the Air Navigation Directors took note of ICAO Assembly Resolution A37-11 on global performance-based navigation goals.

2.9 According to Resolution A37-11, the SAM Region has 114 runways for which instrument procedures have been developed to 175 of the existing 228 thresholds. For these 175 thresholds, 107 APV procedures have been implemented, accounting for 61% of IFR runways.

2.10 It was noted that, of all the procedures existing in the Region for international airports listed in the ANP, there were 783 approach procedures for the 99 airports; 178 were PBN approach procedures (including the GNSS IAPs), out of which 107 were RNP APCH, accounting for 14%, distributed as follows: 83 APV Baro-VNAV (APV) procedures - 11%, and 24 RNP procedures with authorisation required (RNP AR), accounting for 3%.

### **PBN goals for the period 2014-2016 in the SAM Region**

2.11 Regarding standard departures and arrivals (SIDs and STARs) designed in accordance with the PBN concept, CDO and CCO operations, and the objectives of Resolution A37-11 concerning instrument procedures with vertical guidance, the following regional goal was agreed upon for the triennium 2014-2016:

Proposed percentages	60% 2016	60% 2016	40% 2016	40% 2016	60% 2016	According to Resolution A-37/11		
						70% 2014	100% 2016	100% 2016
CAR/SAM ANP international airports	PBN SID	PBN STAR	CCOs CDOs in SIDs and STARS	PBN routes Lower airspace	PBN routes Upper airspace	IAP APV/L NAV	IAP RNP-AR	IAP LNAV Only

2.12 Additionally, based on the airspace optimisation programme being implemented in the SAM Region, a **reduction of 40.000 tonnes of CO<sub>2</sub> emissions per year** was considered as regional goal, mainly related to route optimisation and TMAs using CCO and CDO techniques derived from fuel savings by the users.

### **ATFM implementation**

2.13 Upon analysing the status of implementation of air traffic flow management (ATFM) in the South American Region, and in view of the global events to be held in 2014 and 2016, the meeting identified the need to have at least one ATFM position at the area control centres.

2.14 To date, 2 centralised flow management units and 3 flow management units or positions (FMU/FMP) have been implemented in the SAM Region, while one State is in the process of implementation and 8 States are carrying out activities or have not yet taken action for ATFM implementation. Based on the analysis made, it was noted that 36% of SAM States had implemented FMUs or FMPs.

2.15 Out of the 99 international airports in the SAM Region listed in the ANP, ATFM services are provided to 45 airports (27 in Brazil, 8 in Colombia, 1 in Chile, 2 in Paraguay, and 7 in Venezuela), accounting for 45% of all the airports in the Region. This percentage does not include airports in States that are in the process of implementation.

2.16 Under the auspices of project RLA/06/901, several training courses have been conducted and even a guide has been developed for calculating runway and ATC sector capacity to assist States with the runway and ATC sector calculation methodology. Likewise, courses have been carried out at the centralised ATFM unit in Brazil, and the ATFM and the associated CDM manuals were developed for use in the SAM Region.

#### **ATFM goals for the period 2014-2016 for the SAM Region**

2.17 In view of the above, and given the importance of ATFM for capacity/demand balancing, the following ATFM goals were agreed for the period 2014-2016:

- a) 2014-2016: at least one flow management unit (FMU) or flow management position (FMP) in the ACC of each FIR.
- b) 2016: one centralised ATFM unit (ATFMC) in those States that have more than one FIR.

#### **AIM implementation**

2.18 Regarding AIM implementation in the SAM Region, 14 States of the Region have completed Phase 1 of the roadmap for the transition from AIS to AIM, with respect to the following elements:

- a) P-03 — AIRAC adherence monitoring;
- b) P-04 — Monitoring of States' differences to Annexes 4 and 15; and
- c) P-05 — WGS implementation.

2.19 Regarding element P-17, which corresponds to quality management (QMS) implementation, it was noted that in the SAM Region, there were 5 QMS-certified States: Brazil, Chile, Ecuador, French Guiana (France), and Paraguay.

2.20 An important landmark in the road to the new systems is the completion by administrations of Phase 1 of the AIS-to-AIM transition process, since the phased and interdependent transition requires that one phase be completed before moving on to the next transition phase.

2.21 A delay in the implementation of Phase 1 will have a significant impact on several areas that depend on the quality of aeronautical information. One of the most affected areas is ATM.

#### **AIM goal for SAM States that need to complete PHASE 1 of the AIS-to-AIM transition roadmap during the period 2014-2016**

2.22 According to the information provided by the AIM experts of the States, the following goals were proposed for the period 2014-2016 for those States that had not yet obtained AIM QMS certification:

State	% of implementation January 2012	% of implementation May 2013	Certification
Argentina	30 %	30%	2015
Bolivia	30%	30%	2015
Colombia	70%	90%	2014

State	% of implementation January 2012	% of implementation May 2013	Certification
Guyana	0%	25%	2016
Panama	70%	70%	2015
Peru	40%	50%	2015
Suriname	30%	35%	2016
Uruguay	90%	95%	2014
Venezuela	50%	50%	2015

### Interconnection of AMHS systems

2.23 The interconnection of aeronautical message handling systems (AMHS) started in 2010, at a time when many SAM States had already implemented AMHS systems. To date, four AMHS interconnections have been completed. The connections were implemented on the regional communications network, REDDIG, using the IP communications protocol (Internet protocol).

2.24 In order to establish technical, operational, and administrative agreements when interconnecting automated systems, a model Memorandum of Understanding ((MoU) has been developed for use in the SAM Region. Accordingly, the States planning to start the interconnection will describe in the MoU the activities required for the interconnection, with the respective dates, as well as the parties technically and operationally responsible for coordinating activities.

2.25 A total of 26 AMHS interconnections are required. **The goal is to have 100% of AMHS interconnections completed by the end of 2016;** four have already been completed and the remainder will be implemented as follows: one in 2013, 11 in 2014, 5 in 2015, and 5 in 2016.

### Interconnection of automated systems

2.26 The interconnection of automated systems between adjacent ACCs is aimed at reducing the risk of aeronautical incidents resulting from coordination activities, while improving planning phases for an efficient control of flights to/from the corresponding flight information regions (FIR).

2.27 Follow-up to the interconnection of automated systems in the Region is done through the SAM implementation (SAM/IG) meetings, with the support of project RLA/06/901, through which guides have been drafted to support implementation, and through missions to the States, as shown in the website of the ICAO South American Regional Office in the section on electronic documents.

2.28 The interconnection of automated systems consists of the exchange of radar data using the ASTERIX (*All Purpose Structured Eurocontrol Surveillance Information Exchange*) format and IP communication protocols (Internet Protocol), and the implementation of automated transfer of flight plans between automated centres through AIDC (ATS interfacility data communication). The means of communication will be the REDDIG regional network.

2.29 The goal for the interconnection of automated systems is 15 interconnections **implemented by the end of 2015.** The schedule of implementation from 2013 to 2015 is as follows: **1 in 2013, 8 in 2014, and 6 in 2015.**

### **Implementation of domestic IPS (Internet protocol suites) communication networks**

2.30 With the implementation of AMHS, many SAM States have improved their domestic communication networks by implementing domestic IPS networks, but very few States have planned the implementation of AIS and/or MET services, operational voice services (direct or switched ATS communications) and radar surveillance services over the same domestic IP network.

2.31 The implementation of domestic IPS networks will facilitate the implementation of new services to support aeronautical services, thus increasing their availability.

2.32 In this sense, **it is foreseen that, by the end of the period 2014-2016, 80% of the States of the Region** will have implemented domestic IPS networks with the aforementioned characteristics. Implementation during the period 2014-2016 would be distributed as follows: 2 in 2014, 3 in 2015, and 5 in 2016. It is expected that full implementation will be achieved by 2018.

### **3. Suggested action**

3.1 The Meeting is invited to:

- a) take note of the information presented herein; and
- b) analyse implementation priorities and the associated goals and metrics for improving air navigation efficiency and capacity in the SAM Region for approval.

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