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**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 4: Operational implementation of new ATM automated systems and integration of existing ones

**INTRODUCTION OF IMPLEMENTATION ACTIVITIES FOR THE INTEGRATION OF
AUTOMATED SYSTEMS IN SAM REGION**

(Presented by Secretariat)

Summary

This working paper contains information about implementation activities considered in Project RLA/06/901 regarding automated systems integration among ACCs in SAM Region.

References:

- Document 9750 – Global Air Navigation Plan (Third Edition 2007)
- Document of Project RLA/98/003
- Document of Project RLA/06/901

1 Background

1.1 Considering that in SAM Region there are many ACC automated systems that offer, mainly, integration functions to radar surveillance and flight plans, and taking into account that these do not only benefit air traffic control in the corresponding ACC, but, also, among the Region's ACC, it is necessary the integration of these systems in order to increase the surveillance in the Region air traffic control .

1.2 As a result of GREPECAS activities and of ICAO RLA/98/003 technical cooperation project, guidelines for an integration strategy of the ATM automated systems in CAR/SAM Regions were developed, which are presented in **Appendix A** to this working paper.

1.3 GREPECAS/12 Meeting developed Conclusion 12/31 *Regional strategy for the automated system integration*, through which CAR/SAM Region States were requested that, in coordination with ICAO Regional Offices, to define action plans taking into account strategy guidelines indicated in **Appendix A**.

1.4 In order to support the development of action plans for automated systems integration, the Automation Task Force of the ATM/CNS Subgroup elaborated an “*Interface Control Document (ICD) for data communication between ATS units in the Caribbean and South American Regions (CAR/SAM ICD)*,” as well as a Table about “*ATS Operational Requirements for Automated Systems*”.

2. Discussion

2.1 Project RLA/06/901 --*Support for the implementation of an ATM regional system, which considers the ATM operational concept and the adequate technology support on communication, navigation and surveillance(CNS)*-- considers in its immediate objective No. 3 the activities for the development of a strategy for the operational implementation and integration of air traffic management automated systems in SAM Region with a secure, gradual, evolved and inter-operable vision that will facilitate information exchange and joint decision making regarding all components of ATM system.

2.2 The activities considered to achieve this objective are, first of all, to analyze the current situation of the automated system implementation in SAM Region and total documentation available for the implementation of automated systems integration in the Region (Document ICD, automated systems integration plans, operational requirements, etc.), the analysis of scenarios of operational environment of current and planned ATS, in order to determine the operational requirements for the integration of existing automated systems in the short and medium term, and other operational requirements that will help in future ATM possibilities. Furthermore, regarding systems requirements definition in the non-automated ATS units, to develop a strategy having in consideration the strategy guidelines prepared (Appendix A), to develop technical guidelines for functional operation of ATM automated systems, to develop a cost-benefit assessment for this implementation/integration, to prepare technical/operational bilateral or multilateral agreement models for the integration establishment, to prepare training plans and develop action plans models.

2.3 Once executed Project RLA/06/901, States having automated systems will have available a regional strategy of automated systems integration implementation, as well as guidance for the implementation of automated systems for States that do not have them. Also, action plans models will be available, which will allow bilateral or multilateral automated systems integration.

2.4 As a support of this activity, results achieved by the group of experts on automated systems hired under Project RLA/98/003, who have carried out some of the activities considered in Objective No. 3 of this project, are presented in WP/19 of this Meeting.

3 Suggested action

3.1 The meeting is invited to:

- a. Take note of information provided in this working paper; and
- b. Analyze ATM automated systems integration activities in SAM Region, available in section 2 and in **Appendixes A and B** of this Working Paper.

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APPENDIX A

**GUIDELINES FOR STRATEGY OPERATIONAL INTEGRATION OF THE
ATM AUTOMATED SYSTEMS OF THE CAR/SAM REGIONS**

Objective: Through a committed participation of the States, users and ATS providers of the CAR/SAM Regions,

- 1) to cooperate jointly in the integration of technologies for ATM automation, in accordance with ICAO guidelines available, considering the best regional and global alternatives;
- 2) develop a strategy for the integration of ATM automated systems with a safe, gradual, evolutionary and interoperable vision that facilitates the information exchange and the collaborative decision-making of all the components of the ATM system for a seamless, flexible, optimum and dynamic management of airspace and international aerodromes, and at the same time that it increases the required operational safety levels.
- 3) take into account the data processing and network environment, taking into consideration the use of ground and space segments for an interactive ATS information process, under the criteria of integrity, quality and real time.

FRAMEWORK

- a) identify homogeneous areas on the basis of traffic flows operating in the different airspace and international aerodromes;
- b) analyze the operational environment scenarios of the air traffic services currently provided and those that are planned;
- c) determine the scope, architecture design, characteristics and attributes of the operational requirements for the short-term integration of the current automated systems of the ATS units depending on the current provided service levels, as well as other operational requirements that respond to future expectations of the components of the ATM system, considering:
 - i) arranging the requirements in logical sequence, through the following stages.

Stage	Function
Stage I	- Flight plan processing (FDPS/Flight Data Processing System)
Stage II	- Radar data processing and ATS surveillance (RDPS/Radar Data Processing System, ADS and exchange of radar information); - Monoradar ; - Multiradar ; - Radar data sharing .
Stage III	- Automated digital communications (radar control transfer/automated traffic hand off, AIDC/CPDLC, etc.).
Stage IV	- Implementation of CDM (Collaborative Decision Making) for other ATM requirements (AOM [Airspace Organization and Management], CM [conflict management], DCB [Demand/Capacity Balancing], AO [Aerodrome Operation], TS [Traffic Synchronization], AUO [Airspace User Operation], ASDM [ATM Service Demand Management], AIS, Meteorology, Statistics, etc.);

NOTE: SAR should be taken into consideration in all the lower airspace stages.

- ii) identify the automation level required according to ATS functions defined in States' classification of airspace and international aerodromes, as follows:

ATS Operational functions required in the automated systems (ATC, FIS, SAR)							
APPLICABLE ATS FUNCTIONS	ATS Airspace						
	A	B	C	D	E	F	G
Identification							
Separation							
Navigation guide							
Surveillance							
Transfer							
Coordination							
Information of flight plans in real time							
Visualization of the geographical position of the aircraft (longitude, latitude, history)							
Statistical data of flight plans (past and forecasted information).							
Radar data processing system (RDPS)							
Flight data processing system (FDPS)							
ATS inter-facility data communications (AIDC)							
Controller-pilot data link communications (CPDLC)							
Flight profile information (altitude, vertical speed, offset speed, predictive							

ATS Operational functions required in the automated systems (ATC, FIS, SAR)							
APPLICABLE ATS FUNCTIONS	ATS Airspace						
	A	B	C	D	E	F	G
vector, turn angle, etc.)							
Automatic alerts (STCA, MSAW, DIAW, emergency, communication failure, unlawful interference, etc.)							
AIS Interface							
Meteorological information							

- iii) define the incoming and outgoing data, and functional interfaces data applicable to functions and sub-functions of the service;
 - iv) define from the highest to lowest level the functional decompositions for all the ATM components;
 - v) successively determine the different operational applications from the functional level or lowest interface to the upper interface;
 - vi) define the current and future operational applications needs;
 - vii) determine the short-term operational requirements; and
 - viii) determine the future operational requirements.
- d) determine the existing facilities and technological equipments in the CAR/SAM Regions, especially in adjacent States/Territories/Organizations, as well as the inter-operability technical requirements, data bases, equipped aircraft, software tools, etc., required that ease the integration of automated systems;
 - e) develop a cost-benefit analysis for the integrated implementation of ATM automated systems;
 - f) establish bilateral and multilateral agreements as appropriate, among States/Territories/International Organizations of adjacent airspace and regions for trials and the operational implementation/integration of ATS automated systems;
 - g) develop standards, procedures and guidance material required (as *the Interphase Control Document (ICD) for data communications and common coordination between ATM centres, based on ICAO SARPS*) for the functional operation of ATS automated systems, including critical contingency cases, so as to serve as an aid to users;

- h) take the necessary measures for human resources training on a national and regional basis and allowing the facilitation of the implementation/integration of ATS automated systems;
- i) identify other potential benefits for the ATM community that may be obtained in the long-term; and
- j) document an action plan permitting the interoperable implementation of ATS automated systems.

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APPENDIX B

Immediate objective No. 3

Develop a strategy for the operational implementation and integration of automated air traffic management systems in the CAR and SAM Regions, with a safe, gradual, evolutionary, and interoperable vision that facilitates the exchange of information and collaborative decision-making with respect to all the components of the ATM system.

Success criterion: A number of integrated automated ATM systems that permit a seamless, flexible, optimum, and dynamic management of international airspace and aerodromes, while increasing the safety levels required.

Results	Activities	Party responsible for each activity
<p>3.1 Operational implementation of new automated ATM systems, and integration of the existing ones – (GPIs 6, 7, 9, 16, 17, and 18). ATM, CNS, AIS, MET, RO</p>	<p>3.1.1 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"> a) Existing facilities and equipment, especially for adjacent airspaces; b) Existing regional planning and documentation; c) Existing interface control documents (ICDs); d) Implementation of new ATM automation tools (minimum safe altitude warning, conflict prediction, conflict alert, conflict resolution advisory, path conformity control, functional integration of ground and aircraft systems); e) Implementation of flight data processing systems (FDPS); f) Implementation of radar data processing (RDPS) and ADS ATS surveillance systems, and exchange of radar/ADS data, including mono-radar, multi-radar, and radar data sharing; g) Implementation of digital communication networks at State and regional level; h) Implementation of ATM applications, such as radar control handoff, automated hands-free system, AIDC, CPDLC, etc.; i) Implementation of AIS data banks; j) Processes to ensure quality and timely distribution of aeronautical 	<p>ATM, CNS, AIS, MET, RO</p>

	<p>information;</p> <ul style="list-style-type: none"> k) Functional integration of ground and aircraft systems; l) Implementation of MET data banks; m) Availability of meteorological information in support of ATM systems, including <ul style="list-style-type: none"> ✓ D-ATIS, D-VOLMET and other information (volcanic ash, tropical cyclones, storms, clear air turbulence, icing, wind shear, etc.) using up-linked ADS messages; ✓ MET information from down-linked ADS messages (upper wind fields, real-time wind profiles, etc.) n) Implementation of collaborative decision-making (CDM) aspects for other ATM requirements, in keeping with the global ATM operational concept. <p>Start-up date: week 105 Estimated duration: 2 weeks</p>	
	<p>3.1.2 Analyse the operational scenarios of current and planned ATS, with a view to determining the operational requirements for the short- and medium-term integration of existing automated systems and other operational requirements to meet future ATM expectations, as well as the identification of system requirements for non-automated ATS units.</p> <p>Start-up date: week 107 Estimated duration: 2 weeks</p>	<p>ATM, CNS, RO</p>
	<p>3.1.3 Develop a strategy for the integration and implementation of automated systems in the CAR/SAM Regions, taking into account the guidance contained in Appendix K to agenda item 3 of the GREPECAS/12 report, and including the following aspects:</p> <ul style="list-style-type: none"> a) The information processed under 3.1.1 and 3.1.2, and the operational scenarios of current and planned ATS; b) Implementation by stages, considering the required level of automation according to the volume and complexity of air traffic, taking into account: 	<p>ATM, CNS, AIS, MET, RO</p>

	<ul style="list-style-type: none"> ✓ The new tools (minimum safe altitude warning, conflict prediction, conflict alert, conflict resolution advisory, path conformity control, functional integration of ground and aircraft systems); ✓ The flight data processing system (FDPS); ✓ The radar (RDPS) and ADS ATS surveillance data processing system, and radar/ADS data exchange, including mono-radar, multi-radar and radar data sharing; ✓ Automated digital communications, including radar control handoff, automated hands-free system, AIDC, CPDLC, etc.; ✓ Implementation of collaborative decision-making (CDM) aspects for other ATM requirements, in keeping with the global ATM operational concept; ✓ Implementation of AIS data banks; ✓ Functional integration of ground and aircraft systems; ✓ Processes to assure the quality and timely distribution of aeronautical information; ✓ Implementation of MET data banks; <ul style="list-style-type: none"> - Availability of meteorological information to support ATM systems, including: - D-ATIS, D-VOLMET and other information (volcanic ash, tropical cyclones, storms, clear air turbulence, icing, wind shear, etc.) using up-linked ADS messages; - MET information from down-linked ADS messages (upper wind fields, real-time wind profiles, etc.). <p style="text-align: center;">Start-up date: week 109 Estimated duration: 4 weeks</p>	
	3.1.4 Draft technical guidelines for the functional	ATM, CNS, AIS,

	<p>operation of ATM automated systems, including:</p> <ul style="list-style-type: none"> a) New tools (minimum safe altitude warning, conflict prediction, conflict alert, conflict resolution advisory, path conformity control, functional integration of ground and aircraft systems); b) The data communication interface control document (ICD) for the various automated systems to be implemented and common coordination among ATM centres, based on ICAO SARPs; c) Input and output data and interfaces applicable to service functions and sub-functions; d) The functional breakdown required by all ATM components, in hierarchical order; e) Determination of the various operational applications, from the lowest to the highest functional level or interface; f) Technical requirements concerning interoperability, databases, equipped aircraft, software tools, etc., that will facilitate the implementation and integration of automated systems; g) The implementation of AIS and MET data banks. <p>Start-up date: week 113 Estimated duration: 8 weeks</p>	<p>MET, RO</p>
	<p>3.1.5 Conduct a cost-benefit study for the implementation/integration of ATM automated systems.</p> <p>Start-up date: week 121 Estimated duration: 2 weeks</p>	<p>CBA</p>
	<p>3.1.6 Develop bilateral or multilateral technical/operational agreement models, as appropriate, between States and international organisations responsible for adjacent airspaces and regions, with respect to the conduction of trials and the implementation/operational integration of automated ATM systems.</p> <p>Start-up date: week 123</p>	<p>ATM, CNS</p>

	Estimated duration: 1 week	
	<p>3.1.7 Develop a plan of national and regional training activities for the personnel involved that will facilitate the implementation or integration of automated ATM systems.</p> <p>Start-up date: week 124 Estimated duration: 1 week</p>	ATM, CNS, AIS, MET, RO
	<p>3.1.8 Develop a model action plan based on the material prepared, to be used by the participating States and organisations for the interoperable implementation of new automated ATM systems, and for the integration of the existing systems.</p> <p>Start-up date: week 125 Estimated duration:</p>	ATM, CNS, AIS, MET, RO
	<p>3.1.9 Draft a working paper supporting the submittal of the action plan for its consideration and approval.</p> <p>Start-up date: week 126 Estimated duration: 1 week</p>	ATM, CNS, RO
	<p>3.1.10 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>3.1.11 Make the necessary adjustments or changes to the action plan, 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>	ATM, CNS, RO
	<p>3.1.12 Process, edit, and distribute the plan, introducing the amendments made by GREPECAS in the course of its approval.</p> <p>Start-up date: to be determined Estimated duration:</p>	RO

	<p>3.1.13 Give advice to the participating States and organisations regarding the implementation of the action plan for the automated systems and their integration, including the programming of the necessary coordination and training activities.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>ATM, CNS, RO</p>
	<p>3.1.14 Draft a final report of the activities carried out, including the relevant recommendations.</p> <p>Start-up date: to be determined Estimated duration:</p>	<p>ATM, CNS, AIS, MET, RO</p>