Agenda Item 3: **Follow-up to the implementation of future requirements/services regarding MEVA II / REDDIG interconnection**

FOLLOW-UP TO THE IMPLEMENTATION OF NEW SERVICES REGARDING MEVA II / REDDIG INTERCONNECTION AND TO THE STUDY ON REGIONAL NETWORKS OPTIMIZATION IN TERMS OF BAND WIDTH AND EQUIPMENT

(Presented by the Secretariat)

SUMMARY

This working paper presents information on the implementation of new services in the interconnection of MEVA II / REDDIG, and on the regional networks optimization study carried out in terms of band width and equipment, as follow up to Conclusion MR 7/2 formulated by the Seventh MEVA II / REDDIG Coordination Meeting.

References:

- Seventh MEVA II / REDDIG Coordination Meeting (Mexico City, 10-11 June 2009); and
- Thirteenth Meeting of the REDDIG Coordination Committee Meeting (Lima, Perú, 9-10 March 2010).

ICAO strategic objectives:	*A - Safety* *D - Efficiency*

1. Background

1.1 In the CAR/SAM Regions, is is expected that in the next years many States/Territories, International Organization make progress in the implementation of national aeronautical telecommunications network (ATN) applications, such as AMHS and AIDC. In addition, an increase of automated systems at the ACCs (radar data processing, meteorological data, operational coordinations, flight plans, etc.) are scheduled.

1.2 As regards AMHS implementation in the States/Territories and International Organization involved in MEVA II / REDDIG interconnection, Brazil, Colombia, United States, Panama, Peru and Venezuela have scheduled theirs for 2010. The interconnection plans between these new AMHS systems are indicated in the CAR/SAM FADIS Table CNS 1Bb; the interconnection of MEVA II / REDDIG will serve as a means to interconnect some of these new AMHS systems.

1.3 The need to reduce the frequent errors that present themselves in ATS coordinations between adjacent ACCs, made through speech communications, makes it necessary that the aeronautical administrations implement automated systems in their ACCs and proceed, in turn, to their interconnection. In this respect, GREPECAS has formulated many conclusions with the aim that States/Territories and International Organizations implement and interconnect automated systems in their ACCs. Among the more important conclusions are Conclusion 12/31- *Regional strategy for the integration of automated systems*, Conclusion 14/43 - *Agreements for ATM automated system interface*, Conclusion 14/44 - *Establishment of an action plan for the interface of ATM automated systems* and Conclusion 15/36 - *Measures to reduce operational errors in the ATC coordination loop between adjacent ACCs*.

1.4 During the seventh MEVA II / REDDIG Coordination Meeting (MR/7), the initial requirements for the exchange of radar data and AMHS, through MEVA II / REDDIG interconnection, were analyzed upon.

1.5 In view of the band width requirements for the implementation of these new services, MR/7 considered that an appropriate network configuration that optimizes the use of the equipment and the band width required should be studied upon, urging the MEVA II and the REDDIG Administrations to elaborate a study in this regard, formulating Conclusion MR 7/2 – *Optimization of equipment and bandwidth use in the MEVA II / REDDIG interconnection.*

2. **Analysis**

2.1 As follow-up to Conclusion MR 7/2, the future circuits requirements analyzed during MR/7 were reviewed. In this respect, it was considered that, in addition to the initial circuits taken under consideration, account should be taken in the implementation of new circuits permitting the automatic transfer of ATS data and messages between the automated systems installed at adjacent ACCs.

2.2 The automatic transfer of data between the automated systems installed in the ACC should be implemented through the use of the AIDC, as planned and operationally required in the FASID Table CNS 1Bb, cf GREPECAS Conclusion 15/36. In this regard, in view of the automated systems installed in the ACCs of the States involved in MEVA II / REDDIG interconnection, implementing AIDC between the Bogota ACC-Panama ACC, Barranquilla ACC-Panamá ACC, Bogotá ACC-COCESNA ACC, Barranquilla ACC-Kingston ACC, Barranquilla ACC-Curacao ACC, COCESNA ACC-Guayaquil ACC, Maiquetía ACC-Curazao ACC, Maiquetía ACC-San Juan ACC could be studied upon. In this respect, **Appendix A** to this working paper shows a revised list of future circuits to implement in the MEVA II / REDDIG interconnection.

2.3 In the event that some of the States involved in MEVA II / REDDIG interconnection have OLDI systems currently installed, same could be initially used for the exchange of ATS messages, until the implementation of AIDC.

2.4 With the aim that the States involved in MEVA II / REDDIG interconnection can start the process of interconnecting automated systems between adjacent ACCs, **Appendix B** shows a model MoU that could be used by States wishing to interconnect automated systems (radar, flight plans).

2.5 In addition, for the interconnection of the AMHS systems identified in Appendix A, the States involved could agree on the interconnection by using the model MoU shown in **Appendix C** to this working paper.

2.6 In this regard and in view of the start-up of MEVA II / REDDIG interconnection, the States and International Organization that already have automated systems installed, should start with their interconnection.

2.7 In reference to the study to draft a network configuration permitting to optimize the use of the equipment and band width for the implementation of future circuits, the SAM Region has started with the study for a regional IP network that, together with REDDIG, would define the regional ATN. This study is scheduled to be completed by the end of 2010. For the optimization of the band width use, the SAM Region has carried out preliminary tests to determine the minimum bandwidth required for the transmission of AMHS messages between two MTAs. It is expected that these trials will be completed by the end of June 2010.

3. **Action suggested**

3.1 The Meeting is invited to:

a) Take note of the information presented;

b) Analyze the service requirements indicated in Section 2, paragraphs 2.1 to 2.3, and Appendix A to this working paper;

c) Analyze the model MoU for the interconnection of automated systems and AMHS systems shown in Appendices B and C to this working paper, with the aim that same can be used when implementing the interconnection of automated systems and AMHS through the MEVA II / REDDIG interconnection; and

d) Analyze any other considerations in this respect that the Meeting might consider necessary

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APPENDIX

FUTURE INITIAL FRAME RELAY CIRCUIT REQUIREMENTS AT MEVA II AND REDDIG NETWORKS

SITE	FRAME RELAY CIRCUIT	AMOUNT
Caracas - Curacao	AMHS duplex data channel (band width TBD)	1
	9.6 Kbps-16 Kbps duplex radar data channel	1
	AIDC data channel (band width TBD)	1
Caracas - Aruba	9.6 Kbps-16 Kbps duplex radar data channel	1
Caracas - Puerto Rico	AMHS duplex data channel (band width TBD)	1
	AIDC data channel (band width TBD)	
Bogota - Panama	AMHS duplex data channel (band width TBD)	1
	9.6 Kbps-16 Kbps duplex radar data channel	
	AIDC data channel (band width TBD)	1
Bogota - COCESNA	9.6 Kbps-16 Kbps duplex radar data channel	2
	AIDC duplex data channel (band width TBD)	1
Bogota - Miami	AIDC duplex data channel (band width TBD)	2*
Barranquilla - Curacao	9.6 Kbps-16 Kbps duplex radar data channel	1
	AIDC data channel (band width TBD)	1
Barranquilla - Aruba	9.6 Kbps-16 Kbps duplex radar data channel	1
	AIDC data channel (band width TBD)	1

* Both circuits correspond to the AMHS circuits:
Lima (Peru) - Atlanta (USA)
Brasilia (Brazil) - Atlanta (USA)

APPENDIX B

MEMORANDUM OF UNDERSTANDING FOR THE INTERCONNECTION OF THE AUTOMATED SYSTEMS OF AAA AND BBB

AAA Logo	***MEMORANDUM OF UNDERSTANDING FOR THE INTERCONNECTION OF THE AUTOMATED SYSTEMS OF AAA AND BBB***	BBB Logo
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Preface

This document defines the Memorandum of Understanding that will allow AAA and BBB to interconnect their air traffic control automation systems. It is based on the documents prepared by ICAO experts on automation.

The two States can revise this document as necessary.

Approval

MEMORANDUM OF UNDERSTANDING FOR THE INTERCONNECTION OF THE AUTOMATED SYSTEMS OF AAA AND BBB

For AAA **For BBB**

Revisions

Revision / Date	Description	Revised pages
Rev. 0		

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1. Section 1 - Introduction and Purpose

1.1. Introduction

GREPECAS/15, taking into account the impact that operational errors of the ATC loop between adjacent ACCs have on the safety of air operations, considered, in Conclusion 15/36, that "CAR/SAM States, Territories, and International Organisations should gradually implement the interface for ATC interfacility data communication (AIDC);" and that "ICAO should coordinate, provide assistance for, and do the follow-up on, the implementation of such corrective measures."

The analysis of the problem led to the conclusion that the solution involved an intense use of CNS/ATM technologies, in keeping with ICAO recommendations, especially those concerning the interconnection of automated systems, as described in Document 4444-PANS/ATM, in Section 8.1.6: "*States should, on the basis of regional air navigation agreements, provide for the automated exchange of coordination data relevant to aircraft being provided with ATS surveillance services, and establish automated coordination procedures*".

In this regard, studies were conducted under Projects RLA/98/003 and RLA /06/901 with a view to having an overview of this issue, including obstacles and required action, as well as of the implementation strategy.

The resulting documents are described in Annexes 1, 2 and 3 to the Appendix to this Memorandum.

The main body of this document consists of ten (10) sections and one (1) appendix. The contents of the sections and appendix are summarised below:

a) Section 1 - Presents a brief overview and a statement of purpose;
b) Section 2 – Describes the basic principles guiding the development of this document;
c) Section 3 – Considers the cases in which this Memorandum applies;
d) Section 4 – Describes the version control process;
e) Section 5 – Lists the relevant legislation;

f) Section 6 – Establishes criteria and restrictions for the use of the information shared by two countries;

g) Section 7 – Presents the operational aspects that must be considered for the interconnection of the automated systems;

h) Section 8 - Presents the technical aspects that must be taken into account for the interconnection of the automated systems;

i) Section 9 - Presents the administrative aspects that must be taken into account for the interconnection of the automated systems;

j) Section 10 - Presents the financial aspects that must be taken into account for the interconnection of the automated systems;

k) Appendix 1 – Technical-Operational Agreement

1.2. Purpose

The goal of this MoU is to provide the planning for the interconnection of the automated systems of the XXXXX ACC in AAA, and the YYYY ACC in BBB, establishing standard procedures covering the respective operational, technical, administrative, and financial aspects.

2. Section 2 - Principles

The following aspects have been taken into account when preparing this document:

1. This Memorandum is a guide for States to enter into bilateral agreements; and

2. This document takes into account the aspects contained in the automated system interconnection documents prepared by Projects RLA/98/003 and RLA 06/901, as well as GREPECAS recommendations.

3. Section 3 - Application

This document applies only to the interconnection of the automated systems of AAA and BBB.

4. Section – Organisation

This is a document through which the participating States will agree, as necessary, to revise or modify its details.

The revision to this Memorandum, or changes to its paragraphs will be coordinated by the participating States.

5. Section 5 - References

This Memorandum follows ICAO recommendations contained in the following documents:

a) Annex 11 to the Convention on International Civil Aviation

b) Doc 4444

c) Doc 7030

d) Doc 9426

e) Doc 9694

f) Doc 9880 part IIa (AIDC)

g) RLA/98/003 project document

h) RLA/06/901 project document

i) Final reports of the SAM/IG/1 and SAM/IG/2 meetings

6. Section 6 - Confidentiality

Each participating State must take all the necessary measures to ensure the safety, integrity, and confidentiality of the information.

Disclosure of these data to organisations other than those contemplated in this Memorandum may proceed only if previously authorised by the participating States.

7. Section 7 - Operational Aspects

The implementation of this Memorandum may require adjustments to the Operational Agreements that exist between the States.

The Administrations undertake to instruct the staff of the ACCs involved, on the appropriate sections of this MoU.

Priority will be given to automatic hand-off, through the transmission of the required data between automated systems, according to the specifications contained in the Appendix to this MoU.

However, other means of communication can be used for the transfer when automatic hand-off is not possible.

8. Section 8 - Technical Aspects

The technical aspects to be taken into account by States for the establishment of the interconnection scenarios, the implementation strategy, the implementation of the solution, the supervision of the operation, and the personnel training aspects that will best meet their requirements are shown in Section 6 of the Appendix to this Memorandum.

9. Section 9 - Administrative Aspects

For the orderly implementation of the interconnection solution adopted, the participating States agree to the creation of an administrative structure based on an Interconnection Management Committee, whose functions, detailed composition, and activities are described in Section 7 of the Appendix to this Memorandum.

The States must designate their representatives, members of their respective groups, to make up the basic structure of the aforementioned Committee.

The States must select a forum for discussing cases of non-compliance and for resolving conflicts.

This is an ongoing Memorandum that can be interrupted at any time by common agreement of the parties involved.

10. Section 10 - Financial Aspects

The participating States, as individual administrations, will be responsible for any financial obligation to cover direct or indirect expenditures related to the implementation of this Memorandum, including those associated with the acquisition of equipment, spare parts, training of technical and operational personnel, lines of communication, and others.

Each State will be responsible for its respective portion of expenditures concerning upgrades to the REDDIG to address traffic increases, according to the guidance provided by the REDDIG Administration.

The parties to this Memorandum understand that they will not commit to any action that could result in a financial obligation for the other parties, without first obtaining the written consent by all the other parties involved.

The States can establish financial mechanisms to carry out the interconnection, for example, through ICAO Technical Cooperation Projects.

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APPENDIX TO THE MEMORANDUM OF UNDERSTANDING

TECHNICAL-OPERATIONAL AGREEMENT FOR THE INTERCONNECTION OF THE AUTOMATED SYSTEMS OF AAA AND BBB

TABLE OF CONTENTS

11. Purpose

To provide a detailed description of the technical, operational, and administrative aspects of the Memorandum of Understanding required for the interconnection of the automated systems of AAA and BBB.

12. Summary

ICAO Projects RLA/98/003 and RLA/06/901 identified resources for the conduction of studies, in order to have a full vision of the interconnection of automated systems, including obstacles, required action, and implementation strategy.

The work carried out included:

- Drafting of the Initial Action Plan – July 2006;
- Concept Test – BBB Trial -Venezuela – September 2006;
- Data collection – Phase 1 – survey of countries – current interfaces;
- Data collection – Phase 2 – missions to the States – details of the interfaces – 2007
  - ✓ 1st mission: Peru, Ecuador, and Venezuela – September 2007;
  - ✓ 2nd mission: Colombia, Panama, and COCESNA – October 2007;
  - ✓ 3rd mission: Chile, AAA, and Uruguay - November 2007
- Drafting of the Interconnection Plan – February 2008;
- Drafting of the SICD document (System Interface Control Document) – March 2008;
- Drafting of the SSS document (System Subsystem Specification) – September 2008

The generated products cover, in summary, the following aspects:

1. SICD: contains all the data collected from the SAM States that have automated systems, as well as a description of their interfaces, providing an overview of the current situation and recommendations for the adoption of the necessary measures for their interconnection.

2. Interconnection plan: contains the objectives, concepts, strategies, and the action required to meet the operational requirements for the hand-off between adjacent ACCs in the SAM Region.

3. SSS: contains the requirements--especially those that are mandatory--for ACC automation systems, to be used as a reference for future implementations of new air traffic control automated systems and their upgrades, as necessary.

The SICD, the Interconnection Plan, and the SSS documents were submitted for analysis and approval at the following events:

- Interconnection Plan and SICD:
  - ✓ Project RLA 06/901 - First meeting of the SAM Implementation Group (SAM/IG/1),
  - ✓ Sixth meeting of the GREPECAS ATM/CNS Subgroup; and
  - ✓ Seminar/Workshop on ATM Automation – Rio – BBB;
- SSS:
  - ✓ Project RLA/06/901 - Second meeting of the SAM Implementation Group (SAM/IG/2)

13. Reference

This Agreement follows ICAO recommendations contained in the following documents:

a) Annex 11 to the Convention on International Civil Aviation
b) Doc 4444
c) Doc 7030
d) Doc 9426
e) Doc 9694
f) Doc 9880 part IIa (AIDC)
g) RLA/98/003 project document
h) RLA/06/901 project document
i) Final reports of the SAM/IG/1 and SAM/IG/2 meetings

14. Security

Each State must ensure that its communication networks involved in the interconnection have the protection required for this type of service, taking into account, at least, the following aspects:

- Protection from invasion by unauthorised individuals and/or systems;
- Protection from the attack of computer viruses; and
- Use of the equipment exclusively for the interconnection of the automated systems.

15. Operational Aspects

The Administrations undertake, within their respective jurisdiction, to directly inform the staff of the ACCs involved about the contents of this Memorandum of Understanding.

Priority will be given to automatic hand-off and the provision of radar control service through the transmission of the required data between the automated systems, as specified in this Agreement.

However, other means of communication can be used for the transfer when automatic hand-off is not possible.

Likewise, through the respective operational agreements, the provision of non-radar control services should be coordinated for hand-off between adjacent ACCs when the signals of the radars involved in this Agreement are not available.

The interconnection option chosen implies that the States will have to establish specific operational procedures, taking into account the functionalities available in each automated system, selecting the message set to be used, but complying with the specifications and requirements contained in the documents associated to the solution adopted.

The States agree to jointly define the transition area for the exchange of surveillance data between adjacent ACCs, considering a distance of 55 NM from the boundary of the FIRs involved, for both States.

Special attention must be given to the training of controllers in the use of the tools available in the automated systems concerning automatic hand-off between adjacent FIRs.

16. Technical Aspects

The interconnection must meet the following requirements:

- It should allow for the automatic transfer of flight plans between adjacent ACCs;
- It should allow for surveillance data sharing in areas of common interest.

The main aspects are:

1) Analysis of the current scenario

According to the information contained in the reference documents, the current status in BBB and AAA is as follows:

1) AAA

a) Automated System

The XXXXXX ACC uses an extension of the XXXX system, installed in XXX, which has the functionality required for the provision of radar surveillance services throughout the XXX FIR, and for the automated processing of flight plans, as described in the SICD.

The XXXX system has automatic flight plan “hand-off” capability, using the messages of ICAO Doc 4444, and can process OLDI and AIDC protocols. It is expected to have Asterix 62/63 capability by XXXX.

b) Radar Display

Radar coverage is currently available in the XXX FIR.

c) Data Network

The XXXXX ACC has access to the REDDIG for oral communication with adjacent ACCs.

Radars will transmit data through the Ethernet and the domestic network, using the Asterix protocol.

The AMHS system has been/will be installed at domestic level and has been operating since/will operate starting in 20xx.

2) BBB

a) Automated System

The XXXXXX ACC uses an extension of the XXXX system, installed in XXX, which has the functionalities required for the provision of radar surveillance services throughout the XXX FIR, and for automated processing of flight plans, as described in the SICD.

The XXXX system has the automatic flight plan hand-off capability, using the messages of ICAO Doc 4444, and can process the OLDI and AIDC protocols. It is expected to have Asterix 62/63 capability by XXXX.

b) Radar Display

Radar coverage is currently available in the XXX FIR.

c) Data Network

The XXXXX ACC has access to the REDDIG for oral communication with adjacent ACCs.

Radars will transmit data through the Ethernet and the domestic network, using the Asterix protocol.

The AMHS system has been/will be installed at domestic level and has been operating since/will operate starting in 20xx.

2) Selection of the exchange scenario

Based on the interconnection levels that exist in the XXXX ACC and XXXX ACC facilities, AAA and BBB agree to adopt the following interconnection possibilities in the short and medium term:

1) Short term: Automatic exchange of surveillance data only;

2) Medium term: Automatic exchange of surveillance data and flight plan data.

The States agree to adopt flight plan transfer based on the ICAO OLDI/AIDC, as foreseen in Section 5 (Concepts for Automated ATC Systems Interconnection) of Annex 2 to this Appendix.

The States also agree to adopt the exchange of surveillance data based on the Asterix protocol, according to Section 5 (Concepts for Automated ATC Systems Interconnection) of Annex 2 to this Appendix.

3) Implementation Strategy

The interconnection will be carried out in (two) phases:

- Short term: Exchange of radar data using the Asterix protocol, around XXX; and
- Medium term: Automatic flight plan hand-off using the AIDC protocol, and exchange of radar data using the Asterix protocol, around XXXX.

The implementation strategy adopted by the 2 (two) States must take into account the following aspects:

1.1. Analysis of the impact on existing systems;

1.2. Definition of interfaces and means of communication;

1.3. Configuration of logical and physical connections;

1.4. Hardware and software adjustments; and

1.5. Interconnection tests

These aspects will be analysed by the technicians of the Interconnection Management Committee, as established in this Memorandum, and will be described in the corresponding document.

For the short-term phase, the following radars will be used:

- XXXX secondary radar, as described in paragraph 6.1.1.b of this document; and
- Secondary radars of XXXX.

The radar data contained in the transition area described in Appendix “A” to this document will be transmitted.

The States undertake to provide the necessary technical details for the transmission and reception of the radar signals in each automated system.

Communication between the States will be through the REDDIG.

The medium-term phase will be established by XXX, once the States have the operational capability of using AIDC for automatic hand-off of flight plans.

4) Implementation

The Interconnection Management Committee will carry out the implementation, based on the guidelines issued by common agreement by the States, defining implementation dates, the outsourcing of services, and the distribution of responsibilities, among other relevant matters.

5) Supervision of the Operation

Each State must supervise the operation of its systems, including the maintenance of its equipment and systems, ensuring the required availability, performance, safety, and efficiency.

All the problems of uncertain origin will be jointly analysed by the States through the Interconnection Management Committee, which will coordinate the actions required for their resolution.

However, each State must take all possible steps to implement the actions for which it is responsible, reporting their implementation to the Interconnection Management Committee.

In all cases, the Interconnection Management Committee must be informed at all times about anomalies, regardless of their origin.

6) Training

The participating States must draft training plans for the technical teams responsible for system maintenance, taking into account length, frequency, and technological evolution.

7) Maintenance

Teams must be prepared to face contingencies and be technically capable of analysing anomalies.

Each State must draft its Action Plan that defines the technical information required for the interconnection with adjacent ACCs, covering, at least, the following:

- the topology of the networks involved, with the technical details about the required bandwidth, availability, latency, and redundancy;
- the specification of the equipment used;
- the maintenance requirements;
- the maintenance procedures--preventive, predictive, and corrective---; and
- all of the related technical documents;

The States agree that the means of communication for the implementation of the interconnection will be the REDDIG.

17. Administrative Aspects

This Agreement is a dynamic document that can be revised at any moment, based on the technological evolution of the automated systems and of the communication networks of the participating States.

The Interconnection Management Committee created by the two (2) States will manage the interconnection, based the following:

1. Organisational Structure

In order to carry out its activities, the Committee will be organised as follows:

1.Coordinator

The names of the coordinators of the interconnection between the systems of AAA and BBB are shown in Annex A.

Coordinators will be responsible for the general coordination of all the activities of the technical and operational groups, as well as for the contacts with other organisations to address matters related to the interconnection.

2. Technical Group

Made up by technicians designated by the two States, with proven skills in their respective areas, especially in communication networks and computer automation systems.

It will be responsible for the implementation and/or coordination, in their respective countries, of the technical activities required for the implementation, maintenance, and support of automated systems, communication networks, and interconnection equipment.

3. Operational Group

Made up by personnel specialised in air traffic control, designated by the two States, with proven skills in their respective areas, especially in the automated systems used in the ACCs.

2. Faculties

The Committee is responsible for coordinating the planning, implementation, maintenance, and support of the operation of the systems and equipment involved in the interconnection of the automated systems.

It must guarantee the safety of the information exchanged between the automated systems involved in the interconnection.

Its faculties include the control and updating of all the technical and operational documentation.

It is also responsible for proposing the network topology to be used in the interconnection, which shall be approved by the two (2) States.

The implementation of the interconnection shall be coordinated and controlled by the Committee, based on action plans previously approved by the two (2) States.

The Committee must advise the States about the need for the technological evolution of the equipment and systems involved in the interconnection, taking into account, *inter alia*, the technical requirements contained in Annex 3 – SSS, to this Appendix.

Its teams must monitor the performance, stability, reliability, and integrity parameters of the equipment and systems involved in the interconnection, and propose and supervise the corrective action. To this end, it must use tools for analysing anomalies, such as radar protocol and communication line analysers.

The Committee shall establish the necessary procedures for correcting failures.

It shall also provide, together with the participating States, for the resolution of the problems encountered.

3. Management Process

In order to carry out its activities, the Interconnection Management Committee will apply the following system:

1. Periodical meetings and discussions to identify requirements and preferred technical solution(s), alternatives, and options for the interconnection of the automated systems;
2. The exchange of technical reports and documents, plans and programmes to ensure the successful and timely culmination of these efforts.
3. Joint planning, technical coordination, and development of activities between the two (2) States.

18. Financial Aspects

With respect to financial aspects, the States agree to the following:

1. Acquisition of equipment, components and systems

The equipment required for the interconnection will be acquired by each State, in keeping with the technical specifications approved by the Interconnection Management Committee;

2. Acquisition of spare parts

Spare parts for the equipment used in the interconnection will be acquired by each State, according to its specific needs, but in keeping with the maintenance guidelines issued by the Interconnection Management Committee.

3. Acquisition of services from third parties

Each State agrees to cover the expenditures involved in the hiring of third-party services, such as software adaptations, projects, and implementation of communication networks.

Each State will be responsible for its respective portion of any expenditure concerning upgrades to the REDDIG to support traffic growth, according to the guidelines of the REDDIG Administration.

19. Attachments

1. Preliminary System Interface Control Document for the Interconnection of ACC Centres of the CAR/SAM Regions – SICD;

2. CAR/SAM Automated ACC Interconnection Plan;

3. Preliminary Reference System/Subsystem Specification SSS for the Air Traffic Control Automation System.

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ANNEX A

AUTOMATED SYSTEM INTERCONNECTION MANAGEMENT COMMITTEE

AAA

BBB

ANNEX B

RADAR DATA TRANSITION AREA BETWEEN THE XXX AND THE YYY ACCs

APPENDIX C

MEMORANDUM OF UNDERSTANDING FOR THE INTERCONNECTION OF AMHS SYSTEMS

Preface

This document defines the Memorandum of Understanding for the bilateral interconnection of AMHS systems between the States of the Region. The two States may revise this document when so required.

Approval
Memorandum of Understanding for the Interconnection of AMHS Systems

By **State A** By **State B**

Revisions

Revision / Date	Description	Pages changed
0 – 17/09/09		

TABLE OF CONTENTS

1. Section 1 - Introduction and Purpose

1.1. Introduction

The plans for the implementation of ATN ground-ground applications and the regional ATN router plans are defined in FASID Tables CNS 1Bb and CNS 1Ba, respectively, as formulated in conclusions 13/74 - *Proposed amendment to the Regional ATN Plan* and 13/75 - *Request for information on plans to implement ATN ground-air applications.*

Document: The body of this document contains ten (10) sections and one (1) appendix. The contents of the sections and the appendix are summarised below:

a) Section 1 - Presents a brief overview and a statement of purpose;

b) Section 2 – Describes the basic principles for drafting this document;

c) Section 3 – Considers the cases in which this Memorandum applies;

d) Section 4 – Describes the version control process;

e) Section 5 – Lists the references considered;

f) Section 6 – Establishes criteria and restrictions for the use of the information shared by two countries;

g) Section 7 – Presents the operational aspects that must be considered for the interconnection of automated systems;

h) Section 8 - Presents the technical aspects that must be considered for the interconnection of automated systems;

i) Section 9 - Presents the administrative aspects that must be considered for the interconnection of automated systems;

j) Section 10 - Presents the financial aspects that must be considered for the interconnection of automated systems;

k) Section 11 – Technical-operational agreement for the interconnection of AMHS systems.

1.2. Purpose

The goal of this MoU is to provide the planning for the interconnection of AMHS systems, establishing standard procedures that take into account the operational, technical, administrative, and financial aspects involved.

2. Section 2 - Principles

In preparing this document, the following aspects have been considered:

1. This Memorandum is a guide for States to enter into bilateral agreements; and

2. This document takes into account the aspects contained in documents dealing with AMHS interconnection, ICAO SARPs and documents, documents prepared by project RLA 06/901, and in GREPECAS recommendations.

3. Section 3 - Scope

This document only applies to the interconnection of AMHS systems between States A and B.

4. Section – Organisation

This is a document by virtue of which the participating States will agree to revise or modify its details as necessary.

The participating States will coordinate the revisions to this Memorandum, or changes to its paragraphs.

5. Section 5 - References

This Memorandum follows the ICAO recommendations contained in the following documents:

- Report of the SAM IG/2 meeting, Lima, Peru, 3-7 November 2008;
- Report of the SAM IG/3 meeting, Lima, Peru, 20-24 April 2009;
- Report of the sixth meeting of the CNS Committee of the ATM/CNS Subgroup (CNS/COMM/6), Santo Domingo, Dominican Republic, 30 June - 4 July 2008;
- Report of the GREPECAS 15 meeting (Rio de Janeiro, Brazil, 13 to 17 October 2008);
- Fifth meeting of the ATN Task Force of the CNS Committee of the ATM/CNS Subgroup (ATN/TF/5), Mexico City, Mexico, 12-13 June 2009; and
- SAM COM/MET/09 meeting, Lima, Peru, 10–12 August 2009.

6. Section 6 - Confidentiality

Each participating State must implement all the measures necessary to ensure the safety, integrity, and confidentiality of the information.

The dissemination of these data to other organisations not considered in this Memorandum can be done only if previously authorised by the participating States.

7. Section 7 - Operational Aspects

The application of this Memorandum may require adjustments to the operational agreements that exist between the participating States.

The Administrations undertake to provide training on the appropriate parts of this MOU to their personnel working in the systems involved.

8. Section 8 - Technical Aspects

The technical considerations for the establishment, by the States, of the interconnection scenarios, the implementation strategy, the implementation of the solution, the monitoring of the operation, and personnel training aspects that will best meet their needs are presented in Section 6 of the Appendix to this Memorandum.

9. Section 9 - Administrative Aspects

For the orderly implementation of the selected interconnection solution, the participating States agree to the creation of an administrative structure based on an Interconnection Management Committee, whose powers, composition, and activities are described in Section 7 of the Appendix to this Memorandum.

The States must designate representatives, members of their respective groups, to be part of the basic structure of the aforementioned Committee.

The States must choose a forum for discussing cases of non-compliance and for the resolution of possible conflicts.

This Memorandum is of a continuous nature, and may be interrupted at any time, by agreement of the parties involved.

10. Section 10 - Financial Aspects

The participating States, as individual administrations, will be responsible for any financial obligation to cover direct or indirect expenditures related to the implementation of this Memorandum, including those related to the procurement of equipment, spare parts, training of technical and operational personnel, lines of communications, and others.

Each State will be responsible for its respective portion of any expenses related to REDDIG upgrades to address increased traffic, in keeping with guidance provided by the REDDIG Administration.

The parties to this Memorandum understand that they shall not commit to any action that may result in a financial obligation for other parties without previously obtaining the written consent by all the other parties involved.

The States may establish financial mechanisms to carry out the interconnection, for example, through ICAO Technical Cooperation Projects.

11. Section 11 – Technical-Operational Agreement for the Interconnection of AMHS Systems

APPENDIX A

MEMORANDUM OF UNDERSTANDING

TECHNICAL-OPERATIONAL AGREEMENT FOR THE INTERCONNECTION OF AMHS SYSTEMS

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	MEMORANDUM OF UNDERSTANDING FOR THE INTERCONNECTION OF AMHS SYSTEMS		
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1. Purpose

To provide a detailed description of the technical, operational, and administrative aspects of the Memorandum of Understanding that are needed for the interconnection of AMHS systems between States A and B.

2. Summary

- The plans for the implementation of the ATN ground-ground application and the plans for regional ATN routers, as defined in FASID Tables CNS 1Bb and CNS 1Ba, respectively, were formulated through conclusions 13/74 - *Proposed amendment to the Regional ATN Plan* and 13/75 - *Request of information on plans for the implementation of ATN ground-air applications* and reviewed at the sixth meeting of the CNS Committee of the GREPECAS ATM/CNS Subgroup (ATM/CNS/SG/6). Tables CNS1Ba and CNS1Bb were reviewed at the ATN/TF/5 meeting, held in Mexico, on 12-13 June 2009.

- The regional AMHS addressing plan that the States should apply when implementing AMHS systems in the SAM Region was presented at the GREPECAS 15 meeting (Appendix M to agenda item 3) and reviewed by the COM/MET/09 meeting held in Lima, Peru, on 10-12 August 2009.

- The States that have implemented or are planning to implement AMHS systems should register before the ATS message transmission management centre (AMC), according to ICAO State letter AN 7/49.1-09/34 of 14 April 2009 on management and updating of information on addresses of the air traffic service (ATS) message handling system (AMHS), and the procedure for registering a State representative as user of the AMC.

- The ATN/TF/5 meeting reviewed the IPv4 addressing scheme and, in this respect, considered that, at the national level, the States, when implementing AMHS systems based on IP, could adopt the Ipv4 addressing scheme. The meeting also considered that, for intra-regional links between AMHS systems, the Ipv4 addressing scheme shall be used, and, accordingly, formulated conclusion 5/1 - *Proposed Ipv4 addressing scheme for ATN ground-ground applications at the intra-regional level*.
- For the interconnection of the AMHS systems installed in the Region, consideration has been given to conducting trials between MTAs to check the interoperability of AMHS systems, and a study of the bandwidth required for their interconnection.

3. Reference

This Agreement follows the recommendations contained in the following documents:

- Report of the SAM IG/2 meeting, Lima, Peru, 3-7 November 2008;
- Report of the SAM IG/3 meeting, Lima, Peru, 20-24 April 2009;
- Report of the sixth meeting of the CNS Committee of the ATM/CNS Subgroup (CNS/COMM/6), Santo Domingo, Dominican Republic, 30 June - 4 July 2008;
- Report of the GREPECAS 15 meeting (Río de Janeiro, Brazil, 13-17 October 2008).
- Fifth meeting of the ATN Task Force of the CNS Committee of the ATM/CNS Subgroup (ATN/TF/5), Mexico City, Mexico, 12-13 June 2009; and
- SAM COM/MET/09 meeting, Lima, Peru, 10–12 August 2009.

4. Safety

Each State must ensure that its communication networks involved in the interconnection have the required protection for this type of service, taking into account, at least, the following aspects:

- Protection against intrusion by unauthorised people and/or systems;
- Protection against attacks from computer viruses; and
- Use of the equipment exclusively for the interconnection of automated systems.

5. Operational Aspects

The Administrations undertake, within their respective jurisdiction, to provide direct training on the contents of this Memorandum of Understanding to the personnel working in the systems involved.

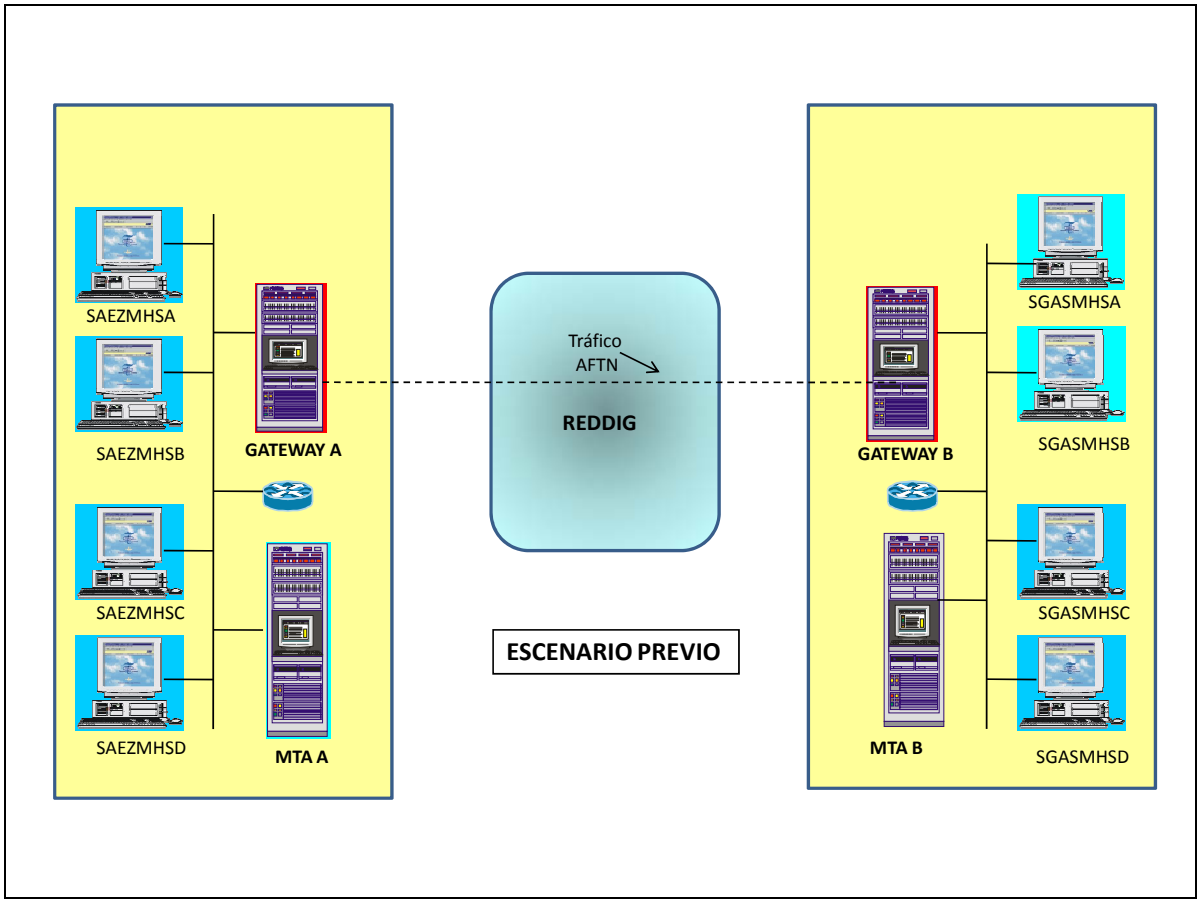
The selected interconnection option entails that States will have to establish specific operational procedures, taking into account the functionality available in each automated system.

6. Technical Aspects

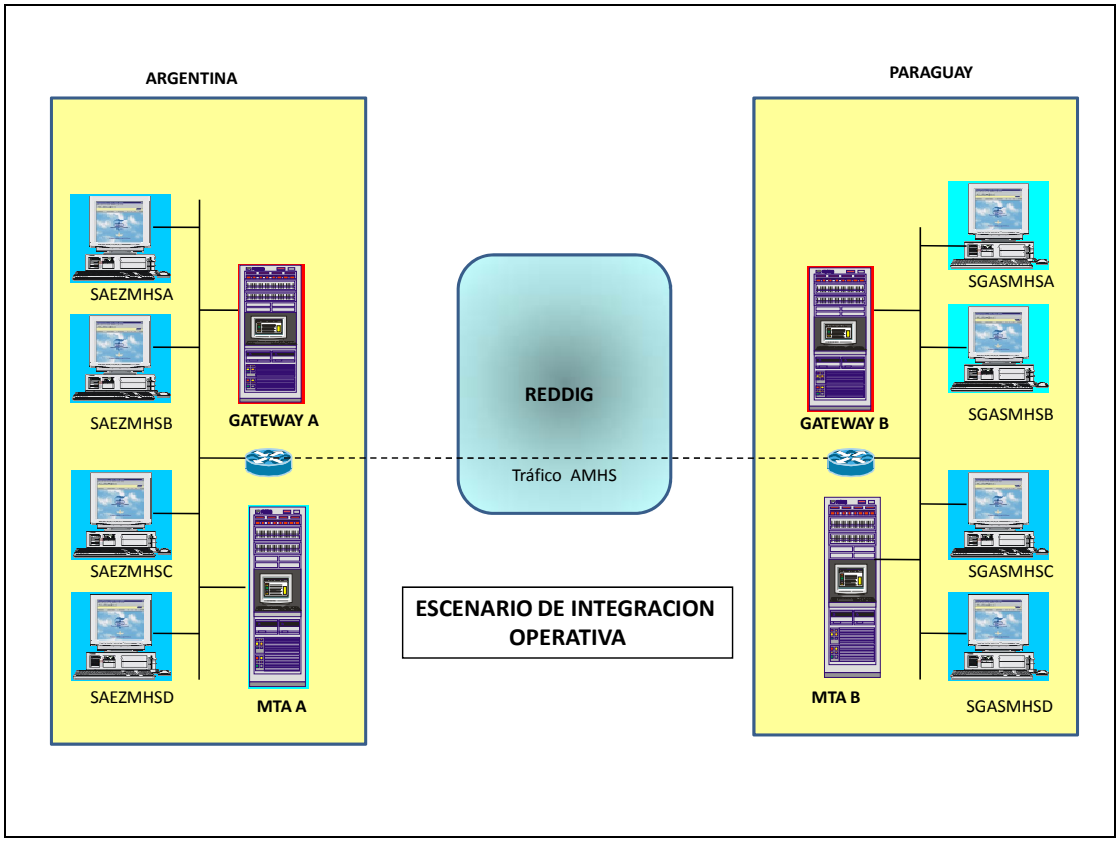
The interconnection must permit the automatic transfer of messaging plans between the two States, using the respective MTAs;

The main aspects are:

1) Analysis of the current scenario: Currently, both States have completed the deployment of their AMHS systems at the national level, but the operating mode between the two is still AFTN, that is, using the gateway, as shown in the following graphical example:



2) Selection of the exchange scenario: the functional scenario can only be as follows, in which the exchange of traffic between States is already being carried out through the interconnection of the respective MTAs, leaving the gateway operational for the exchange of messages with those States that have not migrated to the AMHS:



3) Implementation Strategy:

In order to achieve the desired objective, the following action must be taken, indicating, in each case, whether such action has already taken or the tentative date for its implementation:

- Data transportation network: Intra-regional IP ATN
- Means: REDDIG
- Channel: DLCI
- ATN boundary elements: routers provided by each State
- IP addressing of router link ports: to be configured according to the Regional IP Addressing Plan, Link Ports
- Serial interfaces: V.35

- Tests:
  - *Network transport*: by REDDIG administrator
  - *Network connectivity*: by *State A* and *State B*
  - *Message exchange*:
  - *Exchange of technicians between States*:
  - *Preparatory phase*:
- *Operational status*:

4) Implementation:

- The Interconnection Management Committee will be in charge of implementation management, and will be made up by personnel listed in Attachment A.
- This Interconnection Committee will perform its functions until three (3) months after the beginning of the Operational Phase; thereon, the integrated operation will be entrusted to the respective Communication Stations.

5) Operation Monitoring

Each State must be responsible for monitoring the operation of its systems, including the maintenance of its equipment and systems, ensuring the required availability, performance, safety, and efficiency.

All problems of uncertain origin must be analysed jointly by the States through the Interconnection Management Committee, which will coordinate the actions required for their resolution.

However, each State must do its best to carry out the actions under its responsibility, informing the Interconnection Management Committee about their implementation.

In any case, the Interconnection Management Committee must be constantly informed about the occurrence of anomalies, regardless of their origin.

6) Training

The participating States must develop training plans for the technical teams responsible for system maintenance, taking into account extent, periodicity, and technical evolution.

7) Maintenance

Teams must be prepared for contingencies and be technically capable of analysing anomalies.

Each State shall develop its own Action Plan, which will define the technical information required for the interconnection with adjacent ACCs, and will contain, at least:

1. The topology of the networks involved, with technical details about the bandwidth, availability, latency, and redundancy required;
2. The specifications of the equipment used;
3. Maintenance requirements;
4. Maintenance procedures: preventive, predictive, and corrective; and
5. All related technical documents;
7. The States agree that the means of communication for the implementation of the interconnection will be the REDDIG.

7. Administrative Aspects

This Agreement is a dynamic document that can be revised at any time, in keeping with the technological evolution of the systems and communication networks of the participating States.

Interconnection management will be entirely the responsibility of the Interconnection Management Committee established by the two (2) States, in accordance with the following:

1. Organisational Structure

In order to carry out its activities, the Committee will be organised as follows:

1. Coordinator

The coordinators for AMHS interconnection between States A and B are listed in **Annex A.**

Coordinators will be responsible for general coordination of all the activities of the technical and operational groups, and for maintaining contact with other organisations to address interconnection issues.

2. Technical Group

It must include technicians designated by the two States, with training in their respective fields, especially in communication networks and computer automation systems.

They will be responsible, in their respective country, for the implementation and/or coordination of the technical activities required for the implementation, maintenance, and support of automated systems, communication networks, and interconnection equipment.

3. Operational Group

It must include experts in the operation of electronic messaging systems.

2. Functions

The Committee is responsible for all the coordination required for the planning, implementation, maintenance, and operational support of the systems and equipment involved in the interconnection of AMHS systems.

It must also ensure the continued safety of the information to be transmitted between the automated systems involved in the interconnection.

Its functions include controlling and updating all technical and operational documentation.

It is also responsible for the network topology to be used for the interconnection, which must be approved by the two (2) States.

Interconnection implementation must be coordinated and controlled by the Committee, through action plans previously approved by the two (2) States.

The Committee must advise the States about the need for technological evolution of the equipment and systems involved in the interconnection.

Its teams must monitor the performance, stability, reliability, and integrity of the equipment and systems involved in the interconnection, and propose and monitor corrective action.

The Committee must establish the necessary procedures for correcting faults.

Also, together with the participating States, it must provide for the resolution of problems.

3. Management Process

In order to carry out its activities, the Interconnection Management Committee will apply the following management system:

1. Periodic meetings and discussions to identify requirements, preferred technical solutions, alternatives, and options for the interconnection of AMHS systems;
2. Exchange of technical reports and documentation, plans and schedules as required for a successful and timely culmination of these efforts.
3. Joint planning, technical coordination, and implementation of activities by the two (2) States.

8. Financial Aspects

Regarding financial aspects, the States agree to the following:

1. Acquisition of equipment, components, and systems;

The equipment necessary for the interconnection will be acquired by each State, according to the technical specifications approved by the Interconnection Management Committee;

2. Acquisition of spare parts

Spare parts for the equipment involved in the interconnection will be purchased by each State, according to its specific needs, but in keeping with the maintenance guidelines issued by the Interconnection Management Committee.

3. Acquisition of third-party services

Each State agrees to pay for incidental third-party services, such as software adjustments, projects, and implementation of communication networks.

Each State will be responsible for its share of the incidental cost of upgrades to the REDDIG to address traffic increases, in keeping with the guidance issued by the REDDIG Administration.

ANNEX A

AMHS SYSTEM INTERCONNECTION MANAGEMENT COMMITTEE

COORDINATORS OF THE MANAGEMENT GROUP

State A

Name:
Phone number:
Email:

State B

Name:
Phone number:
Email: