International Civil Aviation Organization
South American Regional Office
Fourteenth Workshop/Meeting of the SAM Implementation Group (SAM/IG/14) - Regional Project RLA/06/901
(Lima, Peru, 10 to 14 November 2014)

SAM/IG/14-WP/11
29/09/14

Agenda Item 6: **Assessment of operational requirements in order to determine the implementation of communication, navigation and surveillance (CNS) improvements for en-route and terminal area operations**

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 the activities under Projects *ATN Architecture* (D1) and *Ground-ground and air-ground ATN applications* (D2) of the Programme *Ground-ground/air-ground communication infrastructure* for the SAM Region.

REFERENCES

- COM/MET/12 meeting (Lima, Peru, 1-3 August 2012)
- Report of the SAM/IG/13 meeting/workshop (Lima, Peru, 21-25 April 2014).
- Report of the Thirteenth Meeting of Civil Aviation Authorities (RAAC/13, Bogotá, Colombia, 4-6 December 2013), Bogota Declaration.
- Report of the Seventeenth meeting of the CAR/SAM Regional Planning and Implementation Group (GREPECAS/17, 21-25 July 2014).

ICAO strategic objectives:	*A – Safety* *B – Air navigation capacity and efficiency*

1. Background

1.1 The main objective of the SAM Implementation Group, with the support of Regional Technical Cooperation Project RLA/06/901, is the implementation of air navigation capacity and efficiency improvements in the SAM Region within the context of safety.

1.2 The implementation of national and regional IP networks, the migration from AFTN to AMHS through the establishment of P1 links between MTAs, and the implementation of AIDC, are regional implementation priorities in the short term (2016).

1.3 Likewise, the progressive implementation of ground-air data links (CPDLC) in oceanic and remote continental areas and for the provision of PDC, D ATIS, and D VOLMET services, the implementation of ADS B, multilateration, and the phasing out of conventional radio aid equipment (en-route VOR, NDB) to give way to GNSS-based navigation, are major implementation achievements during the 2014 - 2018 period, in preparation for the implementation challenges of ASBU Block 1 foreseen in the new global air navigation plan to address air traffic growth.

1.4 In order to support regional implementation of CNS improvements envisaged in GREPECAS programmes and projects, the SAM/IG CNS Group and Project RLA/06/901 have assisted and continue to assist in the development of implementation guides, action plans, and training requirements.

1.5 This working paper describes the progress made in the execution of activities related to the implementation of national and regional IP networks (REDDIG II), as well as in the implementation of ATN ground-ground applications (AMHS and AIDC), and ground-air data links corresponding to GREPECAS Projects D1 and D2.

2. Discussion

2.1 A description follows of the progress made in the implementation of activities corresponding to:

- SAM ATN architecture (Project D1)
- Implementation of national IP networks
- Ground-ground and ground-air ATN applications (Project D2)

SAM ATN Architecture (Project D1)

2.2 Almost all activities contemplated in Project D1 have been executed. Only the monitoring of the implementation of the new REDDIG II digital network is pending. Detailed information on the status of implementation of the new REDDIG II digital network is presented in WP/9.

Implementation of national IP networks

2.3 The implementation of national IP networks constitutes a regional implementation priority. In accordance with the Bogota Declaration, 80% of the States of the Region must have IP networks installed by 2016.

2.4 In support of national IP network implementation, States are reminded to make use of the *Guide for the implementation of national digital IP networks in support of current and future aeronautical applications* developed in the SAM Region with the support of Project RLA/06/901 (which can be downloaded from http://www.icao.int/SAM/Pages/eDocumentsDisplay.aspx?area=CNS).

2.5 With the implementation of AMHS, most States of the Region have improved their communication links, increased the bandwidth and established the IP protocol in the links. As recommended in the guide, all IP-based aeronautical services should be implemented in one same network rather than in several ones. During the Meeting, the States will report on the status of implementation of national IP networks.

Ground-ground and air-ground ATN applications (Project D2)

2.6 This project, whose description and status of implementation are shown in **Appendix A**, includes AMHS interconnection, AIDC interconnection, and progressive implementation of ground-air data links.

Implementation of AMHS interconnection

2.7 All SAM States, except French Guiana, have implemented AMHS systems (see **Appendix B** to this working paper). Regarding the interconnection of AMHS systems, in addition to the four implementations completed since 2010, initial positive operational trials were conducted this year between Argentina-Brazil, Brazil-Peru, and Brazil-Spain, following a period of tests and difficulties. The commissioning of these interconnections is foreseen for the last quarter of 2014. Implementation activities were delayed due to the priority assigned by Brazil to meeting requirements to support traffic growth generated by the World Cup (June-July 2014). It is expected that the States involved will inform the Meeting about the progress made in these implementations.

2.8 It should be noted that, pursuant to the Bogota Declaration, most AMHS interconnections contemplated in the Region (26) are foreseen to be completed by 2016. **Appendix C** to this working paper contains the implementation dates of the aforementioned interconnections. The appendix only lists regional interconnections.

2.9 A teleconference with the participation of Argentina, Brazil, Peru, and ICAO was held on 15 October 2014 to follow-up on the interconnection of AMHS systems on which successful initial trials had been conducted. A summary of the teleconference is contained in **Appendix D** to this working paper.

2.10 During the teleconference, Brazil informed that tests conducted between Brazil and Spain had revealed problems in the management of SS priorities in AMHS messages of Brazil. In this sense, ATECH, the AMHS provider in Brazil, was requested to make the necessary changes. Changes in the AMHS of Brazil would be completed by 20 October and, once verified, operational trials between Brazil and Spain would be resumed in November 2014.

2.11 Likewise, AMHS operational trials between Brazil-Peru and Brazil-Argentina would continue in November 2014. For the conduction of these trials, it was suggested that the test protocol developed by Spain, shown in **Appendix E** to this working paper, be used. The Meeting should review the protocol presented in Appendix E, in reference to the manual for the interconnection of automated systems prepared in the SAM Region, for possible adoption in other AMHS interconnections.

2.12 The AMHS application is not being fully used; it operates like the AFTN. Use should be made of AMHS potential, for instance, the delivery of attachments in messages, which could contain different information, such as tables and graphs, instead of sending only alphanumeric text, as in the AFTN.

2.13 Accordingly, SAM States are required to take advantage of the capabilities provided by AMHS implementation and the establishment of communication networks with higher capacity and velocity, by sending messages with attachments, prior coordination between the units exchanging these messages, in order to increase the delivery of information required by these units, thus improving situational awareness. When AMHS is fully used, the use of AFTN through the gateway will decrease, thus increasing AMHS interconnection at regional and inter-regional level (P1 links between MTAs).

2.14 In order to meet the recommendation of Appendix 3 to the draft amendment to Annex 3, the COM/MET/12 meeting (Lima, Peru, 1-3 August 2012) formulated conclusion COM/MET/3 *OPMET exchange tests in digital format (XML/GML)* on the conduction of OPMET (METAR, SPECI, TAF, and SIGMET) exchange tests by the aeronautical administrations of Peru and Ecuador, Argentina and Paraguay, and other State pairs concerned, using the XML/GML format, and transmitting information through AMHS interconnections established in the REDDIG. Accordingly, trials were conducted but could not be completed, thus the need to complete them.

AIDC interconnection

2.15 WP/12 contains information on the interconnection of automated systems.

Implementation of ground-air data links

2.16 Regarding activities related to the implementation of ground-air data links, Uruguay started coordination for the implementation of CPDLC in its oceanic FIR through the SITA service provider. Other CPDLC services were installed at the Cayenne ACC, Atlantic ACC, Ezeiza ACC, Comodoro Rivadavia ACC and the Lima ACC, all through SITA. Other SAM States with oceanic FIRs that have not yet installed CPDLC should begin studies to implement these services.

2.17 **Appendix F** to this working paper contains the timetable of activities for the implementation of ground-air data links, as specified in the Regional performance-based implementation plan (PBIP), whose last version (1.4) was aligned with the new Global Air Navigation Plan. In this regard, the Meeting should review and update the aforementioned activities.

2.18 In support to ground-air data link implementation, States are reminded to use the guide on the implementation of ground-air data links developed in the SAM Region thanks to Project RLA/06/901. The document can be found in http://www.icao.int/SAM/Pages/eDocumentsDisplay.aspx?area=CNS)

3. **Suggested action**

The Meeting is invited to:

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

b) review the aspects contained in section 2 of this working paper and suggest actions to fulfil the activities proposed in section 2 and the appendices to this working paper; and

c) discuss any other related matter it may deem appropriate.

APPENDIX A

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	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: • 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 per CAR/SAM FASID Table 1Bb • Number of AIDC interconnections as per CAR/SAM FASID Table 1Bb • 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 2015 • Complete AIDC installation between adjacent FIRs by mid-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, MET04 and AIM 02 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 B0 FICE 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 implementation of AIDC	PFF SAM CNS 01 ATM 06 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 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 B0 FICE B0 AMET B0 DATM	States / Project Coordinator / Programme Coordinator		December 2015	Of all the AMHS installed in the Region, the following are interconnected in AMHS (P1 Protocol) Argentina-Paraguay, Colombia-Peru, Guyana-Suriname and Ecuador-Peru. Successful operational trials have been carried out between Brazil-Argentina, Brazil-Peru and Brazil-Spain
Operational integration of AIDC service between adjacent ACCs	PFF SAM CNS 01 ATM 06 B0 FICE	States / Project Coordinator / Programme Coordinator		June 2016	AIDC successful operational trials have been conducted between Argentina-Paraguay through the AMHS circuit. In addition, partially successful tests have been carried out between Argentina–Chile, Chile-Peru, Colombia-Ecuador, Colombia-Panamá, Colombia-Peru and Ecuador-Peru (February- June 2014)
Monitor the implementation of ATN ground-ground and air-ground applications activities in the SAM Region		ICAO		March 2010- June 2016	
Resources necessary	Implementation of AIDC operational integration by the States of the Region				

APPENDIX B

STATUS OF IMPLEMENTATIONOF AMHS IN THE SAM REGION

STATE/	MANUFACTURER/	YEAR OF INSTALLATION	REMARKS
ARGENTINA	RADIOCOM	2005	Three MTAs installed: Ezeiza, Cordoba and Comodoro Rivadavia. MTA Ezeiza connected through P1 protocol with TA Asunción Paraguay VIA REDDIG).
BOLIVIA	THALES	2011	A MTA installed in La Paz
BRAZIL	ATECH	2009	Two MTAs installed: Brasilia and Manaus. The main MTA is Brasilia and manages all regional and interregional connections
CHILE	THALES	2010	An MTA installed in Santiago
COLOMBIA	COMSOFT	2009	An MTA installed in Lima. P1 connection with Peru through REDDIG. First AMHS interconnection in the CAR/SAM (Sept 2010)
ECUADOR	THALES	2012	A MTA installed in Quito. P1 interconnection with Peru through REDDIG. First AMHS interconnection in the CAR/SAM (Aug 2010) between two AMHS systems
GUYANA	INTELCAN	2011	A MTA installed in Georgetown. Since 2011 an PI link is implemented with Suriname through REDDIG.
FRENCH GUIANA (FRANCE)			Lack of short term planes for AMS implementation.
PANAMA	THALES	2014	A MTA installed in Panama City
PARAGUAY	RADIOCOM	2007	A MTA installed in Asuncion. A PI link implemented with MTA Ezeiza through REDDIG
PERU	COMSOFT	2009	A MTA installed in Lima. AMHS interconnected with Colombia (Sep 2010) and Ecuador (Ago 2012) through REDDIG.
SURINAME	INTELCAN	2011	An MTA installed in Paramaribo. A PI link is implemented with Guyana through REDDIG.
URUGUAY	FREQUENTIS	April 2014	An MTA installed in Montevideo
VENEZUELA	RADIOCOM	2010	An MTA installed in Maiquetia

APPENDIX C

AMHS INTERCONNECTION REQUIREMENT AND DATE OF IMPLEMENTATION

STATE	AMHS INTERCONNECTION REQUIREMENT/	DATE OF IMPLEMENTATION/	REMARKS
Argentina	Bolivia	Mar 2016	
	Brazil	Dec 2013	Operational implementation pending.
	Chile	TBD	Reported by Chile delegate during SAM/IG/13 Meeting. It will be implemented under the considerations of the Declaration of Bogota (Dec 2016)
	Paraguay	Mar 2012	Implantado
	Peru	Jul 2014	Reschedule date of implementation.
	Uruguay	Dec 2015	
Bolivia	Argentina	Mar 2016	
	Brazil	Apr 2016	
	Peru	May 2016	
Brazil	Argentina	Dec 2013	Operational implementation pending
	Bolivia	Apr 2016	
	Colombia	Dec 2014	Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
	Guyana	Mar 2015	
	French Guiana	TBD	AMHS implementation pending.
	Paraguay	Jul 2014	To Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
	Peru	Jul 2014	Operational implementation pending. To Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
	Suriname	Mar 2016	
	Uruguay	Dic 2015	
	Venezuela	Dic 2014	Reschedule date of implementation
Chile	Argentina	TBD	Reported by Chile delegate during SAM/IG/13 Meeting. It will be implemented under the considerations of the Declaration of Bogota (Dec 2016)
	Peru	TBD	Reported by Chile delegate during SAM/IG/13 Meeting. It will be implemented under the considerations of the Declaration of Bogota (Dec 2016)

STATE	AMHS INTERCONNECTION REQUIREMENT/	DATE OF IMPLEMENTATION/	REMARKS
Colombia	Brazil	Dec 2014	Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
	Ecuador	Dic 2014	
	Panama	Dic 2014	
	Peru	Sep 2010	Implantado
	Venezuela	Mar 2015	
Ecuador	Colombia	Dec 2014	
	Peru	Jul 2012	Implantado
	Venezuela	May 2015	
French Guiana (France)	Brazil	TBD	AMHS implementation pending
	Venezuela	TBD	AMHS implementation pending
Guyana	Brasil	Mar 2015	
	Suriname	Jun 2011	Implemented
	Venezuela	Dec 2014	
Panama	Colombia	Dec 2014	
Paraguay	Argentina	Mar 2012	Implemented
	Brazil	Jul 2014	Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
Peru	Argentina	Jul 2014	Reschedule date of implementation
	Bolivia	May 2016	
	Brazil	Jul 2014	Operacional implementation pending. Reschedule date of implementation. Delay due to Brazil priorities to handle air traffic control during Football World Cup
	Chile	TBD	Reported by Chile delegate during SAM/IG/13 Meeting. It will be implemented under the considerations of the Declaration of Bogota (Dec 2016)
	Colombia	Sep 2010	Implemented
	Ecuador	Jul 2012	Implemented
	Venezuela	Dec 2014	
Suriname	Brazil	Mar 2016	
	Guyana	Jun 2011	Implemented
	Venezuela	Mar 2016	
Uruguay	Argentina	Dec 2015	
	Brazil	Dec 2015	

STATE	AMHS INTERCONNECTION REQUIREMENT/	DATE OF IMPLEMENTATION/	REMARKS
Venezuela	Brazil	Dec 2014	Reschedule date of implementation.
	Colombia	Mar 2015	
	Ecuador	May 2015	
	Guyana	Dec 2014	
	French Guiana	TBD	AMHS implementation pending.
	Peru	Dec 2014	
	Suriname	Mar 2016	

APPENDIX D

SUMMARY OF THE TELECONFERENCE ON THE INTERCONNECTION OF AMHS SYSTEMS
(15 October 2014 9:00am 10:30 am)

1 Introduction

1.1 In order to follow up on the implementation of AMHS interconnection in the SAM Region, a teleconference was held on 15 October 2014, from 9:00 am to 10:30 am, using the go-to-meeting tool.

1.2 The agenda of the teleconference only included one item, which was the follow-up of the interconnection of the following AMHS systems:

Brazil-Spain
Brazil-Peru
Brazil-Argentina
Argentina-Peru

1.3 The focal points responsible for coordinating AMHS interconnection in Argentina, Brazil, and Peru were invited to participate in the teleconference. The following participated:

Argentina	Javier Vittor	javiervittor@gmail.com
Brazil	Francisco Almeida	franciscoalmeida@hotmail.com
	Murilo Loureiro	loureiromal@decea.gov.br
Peru	Jorge García	jgarcia@corpac.gob.pe
	Raúl Anastacio	ranastacio@corpac.gob.pe

2 Follow-up to AMHS interconnection

2.1 A summary follows of the status of implementation of the following AMHS interconnections:

Brazil-Spain
Brazil-Peru
Brazil-Argentina
Argentina-Peru

Brazil-Spain

2.2 The focal point of Brazil, Mr. Francisco Almeida informed of the positive results of trials between Brazil and Spain. Trials revealed that the Brazilian AMHS system had problems with the AMHS priority management software.

2.3 In this regard, it was noted that ATECH, the AMHS provider of Brazil, had been requested to make the necessary corrections to make sure that priority was given to AMHS messages, and minor changes identified during other trials.

2.4 It was noted that ATECH would make the changes to the AMHS system by 20 October 2014 and, once the changes had been verified, AMHS operational trials would be resumed with Spain. Trials would be conducted with operational AMHS systems and not with AMHS development systems.

2.4 It was also noted that the test protocol used for interconnection trials between Brazil and Spain was a test protocol used by Spain, which is attached to this summary. The attached document only contains the part related to AMHS message priority testing. Francisco will send the complete document to the SAM Office.

2.5 The focal point of Brazil proposed that the test document used be submitted to, and reviewed by, the SAM IG/14 meeting to be held in Lima, on 10-14 November 2014. In this regard, the Secretariat informed that, with the support of Project RLA/06/901, a guidance document on the conduction of interconnection trials had been developed in the Region, based on the Eurocontrol document. In this sense, the SAMIG/14 meeting should analyse the differences that exist with the document developed.

2.6 The Secretariat asked the focal point of Brazil about the possibility of preparing a WP for the SAM IG/14 meeting to report on the results of interconnection trials with Spain, and to propose the use of the test protocol employed between Spain and Brazil for other interconnections.

Brazil-Peru

2.7 Positive AMHS interconnection trials had been conducted between Brazil and Peru through their development systems, but during the teleconference, it was felt that additional trials with the AMHS system, as updated by ATECH, should be conducted in November 2014, that trials should be conducted with the operational AMHS systems, and that the test document used between Brazil and Spain should be used for trials between Brazil and Peru.

Brazil-Argentina

2.8 Regarding this interconnection, the same comments were made as for the AMHS interconnections between Brazil-Spain and Brazil-Peru. Consequently, these trials would also take place in November 2014.

Argentina-Peru

2.9 Regarding this interconnection, the delegate of Argentina, Javier Vittor, noted that changes had been introduced into their AMHS system as a result of the first trials conducted with Peru, and that they were ready to continue with the operational trials.

2.10 In this sense, the focal points of Argentina and Peru, Javier Vittor and Jorge García, respectively, agreed to continue trials on the week of 20 October 2014. In this regard, the focal points would initially coordinate this week as necessary to start trials next week. The Secretariat requested that the ICAO SAM Office be kept informed of trial results.

SPAIN – BRASIL
AMHS INTEROPERABILITY TRIALS

Document Control Log

Edition	Date	Comments	section/pages affected
1.0	12/07/2012	Creation of the document.	all
1.1	02/01/2013	General Parameter Information table	5 & 6
1.2	27/08/2014	Rewording of the document	all

1. Objective

The aim of this document is to describe the technical solution pertaining to the installations to be affected between AENA and ASA for the settlement of AMHS service, collecting the information to set the AMHS trials to be performed in order to ensure the end to end interoperability of the implementations under test.

These trials will not affect current aeronautical message exchange services or any other system already operative with other Comm Centers.

AMHS Service will be settled and operated following EUR AMHS MANUAL documentation. Parts may agree modifications on the procedures provided that no contradiction may arise with EUR AMHS Manual and appendixes.

The set of trials that will be made:

- Performing all the bilateral interoperability trials collected in the EUR AMHS Manual appendix E.
- If were possible, performing also the trilateral trials collected in the same appendix.
- If agreed, performing a subset of conformance trials, described in appendix D. The conformance tests that have to be performed are listed below:

1. CT304– Reject a message, if DL expansion is prohibited
2. CT306– Generate a NDR, if transfer fails
3. CT407 – Convert or reject an IPM, if the ATS-message-text contains lines with more than 69 Characters
4. CT418 – Convert an AFTN SVC “Unknown Addressee Indicator” to a NDR

2. Common Infrastructure

Aena and DECEA will perform the Interoperability trials over test equipment, not affecting current operational services, following EUR AMHS MANUAL Appendix E structure.

CAFSAT will be used to perform AMHS InteroperabilityTrials

Once successfully tested parts will coordinate and perform the Preoperational Trials over Operational Systems and Network, following EUR AMHS MANUAL Appendix F structure.

2.1 Systems Description

2.1.1 Short Description of Brasil Messaging System

DECEA's Messaging TEST System is a ISODE integrated AFTN/AMHS switch which serves as the operational system in the DECEA COM CENTRE in Brasilia.

Component	Release
UA	
MTA	
MTCU	

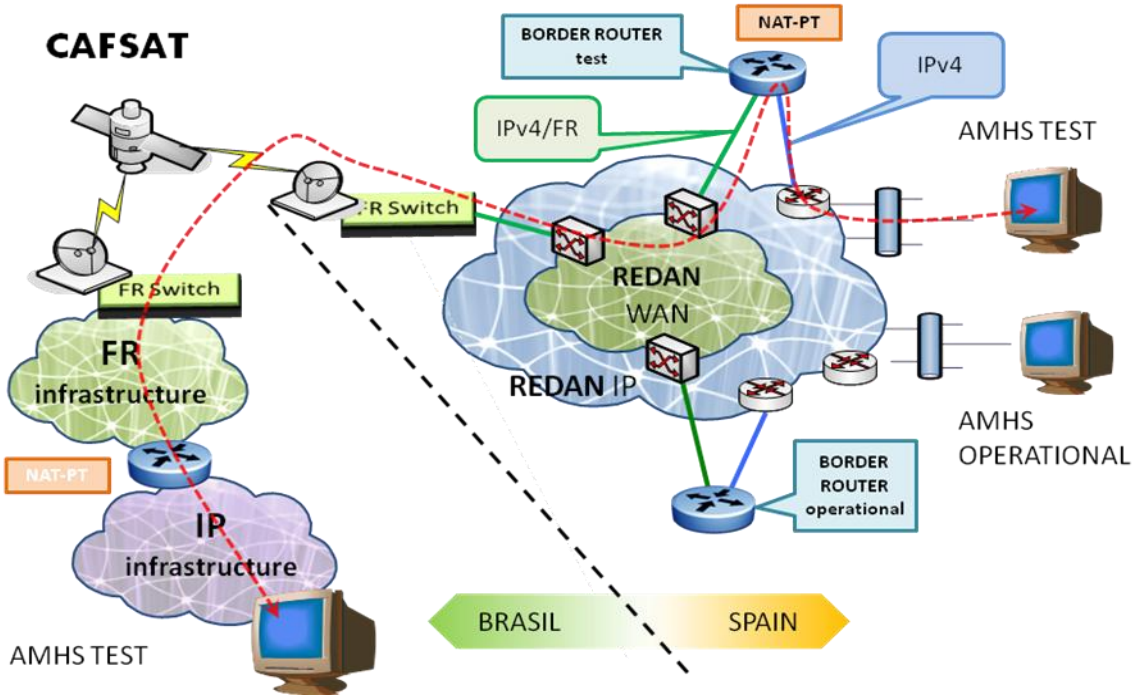
2.1.2 Short Description of Spain Messaging System

AENAs Messaging TEST System (MACRAM) is a Telefónica integrated AFTN/CIDIN/AMHS switch which serves as the operational system in the Aena COM CENTRE in Madrid.

Component	Release
CRAM Integrated AFTN/CIDIN/AFTN gateway	Version 3.5 (November 2013)
CRAM UA/DUA Server	Version 4.2 (November 2013)
AMHS Server	Isode 14.6v16 (May 2010)
Red Hat Linux	Enterprise Advanced Server 4.8 (May 2009)
AMHS User Agent	AMHS message composer integrated in CRAM
AFTN Station	AFTN message composer integrated in CRAM

2.2 Test Infrastructure

In this section there is included a scheme with the common test infrastructure and the main network information:



2.3 Communication Channels

Once put into operational, first line on contact is the telephone. Basic English is considered as the co-ordination speech to be employed by the correspondents. A technical specific glossary ought to be defined for this purpose. Telefax is always considered as a second line of contact E-mail could also be used.

While testing configuration and trials, first line on contact is email and telephone. Basic English is considered as the co-ordination speech to be employed by the correspondents

2.4 Correspondants

- AENA

	Availability	Phone	e-mail
Test Coordinator	8:00 – 15:00 CET Monday - Friday	Gabriel García +34 91 3213210	ggarodriguez@aena.es
Technical Permanent	H24	+34 91 6785135	lecm_cgr@aena.es
Technical Service	9:00 – 17:00 CET Monday - Friday	Same	
Technical service escalate	9:00 – 17:00 CET Monday - Friday	Teresa Barberá Lado +34 916785190 Javier Lores Riesgo +34 916785297	tbarbera@aena.es jlores@aena.es

- DECEA (test platform)

	Availability	Phone	e-mail
Test Coordinator	8:00 – 15:00 Monday - Friday	Lucio Cavalcante +55 61 3364 8375	luciolac@cindacta1.aer.mil.br
Technical Permanent	H24	+55 61 3364 8377	
Technical Service Test issues	8:00 – 15:00 Monday - Friday		
Technical service escalate	8:00 – 15:00 Monday - Friday	Lucio Cavalcante +55 61 3364 8375	luciolac@cindacta1.aer.mil.br

3. General Parameter Information

Parameter	Default Values		Remarks
	DECEA (TEST)	AENA (TEST)	
IP addresses	192.168.69.37	57.235.201.75	In line with the EUROCONTROL IP address allocation plan
TCP Port	102	102	Doc 9896, section 1.3
MTA name	MTA-SBBR-3	MTA-LEEE-1	As per AMHSM section 8.2
MTA password	PLAT-3	ICAO-LEEE-1	As per AMHSM section 8.2
Calling Presentation Address		Yes	Yes or No Depending on SW implementation, parameter may have to be Yes
Authentication requirements	Simple	Simple	Simple, strong or bilateral. Not mandated but may be agreed among test partners.
TSAP addresses	0x35 0x39 0x31 Text “591	0x35 0x39 0x31 Text “591”	Hex e.g. ‘544350’ (“TCP”) or ‘4D4853’ (“MHS”)
Protocol type	X.400/1988	X.400/1988	IPM 1984 phased out (AMHSM App.B)
Type of associations	Monologue	Monologue	Monologue or Two-way alternate (AMHSM App. B)
Number of associations incoming		5 max.	The number of incoming associations should be equal to the number of outgoing ones.
Number of associations outgoing		5 max.	
Connection		Dynamic (5 sec hold time)	Permanent or Dynamic
Minimum message size supported	2Mbytes	2Mbytes	(AMHSM App. B)
Addressing scheme	CAAS with single O	CAAS with single O	XF or CAAS with single or multiple O
	C = XX **ADMD = ICAO** **PRMD = SB** **O = SBBR** **OU1 = SBBR** **CN = SBBRPLTC**	**C = XX** **ADMD = ICAO** **PRMD = SPAIN** **O = LEEE** **OU1 = LEEE** **CN = LEEEXXXX**	

Parameter	Default Values		Remarks
	DECEA (TEST)	AENA (TEST)	
Type of body part used in IPMs by UA	general-text body part with ISO646 repertoire	general-text body part with ISO646 repertoire	general-text body part with ISO646 repertoire

4. Interoperability Trials TEST RESULTS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
6,2 Submission, Transfer and Delivery Operation (AMHS to AMHS)				
IT101	**Submit, transfer and deliver an IPM (UA IUT-A to UA IUT-B)**			
IT101/TC01	A KK priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.			
IT101/TC02	A GG priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.			
IT101/TC03	An FF priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.			
IT101/TC04	A DD priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.			
IT101/TC05	An SS priority message will be submitted from the UA of IUT-A and delivered to the UA of IUT-B.			
IT102	**Submit, transfer and deliver an IPM (UA IUT-B to UA IUT-A)**			
IT102/TC01	A KK priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.			
IT102/TC02	A GG priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.			
IT102/TC03	An FF priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.			
IT102/TC04	A DD priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.			
IT102/TC05	An SS priority message will be submitted from the UA of IUT-B and delivered to the UA of IUT-A.			
6,3 Gateway Operations (AFTN to AMHS)				
IT201	**Convert an AFTN message to AMHS format (IUT-A)**			
IT201/TC01	A KK priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.			
IT201/TC02	A GG priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.			
IT201/TC03	An FF priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.			
IT201/TC04	A DD priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.			
IT201/TC05	An SS priority message will be sent from the AFTN terminal of IUT-A, converted to AMHS and received at the UA of IUT-B.			
IT202	**Convert an AFTN message to AMHS format (IUT-B)**			
IT202/TC01	A KK priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received			

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AMHS INTEROPERABILITY TRIALS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
	at the UA of IUT-A.			
IT202/TC02	A GG priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.			
IT202/TC03	An FF priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.			
IT202/TC04	A DD priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.			
IT202/TC05	An SS priority message will be sent from the AFTN terminal of IUT-B, converted to AMHS and received at the UA of IUT-A.			
6,4 Gateway Operations (AMHS to AFTN)				
IT301	**Convert an IPM to AFTN format (IUT-B)**			
IT301/TC01	A KK priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.			
IT301/TC02	A GG priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.			
IT301/TC03	An FF priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.			
IT301/TC04	A DD priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.			
IT301/TC05	An SS priority message will be submitted from the UA of IUT-A, converted to AFTN in IUT-B and received at the AFTN terminal of IUT-B.			
IT302	**Convert an IPM to AFTN format (IUT-A)**			
IT302/TC01	A KK priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.			
IT302/TC02	A GG priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.			
IT302/TC03	An FF priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.			
IT302/TC04	A DD priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.			
IT302/TC05	An SS priority message will be submitted from the UA of IUT-B, converted to AFTN in IUT-A and received at the AFTN terminal of IUT-A.			
6,5 Gateway Operations (AFTN to AMHS to AFTN)				

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AMHS INTEROPERABILITY TRIALS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
IT401	**Convert an AFTN message to AMHS and back to AFTN format (IUT-A to IUT-B)**			
IT401/TC01	An AFTN message with KK priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.			
IT401/TC02	An AFTN message with GG priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.			
IT401/TC03	An AFTN message with FF priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.			
IT401/TC04	An AFTN message with DD priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.			
IT401/TC05	An AFTN message with SS priority will be sent from the AFTN terminal of IUT-A to the AFTN terminal of IUT-B.			
IT402	**Convert an AFTN message to AMHS and back to AFTN format (IUT-B to IUT-A)**			
IT402/TC01	An AFTN message with KK priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.			
IT402/TC02	An AFTN message with GG priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.			
IT402/TC03	An AFTN message with FF priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.			
IT402/TC04	An AFTN message with DD priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.			
IT402/TC05	An AFTN message with SS priority will be sent from the AFTN terminal of IUT-B to the AFTN terminal of IUT-A.			
6.6 Gateway Operations – special cases				
IT501	**Distribute an IPM to AMHS and AFTN users**			
IT501/TC01	A message will be sent from a UA on IUT-A to IUT-B with Primary Recipients addressing an AFTN terminal and a UA in IUT-B.			
IT501/TC02	A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients addressing an AFTN terminal and a UA in IUT-A.			
IT501/TC03	A message will be sent from a UA on IUT-A to IUT-B with PrimaryRecipients and Copy Recipients, addressing AFTN terminals and UAs in IUT-B.			
IT501/TC04	A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients and Copy Recipients, addressing AFTN terminals and UAs in IUT-A.			
IT501/TC05	A message will be sent from a UA on IUT-A to IUT-B with Primary Recipients, Copy Recipients and Blind Copy Recipients, addressing AFTN terminals and UAs in IUT-B.			

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AMHS INTEROPERABILITY TRIALS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
IT501/TC06	A message will be sent from a UA on IUT-B to IUT-A with Primary Recipients, Copy Recipients and Blind Copy Recipients, addressing AFTN terminals and UAs in IUT-A.			
IT502	**Expand a DL addressing both AMHS and AFTN users**			
IT502/TC01	The message will be sent from a UA on IUT-A addressing a local DL which contains addresses of AFTN terminals and the UA in IUT-B.			
IT502/TC02	The message will be sent from a UA on IUT-B addressing a local DL which contains addresses of AFTN terminals and the UA in IUT-A.			
IT502/TC03	The message will be sent from a UA on IUT-A addressing a remote DL in IUT-B which contains addresses of AFTN terminals and the UA in IUT-B.			
IT502/TC04	The message will be sent from a UA on IUT-B addressing a remote DL in IUT-A which contains addresses of AFTN terminals and the UA in IUT-A.			
IT503	**Convert or reject an IPM, if the ATS-message-text contains more than 1800 characters**			
IT503/TC01	A message with normal priority and length of about 4500 characters is sent from the IUT-A to the IUT-B.			
IT503/TC02	A message with normal priority and length of about 4500 characters is sent from the IUT-B to the IUT-A			
IT504	**Split an incoming IPM addressing more than 21 AFTN users**			
IT504/TC01	A message with normal priority containing 50 recipients is sent from the IUT-A to the IUT-B.			
IT504/TC02	A message with normal priority containing 50 recipients is sent from the IUT-B to the IUT-A.			
IT505	**Probe Conveyance Test**			
IT505/TC01	The probe will be sent from a UA on IUT-A to IUT-B, addressing AFTN terminals and UAs in IUT-B.			
IT505/TC02	The probe will be sent from a UA on IUT-B to IUT-A, addressing AFTN terminals and UAs in IUT-A.			
IT505/TC03	The probe will be sent from a UA on IUT-A to IUT-B, containing the address of an AFTN terminal of IUT-B and two MF addresses which cannot be translated by the MTCU of IUT-B.			
IT505/TC04	The probe will be sent from a UA on IUT-B to IUT-A, containing the address of an AFTN terminal of IUT-A and two MF addresses which cannot be translated by the MTCU of IUT-A.			
6,7 Stress traffic situations				
IT601	**Stress load**			
IT601/TC01	After queuing of an amount of messages both IUTs start sending a burst of 100 messages.			
IT601/TC02	After queuing of an amount of messages both IUTs start sending a burst of 200 messages.			
IT601/TC03	After queuing of an amount of messages both IUTs start sending a burst of 400 messages.			

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AMHS INTEROPERABILITY TRIALS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
IT601/TC04	After queuing of an amount of messages both IUTs start sending a burst of 4000 messages.			
IT602	**Stress load with long messages**			
IT602/TC01	After queuing of an amount of messages both IUTs start sending a burst of 400 “long” messages.			
IT602/TC02	After queuing of an amount of messages both IUTs start sending a burst of 4000 “long” messages.			
7,1 Submission/Transfer/Delivery and Relay operations				
IT701	**Submission / Transfer / Delivery between the partner MTAs**			
IT701/TC01	An IPM submitted in IUT-A is transferred to IUT-B, IUT-C and delivered to the UAs of IUT-B, IUT-C.			
IT701/TC02	An IPM submitted in IUT-B is transferred to IUT-C, IUT-A and delivered to the UAs of IUT-C, IUT-A.			
IT701/TC03	An IPM submitted in IUT-C is transferred to IUT-A, IUT-B and delivered to the UA of IUT-A, IUT-B.			
IT702	**Relay operations**			
IT702/TC01	An IPM is routed via an intermediate MTA, transferred from IUT-A to IUT-C via “relay” IUT-B.			
IT702/TC02	An IPM is routed via an intermediate MTA, transferred from IUT-B to IUT-A via “relay” IUT-C.			
IT702/TC03	An IPM is routed via an intermediate MTA, transferred from IUT-C to IUT-B via “relay” IUT-A.			
7,2 Test of special situations				
IT801	**Alternate MTA routing**			
IT801/TC01	An ATS message (IPM) queued in one MTA (IUT-A) due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT-C).			
IT801/TC02	An ATS message (IPM) queued in one MTA (IUT-B) due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT-A).			
IT801/TC03	An ATS message (IPM) queued in one MTA (IUT-C) due to outage of the primary X.400 routing path is routed via an alternate MTA (IUT-B).			
IT802	**Loop detection**			
IT802/TC01	IUT-A detects that a message submitted in IUT-A is traversing a loop.			
IT802/TC02	IUT-A detects that a message submitted in IUT-B is traversing a loop.			
IT802/TC03	IUT-A detects that a message submitted in IUT-C is traversing a loop.			
IT802/TC04	IUT-B detects that a message submitted in IUT-A is traversing a loop.			
IT802/TC05	IUT-B detects that a message submitted in IUT-B is traversing a loop.			
IT802/TC06	IUT-B detects that a message submitted in IUT-C is traversing a loop.			
IT802/TC07	IUT-C detects that a message submitted in IUT-A is traversing a loop.			

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AMHS INTEROPERABILITY TRIALS

TEST CASE	TESTED FUNCTIONALITY	RESULT	DATE	REMARKS
IT802/TC08	IUT-C detects that a message submitted in IUT-B is traversing a loop.			
IT802/TC09	IUT-C detects that a message submitted in IUT-C is traversing a loop.			

END OF DOCUMENT

APPENDIX F

ANALYSIS OF THE ACTIVITIES FOR THE IMPLEMENTATION OF AIR-GROUND DATA LINKS IN THE SAM REGION

DESCRIPTION OF TASKS	START	END	RESPONSIBLE PARTY	STATUS
1. ANALYSIS OF THE STATUS OF DATA LINK IN THE SAM REGION	**October 2011**	**December 2018**		
1.1 Identify the level of implementation of air data link in the SAM Region	October 2011	May 2012	REGIONAL OFFICE STATES	Completed. Information supplied in the CNS improvement action plans by SAM Region States http://www.icao.int/SAM/Pages/ES/eDocumentsDisplay_ES.aspx?area=CNS Updating required
1.2 Up-date CNS improvement action plan		SAM/IG/15	STATES	
1.3 Identify the data link capacity of the air fleet in the SAM Region and the airlines certified to operate data links	October 2011	May 2012	REGIONAL OFFICE STATES	Pending
2. STRATEGY FOR THE IMPLEMENTATION OF GROUND-AIR COMMUNICATION SYSTEMS IN THE SAM REGION	**2010**	**December 2014**		
2.1 Implementation strategy for the ground-air data links (Performance Based Regional Implementation Plan PBIP)	2010	December 2013	REGIONAL OFFICE STATES	Completed
2.2 Review FASID Table CNS 2 A		December 2014	REGIONAL OFFICE STATES	Pending Meeting review SAM/IG/14
2.3 Develop guidelines for the implementation of data link ground-air applications in the SAM Region	May 2012	October 2013	EXPERTS PROJECT RLA/06/901 RO	Finalized. Approved by SAM/IG/12 http://www.icao.int/SAM/Pages/ES/eDocumentsDisplay_ES.aspx?area=CNS

DESCRIPTION OF TASKS	START	END	RESPONSIBLE PARTY	STATUS
3. IMPLEMENTATION OF GROUND-AIR DATA LINK		**December 2018**		
3.1 Implementation of ground-air data link for oceanic area (CPDLC) HF support			SAM REGION STATES	The following oceanic FIRs has CPDLC implemented (FIR Cayena, Atlantic, Ezeiza, Comodoro and Santiago) FIR Montevideo in process of implementation
3.2 Implementation of DCL services in selected airdromes		2018	SAM REGION STATES	States are supposed to provide information during SAM/IG/14
3.3 Implementation of D-ATIS services in selected airdromes		2018	SAM REGION STATES	Only Brazil has reported an implementation plan
3.4 Implementation of VOLMET services (voice and data)		2018	SAM REGION STATES	Only Brazil has reported an implementation plan
4. TRAINING	**January 2016**	**December 2018**		
2.1 Develop training programmes and documentation for pilots, air traffic controllers and technical maintenance personnel		SAM/IG/15	REGIONAL OFFICE	
2.2 Conduct training programmes and seminars for pilots, air traffic controllers and technical maintenance personnel	January 2016	December 2018	REGIONAL OFFICE STATES EXPERTS PROJECT RLA/06/901	
5. STANDARDS AND PROCEDURES		**December 2015**		
5.1 Develop of model documents to support the implementation of data link ground-air on oceanic and continental areas (AIC, AIP supplements, advisory circulars)		SAM/IG/15	EXPERTS PROJECT RLA/06/901 RO	A two week mission of an expert in design, installation and ground-air data links operations is required.
5.2 Review of Procedures Manual of the ATS dependencies involved in route in oceanic and continental areas		SAM/IG/15	EXPERT PROJECT RLA/06/901 RO	

DESCRIPTION OF TASKS	START	END	RESPONSIBLE PARTY	STATUS
5.3 Update the letters of agreement between ATS units, if necessary, in view of the implementation of the ground-air data link for en-route oceanic and continental areas		December 2015	STATES	
5.4 Amendment to Document 7030, if necessary, in view of the implementation of ground-air data link in oceanic and continental areas	May 2012	December 2015	REGIONAL OFFICE	
6. SYSTEM PERFORMANCE MONITORING	**October 2011**	**December 2015**		
6.1 Monitoring of implementation activities of ground-air data link	October 2010	December 2018	PROJECT AND PROGRAMME COORDINATOR	

- END -