International Civil Aviation Organization
CAR/SAM Planning and Implementation Regional Group (GREPECAS)
Fourth Meeting of the Programmes and Projects Review Committee (PPRC/4)
Lima, 12 - 14 July 2016

Agenda Item 3: Review of GREPECAS Programmes and Projects

3.4 Projects under the Ground-Ground/Air-Ground Communication Infrastructure Programme (B0-FICE and B0-TBO)

DESCRIPTION AND FOLLOW-UP TO THE IMPLEMENTATION OF PROJECT ACTIVITIES UNDER THE GROUND-GROUND AND GROUND-AIR COMMUNICATION INFRASTRUCTURE PROGRAMME FOR THE CAR AND SAM REGIONS

(Presented by the Secretariat)

SUMMARY

This working paper presents updated information on the status of implementation of activities under projects D1, *ATN Architecture*, and D2, *Ground-Ground/Air-Ground Applications*, of the *Ground-Ground/Air-Ground Communication Infrastructure* programme for the SAM Region, and project D, *ATN Infrastructure in the CAR Region and its ground-ground and ground-air applications*, since the Third Meeting of the Programmes and Projects Review Committee (PPRC/3) to date.

REFERENCES

- Final report of the Third Meeting of the Programmes and Projects Review Committee (PPRC/3), Mexico City, Mexico, 21 - 23 July 2015
- Final report of the SAM/IG/16 Meeting, Lima, Peru, 19-23 October 2015
- Final report of the SAM/IG/17 Meeting, Lima, Peru, 9-13 May 2016
- Final report of the Third NAM/CAR Air Navigation Implementation Working Group Meeting (ANI/WG/3), Mexico City, Mexico, 4 to 6 April 2016
- Final report of the Thirty first MEVA Technical Management Group Meeting (MEVA/TMG/31), Kingston, Jamaica, 24 to 26 May 2016

ICAO strategic objectives:	*A - Safety* *B - Air navigation capacity and efficiency* *E - Environmental protection*

1 Background

1.1 The PPRC/3 meeting took note of the progress on the implementation activities under the Ground-Ground/Air-Ground Communication Infrastructure for CAR and SAM Regions highlighting the successful and completed implementation of the modernization of the MEVA regional network, called MEVA III which installation and commission was made in March 2015, as well as the new digital network REDDIG II, mixed satellite and ground network based in IP that began operations at early February 2015.

1.2 Likewise, the PPRC/3 meeting was informed that in the frame of the implementation of ground-air applications in CAR Region, a new scheme of IPv4 addressing was developed, the matrix of AMHS regional implementation together with the NAM/CAR regional AIDC implementation plan were updated, an implementation action plan template was developed using the NAM ICD and a CPDLC/ADS-C implementation guide was provided, as well as an action plan template to guide CPDLC/ADS-C implementation.

1.3 The PPRC/3 meeting also noted the AMHS positive interconnection tests carried out between Brazil-España, Brazil-Peru, Brazil-Argentina and Argentina-Peru in the SAM Region pending its operational implementation.

1.4 The PPRC/3 observed the reduced progress in the AMHS interconnection implementation in the SAM Region, due to the completion of the new REDDIG II that demanded great efforts by the technicians of the States involved, in addition to the inconvenience suffered in the existing operational AMHS circuits. In this sense, concerned States reported that they will make utmost efforts to complete the interconnections and comply as scheduled, taking into account their commitment under the Declaration of Bogota to complete all the interconnections by the end of 2016.

2 Analysis

2.1 Progress of the CAR and SAM Regions Programme D projects since the PPRC/3 meeting to date are described below.

Programme D CAR ATN Infrastructure in the CAR Region and its ground-ground and ground-air applications

2.2 Regarding Central America, and specifically the “Implementation of the Air Traffic Services (ATS) capabilities in Central America”, a project form the Central American Corporation for Air Navigation Services (COCESNA), with budget from the organisation, which had the objective of implementing the S-Mode, Air Traffic Services Inter-Facility Data Communication (AIDC) and Controller-Pilot Data Link Communication (CPDLC) functionalities in Central American Flight Information Region (FIR).

2.3 The Central America Area Control Centre (CENAMER) successfully implemented eight automatic channels:

1. CENAMER-Havana (NAM Protocol)
2. CENAMER-Mérida (NAM Protocol)
3. CENAMER-Panamá (AIDC)
4. CENAMER-La Aurora (AIDC)
5. CENAMER-Managua (AIDC)
6. CENAMER-El Salvador (AIDC)
7. CENAMER-Guayaquil (AIDC)
8. CENAMER-Bogotá (AIDC)

2.4 The channel with Havana completed its automation 100%, through the NAM protocol, Class I.

2.5 The rest of the channels are in the process of debugging failures and implementing technical and operational mechanisms that allow the needed achievement of automation percentages for the voice channel to be used only as a backup system.

2.6 The CENAMER-Bogotá channel did not work accurately due to problems reported by Colombia regarding the performance of its aeronautical messaging system.

2.7 COCESNA also implemented the ADSC/CPDLC, operating in Centralamerican FIR and for route traffic control operations in the south pacific area. Aeronautical publications have been made, indicating that the functionality use is in a test status, allowing COCESNA to perform the following activities:

a) First, to certify the correct functioning of its ATS system regarding its functionality.

b) Perform operational improvements so the controller can manage the operations in a more efficient way.

c) Obtain statistics of the use of ADSC y CPDLC with the objective that this information could support COCESNA to make the most appropriate decisions when formalizing the use of CPDLC.

d) The system, even operational and frequently used by several aircrafts, is still in a test phase.

2.8 COCESNA through its Project “AMHS Implementation in Central America” will implement an aviation communication network for its own users and users of the Central American States. The objective of the Project is that each Central American user has system allowing management and validation of aviation information. Moreover, Central America will have an AIXM, GIS and chart management system for each one of the Central American States integrated with COCESNA. This will allow a unified and standardized management of the database. The system is scheduled to operate by December 2016.

2.9 Further to the implementation of COCESNA interfaces, a NAM ICD Class II link was implemented between Oakland and Vancouver. The goal of 2 more links in the CAR Region was established by end of 2016.

2.10 Concerning flight plan errors, a new data collection was carried out from 15 September to 5 October, which reflected a general drop of the occurrence of duplicated flight plan of 40.08% vs the previous data collection.

2.11 Pv4 addressing scheme Version 1.1 for the Caribbean was approved and since then States have been conducting interoperability testing such as Cayman Islands, Cuba, Trinidad and Tobago and Sint Maarten. All remaining States will apply Version 1.1 while conducting their interoperability test. Cuba, Trinidad and Tobago, and COCESNA are testing and projected for transition to AMHS in the fourth quarter of 2016.

2.12 The AMHS Regional Implementation Plan was updated.

2.13 A NAM/CAR/SAM Air Traffic Services (ATS) Data Link Implementation Workshop took place in St Maarten in April wo16. The purpose and outcome of this workshop was to improve implementation of AMHS and facilitate exchange of information.

2.14 A new group was created composed of representatives from Dominican Republic, Brazil and United States to study the feasibility of utilizing AMHS for XML data transmission. Coordination is going on between such group and the MET group for additional information.

2.15 Due to the wide areas covered in this project with a limited resource and shortage of the participations from experts, unfortunately the actions taken up to date have not been as effective as expected. Therefore, as indicated in **Appendix A**, an extension of the completion date for this project is proposed.

SAM Programme D, Ground-Ground/Air-Ground Communication Infrastructure

2.16 Since the restructuring of GREPECAS (Decision 16/45), the SAM Ground-Ground/Air-Ground Communication Infrastructure programme includes project D1, ATN Architecture in the SAM Region, and project D2, ATN ground-ground and air-ground applications in the SAM Region.

2.17 The main activities conducted by these projects since the PPRC/3 meeting, when the last follow-up to GREPECAS programmes and projects was made, are described below.

Project D1, ATN Architecture in the SAM Region

2.18 The activities under project D1, ATN architecture in the SAM Region, whose purpose is to study and implement the optimum architecture for an IP-based core network (REDDIG II) for the SAM Region, were completed in April 2016 with the commissioning of the new Brasilia node.

2.19 Installation of the new node of Brasilia began in December 2015, the satellite subnet started its operation in January 2016 while the terrestrial subnet did in April, being the node fully integrated to the entire network to date. Enabled services are: (1) circuit AFTN with Guyana and eleven (11) circuits AMHS with all neighbouring countries and Atlanta via MEVA III, three (3) oral channel administrative and four (4) switched ATS.

2.20 Two training activities were delivered, the first was the “Interconnecting Cisco Network Devices part 1 Course” on CISCO routers and switches aimed at providing basic knowledge to staff in charge of the operation of each node of the network and does not have a solid background on IP networks and linked equipment, carried out from 9 to 13 November 2015. The second was Course part 2 (“Interconnecting Cisco Network Devices part 2”) dictated from 4 to 8 April 2016.

2.21 With the implementation of Project D activities, the SAM Region counts at this moment with a digital mixed satellite and terrestrial completely IP-based network that operates with high availability (99.99%.).

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

2.22 The activities of this project that are still pending involve the operational implementation of AMHS and AIDC. AIDC activities were coordinated through project C1 on ATM automation, and are presented in WP/10 of this Meeting.

2.23 There has been considerable progress on AMHS interconnections since PPRC/3 meeting in which no new AMHS interconnection was reported from GREPECAS/17 meeting. In this sense attention is call to the AMHS interconnection between Brasilia and Lima which came into operation on December 14, 2015 and complete connections between Brazil-Spain, Argentina-Brazil, Argentina-Peru, Argentina-Venezuela, Argentina-Uruguay and Peru-Venezuela. **Appendix B** provides further details of these implementations.

2.24 It is expected that by the end of 2016 all AMHS interconnections indicated in the paragraph above are in operation thus reach the amount of 11 AHMS interconnections. Five of this interconnection are already implemented and in operation.

2.25 According to the Declaration of Bogota the goal was 23AMHS interconnections by the end of 2016, being foreseen that by that date there would be a 48% of implementation. Whereas the significant progress in the implementation of AMHS interconnection since the CRPP/3 to date in comparison with implementations made in 2013-2015, despite not being a period of positive number of implementations, there were updates on the AMHS systems and trials that allowed the progress of implementation in the last year and which will contribute to completing the implementation of AMHS missing interconnections in 2017-2019 period.

2.26 With reference to activities pertaining ATN Ground –Air applications, should be mentioned a major training event held in Sint Marteen, from 18 to 21 April 2016 aimed at supporting States in planning the datalink Ground-Air and Ground-Ground "NAM/CAR/SAM Air Traffic Services (ATS) Data Link Implementation Workshop".

2.27 Remarkable presentations were made in the event by the members of the ICAO Operational Data Link Working (OPDLWG) regarding the latest ICAO documents on data (Document 9869 PBCS and Document 10037 GOLD) as well as data link implementation experiences and lessons learned in this concern. Important conclusions and recommendations were obtained from the event. All presentations, as well as the conclusions and recommendations of the event can be found on the following website http://www.icao.int/NACC/Pages/meetings.aspx?year=2016&cM=02&cY=2016

2.28 **Appendix B** describes projects D of the CAR Region, and **Appendices C** and **D**, shows description of projects C1 and C2 of the SAM Region respectively.

3. Suggested action

3.1 The Meeting is invited to:

a) take note of the information contained in this working paper;

b) review the status of implementation of project activities under programme D of the CAR and SAM Regions, as described in section 2 and Appendices A, B, C, and D, with a view to approving the planning, status, and execution of such activities; and

c) discuss other related matters it may deem appropriate.

APPENDIX A
PROJECT ON THE ATN INFRASTRUCTURE IN THE CAR REGION AND ITS GROUND-GROUND AND GROUND-AIR APPLICATIONS

CAR Region	**DESCRI PROJECT DESCRIPTION (DP)**		**DP N° D**	
Programme	**Project Title**		**Starting Date**	**Ending Date**
Ground-ground and air-ground communications infrastructure (ICAO programme coordinator: Julio Siu)	ATN infrastructure in the CAR Region and its ground-ground and ground-air applications Project coordinator: Experts contributing to the project:	Dulce Roses (United States) Carlos Jimenez (Cuba) Fernando Casso (Dominican Republic) Roger Perez/Eduardo Vega/Mayda Avila (COCESNA) Veronica Ramdath/ Randy Gomes (Trinidad and Tobago) ANI/WG MEVA TMG	March 2010	June 2017
Objective	Support the implementation of the ATN network in the CAR Region and its ground-ground and air-ground applications, based on the regional performance objectives of the NAM/CAR performance-based implementation plan (NAM/CAR RPBANIP) and the CAR/SAM ANP CNS Tables 1Ba, 1Bb, and 1Bc.			
Scope	The project scope includes: • an analysis of the existing capacity for CAR networks for ATN implementation • an assessment and definition of technical improvements and/or requirements for ATN implementation • guidelines and recommendations to expedite the implementation of ground-ground (AIDC, AMHS) and air-ground applications, taking into account Doc GOLD			
Metrics	• Percentage of implementation of ATN architecture and routers • Number of AMHS applications implemented in the CAR Region • Number of completed guidelines planned for ATN and its applications.			
Strategy	• Project activities were coordinated and will be coordinated through communications amongst the project members, the project coordinator and the programme coordinator, mainly via teleconferences and eventual meetings held during events according to the activities programme, as was the case of the different meetings of the working groups for the implementation in the CAR Region. • The project Coordinator will coordinate with the programme Coordinator, requirements from other projects and information from the NAM/CAR implementation working groups. Additional experts will be incorporated as required for specialized tasks. • The deliverables of this project will be sent to the programme Coordinator for its application in the NAM/CAR implementation groups.			
Goals	With this Project it is expected to support the following implementation goals of the NAM/CAR Regions : NAM/CAR RPBANIP ASBU-FICE Targets			
Justification	Support implementation proposing core documentation so States can use it as a reference for the transition, testing, and ATN interconnection and to expedite ATN applications implementation according to the operation benefits expected.			
Related projects	This project is related to the projects of Programme C (Situational Awareness			

Project Deliverables	Relationship with the regional performance-Objectives (RPO) and ASBU B0 modules	Responsible	Status of Implementation[1]	Date of delivery	Comments
Performance assessment of the MEVA II REDDIG interconnection	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	Project D		Completed	2014-2015 Successful performance conducted in the MEVA III-REDDIG II Meeting (Aruba 25-26 May 2015)
Technical study of CAR networks for ATN implementation	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	Project D		Completed	
Assessment of preliminary test results to determine the required bandwidth for the ATN network in the CAR and SAM Regions	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	Project D		Completed	
Study for the configuration of an IP backbone network	RPO 4,5, 6, 7 and 8 of NAM/CAR RPBANIP/ RSEQ-SURF-ASUR-SNET-TBO-ACDM-FICE-DAIM-AMET	Dom. Rep/ COCESNA		Completed	IPv4 Version 1.1 was approved. Implementation in the CAR Region will use such Addressing scheme.
Plan for the transition of ATN and its applications in the CAR Region	RPO 4,5, 6, 7 and 8 of NAM/CAR RPBANIP/ RSEQ-SURF-ASUR-SNET-TBO-ACDM-FICE-DAIM-AMET	United States/COCESNA		Nov 2017	

[1] *Grey* *Task not started yet*
Green *Activity being implemented as scheduled*
Yellow *Activity started with some delay, but expected to be implemented on time*
Red *Activity not implemented on time; mitigation measures are required*

Project Deliverables	Relationship with the regional performance-Objectives (RPO) and ASBU B0 modules	Responsible	Status of Implementation[1]	Date of delivery	Comments
AMHS addressing plan	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	States/ Territories/ International Organisations		Completed	
Plan for the implementation of ATN ground-ground applications (AMHS)		United States/Dom. Rep/ Cuba/ Trinidad and Tobago		Completed	The CAR Regional AMHS Implementation Matrix was updated. With the new MEVA III Network, it is expected the implementation of 2 AMHS circuits for 2015 and two more are being tested.
Plan for the implementation of ATN ground-ground applications (AIDC)	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	United States/COCESNA/ Cuba/ Trinidad and Tobago		June 2017	The Regional NAM/CAR Regional AIDC Implementation Plan was updated. An Action Plan template for implementation using the NAM ICD was developed. A comparison of ICD was made as requested by GREPECAS 17/9 Conclusion. Evaluation of interfaces for NAM ICD Class II and III to be included in AIDC Regional Plan implementation.
Assessment and recommendations guide for the ATN applications ground-air implementation according to Doc GOLD	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	United States/COCESNA/ Trinidad and Tobago		June 2017	A guidance on CPDLC/ADS-C implementation considerations was provided, as well as an Action Plan template to guide the CPDLC/ADS-C Implementation The CDPLC/ADS-C service implementation is expected for 2016 in the PIARCO and Central American FIRs.
Plan for the transition of ATN ground-air applications	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	Project D		June 2017	

Project Deliverables	Relationship with the regional performance-Objectives (RPO) and ASBU B0 modules	Responsible	Status of Implementation[1]	Date of delivery	Comments
Monitoring of the implementation of available technology for ATN ground-air applications	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	ICAO/ States/ Territories		June 2017	
Assessment of AMHS infrastructure for MET XML	RPO 6 of NAM/CAR RPBANIP/ ACDM- FICE	United States, Dominican Republic, ICAO		June 2017	
Resources needed	Designation of experts and activities execution by the group of experts (WGs).				

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APPENDIX B

ADVANCE OF AMHS INTERCONNECTION IMPLEMENTATION SINCE THE CRPP/3 MEETING TO DATE

1.1 The progress made in the implementation of AMHS interconnection since the CRPP/4 is reported below. There has been a significant progress in the implementation of AMHS interconnection with respect to previous years.

Brasilia - Lima

1.2 On 14 December 2015, the AFTN circuit between the Brasilia MTA and the Lima MTA was migrated to an AMHS circuit using protocol P1. Thus, Peru has implemented its third operational AMHS, becoming the State with the largest number of AMHS interconnections. The other two AMHS interconnection in Peru are Lima Guayaquil and Lima Bogota.

Brasilia - Madrid

1.3 All AMHS trials between Brazil and Spain (Brasilia MTA-Madrid MTA) through the CAFSAT satellite network had been successfully completed on 14 January 2016. In this regard, all the technical, operational, and managerial personnel of Brazil and Spain involved in the implementation of the interconnection and the trials was commended. It was also reported that Brazil and Spain were coordinating as necessary for the commissioning of this AMHS connection, which would be the first inter-regional AMHS interconnection of the SAM Region.

Brasilia - Ezeiza

1.4 The complete operational test was made with successful result the 18th May 2016. The AMHS circuit is connected to the new REDDIG II node of Brasilia that came in operation by the middle of April 2016.

Ezeiza - Montevideo

1.5 On 3 March 2016, Uruguay began initial coordination with Argentina for AMHS interconnection between Ezeiza and Montevideo. AMHS trials between the Ezeiza and Montevideo MTAs started on the week of 21 March 2016. P1 connectivity between Ezeiza and Montevideo had been achieved , and that trials from Montevideo to Ezeiza were still pending.

Ezeiza - Lima

1.6 Trials were resumed with positive results on the week of 21 March 2016. P1 connectivity between the Ezeiza and the Lima MTAs had been established.

Ezeiza - Caracas

1.7 April 12, 2016 was established successfully P1 connectivity between the MTA of Ezeiza with the MTA of Lima and of May 31, 2016 all operational tests successfully completed.

Lima - Caracas

1.8 On 10 March 2016, AMHS trials between Peru and Venezuela were resumed, attaining P1 connectivity between the Maiquetia and Lima MTAs. P1 connectivity between Peru and Venezuela was achieved with the support of Brazil. Initial message exchange trials through the AMHS (P1) circuit were conducted on 15 March, without satisfactory results. In this regard, the focal point of Peru requested Venezuela to make the necessary corrections so that messages could be processed and delivered to the user without any problems. Trials were conducted on 20 and 21 March, in which some progress was noted, expecting a successful completion as soon as possible.

Brasilia – United States

1.9 On 13 January 2016, the focal points of Brazil and United States started coordinating the implementation of the AMHS interconnection through the MEVAIII-REDDIG II interconnection. In this regard, Brazil reviewed a technical letter required by the United States (FAA) for interconnections with other countries. The technical letter covers administrative and operational aspects for the completion of the AMHS interconnection. At present, the technical letter is being reviewed by the United States. Once the technical letter has been finalised and signed, interconnection trials will start.

Remaining interconnections Brazil

1.10 The remaining Brazil AMHS interconnection tests (Brasilia-Caracas, Brasilia-Bogota, Brasilia-Georgetown, Brasilia-Cayenne, Brasilia-Paramaribo, Brasilia-Asuncion, Brasilia-Montevideo and Brasilia-La Paz) would be made once the new node of Brasilia is completed in full. The REDDIG II network node was completed in mid-2016. Since then Brazil would begin final interoperability tests with the States' MTA with which exist AMHS requirements.

APPENDIX C

SAM Region	**PROJECT DESRICPTION (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 *Project Coordinator:* *Contributing experts: Omar Gouarnalusse (Argentina), Michel Areno (France), Jose Luis Paredes (Peru), Aldo Pereira (Paraguay), Francisco Almeida (Brazil) and Murilo Albuquerque Loureiro (Brazil)*	May 2010	April 2016
Objective	Study and implementation of optimum architecture for an IP protocol backbone network (REDDIG II) for the SAM Region		
Scope	Study and implementation of an IP backbone network for the SAM Region, including an optimum configuration and considering, among other deliverables, the following: • 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 • Drafting of a safety guideline for the implementation of IP networks and of a routing policy for the SAM Region • Support in the bidding process by TCB (Montreal) and in the implementation of the IP backbone network for the SAM Region (REDDIG II)		
Metrics	• Drafting of a study for an IP backbone network for the SAM Region (REDDIG II) • Drafting of technical specifications for REDDIG II implementation • Drafting of a safety guideline for the implementation of IP networks and of a routing policy for the SAM Region • REDDIG II implementation phases completed		
Strategy	• All tasks will be conducted by experts nominated by States of the SAM Region members of the project *ATN Architecture in the SAM Region*, 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	• Complete the drafting of a study for an IP backbone network for the SAM Region by October 2010 (completed) • Complete the drafting of technical specifications for REDDIG II implementation by August 2011 (completed) • Complete the drafting of a safety guideline for the implementation of IP networks and of a routing policy for the SAM Region by May 2013 (completed) • Complete the REDDIG II implementation phases by February 2015 • Complete the installation of the new REDDIG II node in Brasilia by January 2016
Justification	• Implementation of an ATN IP backbone network for the SAM Region will permit the region having a high availability communications platform meeting current and future (voice and data) services requirements in support of air navigation, thus guaranteeing the required capacity, efficiency and safety. • This project contributes to the implementation of ASBU modules B0 FICE, B0 ASUR, B0 DATM and B0 AMET and SAM PFF CNS 01, CNS04, ATM 05, ATM 06, MET 04 and AIM 02 and ANRF: B0 FICE, B0 ASUR, B0 DATM and B0AMET of the *Air Navigation System Performance-Based Implementation Plan for the SAM Region (SAM PBIP)*
Related Projects	• Automation • Improve ATM Situational Awareness • ATN Ground-ground and Air-ground Applications

Project Deliverables	Relationship with Performance Based Regional Plan (PFF) and ASBU Block 0 modules	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Analysis of the current SAM communications network (REDDIG)	PFF SAM CNS 01 and ANRF FICE	REDDIG Administration, Project Coordinator and Omar Gouarnalusse (Argentina)		August 2010	**Completed**
Analysis of the current MEVA II/ REDDIG interconnection	PFF SAM CNS 01 and ANRF FICE	REDDIG Administration		June 2011	**Completed**
Analysis of the AMHS band width impact on the current REDDIG satellite infrastructure	PFF SAM CNS 01 and ANRF B0 FICE	Project Coordinator and Omar Gouarnalusse (Argentina)		September 2010	**Completed**

[1] ***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) and ASBU Block 0 modules	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Long term applications requirements in the SAM Region	PFF SAM CNS 01 PFF SAM CNS 04 PFF SAM MET 04 PFFs SAM ATM 05 and 06 PFF SAM AIM 02 ANRF B0 FICE ANRF B0 ASUR ANRF B0 DATM ANRF B0 AMET	ICAO		September 2010	**Completed**
Comparative study on satellite, ground and mixed (satellite and ground) IP based network models for the SAM Region	PFF SAM CNS 01 and ANRF FICE	Project Coordinator, Omar Gouarnalusse (Argentina) and REDDIG Administration		October 2010	**Completed** Approved by REDDIG Member States

Project Deliverables	Relationship with Performance Based Regional Plan (PFF) and ASBU Block 0 modules	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Definition of ATN IP network infrastructure model for the SAM Region	PFF SAM CNS 01 and ANRF FICE	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 and ANRF FICE	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 CNS 01 PFF SAM CNS 04 PFF SAM MET 04 PFFs SAM ATM 05 and 06 PFF SAM AIM 02 ANRF B0 FICE ANRF B0 ASUR ANRF B0 DATM ANRF B0 AMET	Project Coordinator, Omar Gouarnalusse (Argentina) and REDDIG Administration		August 2011	**Completed** Approved by REDDIG Member States

Project Deliverables	Relationship with Performance Based Regional Plan (PFF) and ASBU Block 0 modules	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Drafting of safety guideline for implementation of IP networks	PFF SAM CNS 01 and ANRF FICE	REDDIG Administration		May 2013	**Completed** Presented and approved at SAM/IG/11 meeting
Drafting of routing policy document for the SAM Region	PFF SAM CNS 01 and ANRF FICE	Project Coordinator		May 2013	**Completed** Presented and approved at SAM/IG/11 meeting
Support in the bidding process and in the offer evaluation	PFF SAM CNS 01 and ANRF 01	Project Coordinator, Omar Gouarnalusse (Argentina), Michel Areno (France), José Luis Paredes (Peru), Aldo Pereira (Paraguay) and REDDIG Administration		April 2012	**Completed**. The bidding was conducted by TCB, under coordination with the ICAO Regional office. The evaluation process will count with the REDDIG Administration and CNS experts selected by the REDDIG Member States

Project Deliverables	Relationship with Performance Based Regional Plan (PFF) and ASBU Block 0 modules	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Support in the implementation of REDDIG II	PFF SAM CNS 01 and ANRF 01	REDDIG II Project Administration and REDDIG II focal points		November 2013-April 2016	The provisional acceptance tests (PSAT) were completed on 6 February 2015, entering into operation the new REDDIG II proceeding to deactivate the REDDIG I. Some problems arose during the PSAT that have been solved gradually, and being expected to be completed by end July 2015 The new interconnection MEVA III REDDIG II in Bogota (Colombia), Caracas (Venezuela) and Tegucigalpa (Honduras) was implemented at the end of March 2015. By mid-April 2016 the new node of Brasilia started operations.
Monitor the ATN architecture project activities in the SAM Region		ICAO		March 2010-April 2016	
Resources necessary	Economic contribution necessary for the implementation of REDDIG II				

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APPENDIX D

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 *Project Coordinator: Gustavo Chiri (Argentina)* *Contributing experts: Javier Vittor (Argentina), Ruben Guillermo Silva (Argentina), Andres Jansen (Brazil), Murilo Loureiro (Brazil), Jorge Garcia (Perú) and Pedro Pastrian (Chile)*	May 2010	December 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: • 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 ground-air data in the SAM Region • Guideline for the implementation of AIDC		
Metrics	• Number of AMHS interconnections as stated in the Declaration of Bogota • Drafting of following guidelines: Guideline for the implementation of AIDC / Guideline for the implementation of ground-air data links in terminal, approach and aerodrome areas / DCL, DATIS and DVOLMET / CPDLC service through VDL in the SAM Region		
Strategy	• All tasks will be conducted by experts nominated by States and organizations of the SAM Region members of the project *ATN Ground-ground and Air-ground Applications in the SAM Region, and States of the SAM Region,* 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	• Complete the migration towards the implementation of AMHS interconnection through IP protocol by December 2016 • Complete the drafting of guideline material for the implementation of AIDC; for the installation of ground/air data links in terminal, approach and aerodrome areas; DCL, DATS and DVOLMET; CPDLC service through VDL in the SAM Region by December 2013.		

Justification	• 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 ASBU modules B0 FICE, B0 TBO, B0 AMET and B0 DATM and SAM PFF SAM CNS 01, CNS 02, ATM 05, ATM 06, MET 03, MET 04, AIM 02 and ANRF B0 FICE, B0 TBO, B0 AMET and B0 DATM of the *Air Navigation System Performance-Based Implementation Plan for the SAM Region (SAM PBIP)*
Related Projects	• Automation (systems interconnection) • ATFM • Improve ATM Situational Awareness

Project Deliverables	Relationship with Performance Based Regional Plan (PFF)	Responsible	Status of Implementation[1]	Delivery Date	Remarks
Review of the regional strategy for the implementation of ground-ground and air-ground applications in the SAM Region	PFF SAM CNS 01 CNS 02 ANRF B0 FICE and ANRF B0 TBO	Omar Gouarnalusse (Argentina)		June 2012	An initial review of 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 Guide, which was reviewed by the Programme Coordinator and presented at SAM/IG/10 implementation meeting for its review and approval
Guideline for the use of AIDC with the aim of reducing coordination errors	PFF SAM CNS 01 ATM 06 and ANRF B0 FICE	Javier Vittor (Argentina) Ruben Guillermo Silva (Argentina)		April 2013	**Completed** The guideline was finalized and presented at SAM/IG/11 meeting (13-17 October 2013) and circulated to SAM States for review.
Guideline for the implementation ground-air data links in the SAM Region	PFF SAM CNS 02 ATM 06 and ANRF B0 TBO	Andrés Jansen (Brazil)		October 2013	**Completed** The finalized guideline was presented and approved at SAM/IG/12 meeting

[1] ***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
Operational integration of AMHS among States	PFF SAM CNS 01 ATM 05 ATM 06 MET 03 MET 04 AIM 02 ANRF B0 FICE ANRF B0 AMET ANRF B0 DATM	States / Project Coordinator / Programme Coordinator		December 2016	Of all the AMHS installed in the Region, the following are interconnected in AMHS (P1 Protocol) Argentina-Brazil, Argentina-Paraguay, Argentina-Venezuela, Argentina-Peru, Argentina-Uruguay, Colombia-Peru, Guyana-Suriname; Ecuador-Peru, Brazil-Peru, Brasil-España and Peru-Venezuela
Monitor the implementation of ATN ground-ground and air-ground applications activities in the SAM Region		ICAO		March 2010-December 2016	
Resources necessary	Implementation of AIDC operational integration by the States of the Region				