



Agenda Item 6: Operational implementation of new ATM automated systems and integration of existing ones

**FOLLOW UP ON THE ACTIVITIES OF THE GROUND-GROUND/AIR-GROUND
COMMUNICATION INFRASTRUCTURE PROGRAMME**

(Presented by the Secretariat)

SUMMARY	
This working paper shows the progress made in the activities of the ground-ground and ground-air communication infrastructure programme.	
REFERENCE	
<ul style="list-style-type: none">• SAM/IG/9 meeting report (Lima, Peru, 14-18 May 2012); and• Seminar/workshop on the implementation of ground-ground and ground-air in the SAM Region (Lima, Peru, 10-12 September 2012).	
ICAO strategic objectives:	A – Safety C – Environmental protection and sustainable development of air transport

1. Introduction

1.1 The GREPECAS Ground-Ground/Air-Ground Communication Infrastructure Programme for the SAM Region contemplates two projects: the SAM ATN architecture project (Project D1), and the ATN ground-ground and air-ground applications project (Project D2).

1.2 Since the SAM/IG/9 meeting to date, significant progress has been made in the implementation of the activities envisaged in these Projects, basically in Project D1; information on the progress made is shown in this working paper.

1.3 Many of the activities carried out have been possible thanks to the support provided by Projects RLA/03/901 - *REDDIG Management and Satellite Segment Administration System* and RLA/06/901 - *Assistance for the implementation of a regional ATM system, taking into account the ATM operational concept and the corresponding technological support for communications, navigation, and surveillance (CNS)*.

1.4 Discussion

Project D1 – SAM ATN Architecture Project

1.5 **Appendix A** to this working paper contains information on Project D1, according to which all planned activities should be completed by 2014. Many of the activities have been carried out and the activities that are pending are already underway, such as the REDDIG implementation and commissioning phase (details on these activities are shown in WP/9). The drafting of the safety guide for the implementation of IP networks, and of the IP network routing policy, has not been completed, and it is expected that it will be completed on the first quarter of 2013 for subsequent submittal to the SAM/IG/11 meeting.

1.6 To complete the drafting of these guides in Project D1, the Meeting might think of the possibility of using RLA/06/901 project in order to count with a CNS specialist for a two-week period.

Project D2 – SAM ATN ground-ground and air-ground applications

1.7 The activities envisaged in this Project are summarized in the following aspects: Operational integration of international AMHS connections in the SAM Region; operational integration of international AIDC connections in the SAM Region; and drafting of guides for the implementation of ground-air data link applications. **Appendix B** describes Project D2.

Operational integration of AMHS connections

1.8 Regarding the activities for the operational integration of AMHS connections, the implementation of a new AMHS interconnection should be highlighted: the first between two systems of different manufacturers, the Ecuador – Peru AMHS interconnection. This interconnection began operations on the first week of July 2012. The status of implementation of AMHS and AMHS systems interconnection is shown in **Appendices C** and **D**, respectively.

1.9 In order to support the interconnection of AMHS systems in the SAM Region, the *Course on ATS Message Handling System (COM-AMHS) and Interconnection Aspects* was held in Lima, Peru, (16-20 July 2012) thanks to the support of Project RLA/03/901. The course was prepared by the EUROCONTROL Instilux Institute and conducted by an expert with broad experience in AMHS systems and communication networks.

1.10 The purpose of the course was to provide information on the technical design of an AMHS system (data networks, server topology, user configuration, routing tables, monitoring and supervision tools, interconnection with other AMHS systems, etc.) and on operational issues such as the design of an appropriate addressing and routing policy, strategies for migrating AFTN flows from AFTN to AMHS, with special attention on contents related to the interconnection between the AMHS system and the operational procedures for incident resolution and escalation. Thirty-four participants of 12 SAM States attended the course.

1.11 A *Seminar/workshop on the implementation of ground-ground and ground-air data link in the SAM Region* was held in Lima (10-12 September 2012) in which, *inter alia*, information was provided on the interconnection of AMHS systems, thus opening a forum for air navigation service providers and companies. Relevant aspects discussed at this seminar/workshop are shown in **Appendix E** to this working paper. The event had 45 attendees from 8 SAM States, United States and representatives of companies and communication service providers.

Operational integration of AIDC connections

1.12 This activity is being coordinated under Project C1 of the Automation Programme. In this regard, Project D2 is providing support with the drafting of a *Guide for the use of AIDC*, with the view to reducing coordination errors. This includes a revision of the Interface Control Document (ICD) for data communications between ATS units in the Caribbean and South American Regions, approved through GREPECAS Conclusion 14/43.

1.13 The guide for the use of AIDC is an important tool to promote AIDC implementation and to determine the types of AIDC messages to be used and their operational acceptance, so that they may be included in the letters of agreement between ATS units that will exchange the data. At the *Seminar/workshop for the implementation of ground-ground and ground-air data links in the SAM Region*, important aspects were addressed, as shown in Appendix E to this working paper. The guide has not been completed yet and it is expected that it will be completed by the first quarter of 2013 for submittal at the SAM/IG/11 meeting.

Drafting of guidelines for the implementation of ground-air data link applications

1.14 A preliminary document has been drafted on a regional strategy for the implementation of ground-ground and air-ground applications in the SAM Region, which appears in **Appendix F** to this working paper, for review by the Meeting.

1.15 The guide for the establishment of ground-air data links in terminal, approach and aerodrome areas has not been completed yet and it is expected that it will be presented at the SAM/IG/11 meeting.

1.16 With a view to completing the guides still pending under Project D2, the Meeting could study the possibility that Project RLA/06/901 provide support for having two experts available in the CNS and ATM areas for a period of 15 days.

1.17 Also, in order to support the States of the Region in the implementation of AIDC, the Meeting could consider holding a one-week practical course on AIDC interconnection with the support of project RLA/06/901.

2. Suggested action

2.1 The Meeting is invited to:

- a) take note of the information contained herein;
- b) review the progress made in programme activities shown in Section 2 of this working paper and in Appendices A, B, C, D and E; and
- c) discuss any other aspect related to this matter as it may deem appropriate.

APPENDIX A

PROJECT ATN ARCHITECTURE IN THE SAM REGION

SAM Region	PROJECT DESCRIPTION (PD)	PD N° D1	
Programme	Project Title	Starting Date	Ending Date
Ground-ground and Air-ground Telecommunications Infrastructure (Programme Coordinator: Onofrio Smarrelli)	ATN Architecture in the SAM Region <i>Project Coordinator: Athayde Licério Vieira Frauche (Brazil)</i> <i>Contributing experts: Omar Gouarnalusse (Argentina), Michel Areno (France), Jose Luis Paredes (Peru), Jesús Bolívar (Venezuela), Christian Amaris de León (Colombia) and Hernando Lara (Bolivia)</i>	March 2010	March 2014
Objective	Study and implementation of optimum architecture for an IP protocol backbone network (REDDIG II) for the SAM Region		
Scope	<p>Study and implementation of an IP backbone network for the SAM Region, including an optimum configuration and considering, among other deliverables, the following:</p> <ul style="list-style-type: none"> • Technical review of the regional telecommunications networks (ground, satellite or mixed) for the implementation of ATN under a cost-benefit analysis • Holding of trials to determine the ATN bandwidth necessary to support ground applications • IP addressing scheme (IPv4 and IPv6) and analysis of the data communications infrastructure in support to ATS operational requirements in the short, medium and long term • Support in the bidding process by TCB (Montreal) and in the implementation of the IP backbone network for the SAM Region • Safety guidance for the implementation of IP networks 		
Metrics	<ul style="list-style-type: none"> • Percentage concluded of the study for an IP backbone network for the SAM Region • Drafting of technical specifications for REDDIG II • REDDIG II implementation percentage 		
Strategy	<ul style="list-style-type: none"> • All tasks will be conducted by experts nominated by States of the SAM Region members of the project <i>ATN Architecture in the SAM Region</i>, under management of the project coordinator, in coordination with the programme coordinator. Communications among project members, as well as between the project coordinator and programme coordinator, shall be carried out through teleconferences and the Internet. In addition, the programme coordinator, together with the project coordinator and the contributing experts, can convene at SAM/IG implementation meetings • Once studies are completed and REDDIG II is implemented, the results will be submitted to the ICAO programme coordinator as a final consolidated document for its analysis, review, approval and presentation at the GREPECAS PPRC 		

Goals	<ul style="list-style-type: none"> • Finalize the SAM IP backbone network study (REDDIG II) by mid-2011 • Finalize the drafting of technical specifications for the implementation of REDDIG II by mid-2011 • Start installation of REDDIG II by September 2013 • Operation of REDDIG II in January 2014
Justification	<ul style="list-style-type: none"> • A study on an ATN IP backbone network for the SAM Region will permit defining the optimum communications network architecture for said Region, currently mainly based on REDDIG (satellite digital communications network). • To arrive to the conclusion on the better network infrastructure, the determining of the current applications demand in terms of band width is considered very important. In this respect, States are carrying out tests, mainly AMHS, to determine the associated space segment. The action is considered as the beginning of the network's cost-benefit relationship research. • In addition, the increasing band width requirements for new services such as automation, surveillance, ATFM and meteorology. Also, a close relationship with the other programmes and their respective projects is necessary, with the aim of collecting the operational requirements demanded by the mentioned applications and their respective tentative implementation dates • After developing all tasks necessary for determining the better network infrastructure, technical specifications for the purchasing and implementation of the SAM backbone network (REDDIG II) will be drafted • This project ends once the SAM IP backbone network (REDDIG II) is implemented • This project contributes to the implementation of SAM PFF CNS 01, CNS04, ATM 05, ATM 06, MET 04 and AIM 02 of the <i>Air Navigation System Performance-Based Implementation Plan for the SAM Region (SAM PBIP)</i>
Related Projects	<ul style="list-style-type: none"> • Air Navigation Systems in Support of PBN • Automation • Improve ATM Situational Awareness • Implementation of the ICAO New Flight Plan Format • ATN Ground-ground and Air-ground Applications

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation ¹	Delivery Date	Remarks
Analysis of the current SAM communications network (REDDIG)	PFF SAM CNS01	REDDIG Administration, Project Coordinator and Omar Gouarnalusse (Argentina)		August 2010	Completed
Analysis of the current MEVA II/ REDDIG interconnection	PFF SAM CNS01	REDDIG Administration		June 2011	Completed
Analysis of the AMHS band width impact on the current REDDIG satellite infrastructure	PFF SAM CNS01	Project Coordinator and Omar Gouarnalusse (Argentina)		September 2010	Completed
Long term applications requirements in the SAM Region	PFF SAM CNS01 PFF SAM CNS 04 PFF SAM MET 04 PFFs SAM ATM 05 and 06 PFF SAM AIM 02	Programme Coordinator		September 2010	Completed

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Gray: Activity has not started

Green: Activity has or will deliver planned milestone as scheduled

Yellow: Activity is behind schedule on milestone, but still within acceptable parameters to deliver milestone on time

Red: Activity has failed to deliver milestone on time, mitigation measures need to be identified and implemented

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation ¹	Delivery Date	Remarks
Comparative study on satellite, ground and mixed (satellite and ground) IP based network models for the SAM Region	PFF SAM CNS 01	Project Coordinator, Omar Gouarnalusse (Argentina) and REDDIG Administration		October 2010	Completed Approved by REDDIG Member States
Definition of ATN IP network infrastructure model for the SAM Region	PFF SAM CNS 01	Project Coordinator, Omar Gouarnalusse (Argentina) and REDDIG Administration		October 2010	Completed Approved by REDDIG Member States
Completion of IPv4 addressing plan for the SAM Region	PFF SAM CNS 01	Project Coordinator and Omar Gouarnalusse (Argentina)		August 2010	Completed The addressing scheme was approved through GREPECAS Conclusion 16/37
Drafting of technical specifications for REDDIG II	PFF SAM CNS01 PFF SAM CNS 04 PFF SAM MET 04 PFFs SAM ATM 05 and 06 PFF SAM AIM 02	Project Coordinator, Omar Gouarnalusse (Argentina) and REDDIG Administration		August 2011	Completed and approved by REDDIG Member States
Drafting of safety guidelines for implementation of IP networks	PFF SAM CNS 01	Project Coordinator		March 2013	An initial document has been drafted

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation ¹	Delivery Date	Remarks
Drafting of IP router policy document	PFF SAM CNS 01	Project Coordinator		October 2013	An initial document has been drafted
Support in the bidding process and in the offer evaluation		REDDIG Administration		June 2012	Completed The bidding process started in April 2012, and was completed with the evaluation of offers from six bidding companies and the appointment of the winning bidder. In the offer evaluation, the following participated: Omar Gouarnalusse, Argentina Athayde Frauche, Brasil Michel Arenó, France Aldo Pereira, Paraguay Jose Luis Paredes, Peru
Support in the implementation of REDDIG II		REDDIG Administration, REDDIG Member States		March 2013- March 2014	This activity is scheduled to start in the second semester of 2013
Monitor the ATN architecture project activities in the SAM Region		ICAO		March 2010- March 2014	
Resources necessary	Economic contribution necessary for the implementation of REDDIG II				

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APPENDIX B

PROJECT ATN GROUND-GROUND AND AIR GROUND APPLICATIONS IN THE SAM REGION

SAM Region	PROJECT DESCRIPTION (PD)	PD N° D2	
Programme	Project Title	Starting Date	Ending Date
Ground-ground and Air-ground Telecommunications Infrastructure (Programme Coordinator: Onofrio Smarrelli)	ATN Ground-ground and Air-ground Applications in the SAM Region <i>Project Coordinator: Omar Gouarnalusse (Argentina)</i> <i>Contributing experts: Javier Vittor (Argentina), Andres Jansen (Brazil)</i>	May 2010	June 2016
Objective	Develop the implementation of ATN ground-ground and air-ground applications in the SAM Region		
Scope	Implementation of SAM ATN ground-ground and air-ground applications, including, at least: <ul style="list-style-type: none"> Operational integration of international AMHS connections in the SAM Region Operational integration of international AIDC connections in the SAM Region Guidelines for the implementation of DCL, DATIS, DVOLMET & CPDLC services through VDL in the SAM Region 		
Metrics	<ul style="list-style-type: none"> Number of AMHS interconnections as per CAR/SAM FASID Table 1Bb Number of AIDC interconnections as per CAR/SAM FASID Table 1Bb Drafting of following guidelines: Guideline for the use of AIDC / Guideline for the establishment of ground-air data links in terminal, approach and aerodrome areas / Guideline for the implementation of DCL, DATIS and DVOLMET systems / Guideline for the implementation of CPDLC through VDL in the SAM Region 		
Strategy	<ul style="list-style-type: none"> All tasks will be conducted by experts nominated by States and organizations of the SAM Region members of the project <i>ATN Ground-ground and Air-ground Applications in the SAM Region</i>, under management of the project coordinator, in coordination with the programme coordinator. Communications among Project members, as well as between the Project coordinator and programme coordinator, shall be carried out through teleconferences and the Internet. In addition, the programme coordinator, together with the project coordinator and the contributing experts, can convene at SAM/IG implementation meetings Once studies are completed, the results will be submitted to the ICAO programme coordinator as a final consolidated document for its analysis, review, approval and presentation at the GREPECAS PPRC 		

Goals	<ul style="list-style-type: none"> • Complete all AMHS interconnections by December 2015 • Complete the drafting of MoU for the interconnection of AMHS by mid-2013 • Complete the migration towards the implementation of AMHS interconnection through IP protocol by December 2015 • Complete AIDC installation between adjacent ACCs by mid-2016 • Complete the drafting of MoU for AIDS systems interconnection by the end of 2013 • Complete AIDC installation between adjacent FIRs by mid-2016 • Complete the drafting of guideline material for the use of AIDC; for the establishment of ground/air data links in terminal, approach and aerodrome areas; and for the implementation of DCL, DATS and DVOLMET.
Justification	<ul style="list-style-type: none"> • The implementation of ground-ground and air-ground data communications infrastructure will contribute to the reduction of air traffic control incidents, increasing the capacity of the transition of information with regard to the currently analogue based applications • This project contributes to the implementation of the SAM PFF SAM CNS 01, CNS 02, ATM 05, ATM 06, MET 03, MET04 and AIM 02 of the <i>Air Navigation System Performance-Based Implementation Plan for the SAM Region (SAM PBIP)</i>
Related Projects	<ul style="list-style-type: none"> • Automation (systems interconnection) • ATFM • Improve ATM Situational Awareness • Implementation of the ICAO New Flight Plan Format

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation ¹	Delivery Date	Remarks
Document on regional strategy for the implementation of ground-ground and air-ground applications in the SAM Region	PFF SAM CNS 01 PFF SAM CNS 02	Omar Gouarnalusse (Argentina)		June 2012	An initial review to the strategy was presented at SAM/IG/8 meeting (Lima, Peru, 10-14 October 2011) In July 2012, the Project Coordinator presented a preliminary version of the guideline, which is being examined by the programme Coordinator, and will be presented at SAM/IG/10 meeting for its review and approval.
Guideline for the use of AIDC with the aim of reducing coordination errors	PFF SAM CNS 01 PFF SAM ATM 06	Javier Vittor (Argentina)		November 2012	The guideline will be based on the Argentinean experience in the IP AIDC implementation between the Cordoba and Ezeiza ACCs. The GREPECAS-approved <i>Interface control document</i> (ICD) for data communications among ATS units in the Caribbean and South American Regions will be reviewed.
Guideline for the implementation ground-air data links in the SAM Region	PFF SAM CNS 02 PFF SAM ATM 06 PFFs SAM MET 03 y 04	Andrés Jansen (Brazil)		May 2013	The guideline will be based on the Brazilian experience in the implementation of ground-air data links. In same, DATIS, DVOLMET and DCL, among others, will be included.

¹

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Red: Activity has failed to deliver milestone on time, mitigation measures need to be identified and implemented

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation ¹	Delivery Date	Remarks
Operational integration of AMHS among States	PFF SAM CNS 01 PFF SAM ATM 05 PFF SAM ATM 06 PFF SAM MET 03, PFF SAM MET 04 PFF SAM AIM 02	States / Project Coordinator / Programme Coordinator		December 2015	Of all the AMHS installed in the Region, the following are interconnected in AMHS (P1 Protocol) Peru-Colombia, Guyana-Suriname, Argentina-Paraguay Other States are in the process of implementation, having drafted and signed MoUs to this end Follow-up to the implementation of AMHS integration is carried out at SAM/IG meetings
Operational integration of AIDC service between adjacent ACCs	PFF SAM CNS 01 PFF SAM ATM 06	States / Project Coordinator / Programme Coordinator		June 2016	To date no AIDC interconnection trials have been held between the Ezeiza and Cordoba ACCs. The integration is still not being used operationally Many States of the Region have drafted and signed MoUs to carry out the integration
Monitor the implementation of ATN ground-ground and air-ground applications activities in the SAM Region		ICAO		March 2010- June 2016	
Resources necessary	Designation of experts for the conduct of some of the deliverables				

APPENDIX C / APENDICE C

STATUS OF IMPLEMENTATION OF AMHS IN THE SAM REGION
ESTADO DE IMPLANTACION DE LOS SISTEMAS AMHS EN LA REGION SAM

STATE/ ESTADO	MANUFACTURER/ FABRICANTE	YEAR OF INSTALLATION/ AÑO DE INSTALACION	REMARKS/ OBSERVACIONES
ARGENTINA	RADIOCOM	Dec 2005	Three MTAs installed: Ezeiza, Cordoba and Comodoro Rivadavia/ Se tienen instalados tres MTA: Ezeiza; Córdoba; y Comodoro Rivadavia Ezeiza MTA connected with MTA Asuncion using P1 protocol (March 2012) / MTA Ezeiza conectado con Protocolo P1 con el MTA de Asunción (Marzo 2012)
BOLIVIA	THALES	Dec 2011	Equipment installed at the end of 2011 / Equipos instalados a finales del 2011
BRASIL	RADIOCOM	Jun 2009	Two MTAs installed: Brasilia; and Manaus / Se tienen instalados dos MTA: Brasilia; y Manaus
CHILE	THALES	Jun 2010	The AMHS system was completed by the end of 2010 / El sistema AMHS se completó a finales del 2010
COLOMBIA	COMSOFT	Dec 2009	AMHS interconnected with Peru. First AMHS interconnection in the CAR SAM Region / Está interconectado con el AMHS con Perú. Primera interconexión AMHS en las Regiones CAR/SAM
ECUADOR	THALES	Feb 2012	A new AMHS from Thales was installed and in operation since February 2012. In July 2012, The Ecuador AMHS interconnected with the Peru AMHS, the first interconnection between two different companies / Un nuevo sistema AMHS de la marca Thales fue instalado y está en operación desde febrero de 2012. En julio de 2012, el AMHS de Ecuador se interconecta con el AMHS de Perú, la primera interconexión con dos empresas diferentes.
GUYANA	SKYCOM	2011	Operational since May 2011. AMHS interconnected with Surinam, with P1 Protocol / En operación desde finales de mayo 2011. Está interconectado en AMHS con Surinam con protocolo P1
FRENCH GUIANA (FRANCE)	AFTN SIGMA	2009 2012	Version 17 will be installed in June 2012 / La versión V17 se realizará en junio de 2012
PANAMA	COCESNA THALES	End of 2013 / Finales de 2013	Panama approved the acquisition of a new AMHS system from THALES, the same it is expected to be in operation at the end of the first quarter 2013 / Panamá aprobó la adquisición de un Nuevo sistema AMHS de la marca Thales que estará operacionalmente en operación a finales del primer trimestre de 2013
PARAGUAY	RADIOCOM	2007	An update of its AMHS was made in March 2012 / Una actualización del sistema AMHS se realizó en marzo de 2012

STATE/ ESTADO	MANUFACTURER/ FABRICANTE	YEAR OF INSTALLATION/ AÑO DE INSTALACION	REMARKS/ OBSERVACIONES
PERU	COMSOFT	Jun 2009	AMHS interconnected with Colombia since November 2010. First AMHS interconnection in the CAR/SAM Regions / Está interconectado con el AMHS con Colombia desde noviembre de 2010. Primera interconexión AMHS en las Regiones CAR/SAM
SURINAME	SKYCOM	2011	Operational since the start of 2011. Interconnected with Guyana / En operación desde inicios de 2011. Interconectado con Guyana
URUGUAY	AFTN from Global Weather	End of 2013 / Finales de 2013	Currently in the purchasing process / Se encuentra en el proceso de adquisición
VENEZUELA	RADIOCOM	2010	AMHS installed since the end of 2010 / Sistema AMHS instalado desde finales del 2010

APPENDIX D

ACTION PLAN FOR THE INTERCONNECTION OF AMHS SYSTEMS IN THE SAM REGION

ITEM	ACTIVITY	RESPONSIBLE	EXPECTED RESULT	STATUS	FINALIZATION DATE
1	2	3	4	5	6
1	Review of the ATN Regional Plan as regards AMHS implementation	Secretariat	Revised ATN ground applications plan (Table CNS 1Bb)	Completed	Jun 2009
2	Review and assignment of intra-regional routers IP addressing	Secretariat	Assignment of IP addressing	Completed	Jun 2009
3	Review of CAAAS addressing plan	SAM States	Revised CAAS addressing Plan	Completed	Jun 2009
4	Prepare interconnection protocol tests to determine bandwidth required for transmission of AMHS messages between MTAs through REDDIG	RLA/06/901 project CNS Expert	Protocol interconnection tests. A guide for the operational interconnection of AMHS systems was drafted	Completed	Dec 2009
5	Preparation of Guide for the Operational Interconnection of AMHS Systems in the SAM Region	RLA/06/901 project CNS Expert	Guide for the operational interconnection of AMHS systems in the SAM Region	Completed	Oct 2009
6	Drafting of a model MoU for the interconnection of AMHS	Argentina	Model MoU for the interconnection of AMHS	Completed	Oct 2009
7	<p>MoU for the interconnection of AMHS currently implemented in the SAM Region:</p> <ul style="list-style-type: none"> a) Argentina-Brazil b) Argentina-Chile c) Argentina-Peru d) Argentina-Paraguay e) Brazil-Colombia f) Brazil-Paraguay g) Brazil-Peru h) Chile-Peru i) Colombia-Peru j) Colombia-Panama k) Colombia-Venezuela l) Peru-Venezuela m) Brazil-Suriname n) Guyana-Venezuela o) Suriname-Venezuela p) Brazil-Guyana q) Guyana-Suriname r) Brazil-Venezuela s) Bolivia-Peru t) Bolivia-Brazil u) Bolivia-Argentina v) Ecuador-Peru w) Ecuador-Colombia x) Ecuador-Venezuela y) Bolivia-Paraguay <p>The AMHS interconnection MoU in French Guiana (France) and Uruguay should be drafted once AMHS installation is completed at national level.</p>	SAM States involved	MoU for interconnection of AMHS systems between SAM States having AMHS implemented	Valid a), b) c), d), f), g), i), l), q) & v) completed	<ul style="list-style-type: none"> h) Oct 2012 j) Mar 2013 k) Oct 2012 m) Oct 2012 n) Oct 2012 o) Oct 2012 p) Oct 2012 r) Oct 2012 s) Oct 2012 t) Dec 2012 u) Oct 2012 w) Mar 2013 x) Mar 2013 y) Oct 2012

ITEM	ACTIVITY	RESPONSIBLE	EXPECTED RESULT	STATUS	FINALIZATION DATE
1	2	3	4	5	6
8	<p>Phase I Interconnection trials between MTAs of:</p> <ul style="list-style-type: none"> a) Argentina-Brazil b) Argentina-Paraguay c) Brazil-Paraguay d) Colombia-Peru e) Argentina-Chile f) Argentina-Peru g) Brazil-Peru h) Guyana-Suriname i) Ecuador-Peru j) Brazil-Colombia k) Perú-Venezuela <p>Types of tests to carry out: Network transportation; Network connectivity; Message exchange; Preparatory phase.</p> <p>Note: Inclusion has been made of only the AMHS interconnected between States having implemented and signed the MoU.</p>	Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Venezuela and REDDIG Administration	Interconnection trials between Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname and Venezuela MTAs	<p>Valid a) message exchange trials were held between Brasilia (Brazil) and CIPE (Argentina) MTAs c) MoU was updated, as entrance node to Brazil will be Curitiba, and the network connectivity, and transport and exchange of messages tests will be carried out. b), d), h) and i) Operational interconnection trials completed c), e), j), and k) No tests carried out f) operational trial pending</p>	<ul style="list-style-type: none"> a) Jun 2012 b) Mar 2012 c) Oct 2012 d) Oct 2010 e) Oct 2012 f) Aug 2012 g) Jun 2012 h) Jun 2011 i) Jul 2012 j) Dec 2012 k) Feb 2013
9	<p>Operational interconnection implementation at the following MTAs:</p> <ul style="list-style-type: none"> a) Argentina-Paraguay b) Argentina-Brazil c) Argentina-Chile d) Argentina-Peru e) Brazil-Paraguay f) Brazil-Peru g) Colombia-Peru h) Guyana-Suriname i) Ecuador-Peru j) Brazil-Colombia k) Peru-Venezuela <p>Note: Inclusion has been made of only the AMHS interconnected between States having implemented and signed the MoU.</p>	Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, and Venezuela	Operational implementation of AMHS systems	<p>Valid AMHS interconnection completed between following MTA, using P1 protocol and operational: Colombia-Peru Guyana-Suriname Argentina-Paraguay Ecuador-Peru</p>	<ul style="list-style-type: none"> a) Mar 2012 b) Jun 2012 c) TBD d) Oct 2012 e) Dec 2012 f) Oct 2012 i) Jul 2012 j) Mar 2013 k) Mar 2013

APPENDIX E**RLA/06/901 - RLA/06/901 - ICAO SEMINAR/WORKSHOP ON THE IMPLEMENTATION OF GROUND-GROUND AND AIR-GROUND DATA LINKS IN THE SAM REGION (LIMA, PERÚ, 10 TO 12 SEPTEMBER 2012)****IMPORTANT CONSIDERATIONS****IMPLEMENTATION OF GROUND-GROUND AND AIR-GROUND APPLICATIONS IN THE SAM REGION****IMPLEMENTATION OF AMHS INTERCONNECTION**

COMPLETE THE ESTABLISHMENT OF MoUs FOR THE INTERCONNECTION OF THE PENDING AMHS IN THE REGION, BY USING THE MODEL MoU ESTABLISHED BY THE SAM/IG GROUP, WITH THE SUPPORT OF RLA/06/901 PROJECT.

FOR A SUCCESSFUL IMPLEMENTATION OF AMHS INTERCONNECTION, THE ESTABLISHMENT OF THE FOLLOWING STEPS IS RECOMMENDED:

- a) TEORETICAL AND PRACTICAL TRAINING OF TECHNICAL AND OPERATIONAL PERSONNEL IN CHARGE OF AMHS; AND
- b) ESTABLISH INTERCONNECTION TRIALS FOLLOWING INDICATIONS IN THE GUIDE FOR THE OPERATIONAL INTERCONNECTION OF AMHS IN THE SAM REGION -- <http://www.lima.icao.int/eDocuments/CNS/AMHS/AMHS%20Guia.pdf>

PERU, IN VIEW OF THE SUCCESS IN THE INTERCONNECTION OF AMHS BETWEEN COLOMBIA-PERU AND ECUADOR-PERU, WOULD BE WILLING TO PROVIDE SUPPORT TO STATES REQUIRING SO, IN THE WORKS PERTAINING TO THE PENDING INTERCONNECTIONS.

IMPLEMENTATION OF AIDC OR OLDI INTERCONNECTION BETWEEN ADJACENT ACCs

THAT PROJECT D2 COMPLETE THE REVIEW OF THE PRELIMINARY SYSTEM INTERFACE CONTROL DOCUMENT FOR THE INTERCONNECTION OF ACC CENTERS OF THE CAR/SAM REGIONS (CAR/SAM ICD), APPROVED BY GREPECAS CONCLUSION 14/43, WITH THE AIM THAT SAME BE ADAPTED TO THE CURRENT REGIONAL AIDC/OLDI IMPLEMENTATION. FOR THE REVIEW OF THE CAR/SAM ICD. IT IS IMPORTANT THAT PERSONNEL IN CHARGE OF AIR TRAFFIC CONTROL PARTICIPATE. THE DOCUMENT SHOULD BE PRESENTED FOR REVIEW AT THE SAM/IG/11 MEETING (MAY 2013).

FOR A SUCCESSFULL AIDC INTEGRATION, IT IS IMPORTANT THAT THE OPERATIONAL MODEL BE WELL DEFINED. THE DEFINITION OF THE AIDC OR OLDI STATE MACHINE REPRESENTS THE MOST SENSIBLE STAGE IN THE PROCESS, WHICH REQUIRES THE DIRECT PARTICIPATION OF PERSONNEL IN CHARGE OF AIR TRAFFIC CONTROL.

THAT, IN THE GUAYAQUIL ACC MODERNIZATION WORKS, MAXIMUM EFFORTS BE MADE IN IMPLEMENTING AN AIDC INTERCONNECTION WITH THE LIMA ACC. IN THIS RESPECT, INDRA, IN CHARGE OF THE MODERNIZATION PROCESS, INFORMED IT WILL SUPPORT IN THE IMPLEMENTATION OF THIS INTERCONNECTION.

THAT THE SAM/IG REQUEST THE SUPPORT OF RLA/06/901 PROJECT FOR A MISSION COMPOSED BY ATM, CNS AND INDUSTRY PERSONNEL, TO EVALUATE THE AIDC IMPLEMENTATION PLANS IN THE SAM REGION, MANY OF WHICH ARE INCLUDED IN THE MoU ALREADY ESTABLISHED, WITH THE AIM OF PRESENTING SOLUTIONS FOR THEIR IMPLEMENTATION.

REGIONAL IMPLEMENTATION OF GROUND-AIR DATA LINKS

WITH THE AIM OF MEETING OPERATIONAL REQUIREMENTS PERMITTING GREATER SAFETY, WORKLOAD REDUCTION IN THE CONTROLLERS' COMMUNICATIONS, AND FAMILIARIZATION WITH AUTOMATED ENVIRONMENTS, THE INITIAL IMPLEMENTATION OF GROUND-AIR DATA LINKS ARE RECOMMENDABLE, SUCH AS D-ATIS, D-VOLMET AND DCL. IN ADDITION, THOSE STATES HAVING OPERATIONS IN THEIR OCEANIC FIRs, ARE RECOMMENDED TO IMPLEMENT CPDLC AND ADS-C. IN THIS MANNER, STATES WILL FOLLOW-UP TO THE CONSIDERATIONS ESTABLISHED IN THE GLOBAL AIR NAVIGATION PLAN AND IN THE AIR NAVIGATION SYSTEM PERFORMANCE-BASED IMPLEMENTATION PLAN FOR THE SAM REGION, APPROVED BY THE SAM AERONAUTICAL AUTHORITIES AT RAAC/12 MEETING, HELD IN LIMA, FROM 3 TO 6 OCTOBER 2011.

WHEN IMPLEMENTING GROUND-AIR DATA LINKS, IT IS IMPORTANT THAT A SIX-MONTH MAXIMUM TRIAL PERIOD PROCESS BE CONDUCTED, IN ORDER TO CERTIFY THE OPERATION OF THE LINKS.

IN VIEW OF BRAZIL'S SUCCESSFUL EXPERIENCE IN THE OPERATION OF GROUND-AIR DATA LINKS, SUCH AS D-ATIS, D-VOLMET, DCL, CPDLS AND ADS-C IN ITS OCEANIC AREA, STATES OF THE REGION COULD REQUEST THE SUPPORT OF THE BRAZILIAN AERONAUTICAL ADMINISTRATION (DECEA) TO EXCHANGE EXPERIENCES IN THIS REGARD.

WHEN IMPLEMENTING GROUND-AIR DATA LINKS, AIRWORTHINESS APPROVAL IS REQUIRED. WITH REGARD TO THIS APPROVAL, THE STATE REGISTRATION AUTHORITY IS TO DETERMINE THAT THE AIRCRAFT COMPLIES WITH THE DATA LINK REQUIREMENTS (CPDLC, ADS-C, AIRWORTHINESS CERTIFICATION) AND THE APPROVAL OF THE MAINTENANCE PROGRAMME (MMEL, AFM, CONFIGURATION CONTROL, ETC.). COMPLIANCE WITH AIRWORTHINESS REQUIREMENTS WILL NOT CONSTITUTE OPERATIONAL APPROVAL AND, FOR THIS APPROVAL, THE USER STATE AUTHORITY IS TO CONDUCT OPERATIONAL APPROVAL AND ISSUE AUTHORIZATION FOR A USER TO CONDUCT CPDLC / ADS-C OPERATIONS.

SINCE MOST OF THE ASCENDING LINKS USE "FREE TEXT" (> 50% OF THE MESSAGES) AND THE DESCENDING MESSAGES USE "ROGER" IN REPLY TO A FREE TEXT MESSAGE, IT IS URGED THAT, WHERE IT APPLIES, THE PRE-FORMATTED MESSAGES AND THE FREE TEXT MESSAGES ARE USED WHEN REALLY REQUIRED.

DATA LINK GLOBAL MANUAL

SAM STATES USE THE GOLD MANUAL FOR GROUND-AIR DATA LINK OPERATIONS, SPECIFICALLY THOSE HAVING OCEANIC FIRs. THE MANUAL HAS DATA LINK PLANNING INFORMATION, TRAINING MATERIAL AND MATERIAL FOR THE ELABORATION OF PROCEDURES.

THE GOLD MANUAL WAS APPROVED AT SAM/IG/8 MEETING (LIMA, PERU, 10-14 OCTOBER 2011) FOR ITS INITIAL USE IN ALL OCEANIC FIRs. PREVIOUSLY, IT HAD BEEN ADOPTED BY THE SAT REGION AT SAT/FIT/5 MEETING (LISBON, PORTUGAL, 17-18 MAY 2010) THROUGH CONCLUSION SAT/FIT/5-7.

SAM STATES PROVIDING, OR HAVING PLANS TO PROVIDE, GROUND-AIR DATA LINK SERVICES (CPDLC /ADS-C) ARE INVITED TO PARTICIPATE IN THE GOLD AMENDMENT PROGRAMME, AS THIS MANUAL IS CURRENTLY THE OPERATION MANUAL ADOPTED WORLD-WIDE.

TO PARTICIPATE IN THE GOLD AMENDMENT PROGRAMME, ONE IS TO SUBSCRIBE AT THE GOLD WEBSITE (ICAO PORTAL WEB SITE: <https://portal.icao.int>). GOLD VERSION 2 WILL BE READY BY THE FIRST QUARTER OF DEL 2013.

TO MONITOR FANS 1A (DATA COMMUNICATINS IN TERMS OF RCP (REQUIRED COMMUNICATIONS PERFORMANCE)) AND SURVEILLANCE PERFORMANCE (ADS-C), STATES OF THE REGION HAVING THE MENTIONED APPLICATION IMPLEMENTED, OR IN ARE IN THE IMPLEMENTATON PHASE, TAKE NOTE OF THE INFORMATION CONTAINED IN THE GOLD MANUAL, APPENDIX D, IN ORDER TO STANDARDIZE THE DATA COLLECTION AND LATER PROCESSING PROCEDURES. THIS ACTIVITY IS IMPORTANT, TO GUARANTEE THE EVALUATION OF SAFETY AND COMPLIANCE TO ANNEX 11, PARAGRAPH 2.2.7.5.

APPENDIX F

**REGIONAL STRATEGY FOR ATN GROUND-GROUND AND AIR-GROUND
APPLICATIONS IN THE SAM REGION**

(Initial Document)

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1. INTRODUCTION

1.1 General considerations

This document is the result of the task assigned to the Ground-Ground and Air-Ground Communication Infrastructure Programme, Project D2, which combined the preliminary elements for the use of ground-ground and air-ground data applications in the short and medium term into a SAM Regional Strategy for the Implementation of Ground-Ground (G-G) and Air-Ground (A-G) Applications.

This strategy is derived from the Global Air Navigation Plan, Doc 9750 and from the CAR/SAM Regional Air Navigation Plan, Doc 8733, since technology is not an end in itself and should be based on clearly established operational requirements for ATM evolution.

The main objective of this strategy is to propose suitable data applications to be applied in the short and medium term in the SAM Region, and to define an evolutionary path that promotes safety, interoperability, and cost-effectiveness of the infrastructure required to meet future ATM needs.

The strategy should be seen as a guide for all stakeholders, which does not contain regulatory or mandatory requirements. If States are planning to introduce new techniques, air navigation authorities should publish the appropriate regulations.

This strategy is a living document and should be reviewed and updated at least once (1) a year.

1.2 Scope of the strategy

The strategy should be seen as a link between the Global Air Navigation Plan for CNS/ATM systems (Doc 9750) and as the strategy of the aeronautical community concerning ATN ground-ground and air-ground applications.

The implementation of these applications should be based on a harmonised strategy for the SAM Region, taking into account the operational requirements and the relevant cost-benefit analyses. It should also be based on action plans to ensure that SAM States, Territories, and International Organisations implement the necessary systems, in accordance with consistent timetables.

Current and future G-G and A-G applications are listed below:

Ground-ground

- ATS message handling system (AMHS);
- ATS interfacility data communication (AIDC);

Air-ground

- Controller-pilot data communications (CPDLC);
- Digital take-off clearances (DCL)
- Data link automatic terminal information service (D-ATIS)
- Digital meteorological information for aircraft in flight (D-VOLMET)

The periods shown in this document define the tentative dates in which it is estimated that applications will be operational. However, some of the applications described in this strategy will be used to solve local issues prior to the dates established in this document, so there will be a migration from pioneering areas to broader regional areas.

In other words, the new policy for the implementation of ATN ground-ground and air-ground applications in the SAM Region should be based first on a voluntary initiative in specific areas, using the existing certified equipment, followed by implementation in broader areas, supported by the implementation rule related to enhanced equipment.

1.3 Structure of the document

This document is structured as follows:

- *Section 1* (this section) describes the purpose of the document, explains its scope and structure, and describes the target audience.
- *Section 2* describes the evolution of the operational scenario and the infrastructure, that is, the operational drivers in the short and medium term.
- *Section 3* summarises a tentative action plan that must be implemented on a timely basis in order to promote the operational use of the new available applications.
- Annex A describes the meaning of the acronyms used in this document.

1.4 Target audience

This strategy was developed for civil and military ANSP departments of SAM States that are responsible for the acquisition/design, acceptance, and maintenance of systems with ATN G-G and A-G applications;

1.5 Execution of tasks

All tasks will be carried out by experts designated by CAR/SAM States and organisations participating in the *CAR/SAM ATN Architecture* project, under the direction of the Project Coordinator. Communications amongst project members and between the project coordinator and the programme coordinator will be through teleconference and the Internet.

Once the studies are completed, the results will be submitted to the ICAO Programme Coordinator in the form of a final consolidated document for its analysis, revision, and approval.

2. **Evolution of the operational scenario and the infrastructure**

2.1 *Short term (2012)*

- Ground-ground

AMHS: It is expected that national implementations will be completed and international operational connections will be advanced during this period of time (currently, they still operate as AFTN, with the exception of Argentina-Paraguay, Colombia-Peru, Ecuador-Peru and Guyana-Suriname).

AIDC: At present, it is not being used at the operational level (only pre-operational tests between two ACCs have been conducted). It is expected that operational use will start during this period.

- Air-ground

Equipment on the ground: It is expected that obsolete VHF equipment will be replaced with digital equipment (VDL) in order to begin data application trials.

Equipment on board: Likewise, the gradual modernisation of the commercial air fleet requires aircraft to be duly equipped in order to begin/expand the use of data link and its emerging applications.

DCL: It is operational only in a couple of airports. It is expected that its operational use will gradually increase.

D-ATIS: Similar to DCL.

D-VOLMET: It is not operational yet. It is expected that trials and/or operational use will be started.

CPDLC: Used only in oceanic areas (EUR – SAM corridor and AORRA). It is expected that trials and operational use will be started.

2.2

Medium term (2013 – 2014)

- Ground-ground

AMHS: It is expected that the aeronautical administrations of the Region will intensify efforts so that, by the end of the period, **all** international connections may be established through AMHS.

AIDC: It is expected that the commitments under the MoUs will be met, resulting in a broader use of this data application.

- Air-ground

Equipment on the ground: It is expected that the ANSPs will make progress in the acquisition of VDL equipment.

Equipment on board: It is expected that the new capabilities of the commercial air fleet will significantly improve during this period.

DCL / D-ATIS / D-VOLMET: The situation described above, together with the availability of global aeronautical telecommunication service providers, hints to the fact that there is no reason that prevents aeronautical administrations from starting to provide these new digital services.

CPDLC: It is expected that national trials will be started.

3. **Action plan**

The basic action plan is briefly described below. It should be noted that some of the actions included therein have already been started and/or have been completed in due time:

Ground-ground

AMHS:

- Drafting of a guide for the interconnection of AMHS systems.
- Drafting of memoranda of understanding between pairs of States.
- Conduction of trials between pairs of States.
- Operational interconnection between pairs of States.

AIDC

- Conduction of pre-operational trials between adjacent ACCs of the same State or between pairs of States.
- Drafting of a guide for the use of AIDC to avoid coordination errors.
- Operational integration between adjacent ACCs.

Air-ground

- Identification of data transmission capabilities of the fleet and ground infrastructure.
- Drafting of a guide for the implementation of ground-air data link in terminal, approach and aerodrome areas.
- Drafting of a guide for the implementation of DCL, D-ATIS, and D-VOLMET systems.
- Conduction of DCL, D-ATIS, and D-VOLMET trials at national level.
- Drafting of a guide for the implementation of CPDLC.
- Implementations at national level.

ANNEX A – ACRONYMS

ACC: Area control centre

AFTN: Aeronautical fixed telecommunication network

A – G: Air-ground

AIDC: ATS interfacility data communication

AMHS: ATS message handling system

ANSP: Air navigation service provider

ATN: Aeronautical telecommunication network

CPDLC: Controller-pilot data link communications

D=ATIS: Data link automatic terminal information service

DCL: Digital take-off clearance

D-VOLMET: Digital meteorological information for aircraft in flight

G – G: Ground-ground

MoU: Memorandum of understanding

VDL: VHF data link
